Pearson & MINISTRY OF EDUCATION AND TECHNICAL EDUCATION

est EGYPTIAN SCHOLASTIC TEST

EST I MATH

LEVEL UP

2025 EDITION

PRACTICE TESTS

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1.

People who own a smartphone worldwide

Year	Number of People (in billions)
2016	2.3
2017	2.6
2018	2.9
2019	3.2
2020	3.5

The table above shows the number of people who owned a smartphone from the year 2016 to the year 2020. The number of people N (in billions) is a linear function of the number of years y from the year 2016. Which of the following expressions best describes N in terms of y?

A. $N = 0.3y$
B. $N = 0.3y + 2016$
C. $N = 0.3y + 2.3$
D. $N = 3.3y + 2.3$

2. $9x^2 + 18x - 3 = 0$

What is the average (arithmetic mean) of the two solutions of the equation given above?

A. -1
B. $-\frac{1}{6}$
C. $\frac{1+\sqrt{2}}{2}$
D. $\sqrt{2}$

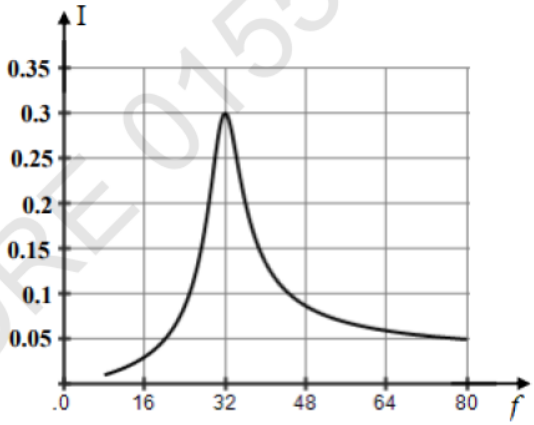
3. In the complex number system, which of the following is equal to $3i(1+i) - (1-i)^2$?
(Note: $i = \sqrt{-1}$)

A. $-3 + i$
B. $-3 + 5i$
C. $3 + i$
D. $3 + 5i$

4. If $p(x) = x^2 - 7x + 5$ and $q(x) = -3x^3 - 7x^2 + 2x - 5$, which of the following expressions is equal to the difference $p(x) - q(x)$?

A. $4x^3 - 9x + 10$
B. $-3x^3 - 6x^2 - 5x$
C. $-3x^3 - 8x^2 + 9x - 10$
D. $3x^3 + 8x^2 - 9x + 10$

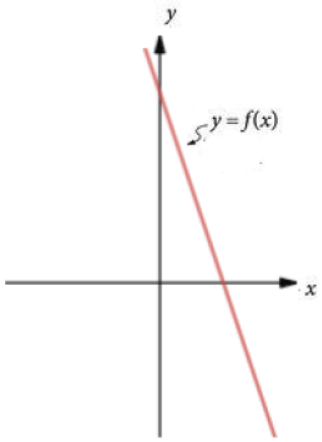
5.



In a certain electric circuit, the generator has an adjustable feature called the frequency. For different frequencies between 60 and 80 Hertz, one obtains different intensities of current flowing in the circuit measured in Amperes. The graph given above represents the variation of the effective value of the current as a function of the frequency. Which of the following values of the current can be attained by only one value of the frequency?

A. 0.04
B. 0.1
C. 0.23
D. 0.35

6.



The graph shown above is that of a linear function f whose expression is given by $f(x) = cx + d$, where c and d are constants. Which of the following must be true about c and d?

A. $c = d$
B. $c > d$
C. $c < d$
D. $c = 0$

7. Ryan wants to calculate the amount of time he spends on social media which, for him, includes only Instagram and Facebook. To do this he uses a formula T = aI + bF, where I is the number of hours he spends on Instagram every day, F is the number of hours he spends on Facebook every day, and T is the total number of hours he spends on social media every week. If he spends the same amount of time on Instagram every day and the same amount of time on Facebook every day, which of the following could be the value of $a + b$?

A. 7
B. 14
C. $\frac{1}{7}$
D. $\frac{1}{14}$

8.
$$3y = 12 - 3y$$
$$y + a = x - 1$$
$$y + a = x - 1$$

In the system of equations above, a is a constant and (x, y) is a solution, where $x = 3$. What is the value of a ?

A. -4
B. 0
C. 2
D. 4

9. If a is a solution of the equation $|2x - 4| = 5$, what is the distance between a and the point of coordinate 2 on the number line?

A. 0.5
B. 2.5
C. 4.5
D. 5

10. $ax - \frac{1}{2}y = c$

$2x + 4y = 5$

The system of equations above has infinitely many solutions. If a and c are constants, what is the value of c?

A. $-\frac{5}{8}$
B. $\frac{1}{4}$
C. $\frac{5}{4}$
D. $\frac{11}{4}$

11.

x	-3	-1	0	2	4	5	8
$f(x)$	2	1	4	7	-3	9	-5
$g(x)$	-7	8	-3	20	0	10	5

The table above shows some values of the two functions f and g. For what value of x is $g(f(x)) = x$?

A. -3
B. 0
C. 4
D. 8

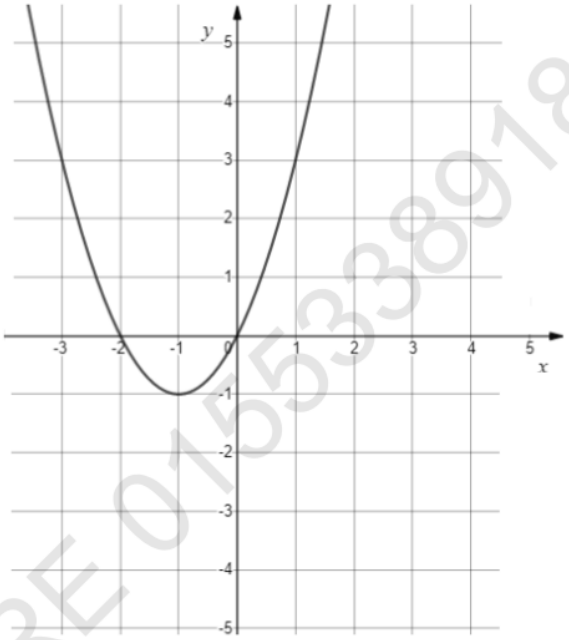
12. Black holes are massive objects in the universe. The Schwarzschild Radius of a black hole is the maximum distance at which an object can escape the gravitational pull of the black hole. It is given by $R = \frac{2GM}{c^2}$, R is the Schwarzschild Radius, G is called the gravitational constant, M is the mass of the black hole, and c is the speed of light in vacuum. What is c in terms of G, M, and R?

A. $c = \sqrt{\frac{R}{2GM}}$
B. $c = \sqrt{2GMR}$
C. $c = \sqrt{\frac{GMR}{2}}$
D. $c = \sqrt{\frac{2GM}{R}}$

13. As a treat for the holidays, the principal of a school got a bucket of 120 cookies for the teachers. Every hour, when the principal checked the bucket, 4 of the cookies seemed to be missing. Which of the following expressions models the number of cookies C eaten by the teachers after T hours?

A. C = 120 – 4T
B. C = 120 + 4T
C. C = – 4T
D. C = 4T

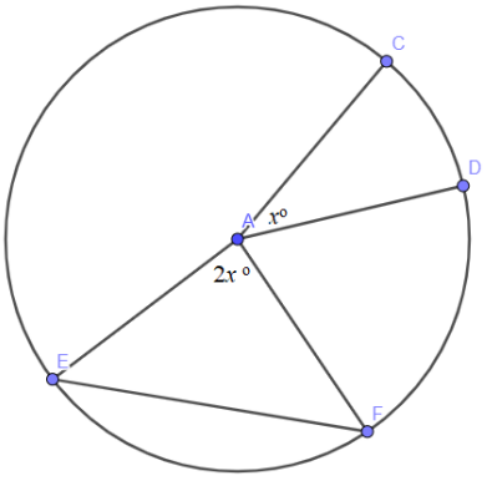
14.



The graph of the function f in the xy-plane above is a parabola. Which of the following expressions defines f while showing the x-intercepts as constants or coefficients?

A. $f(x) = x(x + 2)$
B. $f(x) = (x + 1)(x + 2)$
C. $f(x) = x^2(x + 2)$
D. $f(x) = (x + 2)^2 - 1$

15.



In the given figure, A is the center of the circle. C, D, E, and F are points on the circle. If segments AE and EF have the same length, what is the measure of angle $\angle CAD$?

A. 15°
B. 25°
C. 30°
D. 60°

SPR (Student Produced Responses)

16. $13x - 7y = 12$

$7x - 13y = 6$

Based on the system of equations above, what is the value of $4x + 4y$?

17. If $\sqrt{2^m} = 8$, what is the value of $\sqrt{3^m}$?

18. What is the solution of the equation $x + 2(x + 1) + 3(x + 1) = 3(x - 1) - x + 24$?

19. If $(ax^2 + b)(2x - 1) = cx + 1$ for all values of x, what is the value of $\frac{b}{c}$?

20. If x and y are positive measures of acute angles, and $\sin(x - 20^o) = \cos(y + 12^o)$, what is a possible value of $x + y$? (Disregard the degree sign when gridding in your answer).

Section II
Calculators are required
(60 minutes)

1. If $4t - 10 = 11a$, and a = -2, what is the value of $10t - 10$?

A. -40
B. -8
C. -3
D. 1

2. Vanessa's company has a bonus policy. At the end of each month, based on his or her performance, every employee gets effort points. At the end of each year, each employee gets paid a fixed bonus amount of 400$ and an additional bonus of 50$ for each effort point earned by the employee. At the end of the year 2019, Vanessa got a bonus of 1000$. How many effort points had she earned during the year 2019?

A. 2
B. 2.375
C. 12
D. 200

3. The straight line m has an equation $y = 3x$. The point A of coordinates (1,3) is on m. The line p is perpendicular to m at point A. Which of the following points is on p?

A. (3, 9)
B. $(5, \frac{5}{3})$
C. (3, 0)
D. (0, 0)

4. In a certain board game, a player can make only horizontal and vertical moves with his or her piece on condition that the total number of moves does not exceed 40 moves out of which at least 10 are horizontal. Every horizontal move costs 5 points and every vertical move costs 3 points, and a player Sarah has only 800 points left. If h is the number of horizontal moves that Sarah can make, and v is the number of vertical moves Sarah can make, which of the following systems of inequalities best represents the situation?

A. $h + v \geq 40$
$h \leq 10$
$5h + 3v \leq 800$

B. $h + v \leq 40$
$h \geq 10$
$\frac{h}{5} + \frac{v}{3} \leq 800$

C. $h + v \leq 40$
$h \geq 10$
$5h + 3v \leq 800$

D. $h + v \geq 40$
$h \geq 10$
$\frac{h}{5} + \frac{v}{3} \geq 800$

5. A company decides to let its employees work from home. The employer gathers the workers and wants to distribute the work documents among the workers so they can take them home. When he gives 2 documents to each employee, 20 are left over. Instead, he decides to take one himself and give 3 to each employee. This time 9 are left over. What is the number of documents?

A. 44
B. 11
C. 10
D. 40

6. If $2z - 7(z - 1) \leq 1$ and z is an integer, what is the least possible value of z?

A. -2
B. 0
C. 2
D. 4

7. Due to the large demand on hand sanitizers, a small shop owner decided to increase the price of hand sanitizer by a fixed amount every day. If the price P (in dollars) of the hand sanitizer can be modeled by the equation: P = 3.5 D + 6, where D is the number of days after the shop owner took the decision, which of the following is the best interpretation of the number 6 in the expression?

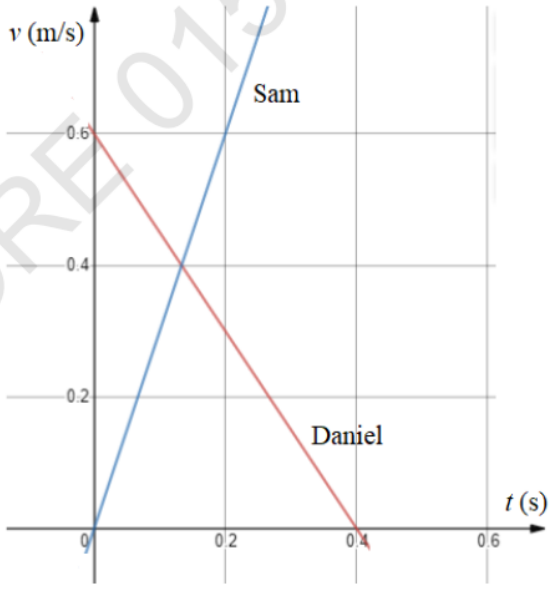
A. The increase in the price of the sanitizer per day.
B. The change in the price of sanitizer every day.
C. The price of the sanitizer after the shop owner stops increasing the price.
D. The price of the sanitizer before the large demand.

8. The graph d of a linear function f has a negative slope. Which of the following may be true about the graph n of a linear function g of slope 12?

I. n is perpendicular to d.
II. n is parallel to d.
III. n passes through the origin (0, 0)

A. Only I
B. Only II
C. I and III
D. II and III

9.



The given graph show the speeds v in meters per second (m/s) of Sam and Daniel, as they do their morning jogs, as a function of time t in seconds (s). The difference in the speeds of the two boys is how much less at t = 0.2s than it was initially?

A. 0 seconds
B. 0.3 seconds
C. 0.4 seconds
D. 0.6 seconds

10. If the average (arithmetic mean) of three numbers *a, b,* and *c* is 10, what is the average of *a* and *b* in terms of *c*?

A. $5 - 0.5c$
B. $15 - c$
C. $30 - 0.5c$
D. $15 - 0.5c$

11. The solution set of the equation $\sqrt{2x+1} - x = -1$ is:

A. $\{0, 1, 4\}$
B. $\{1, 4\}$
C. $\{4\}$
D. $\{0\}$

12. In a certain village, the number of people doubles every three months. If there were 120 people in the village in March, which of the following equations should be solved to find when the population reaches 1500 assuming no deaths occur? (*m* represents the number of months)

A. $120(2)^{\frac{m}{3}} = 1500$
B. $120(2)^{3m} = 1500$
C. $2(120)^{\frac{m}{3}} = 1500$
D. $1500(2)^{\frac{m}{3}} = 120$

13. John owns a drone that has a radio range of 55 meters, that is the owner can control it only if the drone is within 55 meters from him. As John launches the drone, the drone flies off a distance D, measured in meters, given by the expression $D = 4t^2 + 20t$, where t is the time in seconds after the drone is launched. Assuming John stays where he is, at least how many seconds after being launched, does the drone get out of range?

A. 0 seconds
B. 1 second
C. 2 seconds
D. 3 seconds

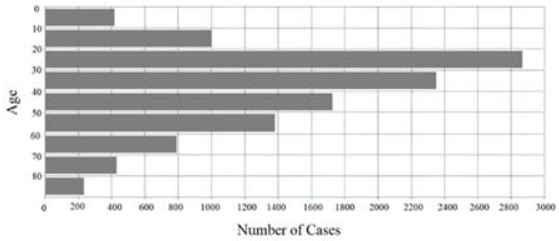
14. The graph of the function h in the *xy*-plane contains the point $(2, 5)$ and has a *y*-intercept of -7 . The function g is defined by $g(x) = 3 - 2h(x)$. Which of the following points lie on the graph of *g*?

A. (0, -7)
B. (2, 17)
C. (0, 17)
D. (-7, 3)

Questions 15 to 17 refer to the following information.

Number of Covid-19 cases according to age

The histogram shown summarizes the number of people who got infected by the Covid-19 virus according to their age in Lebanon. The survey was done over 11,200 people.



15. Based on the information shown in the graph, which of the following is the most likely median age of those infected by the virus?

A. 23
B. 31
C. 56
D. 68

16. Which of the following is closest to the ratio of the number of infected people below the age of 10 to those above the age of 80?

A. $\frac{10}{80}$
B. $\frac{215}{410}$
C. $\frac{410}{215}$
D. $\frac{80}{10}$

17. If 15% of the tests performed in each age group to identify the people who were infected gave wrong results, which of the following gives the closest estimate to the number cases in the age range 20 to 30 who are actually healthy (rounded to the nearest whole number)?

A. 431
A. 1680
B. 2440
C. 9520

18.

46	55	60	65	71	71	76	80	86
88	89	90	92	95	98	100	100	100

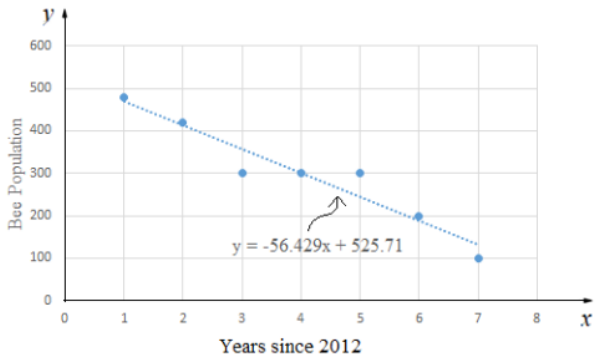
The table above shows the scores of 18 students on an online history exam. Due to technical issues, the score of the 19th student was not added to the list. The professor adds the score and finds out that doing so increases the median score. Which of the following is the most likely score of the 19th student?

A. 74
B. 86
C. 87
D. 88

19. In a certain chip manufacturing company, there are three operating machines A, B, and C. Every day, Machine A produces 30% more chips than machine B, and machine B produces twice as many chips as machine C. If on any particular day machine A produces x chips, what is the total number of chips produced by machines A, B, and C combined on that day in terms of x?

A. $x + 1.3x + 2.6x$
B. $x + 0.3x + 0.6x$
C. $x + \frac{x}{0.3} + \frac{x}{0.6}$
D. $x + \frac{x}{1.3} + \frac{x}{2.6}$

Questions 20 to 22 refer to the following information



The scatterplot above shows the Bee population in a certain farm for every year since 2012. A line of best fit and its equation are also shown.

20. Which of the following is the best interpretation of the value -56.429 in the equation of the line of best fit?

A. The average increase in the number of bees each year.
B. The average decrease in the number of bees every 525.71 years.
C. The average decrease in the number of bees each year.
D. The number of bees present in the beginning.

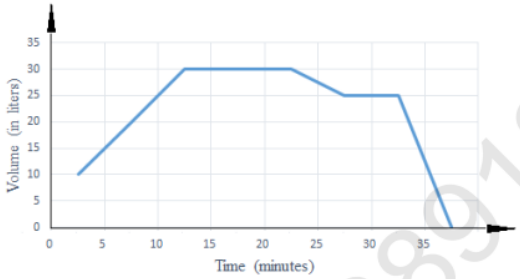
21. Which of the following is closest to the difference in the actual population number of bees and the number predicted by the line of best fit in 2017?

A. 13
B. 56
C. 100
D. 525

22. According to the line of best fit, in which year is the population of bees most likely predicted to drop to zero?

A. 2013
B. 2019
C. 2021
D. 2023

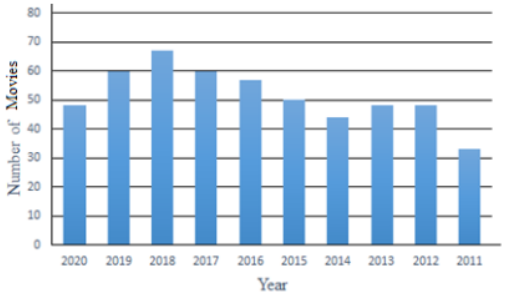
23.



The graph above represents the volume of oil in a certain container over the course of about 37.5 minutes. The container has a small hole through which oil leaks occasionally, and so a certain amount is occasionally added by the owner. Which of the following statements about the situation can be true?

A. Oil is not leaking from the container after 30minutes.
B. Oil is being added to the container at the same rate at which it is leaking between 12.5 and 22.5 minutes.
C. Oil is leaking from the container without any amount being added between 27.5 and 32.5 minutes
D. The rate at which oil is added is the same at which oil is leaking between 2.5 and 12.5 minutes.

24.



The graph above shows the number of action movies made each year from 2011 to 2020. The greatest increase in the number of action movies took place between which two of the following years?

A. 2011 and 2012
B. 2012 and 2013
C. 2017 and 2018
D. 2019 and 2020

25. A certain pharmaceutical company wants to test the efficiency of a vaccine that it recently developed against a certain virus. For this purpose, they administer the vaccine to 10 people from each neighborhood where the virus had been detected. They do this for 40 neighborhoods where the virus was detected, and discover that among the 400 subjects, only 15 got sick when exposed to the virus after receiving the vaccine. Which of the following statements can be true?

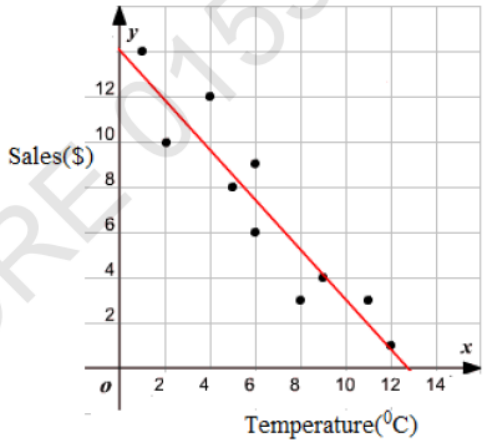
A. If the entire country is vaccinated, only 3.75% are expected to get sick.
B. The vaccine is effective against the virus.
C. The sample was not chosen randomly and so it calls into question the results obtained.
D. The sample size was too large.

26. 15, 5,10, 12, 13, 15, 17, 40, 31, x
If the range of the list above is 29, which of the following can be the value of x? (34,2)

I. 2
II. 34

A. Only I
B. Only II
C. Both I and II
D. Neither I nor II

27.

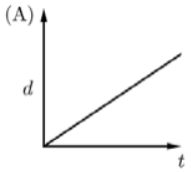


The graph above shows the sales in dollars of the local mall at different temperatures in degrees Celsius on a certain day. Which of the following is closest to the equation of the line of best fit?

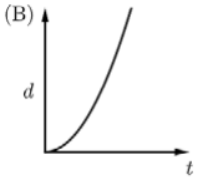
A. $y = -1.1x + 14$
B. $y = 1.1x$
C. $y = -1.1x + 12$
D. $y = -1.8x + 14$

28. An athlete runs every morning for 2 hours straight. On each day, as he progresses, he gets tired and starts slowing down little by little. Which of the following graphs best depicts the distance d covered by the athlete starting from home during the 2 hours he runs every morning as a function of time t?

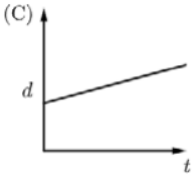
A.



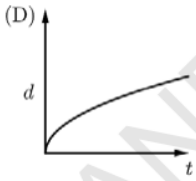
B.



C.



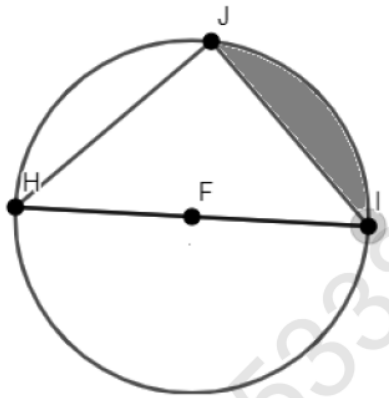
D.



29. In the $xy-$plane, A is the point of coordinates (3,6) and B is the point of coordinates (3,10). If C is the circle of diameter $\overline{AB}$, which of the following is the equation of C?

A. $(x-3)^2+(y-8)^2=16$
B. $(x-3)^2+(y+8)^2=4$
C. $(x+3)^2+(y+8)^2=16$
D. $(x-3)^2+(y-8)^2=4$

30.



In the given figure, F is the center of the circle, and J,H, and I are points on the circle, and FI = 4 If $\angle JHI = \angle JIH = 45°$, what is the area of the shaded region?

A. $16\pi - 32$
B. $8\pi - 16$
C. $4\pi - 8$
D. $2\pi - 4$

SPR (Student Produced Responses)

31. In a chemistry lab, an apparatus is adjusted to measure the mass of gas released during a chemical reaction. The mass M (in grams) of gas produced by the chemical reaction at time t (in seconds) after the reaction starts is given by $M = 1.61t + 3.95$. For every 10 seconds, what is the increase in the mass of gas released?

32. At a certain carnival booth, a trivia game can be played according to the following rule: the player wins 10 gold coins just for participating in the game; he then wins 3 gold coins for each correct answer and loses 1 gold coin for each wrong answer. At the end of the game when the time is up, the player gains money according to the equivalence: 1 gold coin = \$3. If Jad makes 4 mistakes and gains \$153 at the end of the game, how many correct answers does he have?

33. If $f(x) = (2 - x)(x + 4)$ and $g(x) = f(x - 10)$ are functions whose graphs are parabolas in an *xy*-plane, what is the y-coordinate of the vertex of the parabola represented by g?

34. $\frac{x}{x+2} - \frac{1}{2} = x - 2$

What is the positive solution of the equation given above?

35. Distance covered by data as it is transferred between different parts of a large computer is measured in light-nanoseconds (lns). 1 light-nanosecond is equivalent to 29.9cm. If a certain data is transferred at the rate of 19 centimeters every second, what disance, in lns, does the data cover in 3 seconds? (Round your answer to the nearest tenths).

36.

	Smart phones	Laptops	Tablets	Total
Elementary	150	230	120	500
Intermediate	250	100	80	430
Secondary	300	220	100	620
Total	700	550	300	1550

A school asks each of its 1550 students whether they use a smartphone, a laptop, or a tablet during online learning. The table above summarizes the results. If a student is selected at random, what is the probability that he or she doesn't use a tablet knowing that he or she is not in the secondary section? (Round your answer to the nearest tenth).

37.

In the given figure, ABC is a triangle right at B, segment ED is parallel to AB, BC = 24, and AC = 26. If ED = 8, what is the length of $\overline{EC}$?

38. In the year 1990, 12000 tourists visited country X. Due to bad weather conditions, the number of tourists visiting country X started decreasing by 10% per year. How many more tourists visited country X in the year 1993 than the year 2000? (Give the answer to the nearest whole number).

EST I Math – Round 2

Answer key

	No-Calculator	Calculator
1	C	A
2	A	C
3	B	B
4	D	C
5	A	D
6	C	C
7	B	D
8	B	C
9	B	B
10	A	D
11	B	C
12	D	A
13	D	C
14	A	C
15	C	B
16	4	C
17	27	A
18	4	D
19	1/2	D
20	98	C
21		B
22		C
23		B
24		A
25		C
26		D
27		A
28		D
29		D
30		C

31		16.1
32		15
33		9
34		2
35		1.9
36		0.8
37		20.8
38		4564

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

$$4x = 2y + 10$$
$$2x - 2y = 7$$

If (x, y) is the solution to the system of equations above, what is the value of y?

A) -2

B) -1

C) $-\frac{1}{2}$

D) $\frac{1}{2}$

2

$$\frac{3(2x+5)}{(6x+5)(6x+15)}$$

Given $x \neq -\frac{5}{2}$ and $x \neq -\frac{5}{6}$, which of the following is an equivalent form of the expression above?

A) $\frac{1}{3x+1}$

B) $\frac{1}{2x+5}$

C) $\frac{1}{6x+15}$

D) $\frac{1}{6x+5}$

3

Billy has been spending a half of an hour each night using a cell phone app to help keep his brain stimulated. In the app, he is presented with 100 words with which he must correctly identify the definition from four answer choices. When the round is done, Billy's score is calculated by the number of incorrect definitions that he chose. The goal is to get a score of zero. Billy had a score of 64 on his third night and a score of 48 on his seventh night. If Billy's score reduces by the same amount each night, on which of the following nights will Billy receive a perfect score of 0?

A) The 4th night

B) The 10th night

C) The 19th night

D) The 20th night

4

Which of the following expressions is nonpositive for all values of x?

A) $1 - x^2$

B) $1 - |x - 1|$

C) $(-|x|)^3$

D) $-(-|x|)^3$

CONTINUE

5

In the function $f(x) = Kx^2 + 1$, K is a constant. If $f(8) = 33$, what is the value of $f(4)$?

A) 3

B) 9

C) 17

D) 33

6

$$f(x) = 3x + 5$$

Given the function above, which of the following is equal to $\frac{1}{3}x + 5$ for all values of x?

A) $f(\frac{1}{27}x)$

B) $f(\frac{1}{9}x)$

C) $f(\frac{1}{3}x)$

D) $f(-3x)$

7

$$\frac{a(b+a)}{2a} = 5$$

If the equation above is true, which of the following must also be true?

A) $\frac{b}{2} + a^2 = 5$

B) $b + \frac{a}{2} = 5$

C) $b = a - 10$

D) $a = 10 - b$

8

Which of the following systems of linear equations represent two lines that are perpendicular to each other?

A) $y + 2x = 4$
$y - 2x = 6$

B) $2y + 2x = 13$
$-2y - 2x = 3$

C) $3y + 6x = 12$
$-6y + 3x = 9$

D) $8y + 4x = 20$
$4y + 8x = 20$

CONTINUE

9

The function $f(x) = x^2 + 7$ passes through the points $(a,16)$ and $(b,16)$, where the sum of a and b is 0. What is the value of $|a-b|$?

A) 0

B) 3

C) 6

D) 8

10

$$x - 2 = \sqrt{x}$$

When solved as a quadratic equation, which of the following values of x is an extraneous solution to the equation above?

A) -1

B) 1

C) 2

D) 4

11

$$\frac{4m}{m+\frac{1}{24}} = 8$$

What is the value of m in the equation above?

A) $-\frac{4}{3}$

B) $-\frac{3}{4}$

C) $-\frac{1}{12}$

D) $-\frac{1}{96}$

12

A package of 4 muffins is priced at x dollars and a package of 8 muffins is priced at $x+3$ dollars. Angela purchased one package of 4 muffins at 50% off the marked price and Rachel purchased one package of 8 muffins at 50% off the marked price. If Rachel, Angela, and 10 of their friends decided to split the overall price of the 12 muffins evenly, which of the following expressions represents the amount, in dollars, each of them paid in terms of x?

(Assume that there is no sales tax.)

A) $x+\frac{3}{2}$

B) $2x+3$

C) $\frac{2x+3}{12}$

D) $\frac{2x+3}{24}$

CONTINUE

13

In the quadratic equation $x^2 - a^2 = ax$, a is a constant. What are the solutions for x?

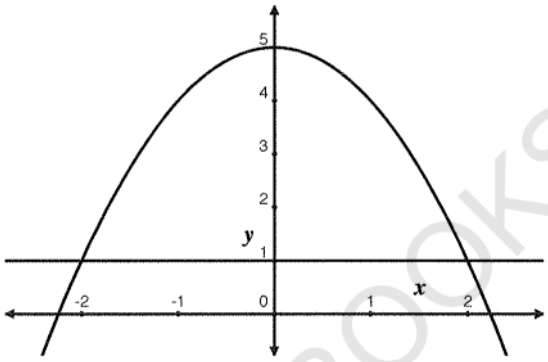
A) $a \pm a\sqrt{5}$

B) $\dfrac{a \pm a\sqrt{5}}{2}$

C) $a \pm \sqrt{-3a}$

D) $\dfrac{a \pm a\sqrt{-3}}{2}$

14



The relations $y = 1$ and $y = 5 - x^2$ are graphed in the xy-plane above. How many ordered pairs (x, y), where both x and y have integer values, would satisfy the system of inequalities defined by $y > 1$ and $y < 5 - x^2$?

A) 7

B) 8

C) 14

D) 15

15

$$\frac{(16+3i)(1+4i)}{i}$$

If the expression above is rewritten in the form $a - bi$, where a and b are positive integer constants, what is the remainder when a is divided by b?

A) 3

B) 4

C) 5

D) 6

CONTINUE

DIRECTIONS

For each question from 16-20, solve and enter your answer in the grid-in section of your answer sheet as described below.

A. Write out your answers in the boxes at the top of each column in order to help you fill in the circles accurately. Remember, you will only receive credit for the circles that are filled in correctly, not for the written answer at the top of the columns.

B. Mark only a single circle in each column.

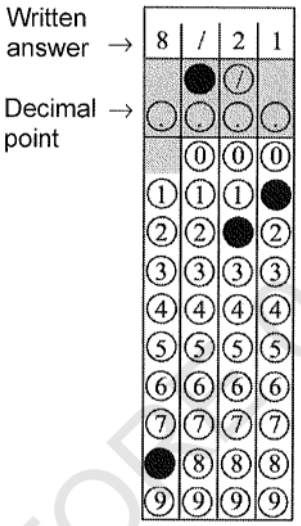
C. There are no negative answers.

D. If the problem has more than one correct answer, grid only one of the correct answers.

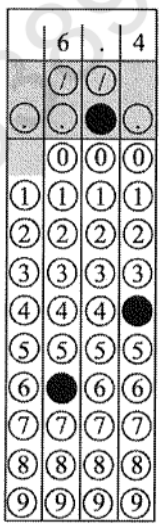
E. When your answer is a **mixed number**, such as $1\frac{1}{2}$, it should be entered as 1.5 or 3/2. You cannot enter a mixed number because there is no room to fill in a circle that represents a space.

F. If you enter a **decimal answer** with more digits then the grid can handle, the answer may be rounded or truncated, but it absolutely must fill the entire grid.

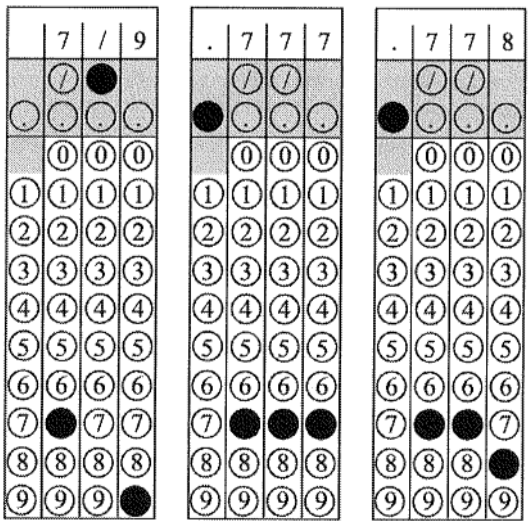
Answer: $\frac{8}{21}$



Answer: 6.4

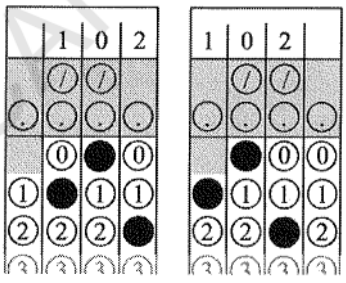


The ways to correctly grid $\frac{7}{9}$ are:



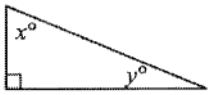
Answer: 102 - both positions are correct

REMEMBER: You can begin writing your answers in any column as long as there is enough space. Leave unused columns blank.



CONTINUE

16



In the triangle above, the cosine of $y°$ is $\frac{12}{13}$. What is the cosine of $x°$?

17

$$Ax + 2y = 12$$
$$8x + 32y = 144$$

For what value of A will the system of equations above have no solutions?

18

Truck A leaves a loading dock and averages 40 miles per hour until it makes a stop in Dover County. Truck B leaves the same loading dock two hours after Truck A and averages 60 miles per hour until it makes a stop in Dover County as well. If both trucks arrive in Dover County at the same time, how many miles is Dover County from the loading dock?

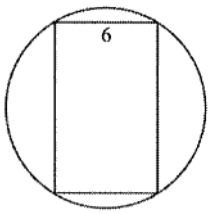
19

$$x^3 - 2x^2 - 9x + 18 = (x - a)(x - b)(x + c)$$

If the equation above is true for all values of x and a, b, and c are all positive constants, what is the value of abc?

CONTINUE

20



A rectangle that has one side measuring 6 inches is inscribed in a circle with an area of 25π square inches. What is the area of the rectangle in square inches?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

Section II
Calculators are required
(60 minutes)

1

Melvin created a daily spending budget for the vacation that he is taking in Florida. Melvin plans to spend no more than \$85 each day that he is on vacation. If Melvin has \$600 in his vacation account, which of the following expressions represents the remaining amount of money in his vacation account d days from the beginning of his vacation given that Melvin spends his maximum daily spending budget each day?

A) $600+85d$

B) $600-85d$

C) $85+600d$

D) $85-600d$

2

In a population of 20,000 Americans, 4,000 prefer to park their cars inside of a garage. If a random sample of 100 Americans from this population were selected, how many people in the sample could one expect to prefer parking inside of a garage?

A) 2

B) 4

C) 10

D) 20

3

Juan and Amelia raised a total of \$2,800 for cystic fibrosis research. If Juan raised \$100 more than half of the amount that Amelia raised, how much money did Amelia raise for cystic fibrosis research?

A) \$900

B) \$1,000

C) \$1,800

D) \$1,900

4

Line k in the xy-plane only has points in Quadrants I and II. Which of the following is not true?

A) Line k has a slope of 0.

B) Line k has a positive y-intercept.

C) Line k has a positive x-intercept.

D) Line k is parallel to the x-axis.

CONTINUE

5

Brandon pays $36 for a yearly membership to a digital music streaming service. If Brandon would like to purchase a song, it costs an additional $0.98. If Brandon's total annual payment for the music service was $71.28, on average, how many songs did Brandon purchase per month?

A) 2

B) 3

C) 12

D) 36

6

Six yards of rope were divided evenly among 9 people. How many inches of rope did each person receive?

(1 yard = 36 inches)

A) 2

B) 4

C) 24

D) 48

7

If pressure, measured in pascals, is equal to the force of an object in newtons divided by the contact area in square meters, which of the following combinations of force and area creates closest to 10,000 pascals of pressure?

A) 200,000 N and 20,000 m^2

B) 20,000 N and 10,000 m^2

C) 5,000 N and 5 m^2

D) 2,000 N and 0.2 m^2

8

Camera and Cell Phone Sales in 2010

Sales Period	Camera Sales	Cell Phone Sales	TOTAL
Jan.-Mar.	20	120	140
Apr.-June	28	120	148
July-Sept.	30	94	124
Oct.-Dec.	42	66	108
TOTAL	120	400	520

In the table above, cell phone sales from January to June account for what proportion of the total sales?

A) $\frac{3}{13}$

B) $\frac{6}{13}$

C) $\frac{3}{5}$

D) $\frac{5}{6}$

CONTINUE

9

In the xy-plane, the graph of a function has only one x-intercept and one negative y-intercept. Which of the following could be the function?

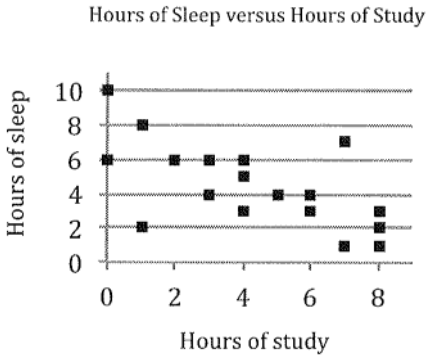
A) $y = -x^2$

B) $y = x^2 - 1$

C) $y = x^2 - 2x + 1$

D) $y = -x^2 - 4x - 4$

Questions 10 and 11 refer to the following information.



A recent sleep study was conducted on high-school seniors to determine if there is an association between the number of hours of sleep and the number of hours of study that each student averages per weeknight. The collected data for a random sample of 18 students is presented in the scatterplot above.

10

The student with the highest ratio of hours of study to hours of sleep had how many hours of sleep?

A) 1

B) 6

C) 8

D) 10

11

Which of the following linear functions using h for hours of study could most reasonably estimate $f(h)$, the number of hours of sleep?

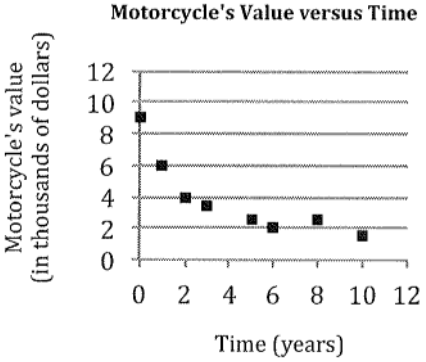
A) $f(h) = \frac{1}{4}h + 6$

B) $f(h) = \frac{3}{4}h + 8$

C) $f(h) = -\frac{3}{4}h + 8$

D) $f(h) = -\frac{5}{3}h + 10$

12



The value of a motorcycle was assessed periodically over the first 10 years of its existence. Which of the following models would best represent the relationship between time and the motorcycle's estimated value?

A) A linear growth model

B) A linear decay model

C) An exponential decay model

D) An inverted quadratic model

CONTINUE

13

$$S(x) = I(1+\frac{r}{100})^x$$

The equation above can be used to determine the overall account balance, $S(x)$, of a savings account x years from the opening of the account given an initial account balance, I, and an annual interest rate of r %. Which of the following gives r in terms of $S(x)$, I, and x?

A) $r = 100\sqrt[x]{\frac{S(x)}{I}} - 100$

B) $r = 100\sqrt[x]{\frac{S(x)}{I}} - 1$

C) $r = 100\sqrt[x]{I}\sqrt[x]{S(x)} - 100$

D) $r = 100\sqrt[x]{I}\sqrt[x]{S(x)} - 1$

14

Ankit has a block of ice in the shape of a cube that has a volume of $27\,ft^3$. Ankit plans to cut the ice block into small ice cubes that measure 2 inches in all directions. How many such ice cubes can Ankit create? (Note: There are 1728 cubic inches in $1\,ft^3$.)

A) 5,832

B) 11,664

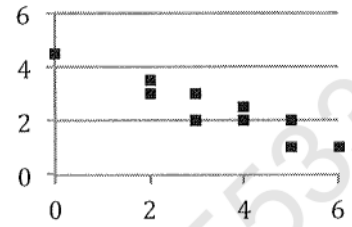
C) 23,328

D) 46,656

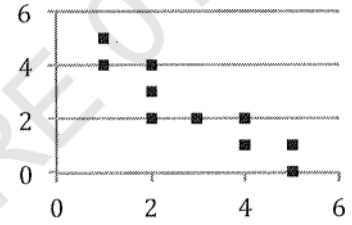
15

Which of the following scatterplots would best be modeled by an equation in the form $y = mx + b$, where b is a positive constant and m is a negative fractional constant?

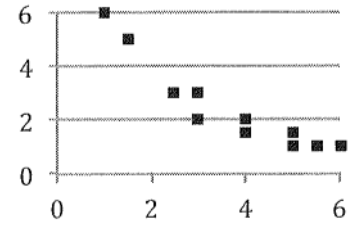
A)



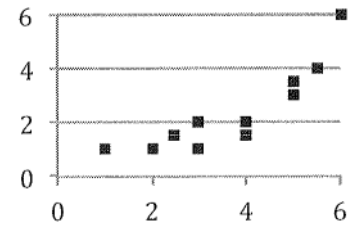
B)



C)



D)



CONTINUE

Questions 16 and 17 refer to the following information.

$$C_1(h) = 640 + 12mh$$
$$C_2(h) = 400 + 15mh$$

Mrs. Jamerson is having all of the rooms on the first floor of her house painted. She has received the two quotes shown above where $C_1(h)$ represents the total cost for having the job completed with Company 1, $C_2(h)$ represents the total cost for having the job completed with Company 2, m represents the number of men on the job, and h is the estimated number of hours to complete the job.

16

If one extra man is needed for the job than initially quoted, which of the following is true?

A) The hourly cost for Company 1 will increase by more than the hourly cost for Company 2.
B) The hourly cost for Company 2 will increase by more than the hourly cost for Company 1.
C) The hourly cost for the two companies will increase equally.
D) The increase in hourly cost for each company cannot be determined.

17

If it is determined by both companies that ten men are necessary to complete the job, what is the least integer number of hours, h, where the total cost to have the house painted by Company 1 would be less than the total cost to have the house painted by Company 2?

A) 8
B) 9
C) 35
D) 80

18

$$6m \leq 2$$

If the equation above is true, what is the greatest possible value for $2m+1$?

A) $\frac{1}{3}$

B) $\frac{2}{3}$

C) 1

D) $\frac{5}{3}$

19

A clear jar is filled with black, red, and green marbles. There are 6 black marbles and each marble is uniquely marked with a number 1 through 6. There are also six red marbles and six green marbles numbered the same way. Given that a black or a red marble is randomly selected, what is the probability that it is marked with a number greater than 4?

A) $\frac{1}{9}$

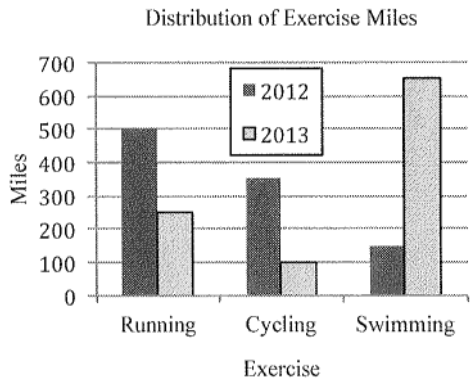
B) $\frac{1}{3}$

C) $\frac{4}{9}$

D) $\frac{2}{3}$

CONTINUE

Questions 20 and 21 refer to the following information.



Jackson exercises regularly and attempts to accumulate 1000 miles of cardiovascular exercise each year by means of running, cycling, and swimming. The bar graph above shows how Jackson's 1000 miles of exercise were distributed in the years 2012 and 2013.

20

Which of the following forms of exercise had the greatest percentage decrease in miles from 2012 to 2013?

A) Running

B) Cycling

C) Swimming

D) Running and Cycling equally

21

What percentage of Jackson's total miles of exercise for 2012 and 2013 was accounted for by swimming?

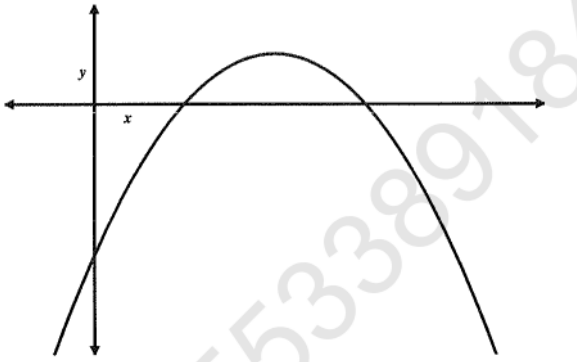
A) 22.5

B) 37.5

C) 40

D) 65

22



Which of the following equations could represent the parabola graphed in the *xy*-plane above?

A) $y = -x^2 - 4$

B) $y = -x^2 + 4x - 3$

C) $y = -x^2 - 4x - 3$

D) $y = x^2 - 4x + 3$

23

$$0 = x^3 - 4x^2 - 9x + 36$$

Which of the following values of x is *not* a solution to the equation above?

A) -4

B) -3

C) 3

D) 4

CONTINUE

24

If a and b are numbers such that $|a-b|>10$, which of the following must be true?

I. $a-b>0$

II. $|a+b|>10$

III. $ab>0$

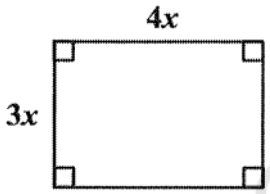
A) None

B) I only

C) II only

D) I and III only

25



The perimeter of the rectangle shown above is 56 inches. What is the length of a diagonal of the rectangle in inches?

A) 10

B) 12

C) 16

D) 20

26

$$G(x)=10+0.55x$$

In the equation above, $G(x)$ represents the increased value of a renovated home in thousands of dollars, given x, the amount of money spent on renovations by the homeowner in thousands of dollars. Which of the following best describes the value of the constant 0.55 in the context of the equation?

A) The value of a home will increase by $5,500 dollars for every $1,000 the homeowner invests into renovations.

B) The value of a home will increase by $550 dollars for every $10,000 the homeowner invests into renovations.

C) The value of a home will increase by 55 cents for every dollar the homeowner invests into renovations.

D) The total value of a home will be equivalent to 55% of the money that the homeowner invests into renovations.

27

The average weight of four bags of concrete is 85 pounds. If two additional bags of concrete are added, the average weight of all of the bags increases to 92 pounds. What is the average weight in pounds of the two additional bags of concrete that were added to the original four bags of concrete?

A) 3.5

B) 7

C) 99

D) 106

CONTINUE

28

The polynomial function f follows the form x^2+bx+c, and has two roots at $(-1,0)$ and $(2,0)$. Which of the following is an equivalent form of the polynomial in which the coordinates of the vertex appear as constants in the equation?

A) $f(x)=(x-\frac{1}{2})^2-\frac{9}{4}$

B) $f(x)=(x-\frac{1}{2})^2-2$

C) $f(x)=(x-1)^2-2$

D) $f(x)=(x-\frac{3}{2})^2-5$

29

$$f(x)=1-x^3$$
$$f(x)=mx+b$$

Line h follows the form $f(x)=mx+b$. If line h and the function $f(x)=1-x^3$ are to be graphed in the xy-plane, what is the greatest integer value of m for which the system of equations will have 3 distinct solutions?

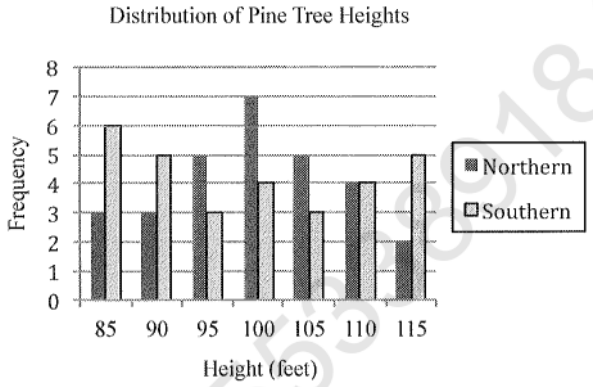
A) –4

B) –1

C) 0

D) 1

30



The bar graph above gives the distribution of the heights of pine trees for 30 randomly selected trees in the northern part of a county and 30 randomly selected trees in the southern part of the county. Which of the following is true about the data presented in the bar graph?

A) The standard deviation of pine tree heights in the northern part of the county is less than the standard deviation of pine tree heights in the southern part of the county.

B) The standard deviation of pine tree heights in the northern part of the county is greater than the standard deviation of pine tree heights in the southern part of the county.

C) The standard deviation of pine tree heights in the northern part of the county is approximately the same as the standard deviation of pine tree heights in the southern part of the county.

D) The standard deviations of the heights of pine trees cannot be calculated with the given data. Therefore, a comparison between the standard deviations of pine tree heights in the northern and southern parts of the county cannot be determined.

CONTINUE

31

$$T_{HR} = (220 - Age)(Intensity)$$

A person can calculate his or her target heart rate, T_{HR}, in beats per minute, using the equation above, where intensity is a percentage in decimal form. According to the model, at an intensity of 60%, a 5-year increase in age would correspond to a decrease in the target heart rate of how many beats per minute?

32

Jonathan is using an international shipping service to ship a box of medical supplies. The company requires that the package have a volume of less than 120 cubic centimeters. If Jonathan's box of supplies has a base that measures 3 inches by 4 inches, what is the greatest height that the box can measure, rounded to the nearest tenth of an inch?

(1 inch = 2.54 centimeters)

33

Nadia is having some friends over to eat a pizza and to watch a movie. She invited 8 friends, but only expects half to attend. Nadia plans to cut the pizza into a number of slices that is equal to the number of friends that arrive. If 6 of Nadia's friends attend, the central angle that defines each slice will be how many degrees fewer than the number of degrees she expected for each slice?

34

A Koi fish pond that holds 2200 quarts of water was just completed. If one hose can fill the pond at 30 quarts per minute and a second hose can fill the pond at 20 quarts per minute, how long will it take to fill the pond, in minutes, if both hoses are running the entire time?

CONTINUE

35

A bowl is filled with a total of 140 red and green candies. If $\frac{4}{7}$ of the candies are red, how many green candies must be removed from the bowl such that $\frac{2}{3}$ of the remaining candies are red?

36

$$PV = nRT$$

The Ideal Gas Law is shown above where the four gas variables are: pressure (P), volume (V), number of moles of gas (n), and temperature (T). The final variable, R, is the gas constant. If pressure remains constant and both the number of moles of gas and the temperature are reduced by half, by what percent will the volume be reduced?

CONTINUE

Questions 37-38 refer to the following information.

$$A_{Value} = I(1+\frac{r}{100})^t$$

A savings account follows the model above where the account's current value, A_{Value}, can be calculated at any time based on the initial account value, I, the percentage growth rate, r, and the number of years that have passed since the opening of the account, t.

37

If the initial deposit in the account was \$1,000 and in the first year the account's value increased by \$5, what is the correct value for r?

38

Let K represent the account's value after 4 years have passed using the percentage growth rate, r, calculated in problem 37 and the initial account value of \$1,000. To the nearest dollar, what amount of money should have been initially deposited into the account to attain an account value of K after only one year?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

—MATH

1. A
2. D
3. C
4. C
5. B
6. B
7. D
8. C
9. C
10. B
11. C
12. D
13. B
14. A
15. A

Fill-Ins:

16. .384, .385, or 5/13
17. .5 or 1/2
18. 240
19. 18
20. 48

–MATH

1. B
2. D
3. C
4. C
5. B
6. C
7. D
8. B
9. D
10. A
11. C
12. C
13. A
14. A
15. A
16. B
17. B
18. D
19. B
20. B
21. C
22. B
23. A
24. A
25. D
26. C
27. D
28. A
29. B
30. A

Fill-Ins:

31. 3
32. .6 or 3/5
33. 30
34. 44
35. 20
36. 75
37. .5 or 1/2
38. 1015

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

If $4x = 12$, what is the value of $2x - 1$?

A) 5

B) 7

C) 23

D) 25

2

$$f(v) = 75 - 12.50v$$

The balance on a gift certificate for a gym, $f(v)$, is given by the equation above. If v represents the number of visits to the gym, which of the following is the best interpretation of the number 75 in the equation?

A) The gym charges \$75 per visit.

B) The gym charges \$75 per day.

C) The gift certificate allows for 8 total visits to the gym.

D) The gift certificate had an initial value of \$75.

3

Line k is perpendicular to the line $y = -4x + 2$ and goes through the points $(0, -2)$ and $(20, m)$. What is the value of m?

A) 1

B) 3

C) 38

D) 78

4

$$\frac{\theta}{360}(2\pi r)$$

The expression above is used to calculate the length of an arc given θ, the measure of the central angle that defines the arc in degrees, and r, the measure of the circle's radius in inches. If an arc measures 22π inches and its central angle measures at most $45°$, what is the shortest possible measure of the circle's radius in inches?

A) $\frac{11}{2}$

B) 11

C) 88

D) 176

5

$$6x - 2y = 10$$
$$-3x + y = -10$$

How many ordered pairs (x, y) satisfy the system of equations above?

A) 0

B) 1

C) 2

D) Infinitely many

6

$$(3a + 3b)(a - b)$$

Which of the following is equivalent to the expression shown above?

A) $3a^2 + 6ab - 3b^2$

B) $3a^2 - 6ab + 3b^2$

C) $3a^2 + 3b^2$

D) $3a^2 - 3b^2$

7

In the equation $(x-3)^2 = h$, if $h = 25$ and $x > 0$, what is the value of x?

A) -2

B) 2

C) 5

D) 8

8

$$f(x) = \frac{x^a x^b}{x^3}$$

If $a + b = 12$, what is the value of $f(2)$?

A) 16

B) 128

C) 512

D) 1,024

9

Which of the following equations has solutions in all four quadrants of the *xy*-plane?

A) $f(x) = x^2 + 1$

B) $f(x) = x^3$

C) $f(x) = 2 - |x - 1|$

D) $f(x) = -|x - 3| - 7$

10

$$P = \frac{2(s-c)}{5}$$

A craftsman's net pay, P, is calculated using the equation above given the sale price of the item that is sold, s, and c, the cost to produce the item. Which of the following gives the cost to produce an item, c, in terms of P and s?

A) $c = s - \frac{2P}{5}$

B) $c = s - \frac{5P}{2}$

C) $c = \frac{2(s-P)}{5}$

D) $c = \frac{5(s-P)}{2}$

11

Line k contains the points $(-4,0)$ and $(3,2)$. Line m contains the points $(-3,2)$ and $(4,0)$. If line k is written in the form $y = m_1x + b_1$ and line m is written in the form $y = m_2x + b_2$, what is the value of $m_1b_2 + m_2b_1$?

A) $-\frac{2}{7}$

B) 0

C) $\frac{2}{7}$

D) $\frac{4}{7}$

12

$$i(3+2i)(12-8i)$$

Which of the following complex numbers is equivalent to the expression above? (Note: $i = \sqrt{-1}$)

A) $16 + 36i$

B) $36 + 16i$

C) $20i$

D) $52i$

13

A 55 kilogram fallen tree branch decays at a rate of 25% per year. Which of the following equations could be used to determine $f(t)$, the remaining mass of the tree branch t years after it has fallen?

A) $f(t) = 55(0.25)^t$

B) $f(t) = 55(0.75)^t$

C) $f(t) = 55 - 0.25t$

D) $f(t) = 55 - 0.75t$

14

$$\frac{x^3 - 2x^2 + 4x + 6}{x - 4}$$

If the expression above is written in the form $ax^2 + bx + c + \frac{k}{x-4}$, where a, b, and c are nonzero constants, what is the value of k?

A) –22

B) –10

C) 54

D) 66

15

What is the product of all of the solutions of the equation $2x^2 + 10x + 1 = 0$?

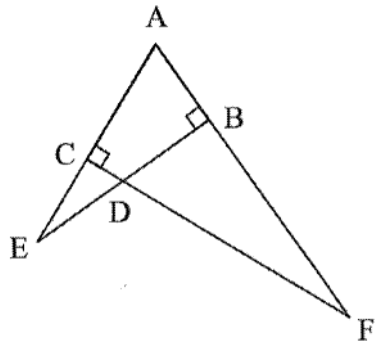
A) $\frac{1}{2}$

B) $\frac{1}{8}$

C) $\frac{1}{16}$

D) $-\frac{5}{2}$

16



In the figure above, if $\overline{AB}$ measures 4 and $\overline{AC}$ measures 6, what is the measure of $\overline{BE}$ if $\overline{CF}$ measures 15?

17

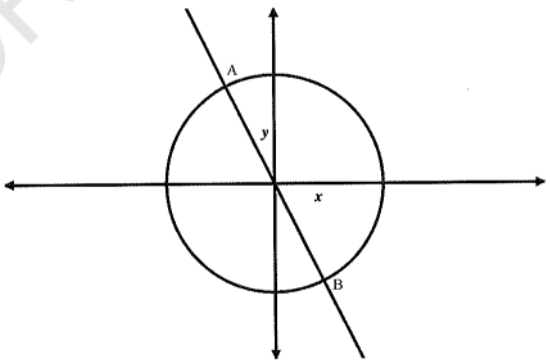
At a large family birthday party, there were mini pumpkin pies and blocks of chocolate fudge for dessert. Each mini pumpkin pie could feed four people and each block of fudge could feed two people. If 16 people ate dessert at the party and at least one pie and one block of fudge were eaten, what is the greatest number of mini pumpkin pies that could have been consumed if no partial pies were eaten?

18

$$(ax-c)(bx+c)=5x^2-49$$

If the equation above is true for all values of x and a, b, and c are all positive constants, what is the value of abc?

19



If the equation of the above circle is given in the form $x^2+y^2=D$ and the length of $\overline{AB}$ is $10\sqrt{5}$ inches, what is the value of D?

20

$$K^2x + 8y = 30$$

$$\frac{K}{2}x + 4y = 5$$

In the system of equations above, both K and x are positive integers. What is a value of K^2 that makes the system of equations true?

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.

Section II
Calculators are required
(60 minutes)

1

A Goodwill store donates 5 of every 120 donated articles of clothing that it receives to a local shelter. If the Goodwill store donated 24 articles of clothing to the shelter this past month, how many articles of clothing were donated to the Goodwill store?

A) 1

B) 10

C) 576

D) 600

2

If $6x+2=8$, what is the value of $6x-2$?

A) -1

B) 1

C) 4

D) 12

Questions 3 and 4 refer to the following information.

18 people are stranded at sea on a lifeboat. The number of days of emergency food rations aboard the lifeboat is inversely proportional to the number of passengers on board. There is currently enough food for the 18 passengers to eat for 4 days.

3

If 6 more stranded people were helped onto the lifeboat, how many days worth of food would be available for all passengers?

A) $\frac{4}{3}$

B) 2

C) 3

D) 12

4

If the number of rations of food that remained with the initial 18 passengers was only 25% of all of the rations that were initially packed on the lifeboat, how many additional days could the 18 passengers have survived if all of the initial food rations were still intact?

A) 16

B) 12

C) 4

D) 3

5

A tailor is paid \$8 for each shirt that he repairs, \$10 for each pair of pants that he repairs, and \$22.50 for each suit that he modifies. Which of the following equations represents M, the amount of money in dollars that the tailor receives for repairing s shirts and modifying u suits?

A) $M = 8s + 22.5u$

B) $M = 10s + 22.5u$

C) $M = 8s + 10u$

D) $M = 8s + 10p + 22.5u$

6

$$P(h, v) = 28h + .0001v$$

A webmaster is paid based on the equation above. The webmaster is paid \$28 for each hour that he works and receives a stipend of \$0.0001 for each time someone visits the website. Which of the following is closest to the number of hours that the webmaster worked in a week in which his total paycheck was \$860 and the website had 200,000 visitors?

A) 24

B) 30

C) 31

D) 38

7

During a fitness test in gym class, a gym teacher gives every student 5 points for every minute of continuous physical activity and 1 point for every jumping-jack that the student completes. If a student's final score was 95 and the student completed 80 jumping-jacks, for how many minutes did the student perform continuous physical activity?

A) 2

B) 3

C) 10

D) 15

8

$$f(x) = x - g(x)$$
$$g(x) = x - 1$$

Given the system of equations above, what is the value of $f(g(x))$?

A) -1

B) 0

C) 1

D) $2x - 3$

9

Which of the following equivalent forms of the linear equation $y = 2x - 1$ gives both coordinates of a point that lies on the line as coefficients or constants in the equation?

A) $y - 2x = -1$

B) $y + 1 = 2x$

C) $y + 1 = 2(x + 1)$

D) $y - 1 = 2(x - 1)$

10

$$a + b \leq 200$$
$$15a + 10b \leq 2500$$

A custodial worker at a high-rise apartment complex is using a service elevator to transport 15-pound boxes of toilet paper and 10-pound boxes of paper towels to the upper levels of the building. The elevator is large enough to transport 200 total boxes or a maximum of 2500 pounds. Given the system of inequalities above, which of the following is true?

A) The elevator can transport a total of 250 boxes of paper towels in a single trip.

B) The elevator can transport a total of 200 boxes of toilet paper in a single trip.

C) The elevator can be filled to capacity and transport an equal number of boxes of toilet paper and boxes of paper towels.

D) The elevator must always transport more boxes of paper towels than boxes of toilet paper.

11

	Daily Hours of Driving	Days of Driving per Week	Average Speed (mph)
Meryl	6	5	50
Dana	8	4	40
Randy	10	3	60

Given the table above, how many more miles does Meryl drive in a week than Dana?

A) 220

B) 300

C) 1280

D) 1500

12

A research study was conducted during the holiday season to determine whether people in a large metropolitan area preferred to shop for holiday gifts online or in person at a store. Two hundred randomly selected customers exiting a mall in the metropolitan area were asked whether they preferred to shop in person or online and only 24 responded that they preferred to shop online. Which of the following statements can best be inferred from this research study?

A) 12% of all people living in the metropolitan area prefer to shop for holiday gifts online.

B) 12% of all people living in the metropolitan area prefer to shop for holiday gifts in person.

C) Nothing reliable can be inferred. The location of the survey made the results biased.

D) The study's results are unreliable due to a sample size that is too small.

13

The moon is approximately 240,000 miles from Earth. If a rocket leaves Earth and takes one day to reach the Moon, which of the following is the closest to the average speed of the rocket in kilometers per hour?

(1 mile $\approx$ 1.609 kilometers)

A) 622

B) 1,610

C) 6,215

D) 16,100

14

The largest domesticated breed of cat is the Maine Coon. An adult male Maine Coon is 125% larger than its female counterpart. If an adult female Maine Coon weighs 12 pounds, the weight in pounds of an adult male Maine Coon is most likely which of the following?

A) 5.3

B) 9.6

C) 15

D) 27

15

$$p(x) = -x^2 + 12x - 20$$

In the function above, $p(x)$ represents a company's profits x years after 1980. For how many years did the company break even or return a positive profit?

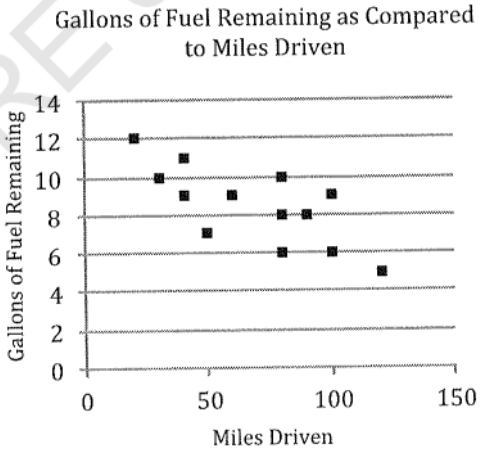
A) 0

B) 2

C) 8

D) 10

16



A line of best fit is calculated from the data in the scatterplot above to estimate the number of remaining gallons of fuel based on the number of miles driven. The line of best fit that models the data has the equation $G(x) = 13.8 - 0.06x$, where x represents the number of miles driven and $G(x)$ is the estimated number of gallons remaining. Based on the model, which of the following would be the best estimate for the number of remaining gallons of fuel given that 150 miles were driven?

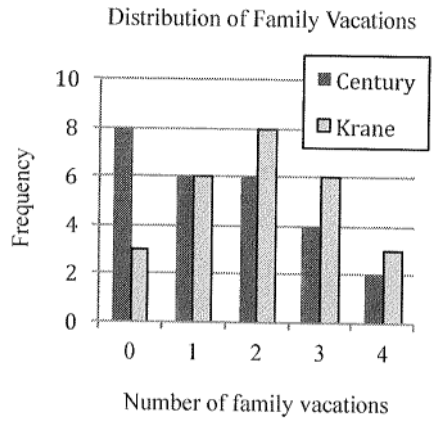
A) 4

B) 5

C) 6

D) 7

Questions 17 and 18 refer to the following information.



A random sample of 26 students from both Century High School and Krane High School were asked about the number of family vacations they take during a given school year. The results are displayed in the bar chart above. There are a total of 1,820 students in Century High School and 2,600 students in Krane High School.

17

What is the average number of family vacations taken by all of the randomly selected students?

A) 1.46
B) 1.73
C) 2.00
D) 2.12

18

Estimating from the data collected in the bar chart, how many more students are expected to take 1 vacation in Krane High School than in Century High School?

A) Approximately 180 more students are expected to take 1 family vacation in Krane High School than in Century High School.

B) Approximately 600 more students are expected to take 1 family vacation in Krane High School than in Century High School.

C) The number of students taking 1 family vacation in Krane High School is the same as the number of students taking 1 family vacation in Century High School.

D) The number of students taking 1 family vacation in Krane High School is less than the number of students taking 1 family vacation in Century High School.

19

	Blue Tint	Red Tint
pH of 1-4	2	8
pH of 5-10	4	4
pH of 11-14	9	1

A group of science students are classifying sample solutions by the color of the liquid and the pH level of the liquid. The data is collected in the table above. If a solution with a pH level of 1-4 is randomly selected, what is the probability that the solution has a blue tint?

A) $\frac{1}{4}$

B) $\frac{1}{5}$

C) $\frac{2}{15}$

D) $\frac{1}{14}$

Questions 20 and 21 refer to the following information.

$$A_p = (2\pi r + 2)(h + 2)$$

A print company uses the formula above to calculate the necessary print area, including bleed margins, for printing labels for cylindrical cans based on r, the radius of the can, and h, the height of the can.

20

If the company wanted to calculate the height of a can from a given radius, r, and print area, A_p, which of the following equations would be used?

A) $h = \dfrac{A_p}{2\pi r + 2} - 2$

B) $h = 2 - \dfrac{A_p}{2\pi r + 2}$

C) $h = \dfrac{A_p - 2}{2\pi r + 2}$

D) $h = A_p(2\pi r + 2) - 2$

21

Cylinder A has a height of 4 inches and a radius of 1 inch. Cylinder B has a height of 8 inches and the same radius as Cylinder A. The print area required for Cylinder A is what percent smaller than the print area required for Cylinder B?

A) 40

B) 60

C) 200

D) 250

22

When advertising job opportunities, a large corporation opted to list the median salary for all of its employees rather than advertise the average salary. In recent hiring cycles, the company discovered through internal surveys that newly hired employees were under the impression that their starting salaries would be higher given the average salaries they read about in former employment ads. The corporation most likely chose to list the median salary instead of the average salary for which of the following reasons?

A) A few employee salaries are much lower than the rest of the employee salaries, which skews the average salary downward.

B) A few employee salaries are much higher than the rest of the employee salaries, which skews the average salary upward.

C) The salaries of the empolyees are extremely scattered and spread out.

D) The salaries of the employees are very close together with very little difference from employee to employee.

23

A cereal manufacturer is selling large boxes of cereal. The manufacturer would like to keep the target weight of each box between 17.5 ounces and 19.5 ounces. Which of the following inequalities could be used to determine whether the weight of a randomly selected box of cereal, x, meets the target weight requirement set forth by the manufacturer?

A) $|x - 18.5| < 1$

B) $|x + 18.5| \leq 1$

C) $|x - 1| < 18.5$

D) $|x - 1| \leq 18.5$

24

The graph of a quadratic function f has x-intercepts at $(d,0)$ and $(e,0)$, where d is greater than e. The x-coordinate of the vertex of the parabola is equivalent to $2e+d$. If d and e are integers, which of the following could be the equation of f?

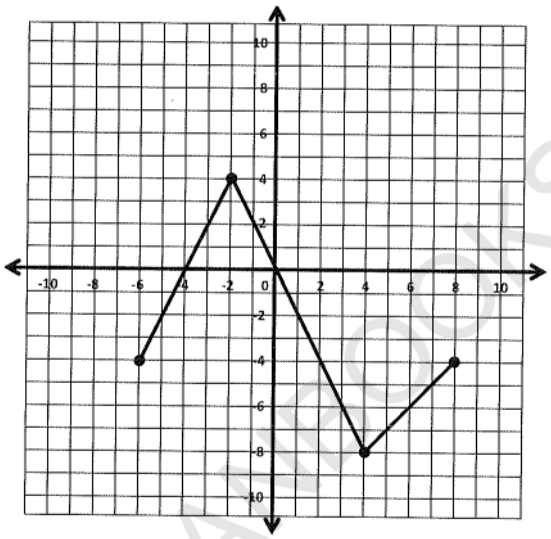
A) $f(x)=x^2-4x+2$

B) $f(x)=x^2-4x-12$

C) $f(x)=-x^2+8x-12$

D) $f(x)=-x^2+6x-9$

25



The complete graph of the function f is shown in the xy-plane above. Which of the following values is not equal to $f(-6)$?

A) $-f(-2)$

B) $f(2)$

C) $f(4)+2$

D) $f(8)$

26

$$x^2+y^2-8y=9$$

The equation above is of a circle in the xy-plane that has an area of what?

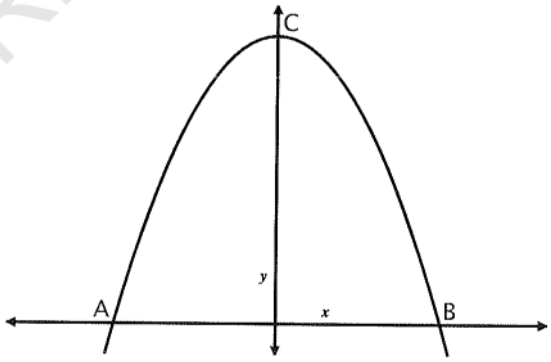
A) 9π

B) 16π

C) 25π

D) 81π

27



The graph of the function $y=-2x^2+18$ is shown above. The function intercepts the x-axis at the points A and B. The function intercepts the y-axis at the point C. If point D lies on the x-axis and is one-fourth of the distance from A to B, what is the slope of the line that goes through points C and D?

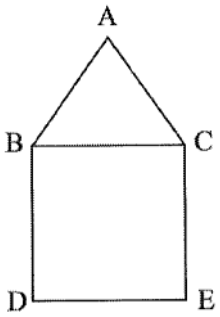
A) -27

B) 6

C) 12

D) 27

28



If $\triangle ABC$ is equilateral and has an area of $16\sqrt{3}$, what is the area of the pentagon $ACEDB$?

A) 64

B) $80\sqrt{3}$

C) $16+16\sqrt{3}$

D) $64+16\sqrt{3}$

29

$$(x^2+bx)+c(x+d)=x^2+5x+12$$

If the equation above is true for all values of x and b, c, and d are all positive integer constants, which of the following cannot be the value of d?

A) 2

B) 3

C) 4

D) 6

30

Moped's Value: $V_1(t)=10{,}000-1{,}000t$

Dirt Bike's Value: $V_2(t)=10{,}000(0.9)^t$

The value of a moped t years after its purchase follows the linear decay model defined above. The value of a similarly priced dirt bike t years after its purchase follows the exponential decay model defined above. Within which of the following intervals is the value of the moped greater than the value of the dirt bike?

A) 0 to 1 years

B) 1 to 2 years

C) 2 to 3 years

D) The value of the moped is never higher than the value of the dirt bike.

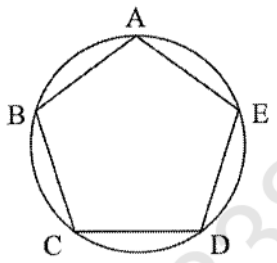
31

A man stands 77 inches tall and states that he is, "F feet I inches tall," where I is less than 12. What is the value of $F+I$?

32

Enrique and Sadie took a total of 122 photos while they were on vacation. If Enrique had 20 more than half the number of photos on his cell phone than Sadie had on her cell phone, how many photos were on Sadie's cell phone?

33



A regular pentagon is inscribed in a circle with an area of 121π. If the length of arc $\overset{\frown}{ABC}$ is written in the form $D\pi$, what is the value of D?

34

A college professor has noted that his freshman environmental design class has steadily grown to a size of 122 students. If the class size was only 54 students when he started teaching the course 17 years ago, the course enrollment has had an average increase of how many students per year?

35

Line k crosses the x-axis at 5 and is parallel to the line with equation $5y - 12x = 5$. What is the distance between the x-intercept and the y-intercept of Line k?

36

$$B = 3{,}520(0.8)^m$$

Polly is spending a semester studying abroad in Spain. The equation above models the remaining balance in euros of Polly's spending account after m months have passed. By what percent does Polly's spending account balance decrease over the course of three months?

Questions 37-38 refer to the following information.

$$A_{Current} = 1.05(\frac{P_{Current}}{P_{Last}})(A_{Last})$$

A small manufacturer and supplier of bookshelf audio systems spent $5,200 last year on advertising. The manufacturer calculates its current advertising budget in dollars each year, $A_{Current}$, using the formula above where $P_{Current}$ represents the net profit from the current year's sales, P_{Last} is the net profit from last year's sales, and A_{Last} is the advertising budget from last year in dollars.

37

If the company were to have a current net profit that was 20% larger than last year's, how many dollars could the company expect to spend on advertising in the current year?

38

If the company's current net profit were actually $142,500 and the current advertising budget had to be reduced to $5,187, how much larger was last year's net profit than this year's net profit?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1. A
2. D
3. B
4. C
5. A
6. D
7. D
8. C
9. C
10. B
11. B
12. D
13. B
14. C
15. A

Fill-Ins:

16. 10
17. 3
18. 35
19. 125
20. 25 or 4

1. C
2. C
3. C
4. B
5. A
6. B
7. B
8. C
9. D
10. C
11. A
12. C
13. D
14. D
15. C
16. B
17. B
18. A
19. B
20. A
21. A
22. B
23. A
24. B
25. C
26. C
27. C
28. D
29. A
30. A

Fill-Ins:

31. 11
32. 68
33. 44/5 or 8.8
34. 4
35. 13
36. 48.8
37. 6552
38. 7500

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

If $3+h(x-4)=33$ and $h=5$, what is the value of x?

A) $\frac{16}{5}$

B) $\frac{34}{5}$

C) 10

D) 50

2

Manny can ride his bicycle 5 miles in h hours. If Manny rides his bicycle h hours each day for d days, which of the following expressions represents the total number of miles that Manny rode on his bicycle?

A) $5d$

B) $5hd$

C) $\frac{5h}{d}$

D) $\frac{5d}{h}$

3

$$\frac{5x^2-20xy}{3xy-12y^2}$$

If $x \neq 4y$ and $y \neq 0$, the expression above is equivalent to which of the following?

A) 1

B) $x-4$

C) $\frac{5x}{3y}$

D) $\frac{5x(x-20y)}{3y(x-12y)}$

4

$$(-1+i)(-3+2i)$$

Which of the following is equivalent to the value of the expression above? (Note: $i=\sqrt{-1}$)

A) $1-i$

B) $1-5i$

C) $-5-5i$

D) $5-5i$

CONTINUE

5

Hernando owns and operates an ice cream parlor in the city of Highgate. When the ice cream parlor opened, Hernando opened a savings account at a local bank. Not counting any deposits, the balance in Hernando's savings account closely follows the model $B = 5{,}500(1.01)^t$, where B is the account balance t years after the account was opened. The constant 1.01 indicates which of the following in the context of Hernando's savings account balance?

A) The account balance will decrease by 1% each year.

B) The account balance will increase by .01% each year.

C) The account balance will increase by .1% each year.

D) The account balance will increase by 1% each year.

6

$$3p - 9c = 120$$

A video gamer's point total, p, and number of competitions entered, c, closely follows the linear relationship above. If the gamer were to use the equation to estimate the point total based on the number of competitions he had entered, the gamer could expect an increase of how many points per competition?

A) 3

B) 9

C) 12

D) 120

7

If a is not equivalent to 0 and $b = \frac{a}{5}$, what is the value of $\frac{25b}{a}$?

A) $\frac{1}{5}$

B) 5

C) 25

D) 125

8

Given $f(x) = \frac{b}{2}x^2$ and $f(8) = 96$, what is the value of $f(2)$?

A) 2

B) 3

C) 4

D) 6

CONTINUE

9

$$y = -\frac{1}{2}x + 7$$

Line k is perpendicular to the line defined by the equation above and passes through the point $(4,0)$. Which of the following points also lies on line k?

A) $(0,8)$

B) $(2,-4)$

C) $(2,-2)$

D) $(2,8)$

10

$$S = \frac{(\frac{320}{h})(h-8)}{64B} - MPh$$

The final selling price per bottle, S, for B bottles of breath mints can be calculated based on the number of hours, h, that the manufacturing machines have been running, M, the number of men operating the machines, and P, the current hourly wage for the machine workers. Which of the following gives B in terms of S, h, M, and P?

A) $B = \frac{(\frac{320}{h})(h-8) - MPh}{64S}$

B) $B = \frac{(\frac{320}{h})(h-8)}{64S + MPh}$

C) $B = \frac{(\frac{320}{h})(h-8)}{64(S + MPh)}$

D) $B = \frac{64S - 64MPh}{(\frac{320}{h})(h-8)}$

11

$$12x - 2y = 21$$
$$-4x + Ay = -7$$

If the system of equations above is true for all values of x and y, what is the value of A?

A) $-\frac{1}{3}$

B) -1

C) 1

D) $\frac{2}{3}$

12

One phone service provider charges \$1 for the first two minutes of a long-distance phone call and \$0.03 per minute thereafter. Another phone service provider charges \$0.05 per minute for long-distance calls of any length. What is the price, in dollars, of a long-distance phone call that costs the same from both providers?

A) 2.35

B) 2.65

C) 47

D) 53

CONTINUE

13

$$\frac{16^x \bullet 4^y}{2}$$

If $4x+2y-1=5$, what is the value of the expression above?

A) 1

B) 32

C) 64

D) 1024

14

$$m(x^2-b^2)=(2x-1)(2x+1)$$

If the equation above is true for all values of x, m is a constant, and $b<0$, what is the value of b?

A) $-\frac{1}{2}$

B) $-\frac{1}{16}$

C) $\frac{1}{16}$

D) $\frac{1}{2}$

15

Given that $x<0$, which of the following is equivalent to the expression $\frac{\frac{1}{x-1}+\frac{1}{x-2}}{4x-6}$?

A) $\frac{1}{2x^2-6x+4}$

B) $\frac{2}{x^2-3x+2}$

C) $\frac{8x^2-24x+18}{x^2-3x+2}$

D) $\frac{1}{2}$

CONTINUE

16

How many integer values of x satisfy the inequality $2x^2 - 9x + 4 < 0$?

17

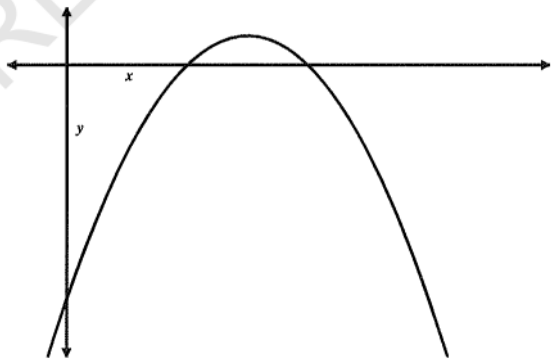
$$y = x^2 - 2x + 1$$
$$y = -2x + \frac{13}{4}$$

If the point (x_1, y_1) is a solution to the system of equations above in which $x_1 > 0$, what is the value of y_1?

18

In a right triangle, the smaller acute angle measures $x°$ and the larger acute angle measures $y°$. If $\sin x° = \frac{5}{13}$, what is $\tan y°$?

19



The equation of the function graphed above in the y-plane can be written in the form $y = -a(x - h)^2 + 1$ where a and h are positive constants. If the function crosses the x-axis at 2 and 4, what is the value of a?

20

A triangle has two sides that measure 6 inches and 26 inches. A similar triangle has sides that measure exactly half of the length of the original triangle What is the greatest possible area of the smaller triangle?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1

$\frac{y}{x} = k$ where k is a positive constant. If $y = 12$ when $x = 60$, what is the value of y when $x = 35$?

A) 5

B) 7

C) 25

D) 175

2

Three less than one half of a number is twelve more than the number. What is the number?

A) -30

B) -15

C) $-\frac{15}{2}$

D) 30

3

There are 128 ounces in a gallon of orange juice. A one pint glass can hold exactly 16 ounces of liquid. Three half-gallon containers of orange juice can fill exactly how many pint glasses with orange juice?

A) 6

B) 8

C) 12

D) 24

4

For how many integer values of x is $x^2 + 16 \leq 7$?

A) 0

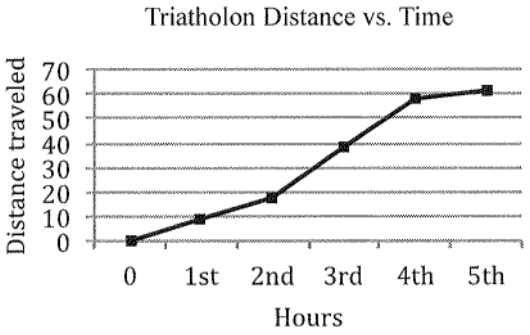
B) 1

C) 2

D) Infinitely many

CONTINUE

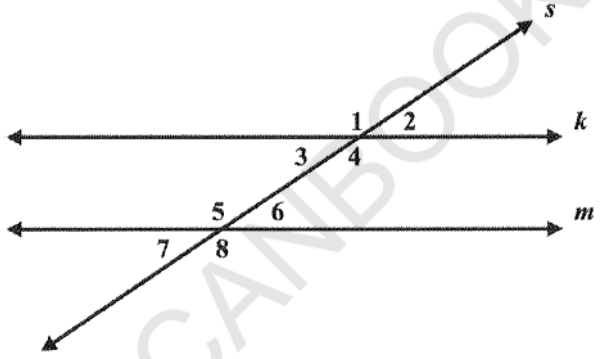
5



Tom recently entered a triatholon where he had to swim, run, and cycle a course that totaled 61 miles. If Tom cycles faster than he runs and runs faster than he swims, during which of the following intervals could Tom have been running?

A) 0-2 hours
B) 0-4 hours
C) 2-4 hours
D) 4-5 hours

6



If line k is parallel to line m and $\angle 1$ has twice the measure of $\angle 3$, what is the measure of $\angle 5 + \angle 8$ in degrees?

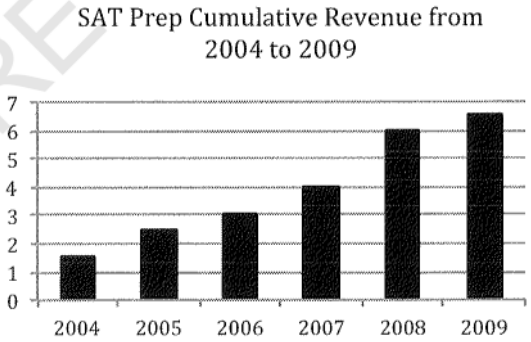
A) 60
B) 120
C) 240
D) 270

7

A scatterplot created in the xy-plane is populated by a group of 24 points that closely approximates a line with little to no outliers. A best fit line has been calculated for the data and has the equation $y = -0.5x + 6.5$. Which of the following best describes the association between the variables x and y?

A) Strong positive linear association
B) Weak positive linear association
C) Strong negative linear association
D) Weak negative linear association

8



The cumulative revenue for an SAT preparation company for the years 2004 through 2009 is shown in the bar graph above. If $500,000 was made by the company over the course of the year 2005, which of the following would be an appropriate label for the vertical axis of the graph?

A) Cumulative revenue as per the first of the year in millions of dollars.
B) Cumulative revenue as per the first of the year in thousands of dollars.
C) Cumulative revenue as per the last day of the year in millions of dollars.
D) Cumulative revenue as per the last day of the year in thousands of dollars.

CONTINUE

9

If b is a prime number and the product bc is equivalent to 30 for some positive integer value of c, which of the following could NOT be the value of b?

A) 2

B) 3

C) 5

D) 7

10

The average of 11 consecutive numbers is 9. If the largest number is increased by 55, by how much does the average increase?

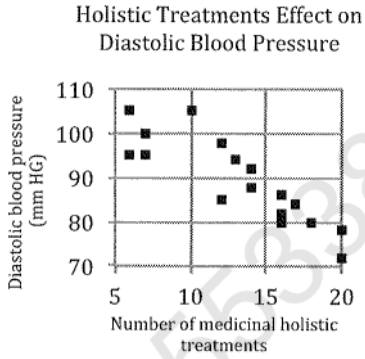
A) 3

B) 5

C) 9

D) 14

Questions 11 and 12 refer to the following information.



A random sample of 17 adults diagnosed with high blood pressure who have been undergoing medicinal holistic treatments to reduce their diastolic blood pressure were asked the number of treatments they have received and their current diastolic blood pressure. The results are gathered in the scatterplot above.

11

Which of the following linear models could best be used as a line of best fit to predict diastolic blood pressure, D, in mm HG as defined by t, the number of medicinal holistic treatments received?

A) $D = -2.3t + 110$

B) $D = -2.3t + 122$

C) $D = -3.5t + 110$

D) $D = -3.5t + 122$

12

For the one patient who reported 10 treatments, what is the approximate difference between the patient's observed diastolic blood pressure and the diastolic blood pressure that would have been predicted using the best fit model?

A) 0

B) 6

C) 18

D) 30

CONTINUE

13

Runner	Time
Daniel	4:30
Bill	5:05
Geraldine	5:25
Gregory	4:45
Angela	5:05
Samantha	4:50

The table above includes the times, in minutes and seconds, that it took 6 runners to complete a one-mile run. Geraldine's time was accidentally recorded as a minute longer than she actually ran. If Geraldine's time were adjusted appropriately, which of the following would change?

A) Range

B) Median

C) Mean

D) They will all change.

14

If $f(x) = 3x^2 - 6x + 2$, what is the least possible value of $f(x)$?

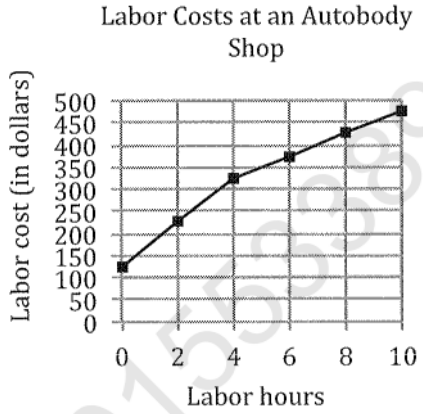
A) -1

B) 1

C) Infinite

D) The minimum value cannot be determined.

Questions 15 and 16 refer to the following information.



The graph above displays the total cost of labor for an autobody repair job that lasts between 0 and 10 hours.

15

What does the point at $(0,125)$ represent in the graph?

A) The total number of laborers required.

B) The initial cost of parts required for the job.

C) The initial fixed cost of a repair.

D) The total cost of repair and labor if no additional labor hours are required.

16

What is the difference in the price of additional labor per hour, in dollars, during the period from 0 to 4 hours as compared to the period from 4 to 10 hours?

A) 25

B) 35

C) 50

D) 100

CONTINUE

Questions 17 and 18 refer to the following information.

	Business	Science	TOTAL:
Undergraduate	18	9	27
Graduate	27	9	36
TOTAL:	45	18	63

63 students studying business or science at a local university were asked which degree they were working toward and if they were undergraduates or graduate students. The results were collected in the table above.

17

Which of the following categories accounts for approximately 43% of the students in the sample?

A) Graduate students studying Business
B) Graduate students
C) Undergraduate students studying Business
D) Undergraduate students studying Science

18

If a student studying business were to be selected at random, what is the probability that the student is an Undergraduate?

A) $\frac{2}{5}$

B) $\frac{3}{7}$

C) $\frac{2}{3}$

D) $\frac{5}{7}$

19

The drama club at a high school is charging \$5 for tickets sold in advance to the performance of the spring play and \$7 for tickets sold on the day of the performance. If the club sold a total of 200 tickets and raised a total of \$1,150, how many tickets were sold on the day of the performance?

A) 50
B) 75
C) 125
D) 150

20

$$y = 2x + a$$
$$y = ax + 2$$

If the coordinate point $(1,s)$ is the only solution to the system of linear equations above, which of the following statements is true about a and s?

A) $a+s=2$

B) $a=s+2$

C) $a+2=s$

D) $a=\frac{s}{2}$

CONTINUE

21

$$x^2 + y^2 - 2y = 3$$

Which of the following coordinate points is the center of the circle represented by the equation above?

A) $(0,-1)$

B) $(0,2)$

C) $(1,0)$

D) $(0,1)$

22

Helina bought a purse that was discounted by 35% and her receipt read that she paid d dollars. If Helina paid 6% sales tax, which of the following is equivalent to the original selling price of the purse?

A) $0.35(1.06)d$

B) $0.65(1.06)d$

C) $\dfrac{1.06d}{0.65}$

D) $\dfrac{d}{0.65(1.06)}$

23

A statistics professor at Knoll University noticed that the enrollment for Introductory Statistics was 30% lower than the enrollment for Intro to Statistics for Business. If there were 210 students enrolled in Introductory Statistics, how many students enrolled in Intro to Statistics for Business?

A) 63

B) 147

C) 300

D) 840

24

A tennis ball is thrown upward from the ground and its height, h, with respect to time, t, is given by the equation $h = 22t - t^2$. Some kids are sitting on the roof of a building that stands 21 feet tall. If the kids are sitting in such a position that they cannot see the ball until it reaches the height of the roof, for how many seconds of the tennis ball's flight can the kids see the ball?

A) 18

B) 20

C) 21

D) 22

CONTINUE

Questions 25 and 26 refer to the following information.

Net Profit for Multiple Income Streams of a Music Store

	2010	2011	2012	2013	2014
Classes	35	41	45	49	55
Book Sales	12	14	13	12	14
Equipment Sales	4	8	15	31	64
TOTAL:	51	63	73	92	133

The table above displays the net profit in thousands of dollars for the three sales divisions of a music store from the year 2010 through the year 2014.

25

The net profits of which of the following divisions of the music store would best be approximated by a linear equation of the form $y = b$ where b is a positive constant?

A) Classes
B) Book Sales
C) Equipment Sales
D) None of the divisions

26

Which of the following best approximates the average change in dollars per year of net profits from the sale of classes?

A) 4
B) 5
C) 4,000
D) 5,000

27

$$x + y < -1$$
$$x - 2y \geq 2$$

Which of the following is true of all solutions (x, y) in the solution set of the system of linear inequalities above?

A) $x < y$
B) $y \leq x$
C) $x \leq -1$
D) $y < -1$

28

When the polynomial $f(x)$ is divided by $x - 4$, the remainder is equivalent to $\frac{5}{x-4}$. Which of the following statements must be true?

A) $f(4) = 5$
B) $f(-4) = 5$
C) $f(5) = 4$
D) $f(4) = 0$

CONTINUE

29

	Number of Gold Awards
Student 1	5
Student 2	8
Student 3	2
Student 4	4
Student 5	1
Student 6	10

6 students were each asked to play 50 simple mind games generated by an educational website and to record the number of Gold Awards they received in those 50 games. The website states that any student who earns over 500 Gold Awards will be entered in a lottery to win a free iPad. A new student would like to know how many Gold Awards he could expect to win if he played all of the games generated by the website. Using the data in the table above, if the website boasts that it has 45,000 games available, how many Gold Awards can the student reasonably expect to receive if he plays all of the games generated by the website?

A) 450

B) 500

C) 4,500

D) 7,500

30

$$y = -x^2 + 6x - 5$$

The quadratic equation above reaches its maximum at the point (a, b). A second quadratic equation intercepts the x-axis at the same points as the equation above, except it has an absolute minimum at the point $(a, -b)$. Which of the following is an equivalent form of the second quadratic equation in which a and $-b$ appear as constants in the equation?

A) $y = (x-1)(x-5)$

B) $y = (x+1)(x+5)$

C) $y = (x-3)^2 - 4$

D) $y = -1(x-3)^2 + 4$

CONTINUE

31

Justine makes homemade candles as a small side business to make extra money. Justine ships her candles in pre-paid shipping boxes that allow her to ship a maximum weight of 28 pounds in each box before she is charged additional postage. Justine knows that the packaging material for each box of candles weighs 3 pounds and she knows that each candle weighs 1.5 pounds. If x is the maximum number of candles that Justine can pack in the shipping box without going over weight, what is the value of x?

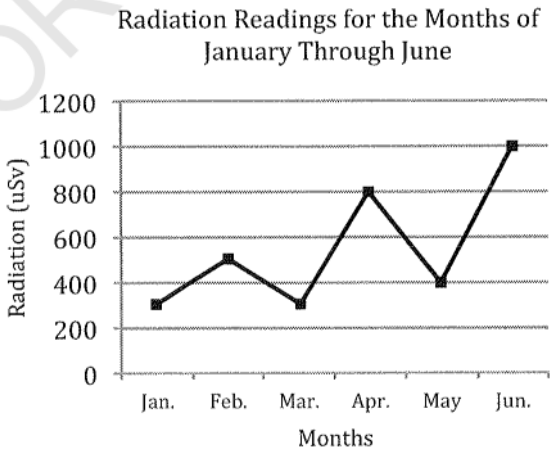
32

Felipe rents self-storage spaces that measure 320 cubic feet each. Each warehouse that Felipe owns has a total of 17,600 cubic feet of available rental space. If Felipe owns two warehouses, how many total self-storage spaces can he rent?

33

Daniella trains for long distance road races. In her most recent training cycle, her lowest average pace for a single run was 5 miles per hour, whereas her fastest pace was completed on a day where she ran 14 miles in 2 hours. If Daniella were to run for 2 and a half hours, what is one possible distance, in miles, she could have run?

34



According to the radiation readings in the line graph above, the radiation reading in June was what percent larger than the radiation reading in April?

CONTINUE

35

A square with an area of 16 square centimeters is inscribed in a circle. If the area of the square is $\frac{a}{\pi}\%$ of the area of the circle, what is the value of a?

36

$$g(x) = \frac{x-2}{x^3 - \frac{5}{2}x^2 + x}$$

For how many values of x is the function above undefined?

CONTINUE

Questions 37-38 refer to the following information.

$$\$2{,}100\left(1+\frac{r}{100}\right)^{\frac{m}{12}}$$

The account balance of a savings account at a bank can be calculated using the expression above, where r is the annual interest rate of the account and m is the number of months that have passed since the initial deposit of \$2,100 was placed in the account.

37

If the account balance after 24 months was \$2,227.89, what is the value of r?

38

If the account balance was \$2,227.89 after 24 months had passed, by exactly what rational number of percentage points must the annual interest rate, r, be increased in order for the account to grow to the same value in half the amount of time?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1. C
2. A
3. C
4. B
5. D
6. A
7. B
8. D
9. B
10. C
11. D
12. A
13. B
14. A
15. A

Fill-Ins:

16. 3
17. 1/4 or .25
18. 12/5 or 2.4
19. 1
20. 39/2 or 19.5

1. B
2. A
3. C
4. A
5. A
6. C
7. C
8. A
9. D
10. B
11. B
12. B
13. D
14. A
15. C
16. A
17. A
18. A
19. B
20. C
21. D
22. D
23. C
24. B
25. B
26. D
27. D
28. A
29. C
30. C

Fill-Ins:

31. 16
32. 110
33. $12.5 < x < 17.5$
34. 25
35. 200
36. 3
37. 3
38. 3.09

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

Resha and Kiley wrote a total of 842 text messages in the last month. If Resha wrote 4 less than twice the number of text messages that Kiley wrote, which of the following equations could be solved to find x, the number of text messages written by Kiley?

A) $2x-4=842$

B) $3x-4=842$

C) $4-2x=842$

D) $4-x=842$

2

$$b\sqrt{b}$$

The expression above is *not* equivalent to which of the following expressions?

A) $\sqrt{b^3}$

B) $b^{\frac{3}{2}}$

C) $\frac{b^3}{b^2}$

D) $\sqrt{\frac{b^5}{b^2}}$

3

If $4x^2-17=11$, what is the value of $16x^2$?

A) -24

B) 7

C) 56

D) 112

4

$$4x+9y=12$$
$$5x+3y=12$$

What is the value of $3x+4y$ given that the coordinate pair (x,y) is a solution to the system of equations above?

A) 6

B) 8

C) 12

D) 24

CONTINUE

5

$$\frac{a-2}{2}=\frac{3a}{a+8}$$

If the equation above is true, what is the value of a^2 ?

A) -4

B) 4

C) 16

D) 256

6

A professional steam cleaning service charges its clients by using the expression $CLh+f$, where C is the number of cleaning machines, L is the number of laborers, h is the number of hours, and f is the square footage of the area to be cleaned. If the carpets at a certain location are stained much deeper than expected, which of the following values would be affected the most?

A) C

B) L

C) f

D) CLh

7

Line m is perpendicular to a line with the equation $y=-Kx+t$. If line m goes through the point $(4,3)$ and has a y-intercept at the point $(0,b)$, which of the following is equivalent to b?

A) $b=4-\frac{3}{K}$

B) $b=3-\frac{4}{K}$

C) $b=4+3K$

D) $b=3+4K$

8

$$2x+y=15$$
$$kx-4y=100$$

If the system of equations above has one solution at the point $(1,y)$, what is the value of k?

A) 13

B) 48

C) 152

D) 168

CONTINUE

9

The quadratic function $y=-(x-2)^2+4$ intercepts the origin. If the absolute maximum of the function occurs at point A, what is the distance between point A and the origin?

A) $2\sqrt{3}$

B) $2\sqrt{5}$

C) 5

D) $4\sqrt{3}$

10

In the polynomial $g(x)$, if $g(2)=1$, which of the following must be true?

A) $x-2$ is a factor of $g(x)$.

B) $x-1$ is a factor of $g(x)$.

C) $x+2$ is a factor of $g(x)$.

D) The remainder when $g(x)$ is divided by $x-2$ is 1.

11

The quadratic function $y=x^2-12x+20$ intercepts another quadratic function $y=-x^2+12x-34$ at the points A and B. What is the length of $\overline{AB}$?

A) 3

B) 4

C) 6

D) 9

12

If the expression $2x^2-7x+M$ is divided by the binomial $2x+5$, the remainder is $\frac{4M}{2x+5}$. What is the value of M?

A) 6

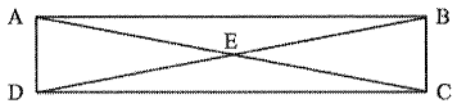
B) 10

C) 36

D) 100

CONTINUE

13



In the figure above, quadrilateral ABCD is a rectangle. If the measure of $\angle DAE$ is four times the measure of $\angle BAE$, what is the measure of $\angle AED + \angle BEC$ in degrees?

A) 18

B) 36

C) 72

D) 144

14

For integers a and b, if $|a-b| = 2a$ and $a+b=0$, which of the following must be true?

I. $a^2 = b^2$

II. $a-b<0$

III. $ab<0$

A) I only

B) I and III only

C) II and III only

D) I , II, and III

15

The coordinate pairs $(\frac{-1+\sqrt{13}}{3},0)$ and $(\frac{-1-\sqrt{13}}{3},0)$ are solutions to which of the following equations?

A) $y=3x^2+2x-4$

B) $y=\frac{3}{2}x^2+2x-8$

C) $y=x^2-16x+39$

D) $y=3x^2-40x+13$

CONTINUE

16

$$2+\frac{3}{7}(x-\frac{1}{3})=\frac{5}{2}$$

What value of x makes the equation above true?

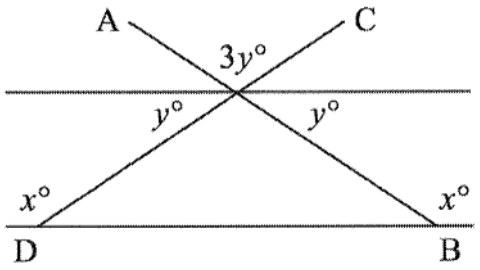
17

For what value of x, where $x>0$, is the equation $255=(x^2+1)(x^2-1)$ true?

18

In a recent gymnastics competition, Team A scored 30 points less than four times the number of points that Team B scored. Team C scored 61 points more than half of the number of points that Team B scored. If Team A and Team C shared in the victory, having earned the same number of points, how many more points did each team have than Team B?

19



If $\overline{AB}$ intersects $\overline{CD}$ as shown in the figure above, what is the value of x?

CONTINUE

20

A 26 foot bridge crosses a stream at an incline. If one bank of the river is 2 feet above the height of the water and the other bank is 12 feet above water level, what is the tangent of the angle that the bridge makes with the surface of the water?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

Section II
Calculators are required
(60 minutes)

1

$$(12x^2+5x+1)-(10x^2-5x-1)$$

The difference of the polynomials shown above is equivalent to which of the following expressions?

A) $2x^2+10x+2$

B) $2x^2+10x$

C) $2x^2+2$

D) $2x^2$

2

x	y
-3	5
0	7
6	11
9	13

Which of the following linear equations is displayed in the *xy*-table above?

A) $y=\frac{2}{3}x+7$

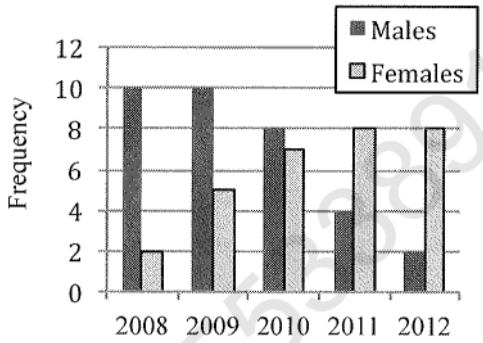
B) $y=\frac{2}{3}x+5$

C) $y=2x+7$

D) $y=3x+5$

3

Distribution of Actuarial Students



If one actuarial student were to be selected at random from all of the actuarial students from 2008 to 2012, what is the probability that the student is a female from either 2011 or 2012?

A) $\frac{3}{32}$

B) $\frac{1}{8}$

C) $\frac{1}{4}$

D) $\frac{11}{32}$

4

Approximately 22% of the students at Lakesedge High School are sophomores and 40% of the sophomores took the class Contemporary American Issues. If there are 1670 students in Lakesedge High School, approximately how many sophomores took Contemporary American Issues?

A) 135

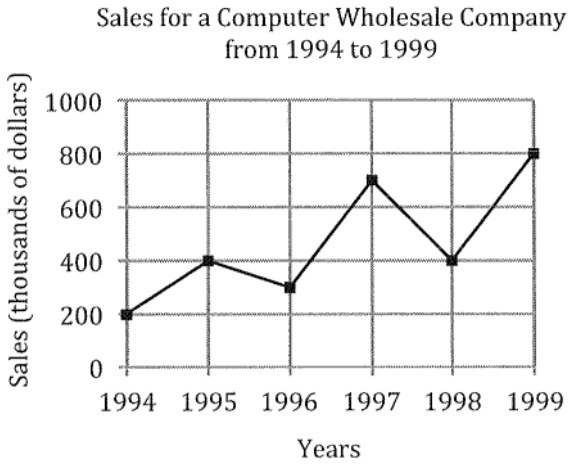
B) 150

C) 370

D) 670

CONTINUE

5



The graph above shows the total sales in thousands of dollars each year from 1994 to 1999 for a computer wholesale company. Which of the following best describes the trend in sales from 1994 to 1999?

A) The sales steadily increased each year.

B) The sales increased and then decreased.

C) The sales increased on average by approximately \$100 each year.

D) The sales increased on average by approximately \$100,000 each year.

6

If $\frac{7}{2}a = \frac{5}{b}$ and $a = 5$, what is the value of b?

A) $\frac{2}{7}$

B) $\frac{7}{2}$

C) $\frac{50}{7}$

D) 14

7

Madeline can drink 13 bottles of water in 5 minutes. Approximately how many seconds would it take Madeline to drink 3 bottles of water?

A) 1.2

B) 15

C) 23

D) 69

8

The enrollment for a training seminar for construction foremen on how to employ tablets as a means of updating progress at construction sites has increased by 18 people since the seminar's inception six years ago. If the current enrollment is 42 construction foremen, which of the following linear equations could be used to estimate the enrollment, y, based on the number of years, x, that have passed since the first year the seminar was held?

A) $y = 18x + 42$

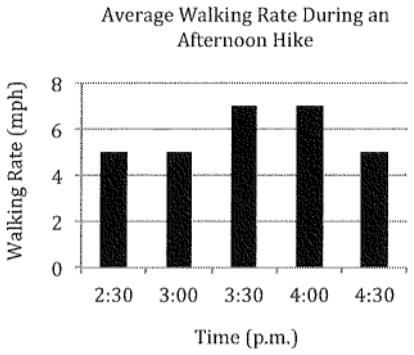
B) $y = 18x + 24$

C) $y = 3x + 42$

D) $y = 3x + 24$

CONTINUE

9



Hernando was hiking one afternoon and he would record his walking rate in miles per hour every half an hour until his hike was over. At one point during his hike, Hernando switched from walking uphill to walking downhill. If Hernando walks at a constant rate uphill and a constant rate downhill, Hernando most likely transitioned from walking uphill to walking downhill during which of the following time frames?

A) 2:30 to 3:00

B) 3:00 to 3:30

C) 3:30 to 4:00

D) 4:00 to 4:30

10

$$y = a(x-h)^2 + k$$

The quadratic equation above is the vertex form of a quadratic function where a, h, and k are constants and (h,k) is the vertex of the function's graph. Which of the following equations gives the x-coordinate of the vertex in terms or y, a, x, and k, where $x > 0$?

A) $h = \frac{y-k}{a} - x$

B) $h = x - \frac{y-k}{a}$

C) $h = \sqrt{\frac{y-k}{a}} - x$

D) $h = x - \sqrt{\frac{y-k}{a}}$

Questions 11 and 12 refer to the following information.

Name of Tree	Growth Rate (Feet per year)	Years to Maturity
Empress	15	3.33
Lombardy Poplar	10	6
Eucalyptus	8	5
Quaking Aspen	5	10
Cleveland Pear	4	7.5

The chart above shows the names, growth rates, and years to maturity of 5 of the fastest growing trees in the world. A tree's maturity is defined as the point at which a tree's future growth is negligable and the tree has reached its highest height.

11

Which of the following pairs of trees will be of the same approximate height when they have reached maturity?

A) Empress and Lombardy Poplar

B) Eucalyptus and Cleveland Pear

C) Empress and Quaking Aspen

D) Lombardy Poplar and Quaking Aspen

12

The tree with the greatest height at maturity is what percent taller than the tree with the lowest height at maturity?

A) 50

B) 66

C) 100

D) 200

13

At an arcade, a machine dispenses 4 tokens for every dollar placed in the machine. If a boy uses his tokens at a steady rate and puts a ten dollar bill in the machine every 20 minutes, which of the following equations represents t, the total number of tokens dispensed by the machine in m total minutes of time?

A) $t = 20(4)m$

B) $t = 20(10)(4)m$

C) $t = \frac{4m}{20}$

D) $t = \frac{10(4)m}{20}$

14

Name	Time (seconds)
Andrew	12
Brenda	9
Larissa	14
Mandeep	8
Roger	13
Shobitha	6
Willamina	12
Xavier	8

As a fun project to get her students interacting with each other, a kindergarten teacher decided to have every student tie both of his or her shoes and she recorded the time that it took each student to complete the task. She recorded the data in the table above. What is the median time it takes one of the students to tie his or her shoes?

A) 9
B) 10.5
C) 11.5
D) 12

15

A student conducting an experiment would like to test the theory that temperature affects the elasticity before breaking of a rubber band. The student takes a random sample of 20 rubber bands from Company A and places them in the freezer for 15 minutes. The student also takes a random sample of 20 of the same sized rubber bands from Company B and places them on a warming tray for 15 minutes. After the 15 minutes have passed, the student tests all 40 rubber bands. All of the rubber bands from the freezer snapped at under 10 inches of stretch length and all of the rubber bands from the warming tray broke at over 10 inches of stretch length. Which of the following conclusions can be drawn by the student?

A) Frozen rubber bands have less elasticity before breaking than rubber bands that have not been frozen.
B) Frozen rubber bands have less elasticity before breaking than rubber bands that have been warmed.
C) Frozen rubber bands from Company A have less elasticity before breaking than frozen rubber bands from Company B.
D) The student cannot draw a conclusion because he does not know whether the frozen rubber bands have less elasticity before breaking because they were frozen or because they were made by a different company.

16

Osmium is the densest of all metals. A single liter of osmium weighs 50 pounds. If there are 3.88 liters in every gallon, how many gallons of osmium would weigh 582 pounds?

A) 2
B) 2.65
C) 3
D) 11.64

CONTINUE

Questions 17 and 18 refer to the following information.

$$y = 10 + 62x$$

$$y = 10(2)^x$$

Two stock market analysts have generated models for the growth of a stock that recently became publicly traded. The models predict the trading price of the stock, y, based on x, the number of years that have passed from the stock's opening trading date. Both analysts believe that the stock is going to be extremely successful over its first few years. However, one analyst believes that the stock will follow a linear growth model and the other analyst believes that the stock will see exponential growth.

17

By how much more does the analyst who generated the exponential model feel that the stock is going to increase from its 3rd to 4th year, than the analyst who predicts linear growth?

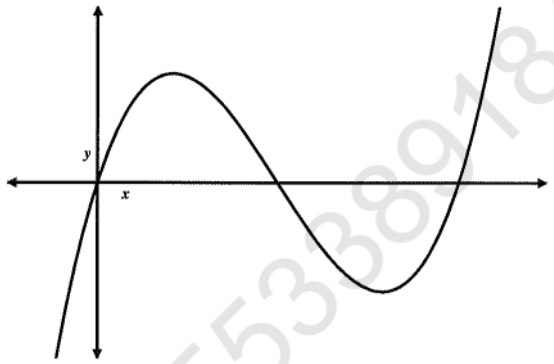
A) 18
B) 22
C) 40
D) 80

18

The linear growth model places the stock at its greatest advantage over the exponential model after approximately how many years have passed?

A) 2
B) 3
C) 4
D) 5

19



The function $g(x)$ is graphed in the xy-plane above. Which of the following could be the equation for $g(x)$?

A) $y = -x^2 + 2x$
B) $y = (x-3)^3$
C) $y = x^3 - 6x^2 + 8x$
D) $y = x^3 + 6x^2 + 8x$

20

The sum of four numbers is 84. If one of the numbers is equivalent to the sum of the other three numbers, what is the average of the other 3 numbers?

A) 7
B) 14
C) 21
D) 42

21

On halloween, Mrs. Darcy had enough candy to give each person who came by her house 2 pieces of candy, and she then had 24 pieces of candy left over. If Mrs. Darcy had given each trick-or-treater 5 pieces of candy, she would have needed twice as much candy to give an equal amount to everyone that came by her house. How many trick-or-treaters came by Mrs. Darcy's house?

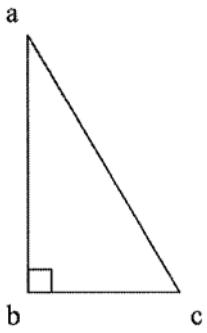
A) 48

B) 60

C) 96

D) 120

22



If the measure of $\angle acb$ is equivalent to $7x+4$ degrees and the measure of $\angle cab$ is equivalent to $4x-2$ degrees, what is the tangent of $\angle acb$?

A) $\frac{1}{2}$

B) $\frac{1}{\sqrt{3}}$

C) $\sqrt{3}$

D) 2

23

A cylindrical container of salt stands 6 inches tall and has a diameter of 3 inches. If all of the salt in the container is poured into another cylindrical container that has 3 times the diameter of the first container, how tall must the second container be, in inches, in order to hold the same amount of salt?

A) $\frac{1}{3}$

B) $\frac{2}{3}$

C) $\frac{4}{3}$

D) 2

24

$$H(x)=2.1x+48$$

The equation above is a best fit line that is used to predict the height of a person in inches, $H(x)$, given the person's shoe size, x, for shoe sizes where $6<x<13$. In a scatterplot, the residual of a data point is defined as the difference between an observed data point and a predicted data point, or *observed – predicted*. If the residual for a particular person who had a size 10 shoe was -3, what was the observed height in inches of the person?

A) 66

B) 69

C) 72

D) 75

CONTINUE

25

By what percent must each side of a cube with a volume of 8 cubic inches be increased in order to attain a volume of 27 cubic inches?

A) 25%

B) 50%

C) 67%

D) 150%

26

Which of the following *does not* detail an account balance that grows exponentially?

A) At the end of each month, an account grows by 5% of the total value of the account.

B) At the end of each month, an account increases by one tenth of its current value.

C) At the end of each month, an account increases by 10% more than $100.

D) At the end of each month, an account increases by 99% less than its current value.

27

Two different lines with two different slopes are both satisfied by the coordinate pairs $(5,24)$ and $(15,h^2)$, where h happens to be the value of each of their respective slopes. What is the sum of the two slopes?

A) -10

B) -2

C) 10

D) 14

28

$$a = 2b + 3$$
$$4c = 5d + 6$$

In the system of linear relationships above, if a is equivalent to $3c$, which of the following expressions is equivalent in value to d?

A) $\frac{8b-6}{15}$

B) $\frac{8b+6}{5}$

C) $\frac{8b-3}{15}$

D) $\frac{2b-3}{5}$

CONTINUE

29

A radioactive isotope has decayed to a size of 202 kilograms over the last 20 years. If the isotope has a half-life of 40 years, which of the following is equivalent to I, the initial mass of the isotope 20 years prior?

A) $I = 202(\frac{1}{2})^2$

B) $I = 101(\frac{1}{2})^2$

C) $I = 101\sqrt{2}$

D) $I = 202\sqrt{2}$

30

In a group of 250 men and women, some are doctors and some are lawyers. There are 50 more women than men and there are 100 fewer doctors than lawyers. If there are 30 male doctors and a woman is to be selected at random, what is the probability that the woman is a lawyer?

A) $\frac{3}{10}$

B) $\frac{2}{5}$

C) $\frac{3}{5}$

D) $\frac{7}{10}$

CONTINUE

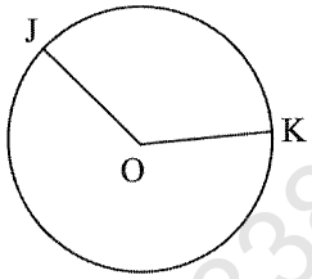
31

If the function $g(x)$ is created by adding the expression $-x^2+22$ to the expression $2x^2+7x-52$, what is the absolute value of the sum of the roots of $g(x)$?

32

Jefferson has at least one ten-dollar bill, one five-dollar bill, and one one-dollar bill in his wallet. If Jefferson has $30 in his wallet, what is one possible number of one-dollar bills he can have in his wallet?

33



If the measure of arc $\overset{\frown}{JK}$ is 7 and the area of circle O is 16π, what is the measure of $\angle JOK$ in radians?

34

If $x>-2$ and $y\geq\frac{13}{2}x+20$, what is the least integer value of y that satisfies the system of linear inequalities?

CONTINUE

35

The sum of 8 different positive integers is 124. If at least 3 of the integers are greater than 10, what is the greatest possible value that one of the integers can have?

36

$$f(x) = x^2 + abx + bc$$

In the function above, a, b, and c are positive integer constants. If $f(x)$ has only one root at the point $(-4,0)$ and $b < a < c$, what is one possible value for the product abc?

Questions 37-38 refer to the following information.

$$w = mg$$

The weight of an object, measured in Newtons, N, is the force of gravity acting on the object It can be calculated by multiplying the mass of an object, in kilograms, or kg, by gravitational acceleration in meters per second squared, or m/s^2. The gravitational acceleration on Earth is 9.8 m/s^2 and the gravitational acceleration on Mars 3.75 m/s^2.

37

If one Newton of force is equivalent to approximately 0.225 pounds of force and a 200-pound man were to stand on a standard scale on the surface of Mars, what would the scale read in pounds? *(Round the answer to the nearest tenth of a pound.)*

38

If the same man were to stand on the scale on a mysterious planet and the scale read 1,000 pounds, the planet would have to have a gravitational acceleration that was how many times as large as the gravitational acceleration on Mars? *(Round the answer to the nearest whole number.)*

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

SECTION 3 – MATH

1. B
2. C
3. D
4. B
5. C
6. D
7. B
8. C
9. B
10. D
11. C
12. B
13. C
14. A
15. A

Fill-Ins:

16. 3/2 or 1.5
17. 4
18. 48
19. 144
20. 5/12, .416, or .417

SECTION 7 – MATH

1. A
2. A
3. C
4. B
5. D
6. A
7. D
8. D
9. B
10. D
11. C
12. C
13. D
14. B
15. D
16. C
17. A
18. B
19. C
20. B
21. A
22. C
23. B
24. A
25. B
26. C
27. C
28. A
29. D
30. D

Fill-Ins:

31. 7
32. 5, 10, or 15
33. 7/4 or 1.75
34. 8
35. 86
36. 64 or 128
37. 76.5
38. 13

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

$$103 = 8x + 9$$

Given the equation above, what is the value of $4x + 4$?

A) 12

B) 51

C) 52

D) 102

2

The coordinate point $(1, -1)$ is a solution to which of the following systems of linear inequalities?

A) $x + y \geq 0$
$x - y \leq 0$

B) $x - y \geq 0$
$x + y \leq 0$

C) $2x + 3y < 0$
$3x + 4y > 0$

D) $-x - 2y < 0$
$-x + 4y > 0$

3

Line r is perpendicular to line s in the xy-plane. If line r goes through the points $(-10, 0)$ and $(0, 5)$ and line s goes through the origin, at what value of x do the two lines intersect?

A) -2

B) -1

C) 2

D) 4

4

$$\sqrt{g} + 3 = x$$

If $g = 3x + 1$ and x must be greater than 1, what is the value of x?

A) 1

B) 3

C) 8

D) 9

CONTINUE

5

A kindergarten teacher's supply of crayons during the school year follows the linear model $N = 450 - 3c$, where N is the remaining supply of crayons and c is the number of classes that have passed. What does the value -3 most likely represent in this equation?

A) The number of crayons that the teacher distributes for use during class each day

B) The number of crayons that the teacher distributes for use to each student each day

C) The number of crayons that are used up or lost by each student each day of class

D) The number of crayons that are used up or lost by the entire class each day

6

Which of the following expressions is equivalent to the expression $4x^2 - 35$?

A) $(2x+6)(2x-6)+1$

B) $(2x+6)(2x-6)-1$

C) $(2x+3)(2x-3)+26$

D) $(2x+3)(2x-3)-16$

7

The measure of the length of an arc in degrees can be calculated using the expression $\frac{\theta \pi d}{360}$, where θ is the measure of the central angle that defines the arc in degrees and d is the diameter of the circle. What is the smallest integer diameter that a circle can have if the measure of the arc is π inches and $\theta < 120°$?

A) 2

B) 3

C) 4

D) 6

8

If $a^{x^2} \bullet a^{4x} \bullet a^4 = a^9$, $a > 0$, and $x > 0$, what is the value of x?

A) -5

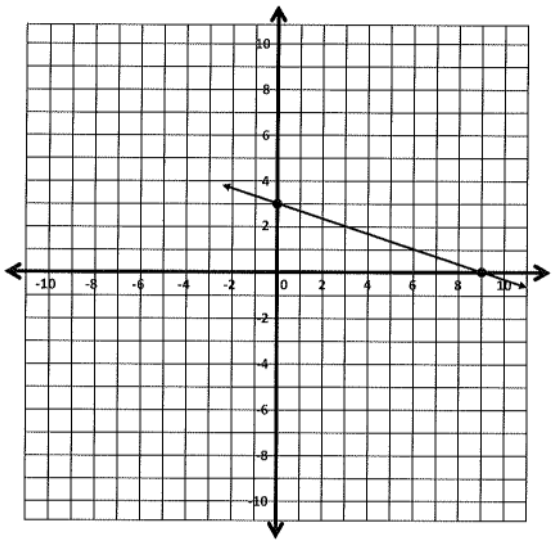
B) 1

C) 3

D) 7

CONTINUE

9



Line h is parallel to the line graphed in the xy-plane above. If line h goes through the point $(0,-\frac{4}{3})$, what is the x-value of the x-intercept of line h?

A) -4

B) -3

C) $-\frac{9}{4}$

D) $\frac{3}{4}$

10

Which of the following equations has a graph in the xy-plane where y is always less than or equal to 6?

A) $y = x^2 + 6$

B) $y = -x^2 + 36$

C) $y = |x - 6|$

D) $y = -|x| + 6$

11

A fallen tree branch in the woods has an initial mass of 125 kilograms and decays by 15% of its mass every year. Which of the following equations gives the current mass, M, of the fallen tree branch after x years have passed?

A) $M = .85(125)^x$

B) $M = .15(125)^x$

C) $M = 125(.85)^x$

D) $M = 125(.15)^x$

12

The function $f(t) = t^2 - 8t + 4$ crosses the x-axis twice at the coordinate points $(x_1, 0)$ and $(x_2, 0)$. What is the absolute distance between x_1 and x_2?

A) $8 + 4\sqrt{3}$

B) $8\sqrt{3}$

C) 8

D) $4\sqrt{3}$

13

$$\frac{5-2i}{5+3i}$$

If the expression above is written in the form $a+bi$ where $i=\sqrt{-1}$, which of the following is the value of a?

A) $-\frac{25}{34}$

B) $-\frac{2}{3}$

C) $\frac{19}{34}$

D) 1

14

The equation $y=-\frac{x}{m}+b_2$ is the equation of a line that is perpendicular to the line with an equation of the form $y=mx+b_1$. Which of the following equations gives m in terms of y, x, and b_2?

A) $m=\frac{x}{b_2-y}$

B) $m=\frac{x}{y-b_2}$

C) $m=\frac{b_2-y}{x}$

D) $m=\frac{y-b_2}{x}$

15

If x does not equal $-\frac{1}{2}$, what is the average of the expressions $\frac{8x+1}{2x+1}$ and $4+\frac{3}{2x+1}$?

A) 4

B) $4+\frac{1}{2x+1}$

C) $4+\frac{3}{2x+1}$

D) 8

CONTINUE

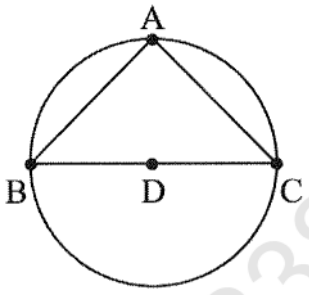
16

An isosceles right triangle has a hypotenuse that measures $50\sqrt{2}$. If a similar triangle has a longest side length of $5\sqrt{8}$, what is the sum of its shorter two sides?

17

Mr. Waterman has \$5, \$10, and \$25 gift certificates to a local ice cream parlor. He would like to give each of his nephews and nieces \$55 worth of gift certificates to the ice cream parlor. If he wants to make sure that each nephew and niece receives at least one of each type of gift certificate, what is the difference between the maximum number of \$5 gift certificates and minimum number of \$5 gift certificates that each child could receive?

18



In the circle above, the measure of $\overline{AB}$ is equivalent to $5\sqrt{2}$ and the measure of $\overline{BC}$ is equivalent to 10. If the measure of $\angle ACB$ in radians is given by the expression $H\pi$, what is the value of H?

19

$$A^2x + 10y = 75$$
$$Ax + 2y = 15$$

For what positive value of A does the system of equations above have infinitely many solutions?

CONTINUE

20

$$(2a+B)^2 = Ma^2+8a+Q$$

If the equation above is true for all values of a and if B, M, and Q are all positive constants, what is the value of the product BMQ?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

Section II
Calculators are required
(60 minutes)

1

A cell phone vendor at a trade show makes \$15 for every accessory that he sells and has to pay \$35 per hour to rent the table at the trade show. If the vendor sells a accessories and rents the table for h hours, which of the following expressions is equivalent to the vendor's profit in dollars?

A) $15a-35h$

B) $15a+35h$

C) $35a-15h$

D) $35a+15h$

2

Janelle always gives away 24% of her jelly beans to friends at her lunch table. If Janelle has a bag with 75 jelly beans, how many will she eat?

A) 18

B) 24

C) 51

D) 57

3

Which of the following quadratic equations has the same x-intercepts as the equation $y=2(x+2)(x-3)$?

A) $y=x^2+x-6$

B) $y=-x^2+x+6$

C) $y=2x^2-10x-12$

D) $y=4x^2+20x+24$

4

12 times a number is equivalent to 30 more than 6 times the number. What is the value of 30 less than 6 times the number?

A) 0

B) 15

C) 30

D) 45

Questions 5 and 6 refer to the following information.

The percentage of the night's profits that a restaurant owner pays out to his employees on any given night is inversely proportional to the number of patrons that visit the restaurant on that night. On a night when 50 people ate dinner at the restaurant, the owner paid out 80% of the profits to the employees. On a night when 125 people ate dinner at the restaurant, the owner paid out 32% of the profits to his employees.

5

What percentage of the night's profit would the restaurant owner pay out to his employees on a night when 250 patrons visited the restaurant?

A) 4
B) 8
C) 10
D) 16

6

One night the restaurant is charging every customer a $10 door charge to enter for an all you can eat buffet. If 160 customers eat at the buffet and the owner has 5 employees working that night, how much money, in dollars, will each employee take home?

A) 80
B) 320
C) 400
D) 1600

7

The amount of remaining gas, G, in a car's gas tank can be calculated using the equation $G = 13 - \frac{1}{21}m$, where m represents the number of miles driven since the last time the gas tank was filled. If the gas tank has 11 gallons of gas remaining, how many miles has the car driven since its most recent fill-up?

A) 2
B) 11
C) 21
D) 42

8

Arielle has been collecting figurines since she was a child. Every year she receives one figurine from her parents and one from her grandmother on both her birthday and again during the holiday season. If Arielle currently has 56 figurines and had f figurines collected before she started receiving them as presents from her parents and grandmother 6 years ago, what is the value of f?

A) 32
B) 44
C) 50
D) 52

CONTINUE

9

Nadia is selling hardcover books for \$2 each and paperback books for \$1 each at a garage sale. Nadia would like to sell at least 40 books to make at least \$60. Using h for the number of hardcover books and p for the number of paperback books, which of the following systems of linear inequalities accurately represents the number of book sales and the amount of money that Nadia would like to make?

A) $h + p \geq 60$
$2h + p \geq 40$

B) $h + p \geq 40$
$2h + p \geq 60$

C) $h + p \geq 60$
$h + 2p \geq 40$

D) $h + p \geq 40$
$h + 2p \geq 60$

10

A random sample of 85 adults leaving a local Mexican restaurant were asked to answer a quick one-question survey without giving their names. The survey revealed that 82% of the participants preferred to eat out on a regular basis as opposed to eating at home. The results of this survey are unreliable for gauging the dining preferences of adults in the population mainly due to which of the following?

A) Insufficient sample size

B) Inappropriate sample collection methods

C) Biased sampling location

D) All of the above

11

A ball is tossed upward from the ground and its height, $h(x)$, after x seconds have passed is given by the equation $h(x) = -4x^2 + 24x$. Which of the following inequalities represents all of the times, x, when the height of the ball, $h(x)$, is above 20 feet?

A) $20 \geq -4x^2 + 24x$

B) $20 \leq -4x^2 + 24x$

C) $0 > -4x^2 + 24x - 20$

D) $0 < -4x^2 + 24x - 20$

12

If $t(8) = 9$, $s(7) = 2t(8)$, and $r(x) = \sqrt{2x}$, what is the positive value of $r(s(7))$?

A) 3

B) 6

C) 81

D) 1,296

13

	Miles Driven	Hours Driven
Monday	248	4
Tuesday	120	2
Wednesday	240	6
Thursday	256	4
Friday	136	4

The table above shows the number of miles driven and the number of hours that Mike spent on the road in the first week of his job. Which of the following is Mike's average speed, in miles per hour, for the week?

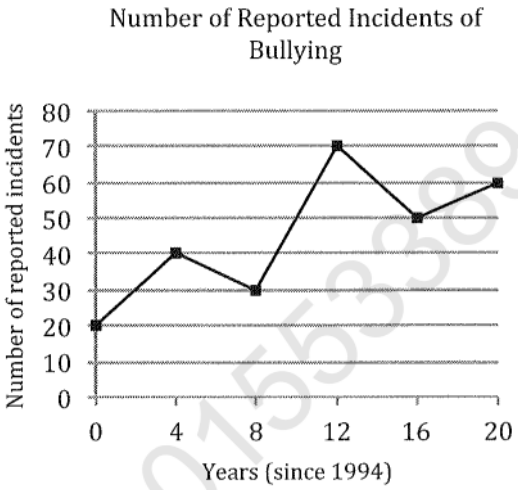
A) 40
B) 48
C) 50
D) 56

14

On average, Mrs. Teetertotter can grade 8 tests in an hour. If Mrs. Teetertotter gives 24 tests a year and has approximately 16 students in each of her 4 classes, how many full 24-hour days does Mrs. Teetertotter spend grading tests?

A) 4
B) 8
C) 192
D) 1,536

15



During which 4-year period did the greatest change in reported incidents of bullying take place?

A) 1994-1998
B) 2002-2006
C) 2006-2010
D) 2010-2014

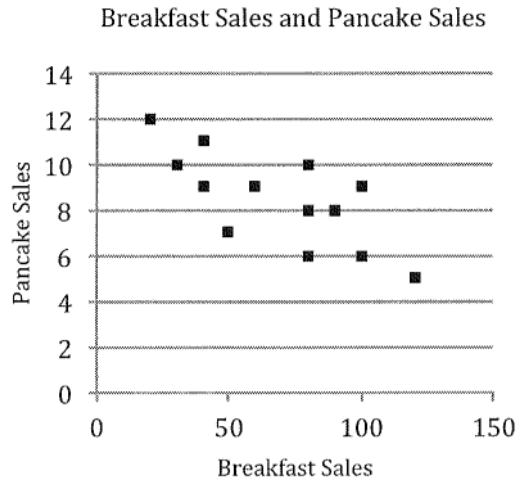
16

Jessica's pottery class is 25% larger than Michelle's pottery class. Lauren's pottery class is 50% smaller than Michelle's pottery class. Jessica's pottery class is what percent larger than Lauren's pottery class?

A) 75
B) 150
C) 250
D) 300

CONTINUE

17



A local diner kept track of the total number of breakfast meals sold and the number of those meals that were pancake breakfasts on 13 separate days. If one of the days that the restaurant had 50 or more breakfast sales is chosen at random, what is the probability that there were more than 6 pancake meals sold?

A) $\frac{6}{13}$

B) $\frac{8}{13}$

C) $\frac{2}{3}$

D) $\frac{8}{9}$

18

A cereal manufacturer wants to keep the weight of its cereal boxes to 9.5 ounces at a minimum and 12.5 ounces at a maximum. Which of the following equations defines x, the weight of an acceptable cereal box?

A) $|x-11| \leq 1.5$

B) $|x-1.5| \leq 11$

C) $|x-12.5| \leq 3$

D) $|x+9.5| \leq 3$

Questions 19 and 20 refer to the following information.

	A	B	C	D	F
Freshman	8	8	3	1	0
Sophomore	10	6	3	1	0
Junior	13	2	4	1	0
Senior	6	12	1	0	1

In a recent survey, a group of 50 students from each grade level in a local high school were asked how many A's, B's, C's, D's, and F's they received among the 20 marking period grades they received for the year. The average responses for each grade level were recorded in the table above.

19

Which of the following is the average number of B's that could be expected in a single school year for all of the students in the high school?

A) 1

B) 3

C) 7

D) 9

20

If there are a total of 428 freshman in the high school, which of the following is the best estimate for the total number of grades lower than B to be expected from the entire freshman class?

A) 30

B) 110

C) 1,700

D) 6,400

21

Data collected from the guidance counseling department of Jefferson High School stated that the most popular number of colleges applied to by graduating seniors was 4, the median number of colleges applied to was 4.5, and the mean number of colleges applied to was 2.5. Which of the following could explain the difference between the median and the mean number of colleges applied to?

A) Half of the students applied to 4 colleges or fewer.

B) A large majority of the students applied to 2 or 3 colleges.

C) A few students applied to more than 4 colleges.

D) A few students applied to no colleges at all.

22

$$x^2 + 8x + y^2 = 20$$

What is the area of the circle, in units squared, defined by the equation above?

A) 4π

B) 16π

C) 20π

D) 36π

Questions 23 and 24 refer to the following information.

$$F = k\frac{Q_1 Q_2}{r^2}$$

Coulomb's Law states that the force, in newtons, between two charges Q_1 and Q_2, measured in Coulombs, at a separation distance of r meters can be calculated using the equation above where k is a constant.

23

Which of the following represents the distance between the charges, r, in terms of the force between the two charges, the charges themsleves, and the constant k?

A) $r = \sqrt{\frac{kQ_1Q_2}{F}}$

B) $r = \sqrt{\frac{FQ_1Q_2}{k}}$

C) $r = \sqrt{\frac{F}{kQ_1Q_2}}$

D) $r = k(\frac{Q_1Q_2}{F})^2$

24

If the distance between the two charges is doubled, the force between the two charges will decrease by what percent?

A) 25

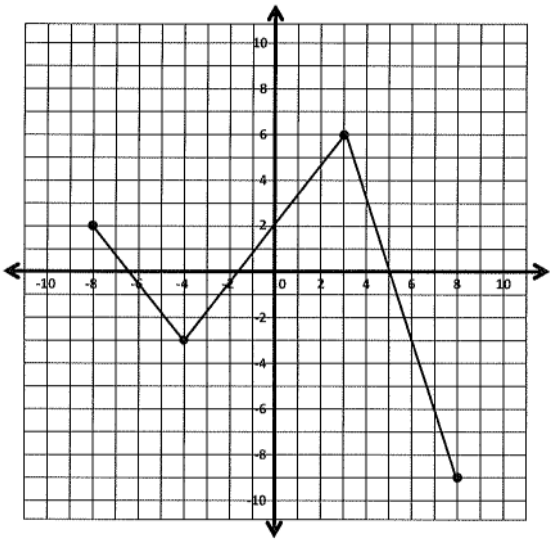
B) 50

C) 75

D) 100

CONTINUE

25



The entire function $g(x)$ is shown in the graph above. For how many values of x is $g(x)$ equivalent to $g(-8)$?

A) 0

B) 1

C) 2

D) 3

26

The line with the equation $y = 2x + 2$ and the line with the equation $y = 6$ intersect at the point A. The line defined by the equation $y = -x - 1$ intersects the line $y = \frac{1}{2}x - 4$ at the point B. Which of the following best defines the slope of the line that intersects point A and point B?

A) It equals 0.

B) It is undefined.

C) It is positive.

D) It is negative.

27

$$y = 2b + 1$$
$$y = x^3 + 8b$$

The system of equations above has one negative integer value for x that satisfies the system when b is equivalent to which of the following?

A) 1

B) $\frac{9}{2}$

C) $\frac{14}{3}$

D) 5

28

Two hundred forty kilograms of organic matter decay following the exponential decay model $R = 240(0.5)^x$, where R is the mass of the remaining organic matter in kilograms and x is the number of years that have passed. One hundred fifty-five kilograms of inorganic matter decay in a linear fashion following the model $R = -35x + 155$, where R is the mass of the remaining inorganic matter in kilograms and x is the number of years that have passed. For how many years is the mass of the organic matter lower than the mass of the inorganic matter?

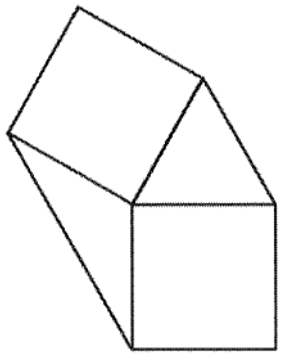
A) 2

B) 3

C) 4

D) 5

29



The figure above contains two squares of equal size, an equilateral triangle, and an isosceles triangle. If the area of the equilateral triangle is $13\sqrt{3}$ and the area of the isosceles triangle is $A\sqrt{3}$, what is the value of A?

A) $\frac{13}{2}$

B) 13

C) 26

D) 52

30

The equation of a line that goes through two non-adjacent vertices of a square is $y = -3x + 2$. Line r passes through the point $(3,5)$ and is parallel to the line that goes through the other non-adjacent vertices of the square. If the y-intercept of line r is $(0,b)$, what is the value of b?

A) 4

B) 8

C) 10

D) 14

CONTINUE

31

A beekeeper estimates that a population of bees will double every year for the foreseeable future. If the initial population of bees is 31,250 bees, how many years will pass before the population reaches one million bees?

32

A ladder measures exactly 12 feet 6 inches in length. If 1 inch is equivalent to 2.54 centimeters, what is the length of the ladder in centimeters?

33

$$C(x) = 125 + 50mh$$

A painting company uses the linear model above to calculate $C(x)$, the total estimated price of a job that requires m men to paint for h hours. If a job were to last 8 hours, what would be the client's estimated cost per additional man in dollars?

34

Angel and Sebastian logged a total of 136 hours combined at a woodworking residency in New Hampshire. If Sebastian logged 204 hours less than four times the number of hours that Angel logged, how many additional hours had Angel logged over Sebastian?

CONTINUE

35

$$y = ax^2 + 2ax + c$$

If the quadratic equation above contains the point $(-3, a)$ and $c = -\frac{1}{4}$, what is the value of a?

36

The points R and S lie on circle O. If the length of $\overset{\frown}{RS}$ is 4π and the area of circle O is 64π, what is the area of $\triangle RSO$?

Questions 37-38 refer to the following information.

3, 9, 21, 33, ...

The sequence given above is defined by the equation $A_n = d(1+n(n-1))$, where A_n is the value of the nth term of the sequence, d is a positive constant, and n is the number of the term in the sequence.

37

What value of the constant d makes the equation produce the given sequence?

38

The kth term of the sequence has a value of 1659. What is the value of k?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1. B
2. B
3. A
4. C
5. D
6. A
7. C
8. B
9. A
10. D
11. C
12. D
13. C
14. A
15. A

Fill-Ins:

16. 20
17. 2
18. 1/4 or .25
19. 5
20. 32

1. A
2. D
3. B
4. A
5. D
6. A
7. D
8. A
9. B
10. C
11. D
12. B
13. C
14. B
15. B
16. B
17. C
18. A
19. C
20. C
21. D
22. D
23. A
24. C
25. D
26. B
27. C
28. B
29. B
30. A

Fill-Ins:

31. 5
32. 381
33. 400
34. 0
35. 1/8 or .125
36. 32
37. 3
38. 24

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1 One angle of a triangle measures 82°. The other two angles have a ratio of 2:5. Find the number of degrees in the smallest angle of the triangle.

(A) 14
(B) 28
(C) 38
(D) 82

2 $\left(\sqrt{18}-\sqrt{8}\right)^2 =$

(A) 1
(B) $\sqrt{2}$
(C) 2
(D) 10

3 If $f(x) = x^2 + 2$ and $g(x) = x - 1$, which expression represents $f(g(a))$?

(A) $a^2 + 1$

(B) $a^2 - 2$

(C) $a^2 + 2a - 3$

(D) $a^2 - 2a + 3$

4 Which expression is equivalent to $(2x - y)(x - y) - xy$?

(A) $2x^2 + y^2$

(B) $2x^2 - xy + y^2$

(C) $2x^2 - 2xy + y^2$

(D) $2x^2 - 4xy + y^2$

5 Simplify:

$$\frac{x^2 - y^2}{x - y}$$

(A) $\frac{xy}{x + y}$

(B) $\frac{x + y}{xy}$

(C) $x + y$

(D) xy

6 Which of the following complex numbers is equivalent to $(3 - i)(8 + 4i)$?

(A) $20 - (-4i)$

(B) $20 + 4i$

(C) $24 - 4i$

(D) $28 + 4i$

7 Which of these expressions is equivalent to $(x + y)^2 - (x - y)^2$?

(A) 0

(B) $2y^2$

(C) $4xy$

(D) $4xy + 2y^2$

8 An economist studied the labor forces in several randomly selected states. He found the average minimum wage of these states was \$7.50, with a 95% confidence interval of ±0.25. How should the economist interpret the data?

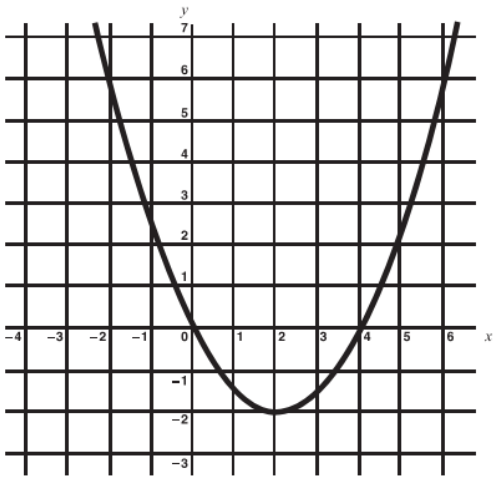
(A) States that have a minimum wage below \$7.75 represent 95% of the states.

(B) States that have a minimum wage above \$7.25 represent 95% of the states.

(C) There is a 95% probability that a randomly selected state will have a minimum wage between \$7.25 and \$7.75.

(D) There is a 95% probability that the actual average minimum wage of all states is between \$7.25 and \$7.75.

9



The curve shown on the xy-plane represents the function $f(x)$. Which of these equations represents the same function?

(A) $y = \frac{1}{2}x^2 - 2x$

(B) $y = x^2 - 4x$

(C) $y = x^2 + 4x$

(D) $y = \frac{1}{2}x^2 + 2x$

10 A 10% saline solution is to be mixed with a 40% saline solution to obtain 5 liters of a 20% saline solution. Which system of equations can be used to find the number of liters of the 10% solution, x, that will be needed to be combined with the number of liters of the 40% solution, y?

(A) $0.1x + 0.4y = 1$
$x + y = 5$

(B) $0.1x + 0.4y = 5$
$x + y = 5$

(C) $0.1x + 0.4y = 1$
$x + y = 1$

(D) $0.1x + 0.4y = 5$
$x + y = 1$

11 The function $f(t) = -4.9t^2 + 40t + 4$ is used to model the height of a ball, in meters, above the ground t seconds after being thrown. Which statement accurately describes the meaning of the number 40 in this function?

(A) The ball will achieve a maximum height of 40 meters.

(B) The ball will achieve its maximum height after 40 seconds.

(C) The ball was thrown upwards at a velocity of 40 meters per second.

(D) The ball was initially thrown from a height 40 meters above the ground.

12 $2x + 3y = 3$
$x = 2 - 9y$

If (x,y) is the solution of the system of equations above, what is the value of y?

(A) $-\frac{7}{15}$

(B) $\frac{1}{15}$

(C) $\frac{2}{9}$

(D) $\frac{3}{2}$

13 What is the equation of the line that is parallel to $y = 5x + 7$ and contains the point $(1, 3)$?

(A) $y = -5x + 8$

(B) $y = 5x - 2$

(C) $y = 5x + 3$

(D) $y = 5x + 2$

14 When Rafael parked his car in the city garage for 3 hours, the charge was \$5. When he parked his car for 5 hours, the charge was \$6.50. If the cost of parking a car in the city garage is a linear function of time in hours, which function represents the charge, y, to park for x hours?

(A) $y = \frac{5}{3}x$

(B) $y = 1.3x$

(C) $y = 3x + 5$

(D) $y = 0.75x + 2.75$

15 What is the solution of the equation $3(x - 9) = 4x + 3(1 - 2x)$?

(A) -4

(B) 6

(C) 12

(D) 30

16 How many degrees are in $\frac{4\pi}{5}$ radians? (Do not grid in the degree symbol.)

17 What is the solution of the equation $\frac{3}{2}x + 7 = 4x$?

18 What is a solution of $x^2 + 4 = 9x - x^2$?

19 What is the x-intercept of the graph of $y - 3 = 5(x - 2)$?

20 Find a solution of $\sqrt{x+3} = x - 3$.

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

Section I
Calculators are not required
(30 minutes)

1 A salesperson earns twice as much in December as in each of the other months of a year. What part of this salesperson's entire year's earnings is earned in December?

(A) $\frac{1}{7}$

(B) $\frac{2}{13}$

(C) $\frac{1}{6}$

(D) $\frac{2}{11}$

2 Village A has a population of 6,800, which is decreasing at a rate of 120 per year. Village B has a population of 4,200, which is increasing at a rate of 80 per year. Which equation can be used to find the number of years, y, until the population of the two villages will be equal?

(A) $6800 - 120y = 4200 + 80y$

(B) $6800 + 120y = 4200 - 80y$

(C) $6800 - 120y = 4200 - 80y$

(D) $6800 + 120y = 4200 + 80y$

3

	Candidate A	Candidate B	Candidate C	Candidate D
Male	27	29	35	24
Female	24	49	45	17

The table above shows the results of a survey of a random sample of likely voters. What is the probability that a male voter who responded to the survey supports candidate C?

(A) $\frac{7}{50}$

(B) $\frac{7}{23}$

(C) $\frac{7}{16}$

(D) $\frac{7}{9}$

4 The formula for converting temperatures from degrees Fahrenheit to degrees Celsius is $C = \frac{5}{9}(F - 32)$.

Solve the formula for F.

(A) $F = \frac{5}{9}(C + 32)$

(B) $F = \frac{5}{9}(C - 32)$

(C) $F = \frac{9}{5}C - 32$

(D) $F = \frac{9}{5}C + 32$

5 A recent study showed that 15% of the salmon that pass through a turbine in hydroelectric dams are killed. If an initial population of 50,000 salmon must pass through n turbines, which function models the number of salmon that will survive?

(A) $A(n) = 50{,}000 - 0.15n$

(B) $A(n) = 50{,}000 - 0.85n$

(C) $A(n) = 50{,}000 \times 0.15^n$

(D) $A(n) = 50{,}000 \times 0.85^n$

6 The equation $f(x) = 1.5x + 15$ models the growth of a bamboo shoot, where x represents the number of days and $f(x)$ represents the height of the shoot in feet. Determine how many days it will take the bamboo shoot to reach a height of 19.5 feet.

(A) 1

(B) 2

(C) 3

(D) 4

7 What part of the total quantity is represented by a 24-degree sector of a circle graph?

(A) $6\frac{2}{3}\%$

(B) 12%

(C) $13\frac{1}{3}\%$

(D) 15%

8 A high school principal wanted to estimate the mean of the grade point averages of students in her school. She randomly selected a group of students and found the mean grade point average to be 2.8 on a four-point scale, with a 95% confidence interval of ±0.2. How should the principal interpret the data?

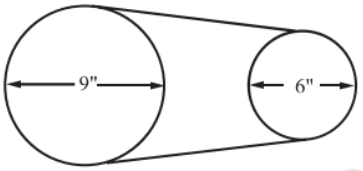
(A) Students with a grade point average below 3.0 make up 95% of the students in the school.

(B) Students with a grade point average above 2.6 make up 95% of the students in the school.

(C) There is a 95% probability that a randomly selected student will have a grade point average between 2.6 and 3.0.

(D) There is a 95% probability that the actual mean grade point average of all students in the school is between 2.6 and 3.0.

9



A pulley having a 9-inch diameter is belted to a pulley having a 6-inch diameter, as shown in the figure. If the large pulley runs at 120 rpm, how fast does the small pulley run, in revolutions per minute?

(A) 80

(B) 100

(C) 160

(D) 180

10

$$y = x^2 - 7x + 10$$
$$x - y = 4$$

If (x, y) is a solution of the system of equations above, what is the value of y^2?

(A) 2

(B) $\frac{9}{2}$

(C) $18 - 8\sqrt{2}$

(D) 14

11 The water level of a swimming pool, 75 feet by 42 feet, is to be raised 4 inches. How many gallons of water must be added to accomplish this? (7.48 gal. = 1 cubic ft.)

(A) 1,684

(B) 7,854

(C) 12,600

(D) 94,248

12 If $\frac{3}{7}$ of a bucket can be filled in 1 minute, how many minutes will it take to fill the rest of the bucket?

(A) $\frac{7}{3}$

(B) $\frac{4}{3}$

(C) $\frac{3}{4}$

(D) $\frac{4}{7}$

13 The distance from the center of a circle to a chord is 5. If the length of the chord is 24, what is the length of the radius of the circle?

(A) 5

(B) 10

(C) 13

(D) 26

14 A 40-pound bag of garden soil contains 0.8 cubic feet of soil. What is the weight, in pounds, of the garden soil needed to cover a 12-foot by 12-foot square garden to a depth of 3 inches?

(A) 1152

(B) 1800

(C) 4608

(D) 5760

15 The demand for a certain product can be defined by the function $y = 500 - 12x$, where y is the number of units of the product that can be sold at a price of x dollars. Which statement must be true?

(A) If the price of the product decreases by \$1, the number of units that can be sold decreases by 12.

(B) If the price of the product increases by \$12, the number of units that can be sold decreases by 1.

(C) The y-intercept of the graph of the function represents the units of the product that can be sold at a cost of \$1.

(D) The x-intercept of the graph of the function represents the price at which no units of the product will be sold.

16 $y = (x - 5)(x + 1)$

The equation above represents a parabola. Which of the following equivalent forms of the equation shows the coordinates of the vertex of the parabola as constants or coefficients?

(A) $y = x^2 - 4x - 5$

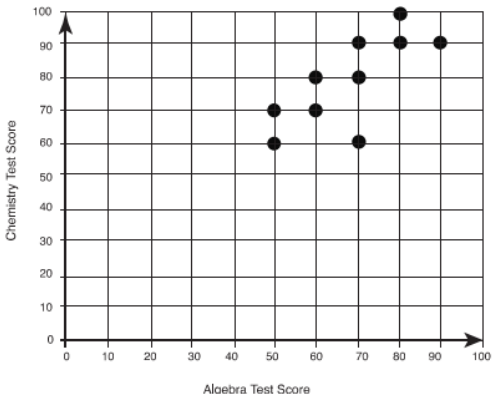
(B) $y = (x - 2)^2 - 9$

(C) $y = x(x - 4) - 5$

(D) $y + 5 = x^2 - 4x$

QUESTIONS 17–19 REFER TO THE FOLLOWING GRAPH.

This scatterplot shows the scores for 10 students on their most recent Algebra and Chemistry tests.



17 What is the arithmetic mean of the students' algebra test scores?

(A) 68
(B) 70
(C) 79
(D) 80

18 A line of best fit of the data is given by $y = 0.76x + 27.6$, where x is a student's algebra test score, and y is a student's chemistry test score. Which interpretation is valid?

(A) The average chemistry test score is 27.6 points higher than the average algebra test score.
(B) The average algebra test score is 0.76 times the average chemistry test score.
(C) Students with higher algebra test scores tended to have higher chemistry test scores.
(D) There is not enough information to determine a relationship between the students' chemistry test scores and their algebra test scores.

19 Using the line of best fit, $y = 0.76x + 27.6$, what is the predicted algebra test score of a student with a chemistry test score of 70, rounded to the nearest whole number?

(A) 50
(B) 56
(C) 77
(D) 81

20 The velocity of an object dropped from a tower is given by the function $v(t) = -9.8t$, where t is the number of seconds after the object was dropped and $v(t)$ is given in meters per second. If the object hits the ground and stops moving after 4 seconds, which inequality shows the possible values of $v(t)$?

(A) $-39.2 \leq v(t) \leq 0$
(B) $-2.45 \leq v(t) \leq 0$
(C) $0 \leq v(t) \leq 2.45$
(D) $0 \leq v(t) \leq 39.2$

21 To predict the results of an election for city council, a polling company surveyed 200 randomly selected likely voters within the city. Of those surveyed, 80 planned to vote for candidate A. The polling company reported a margin of error of 3.5%. What is a reasonable estimate of the percentage of likely voters who support candidate A?

(A) Between 36.5% and 43.5%
(B) Between 46.5% and 53.5%
(C) Between 56.5% and 63.5%
(D) Between 76.5% and 83.5%

22 Corporate Average Fuel Economy sets targets for fuel economy for cars and light trucks. The target for the year 2020 is 42 miles per gallon, and for 2025, it is 54.5 miles per gallon. Which function can be used to estimate progress toward the goal y years after 2020 until 2025?

(A) $g(y) = 54.5 - 2.5y$
(B) $g(y) = 42 - 2.5y$
(C) $g(y) = 54.5 + 2.5y$
(D) $g(y) = 42 + 2.5y$

23 A municipal light plant buys energy from windmill farms that have two sizes of windmills. Small windmills produce 1.45 megawatts of power, and large windmills produce 2.75 megawatts of power. Which inequality represents the number of small windmills, x, and large windmills, y, needed to supply the light plant with a total power supply of at least 200 megawatts?

(A) $2.75x + 1.45y \leq 200$
(B) $1.45x + 2.75y \geq 200$
(C) $2.75x + 1.45y \geq 200$
(D) $1.45x + 2.75y \leq 200$

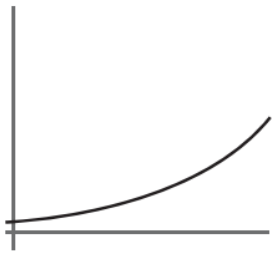
24 If x_1 and x_2 are the solutions of $x^2 - 4x = 3$, what is $|x_2 - x_1|$?

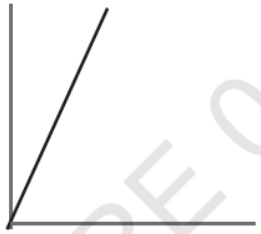
(A) 0
(B) 2
(C) 4
(D) $2\sqrt{7}$

25 A group of 18 coins has a total value of \$3.10. If the coins consist only of quarters and nickels, how many more quarters are there than nickels?

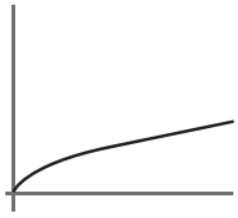
(A) 3
(B) 4
(C) 7
(D) 11

26 Which graph would be drawn to represent an economy that is growing at a fixed percentage rate?

(A)


(B)


(C)


(D)


27 The graph of the line $2x + 3y = 15$ is drawn on the coordinate plane. What is the equation of the perpendicular line with the same y-intercept?

(A) $y = \frac{2}{3}x + \frac{15}{2}$

(B) $y = -\frac{2}{3}x + \frac{15}{2}$

(C) $y = \frac{3}{2}x + 5$

(D) $y = -\frac{3}{2}x + 5$

28

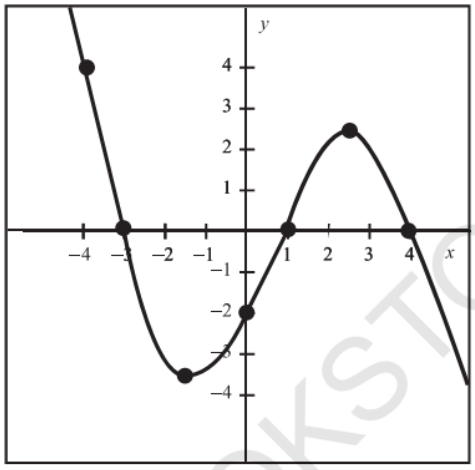
$x + 3y < 1$

$x + y > 1$

Which of these points is in the solution set of the system of inequalities above?

(A) (4, 2)
(B) (−4, −2)
(C) (4, −2)
(D) (−4, −2)

29



A polynomial function $p(x)$ is shown on the xy-coordinate plane. If $q(x)$ is a quadratic function, which of these equations can represent $p(x)$?

(A) $p(x) = (x - 1)q(x)$
(B) $p(x) = (x + 2)q(x)$
(C) $p(x) = (x - 3)q(x)$
(D) $p(x) = (x + 4)q(x)$

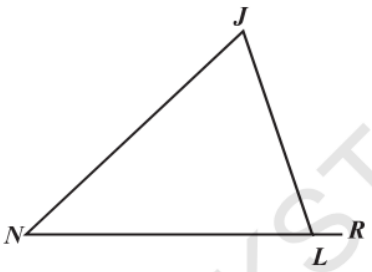
30

The points (−3, 2) and (3, 2) are the endpoints of a diameter of a circle. Which equation represents the circle?

(A) $(x - 2)^2 + y^2 = 3$
(B) $(x - 2)^2 + y^2 = 6$
(C) $x^2 + (y - 2)^2 = 9$
(D) $x^2 + (y - 2)^2 = 16$

31 A local politician requested donations to pay for the cost of a radio ad. Twelve donors offered to split the cost equally, so they each paid $75. If the politician was able to find 20 donors to equally split the same cost, how much would each pay?

32



In the figure above, $\angle N = (9x - 40)°$, $\angle J = (4x + 30)°$, and $\angle JLR = (8x + 40)°$. What is the measure of $\angle J$? (Do not grid the degree symbol.)

33 Jessica caught five fish with an average weight of 10 pounds. If three of the fish weigh 9, 9, and 10 pounds, respectively, what is the average (arithmetic mean) weight of the other two fish?

34 In 2012, Algeria had a population of approximately 37.44 million. In 2013, the population had grown to 38.19 million. If the function $p(t) = a \cdot b^t$ is used to model the population in millions, $p(t)$, t years after 2012, what is the value of b? Round your answer to the nearest hundredth.

35 Juliette runs 20 miles a week. She would like to increase her running distance by 10% each week. How many miles should Juliette run after 2 times of increasing her distance by 10%?

36 For which value of a will the equation $5(x + 7) - ax = ax + 35$ have infinitely many solutions?

37 $3.6x + 2.4y = 12$

$x - y = 2$

If (x,y) is a solution of the system of equations above, what is the value of y?

38 The function $f(x) = x^2 - 4$ is translated 3 units to the right to create function $g(x)$. What is the value of $g(9)$?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1. B	**5.** C	**9.** A	**13.** B	**17.** 14/5 or 2.8
2. C	**6.** D	**10.** A	**14.** D	**18.** 4 or 1/2
3. D	**7.** C	**11.** C	**15.** B	**19.** 1.4 or 7/5
4. D	**8.** D	**12.** B	**16.** 144	**20.** 6

1. B	**9.** D	**17.** A	**25.** B	**33.** 11
2. A	**10.** A	**18.** C	**26.** A	**34.** 1.02
3. B	**11.** B	**19.** B	**27.** C	**35.** 24.2
4. D	**12.** B	**20.** A	**28.** C	**36.** 5/2 or 2.5
5. D	**13.** C	**21.** A	**29.** A	**37.** 0.8
6. C	**14.** B	**22.** D	**30.** C	**38.** 32
7. A	**15.** D	**23.** B	**31.** 45	
8. D	**16.** B	**24.** D	**32.** 70	

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1 Simplify the expression

$(4x^2 - 5x + 8) - (3x^2 - 5 - 2x)$.

(A) $x^2 - 3x + 13$

(B) $x^2 - 3x + 3$

(C) $x^2 - 7x + 13$

(D) $x^2 - 7x + 3$

2 Which expression is equivalent to

$x^{\frac{2}{3}} \cdot x^{\frac{-4}{3}}$?

(A) $-\sqrt[3]{x^8}$

(B) $-\sqrt[3]{x^2}$

(C) $\sqrt[3]{x^2}$

(D) $\frac{1}{\sqrt[3]{x^2}}$

3 Which expression is equivalent to $\frac{3}{4}(3x-4y)+\frac{2}{3}(-3y+5x)$?

(A) $\frac{67x}{12}-5y$

(B) $\frac{x}{4}+\frac{y}{3}$

(C) $\frac{19x}{12}-5$

(D) $\frac{17x}{4}+\frac{19y}{3}$

4 $8x-9=x^2-y$

Which of the following equations is equivalent to the equation above and in a form that includes the vertex of the parabola as coefficients?

(A) $y=(x+1)(x-9)$

(B) $y=(x-4)^2-7$

(C) $y=x^2-8x+9$

(D) $x=\sqrt{y+7}+4$

5 If $a+4b=16$, what is the value of $3(a+4b)$?

(A) 48

(B) 24

(C) 16

(D) $5\frac{1}{3}$

6 $S=2\pi r^2+2\pi rh$

The formula above gives the suface area S of a cylinder with a radius r and height h. Which of the following gives h in terms of S and r?

(A) $h=\frac{S}{2\pi r}-r$

(B) $h=\frac{S}{2\pi r}+r$

(C) $h=\frac{2\pi r^2-S}{2\pi r}$

(D) $h=\frac{S+2\pi r^2}{2\pi r}$

7 A group of economists performed a study on the decreasing population in a small town for a time period of 10 years. They determined that as a result of factors such as loss of jobs and a poor economy, the population of the town decreased by about 3.5% each year. Write an equation for the population of the town, P, in terms of its initial population, P_0, and n, the number of years of the study.

(A) $P=P_0(0.965)^n$

(B) $P=P_0(0.965)n$

(C) $P=P_0(1.035)^n$

(D) $P=P_0(1.035)n$

8 If f is a linear function and if $f(4)=2$ and $f(6)=10$, which of the following could be the function f?

(A) $f(x)=x-2$

(B) $f(x)=2x-2$

(C) $f(x)=2x-6$

(D) $f(x)=4x-14$

9

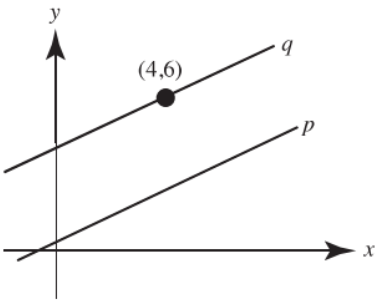


Figure not drawn to scale.

In the figure above, lines p and q are parallel. If $y = x + 1$ represents the equation of line p, what is the y-intercept of line q?

(A) 2
(B) 3
(C) 4
(D) 5

10 A certain brand of yogurt is sold in either large or small cups. If 3 small cups and 2 large cups hold 30 ounces of yogurt, and 4 small cups and 1 large cup hold 25 ounces of yogurt, how much yogurt, in ounces, does a large cup of yogurt hold?

(A) 2 ounces
(B) 4 ounces
(C) 7 ounces
(D) 9 ounces

11

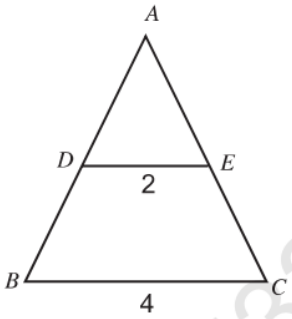


Figure not drawn to scale.

In the figure above, DE is parallel to BC and $AD = 3$. What is the length of segment AB?

(A) 2
(B) 3
(C) 4
(D) 6

12 A student opened a savings account that earns r% annual interest compounded monthly. The equation that shows the total amount of money in the account at any time is $A = P\left(1+\frac{r}{1200}\right)^{12t}$.

What does t represent in the equation?

(A) The initial investment in the savings account
(B) The rate of interest
(C) The number of years the money has been in the account
(D) The total amount of money in the account

13 If $(x + 2)^2 - (x - 3)^2 = 0$, which of the following are possible values of x?

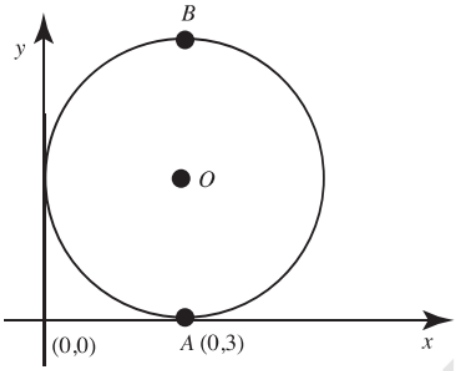
(A) $\frac{1}{2}$ only

(B) -2 and 3

(C) -3 and 2

(D) -2 and $\frac{1}{2}$

14



If AB is a diameter of the circle with center O, and AB is parallel to the y-axis, which equation represents the circle?

(A) $(x - 3)^2 + (y - 3)^2 = 3$

(B) $(x - 3)^2 + y^2 = 3$

(C) $(x - 3)^2 + (y - 3)^2 = 9$

(D) $(x - 3)^2 + y^2 = 9$

15 A line in the xy-plane with the slope $-\frac{4}{5}$ passes through the point (3, 4). Which of the following points lies on the line?

(A) (–5, 12)

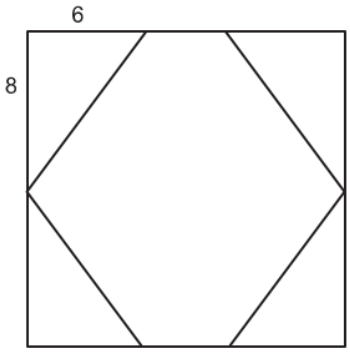
(B) (–2, 0)

(C) (7, –1)

(D) (13, –4)

16 Miguel is making a new garden. He is buying a new wheelbarrow and bags of peat moss. Each bag weighs 32 pounds and the wheelbarrow weighs 65 pounds. If his truck can carry a maximum of 1500 pounds in the bed, what is the greatest number of whole bags of peat moss he can carry in the bed of his truck, along with the wheelbarrow?

17



A sign is made by cutting four identical right triangles out of a square, as shown above. What is the perimeter of the sign, in inches?

18 What is the value for b that will make the equation below true?

$$\frac{5x+2}{x-4} = 5 + \frac{b}{x-4}$$

19

$y = 3x - 4$

$y = 2x - 5$

According to the system of equations above, what is the value of xy?

20

$6x - 5y = 9$

$ax + by = -27$

What value of b will make the system of equations above have infinitely many solutions?

Section I
Calculators are not required
(30 minutes)

1 A large bottle of soda holds 3 times as much as a small bottle of soda, which holds 12 fluid ounces. How many large bottles are completely filled by 120 fluid ounces of soda?

(A) 2
(B) 3
(C) 4
(D) 5

2 If $4(x + 10) - 3(x + 10) = 0$, what is the value of x?

(A) –40
(B) –10
(C) 2
(D) 20

3 In the 1908 London Olympics, the 400-meter race was introduced. Wyndham Halswelle of Great Britain won with a time of 50.0 seconds. In 1996, Michael Johnson of the United States ran the 400-meter race with a time of 43.18 seconds, which is the current record. If they had been racing together, approximately how many meters would Halswelle still have had to run after Johnson finished the race?

(A) 10
(B) 25
(C) 55
(D) 100

4 If $18 - 6x$ is 4 less than -8, what is the value of $-3x$?

(A) -15
(B) -5
(C) 5
(D) 15

5 1000 milligrams = 1 gram

1000 grams = 1 kilogram

Ibuprofen is an over-the-counter drug used to treat arthritis and relieve pain, fever, and swelling. The dose contained in a standard tablet is 200 mg. If ibuprofen is sold in cartons of 24 bottles with 250 standard tablets per bottle, how much pain medication is in the carton in all?

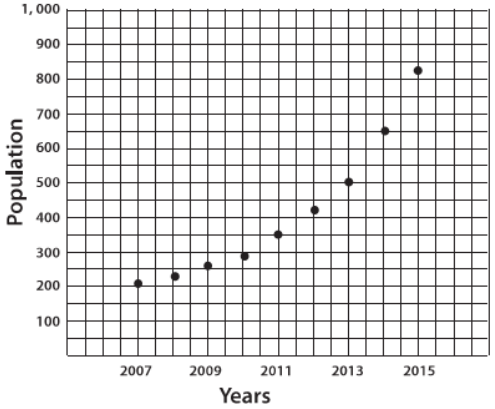
(A) 0.12 kilograms
(B) 1.2 kilograms
(C) 12 kilograms
(D) 120 kilograms

6 A local newspaper reported a poll of 100 adults that found 80% of respondents were in favor of building a new school. The poll was taken by asking random parents picking up their students after school. Which of the following statements about the sampling method for this poll is NOT true?

(A) The sampling method was not representative of the town as a whole because some students take the bus home.
(B) The sampling method was not representative of the town as a whole because not everyone has children who go to school.
(C) The sampling method was not representative of the town as a whole because the population of the town is much greater than 100.
(D) The sampling method was not representative of the town as a whole because people who do not have students in school are less likely to support a new school.

QUESTIONS 7 AND 8 REFER TO THE FOLLOWING INFORMATION.

The graph below shows the population of a small town, from the years 2007 through 2015.



7 Assuming that the population growth trend continues, what is the best prediction for the town's population in 2016?

(A) 850

(B) 900

(C) 950

(D) 1,025

8 Which of the following best describes the relationship between the population of the small town and the number of years?

(A) The relation is an example of linear growth, because a line can be drawn between any two points on the grid that exactly shows the relation.

(B) The relation is an example of linear growth, because all of the points lie on a single line.

(C) The relation is an example of exponential growth, because the slope of the line between any two points is increasing as the x-values increase.

(D) The relation is an example of exponential decay, because the vertical space between the points gets greater as the number of days increases.

9 The median salary at a large biotech company is $45,000. The mean income is $60,000. Which of the following statements best explains the difference between the mean and the median?

(A) There are a few people at the biotech company with very low salaries.

(B) There are a few people at the biotech company with very high salaries.

(C) Most of the salaries at the biotech company are between $45,000 and $60,000.

(D) All of the salaries at the biotech company are within a small range.

10 Mount Asgard in Auyuittuq (pronounced: *ow-you-eet-took*) National Park, Baffin Island, Nunavut, was used in the opening scene for the James Bond movie *The Spy Who Loved Me*. A stuntman skis off the edge of the mountain, free-falls for several seconds, and then opens a parachute. The height, h, in meters, of the stuntman above the ground t seconds after he opens the parachute is represented by the equation $h(t) = -10.5t + 980$. What does the 980 in the equation represent?

(A) The speed of the stuntman

(B) The height of the mountain

(C) The height of the stuntman when he opens the parachute

(D) The total length of time the stuntman is in the air

11 According to Einstein's theory of relativity, no object can travel faster than the speed of light, which is approximately 180,000 miles per second. Which inequality represents this information?

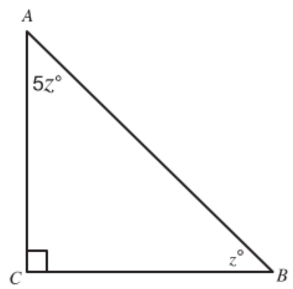
(A) $x \leq 180{,}000$

(B) $x \geq 180{,}000$

(C) $x = 180{,}000$

(D) $x > 180{,}000$

12



What is the value of z in right triangle ABC?

(A) 15

(B) 18

(C) 30

(D) 36

13 In 1992, the first AA lithium battery was released. Suppose a pack of 4 AA lithium batteries costs x dollars. At this rate, how much do 100 batteries cost?

(A) $5x$
(B) $10x$
(C) $25x$
(D) $100x$

14 What is the value of y if

$$\frac{7}{4}+\frac{6}{y}=1\,?$$

(A) –24
(B) –8
(C) –4
(D) 6

15 A food truck sells sandwiches for $5.95 each and drinks in cans or bottles. Which of the following statements is true about the equation that represents the food truck revenue, $5.95x + 1.75y = z$?

(A) x is the number of customers served
(B) z is the number of customers served
(C) y is the number of beverages sold
(D) y is the number of sandwiches sold

16 $2x + y \geq a$
$x + 2y \geq b$

In the xy-plane, if (–1, –1) is a solution to the system of inequalities above, which of the following relationships must be true about a and b?

(A) $a > b > 0$
(B) $a < b < 0$
(C) $b < a < 0$
(D) $a < 0$ and $b < 0$

17 Alex is baking cupcakes and cookies. The cupcake pan holds 15 cupcakes and the cookie pan holds 18 cookies. Alex wants to make at least twice as many cookies as cupcakes, but no more than 165 total cookies and cupcakes. Which of the following system of inequalities fits the situation?

(A) $18x+15y \leq 165$
$x \leq 2y$

(B) $18x+15y \leq 165$
$x \geq 2y$

(C) $18x+15y < 165$
$x < 2y$

(D) $18x+15y < 165$
$x > 2y$

18 Which of the following equals x, if

$$3\sqrt{x}+8=20\,?$$

(A) 4
(B) 8
(C) 12
(D) 16

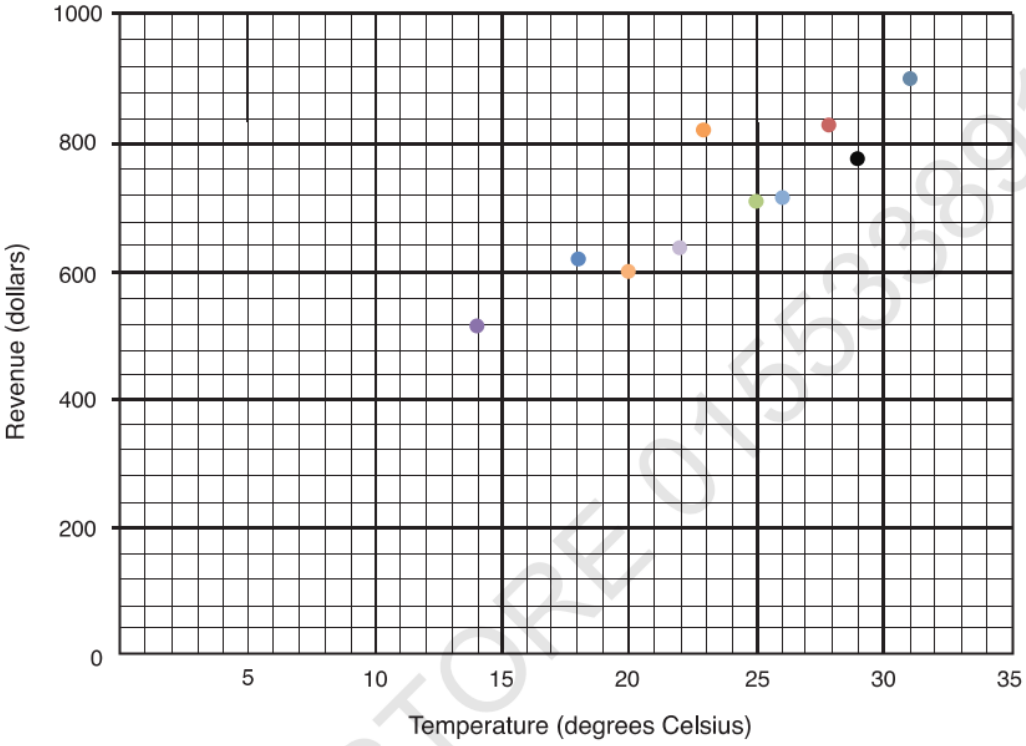
19 According to historians, Archimedes proved that a crown made for his king was not pure gold. Suppose the crown had a density of 800 grams and a volume of 50 grams. The density of gold is about 19 grams per cc, and the density of silver is about 10.5 grams per cc. The system below models this relationship (G = volume of gold, S = volume of silver).

$$G + S = 50$$
$$19G + 10.5S = 800$$

If the crown contained both silver and gold, about what percent of the crown is silver?

(A) 19 percent
(B) 36 percent
(C) 62 percent
(D) 81 percent

QUESTIONS 20 AND 21 REFER TO THE FOLLOWING INFORMATION.



The graph above displays the total revenue R in dollars for an ice cream shop when the temperature is T degrees Celsius.

20 Which of the following best describes the association between R and T?

(A) Strong positive correlation
(B) Strong negative correlation
(C) Weak positive correlation
(D) Weak negative correlation

21 Which of the following is the best fit equation for the data in the graph?

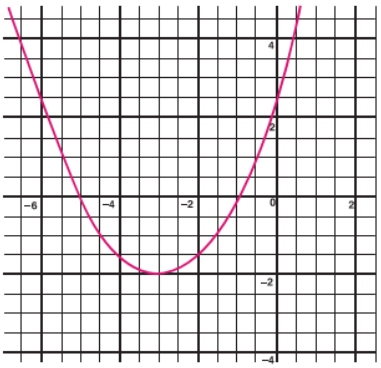
(A) $y = 500 + 1.2x$
(B) $y = 1.33x$
(C) $y = 20x + 250$
(D) $y = 725$

22 Simplify $(5 - 3i)(4 + 2i)$.

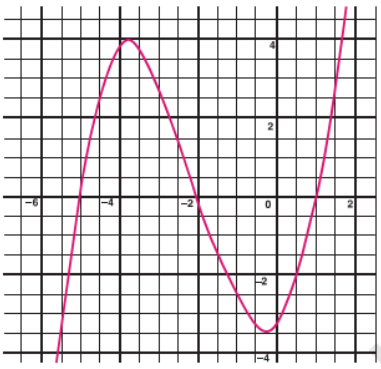
(A) $20 - 2i$
(B) $20 - 6i$
(C) $26 - 2i$
(D) $26 - 6i$

23 If $(x - 1)$ and $(x + 5)$ are factors of $f(x)$, which of the following graphs shows a possible graph of the function f?

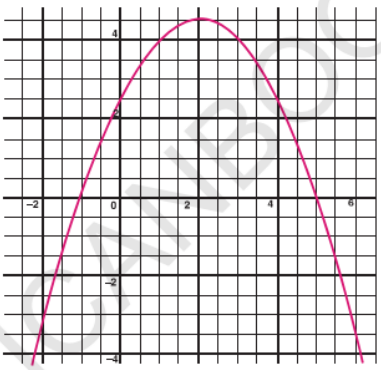
(A)



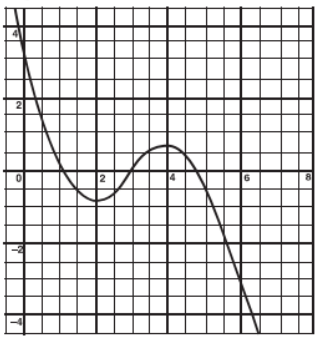
(B)



(C)



(D)



24 The graph of a parabola has x-intercepts at 4 and –2 and a y-intercept at 8. Which of the following could be the equation of the graph?

(A) $y = -(x - 1)^2 + 9$

(B) $y = x^2 - 2x + 8$

(C) $y = (x - 1)^2 - 9$

(D) $y = x^2 + 2x - 8$

25 A population of bacteria in a sample increases in number by 30% every hour. Which best describes the relation between the time h in hours and the number of bacteria B in the sample?

(A) The relation between B and h is linear, because the population increases by the same percent each hour.

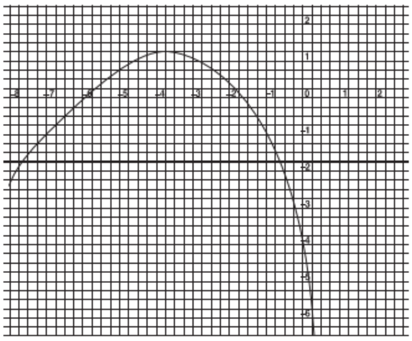
(B) The relation between B and h is linear, because the population increases by the same amount each hour.

(C) The relation between B and h is exponential, because the population increases by the same percent each hour.

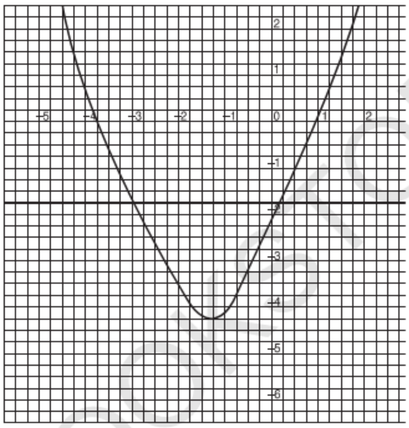
(D) The relation between B and h is exponential, because the population increases by the same amount each hour.

26 If k is a negative constant less than –1, which of the following could be the graph of $y = kx^2 + bx + c$?

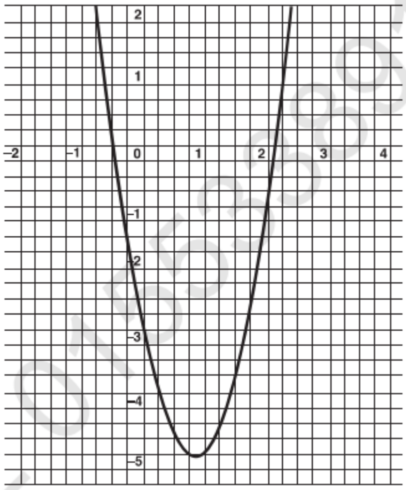
(A)



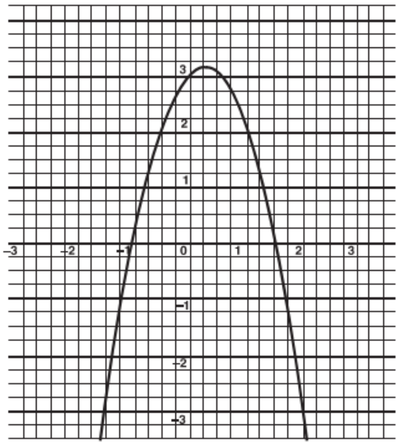
(B)



(C)



(D)



QUESTIONS 27 AND 28 REFER TO THE FOLLOWING INFORMATION.

An educational researcher chose 200 randomly selected college students and asked them how they would best categorize their political inclinations. The results are shown in the table below.

	Liberal	Moderate	Conservative
Seniors	6	18	34
Juniors	20	42	30
Sophomores	8	6	4
Freshmen	22	8	2

27 What is the probability that a junior of this group is a conservative?

(A) $\frac{17}{29}$

(B) $\frac{9}{15}$

(C) $\frac{2}{9}$

(D) $\frac{15}{46}$

28 If there were a total of 4,000 students at the college, about how many of those students would categorize themselves as moderates?

(A) About 74

(B) About 1,120

(C) About 1,400

(D) About 1,480

29 A recent poll found that 11% of the respondents approve of the job that the U.S. Congress is doing. The margin of error for the poll was ± 3% with 95% confidence interval. Which of the following statements is a conclusion that can accurately be drawn from this poll?

(A) The true percentage of people who disapprove of the job that the U.S. Congress is doing is between 86% and 92%.

(B) The true percentage of people who approve of the job that the U.S. Congress is doing is between 8% and 14%.

(C) The pollsters are 95% confident that the true percentage of people who approve of the job that the U.S. Congress is doing is between 86% and 92%.

(D) The pollsters are 95% confident that the true percentage of people who approve of the job that the U.S. Congress is doing is between 8% and 14%.

30 Line m intersects the x-axis at (3, 0) and the y-axis at (0, –2). Line n passes through the origin and is perpendicular to line m. Which of the following is an equation of line n?

(A) $y = \frac{3}{2}x$

(B) $y = \frac{2}{3}x$

(C) $y = -\frac{3}{2}x$

(D) $y = -\frac{2}{3}x$

31 A baboon troop has 60 members, 35% of which are male. What is the ratio of males to females in the baboon troop? (Grid your answer as a fraction.)

32 During a recent baseball season, 2 hitters on a team had a total of 66 home runs. Batter *B* had 14 fewer home runs than batter *A*. How many home runs did batter *A* hit?

33 A community radio station operates 24 hours per day, every day of the week. Each radio show lasts 90 minutes. What is the total number of shows that the radio station will broadcast Monday through Friday?

34 $3(5 - 2x) = -4(cx + 4)$

What value for c in the equation above will make the equation have no solutions?

35 If a cube with a surface area of 600 square centimeters holds 1 liter, how many liters are held in a cube with a surface area of 5400 square centimeters?

36 $f(x) = 3x^2 - 4x + 8$

$g(x) = 2x - 5$

Use the functions above to find the value of $g(f(-2))$.

37

$y = 2x - 3$

$y = -3(x-1)^2 + 4$

According to the system of equations above, what is one value of x?

38

The total rainfall in Plainville increased by 25% from 2012 to 2013. The rainfall decreased by 30% from 2013 to 2014. Then, it increased again by 40% from 2014 to 2015. What was the percent of increase in rainfall from 2012 to 2015? Write your answer as a percent, but do not write in the percent symbol.

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

1. A
2. D
3. A
4. B

5. A
6. A
7. A
8. D

9. A
10. D
11. D
12. C

13. A
14. C
15. D
16. 44

17. 48
18. 22
19. 7
20. 15

1. B
2. B
3. C
4. A
5. B
6. C
7. D
8. C

9. B
10. C
11. A
12. A
13. C
14. A
15. C
16. D

17. B
18. D
19. B
20. A
21. C
22. C
23. B
24. A

25. C
26. D
27. D
28. D
29. D
30. C
31. 7/13
32. 40

33. 80
34. 1.5
35. 27
36. 51
37. 2
38. 22.5

SECTION 3: MATH TEST—NO CALCULATOR

20 Questions • 25 minutes

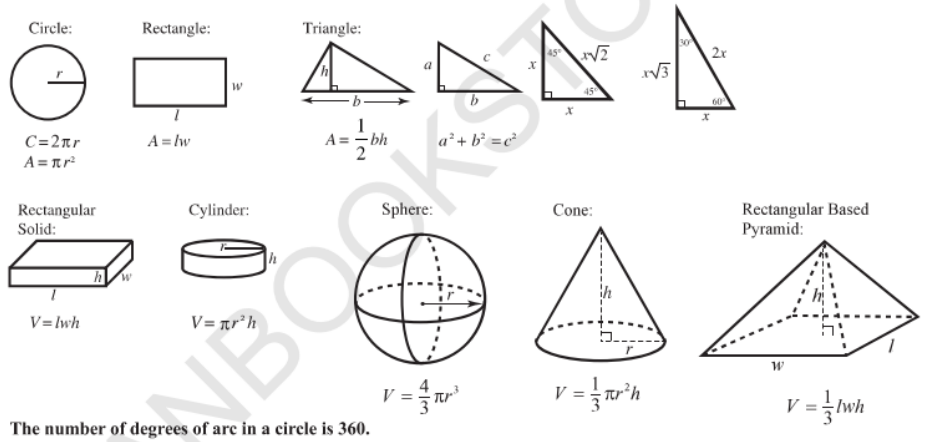
TURN TO SECTION 3 OF YOUR ANSWER SHEET TO ANSWER THE QUESTIONS IN THIS SECTION.

Directions: For Questions 1–15, solve each problem, select the best answer from the choices provided, and fill in the corresponding oval on your answer sheet. **For Questions 16–20,** solve the problem and enter your answer in the grid on the answer sheet. The directions **before Question 16** will provide information on how to enter your answers in the grid.

ADDITIONAL INFORMATION:

- The use of a calculator in this section **is not permitted.**
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference Information



The number of degrees of arc in a circle is 360.
The number of radians in the arc of a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

1 Jared is beginning to track the number of steps he walks each day. Yesterday he walked 950 steps. He set a goal of increasing his steps per day by 125, with an eventual goal of walking at least 3,000 steps per day. Which of the following functions can be used to determine the number of steps Jared plans to take d days from yesterday?

(A) $f(d) = 3000 - (950 + 125d)$
(B) $f(d) = 3000 - 125d$
(C) $f(d) = 950 + 125d$
(D) $f(d) = 950 - 125d$

2 *If* $f(1) = 3$, $f(3) = -1$, $g(3) = 1$, and $g(-1) = 3$, what is the value of $f(g(3))$?

(A) –3
(B) –1
(C) 1
(D) 3

GO TO THE NEXT PAGE

3 The amount of radioactive iodine 131 that remains in an object after d days is found using the formula

$y = a(0.5)^{\frac{d}{8.02}}$.

What does a represent in the formula?

(A) The number of days for the object to lose half of its radioactive iodine 131

(B) The initial amount of radioactive iodine 131

(C) The amount of radioactive iodine 131 after d days

(D) The amount of radioactive iodine 131 lost each day

4 An architect is designing the roof of a house. The peak of the roof is 8 ft. above the house. If the outside of the roof is separated into two parts, how long is each part from the peak of the roof to its edge?

(A) 15 ft.

(B) 17 ft.

(C) 23 ft.

(D) 31 ft.

5 $y = 2(x - 5)^2 - 2$

Which equation is equivalent to the equation above and shows the x-intercepts as constants?

(A) $y = 2x^2 - 20x + 48$

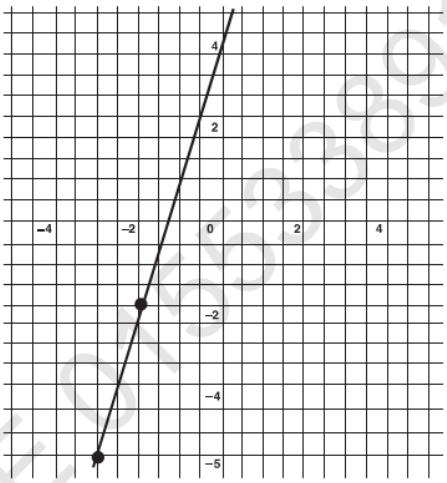
(B) $y = 2(x^2 - 10x + 24)$

(C) $y = 2(x - 4)(x - 6)$

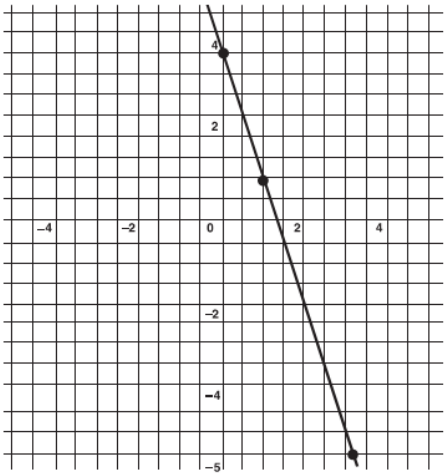
(D) $y = (2x - 8)(x - 6)$

6 Which of the following graphs represents the equation $3x + y = 4$?

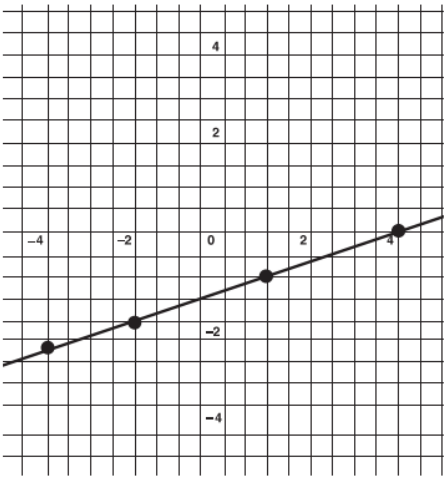
(A)



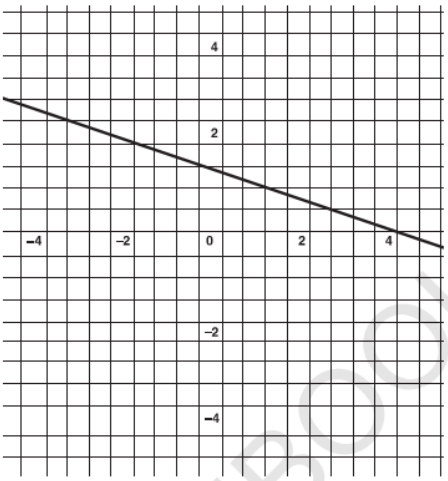
(B)



(C)



(D)



7 Which of the following is an equation for the line through the point (2, 3) with a slope of –1?

(A) $2x + 3y = -1$
(B) $3x + 3y = 15$
(C) $3x + 2y = 10$
(D) $x + y = -5$

8 Which of the following expressions is equivalent to

$\frac{3}{4}(x-4)(3+5x)$?

(A) $\frac{3x^2}{4} - 15x - 9$

(B) $\frac{9x^2}{4} - \frac{7x}{4} - 15$

(C) $\frac{15x^2}{4} - \frac{51x}{4} - 9$

(D) $\frac{15x^2}{4} - \frac{69x}{4} - 9$

9 Which of the following is equal to $x^{\frac{3}{4}}$?

(A) $4x^3$
(B) $3x^4$
(C) $\sqrt[4]{x^3}$
(D) $\sqrt[3]{x^4}$

10 Which of the following is the equation for the graph of a parabola that has a vertex at (3, –5) and a y-intercept at 13?

(A) $y - 28 = (x - 3)(x + 5)$
(B) $y = 2(x - 3)^2 - 5$
(C) $y = (x - 3)^2 - 13$
(D) $y = x^2 - 6x + 13$

GO TO THE NEXT PAGE

11 The admission cost for a play is \$12 for adults and \$7 for children. Which system of equations can be used to determine the number of adults and number of children that attended if 117 people attended the play and the total amount collected for admission was \$1,079?

(A) $12x + 7y = 117$
$x + y = 1079$

(B) $12x + y = 117$
$x + 7y = 1079$

(C) $12x + 7y = 1079$
$x + y = 117$

(D) $x + 7y = 117$
$12x + y = 1079$

12 Which of the following is equivalent to $\frac{4-i}{3+i}$

that can be found by multiplying by the complex conjugate of the denominator?

(A) $\frac{1}{3}$

(B) $\frac{17}{11+7i}$

(C) $\frac{11-7i}{10}$

(D) $\frac{13+i}{8}$

13 What is the solution to the equation $-6(t + 1) = 2(1-3t) - 8$?

(A) –8
(B) –6
(C) No solution
(D) Infinitely many solutions

14 A small city in Spain grows at an average rate of 1.7% a year. The population of the city in 1980 was 2,845. The equation that models the city's population in 1990 is $P = 2845e^{(0.017)(10)}$. What does 10 represent in the equation?

(A) The city's population in 1980
(B) The number of years
(C) The city's average grown rate
(D) The factor of increase of the city's population each year

15 If p and q are positive and $\frac{2p+2n}{qn} = 2$, which of the following is equivalent to n?

(A) $\frac{p}{q-1}$

(B) $\frac{p-1}{q-1}$

(C) $\frac{q+1}{p}$

(D) $\frac{q-1}{p}$

16 If $\sqrt{x+1}-2=3$, what is the value of x?

17 If $f(x) = 3x - 2$, for what value of x does $f(x)$ equal 1?

18

$$\frac{3x^2-4x-18}{x+3}=3x-c+\frac{21}{x+3}$$

What is the value for c that will make the equation above true?

19

$$y = 3x + 7$$
$$4x - ty = 5$$

According to the system of equations above, what is the value of b that makes the system of equations have no solutions?

20 A spherical scoop of ice cream is placed on top of a hollow ice cream cone. The scoop and cone have the same radius. The ice cream melts completely and it fills the cone to the top. How many times greater is the height of the cone than the radius of the cone?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

1 A certain insect is estimated to travel 1,680 feet per year. At this rate, about how many months would it take for the insect to travel 560 feet?

(A) 0.75
(B) 3
(C) 4
(D) 5.5

2 A librarian is tracking the circulation of books at the library. In one day of checking books, 18 were renewed, 46 were returned on time, and 11 were returned late. At this rate, about how many books will be renewed if the library loans 25,000 books each year?

(A) 4,000
(B) 6,000
(C) 9,000
(D) 15,000

3

	Smalltown	Littletown	Total
Male	175	210	385
Female	195	205	400
Total	370	415	785

Smalltown and Littletown are two towns in Tinytown County. The table above shows the distribution of population of males and females of the towns. If a person from the county is selected at random, what is the probability that the person will be either a male from Littletown or a female from Smalltown?

(A) $\frac{39}{74}$

(B) $\frac{42}{83}$

(C) $\frac{56}{157}$

(D) $\frac{81}{157}$

4

A pink dogwood tree has an average growth rate of 0.36 inches per week. Based on the average growth rate, if a pink dogwood tree was newly planted, what would its height, in inches, be in 10 years?

(A) 43.2 inches

(B) 187.2 inches

(C) 218 inches

(D) 360 inches

5

Glen earns $10.25 per hour and pays $12.50 per day to commute to and from work on the bus. He wants to make sure that he works long enough to earn at least three times as much as he spends commuting. Which of the following inequalities best represents this situation?

(A) $10.25h \geq 3(12.50)$

(B) $3(10.25) \geq 12.50h$

(C) $3(10.25h) \geq 12.50$

(D) $h \geq 3(12.50)(10.25)$

6

Nadia spent 7 more hours on math homework last month than Peter. If they spent total of 35 hours doing math homework last month, how many hours did Peter spend on math homework?

(A) 7

(B) 14

(C) 21

(D) 28

7

If c is 22 percent of e and d is 68 percent of e, what is $d - c$ in terms of e?

(A) $90e$

(B) $46e$

(C) $0.9e$

(D) $0.46e$

8

$$2x - 9y < 12$$
$$-3x + 4y > 5$$

Which of the following is a solution to the system of inequalities shown above?

(A) (–4, –4)

(B) (–4, 4)

(C) (4, –4)

(D) (4, 4)

9 If n = 7, what is $2m(16 - 6n)$ in terms of m?

(A) $-52m$
(B) $-15m$
(C) $-14m$
(D) $32m$

10 Tessa wants to raise a total of $250 for her favorite charity. She has already raised $145. Tessa asks for $15 contributions from each person she contacts. Which equation best represents this situation?

(A) $15x = 250$
(B) $145(15x) = 250$
(C) $145 + 15x = 250$
(D) $145 - 15x = 250$

QUESTIONS 11 AND 12 REFER TO THE FOLLOWING INFORMATION.

A class raised money selling t-shirts, and then began selling hats. The graph represents the total amount of money in the class account as the number of hats sold increases.

11 According to the graph, which of the following best approximates the number of hats that must be sold for the class to have raised a total of $400

(A) 54
(B) 58
(C) 64
(D) 68

12 What does the slope of the line signify?

(A) The amount of money already raised
(B) The amount of money raised by selling each hat
(C) The number of hats that are sold
(D) The number of hats that must be sold to meet the fundraising goal

13 A survey was conducted to determine whether the voters in a city of 38,000 would support funding a new park. A sample of 18 voters randomly selected from the voting list revealed that 11 voters favored funding the park, 4 voters did not want to fund the park, and 3 voters had no preference. Which of the following makes it least likely that a reliable conclusion can be drawn from the data?

(A) The size of the sample population

(B) The size of the city's population

(C) The number of people with no preference

(D) How the sample population was selected

14 In 2010, a census showed a city had a population of 22,500. The results of the census also showed that the mean income of the population was $72,350, and the median income was $65,580. Which of the following could describe the difference between the mean income and the median income of the population?

(A) Most of the income values are between the mean and median income values.

(B) There are a few income values that are much less than the other income values.

(C) There are a few income values that are much greater than the other income values.

(D) The range in income values is greater than the income value.

15 A group of h neighbors has 1,230 CDs they are selling at a yard sale. If each neighbor sells on average x CDs per day for j days of the yard sale, which of the following represents the total number of CDs that will be left when the yard sale is over?

(A) $1230 - jhx$

(B) $1230 - hx - j$

(C) $1230 - \frac{jx}{h}$

(D) $1230 + \frac{jx}{h}$

16 $y = -16x^2 + 50x + 2$

The equation above represents the height y of a ball, in feet, x seconds after it has been thrown upwards. Which of the following best describes the meaning of the coefficient 50?

(A) The height of the ball when it is thrown

(B) The height of the ball after x seconds

(C) The initial velocity of the ball when it is thrown

(D) The acceleration of the ball's upward velocity

QUESTIONS 17 AND 18 REFER TO THE FOLLOWING INFORMATION.

Quinn is moving across the state and needs to rent a moving truck that will fit her belongings. The table below shows the mileage rate and daily rental cost for trucks from three different companies.

	Mileage rate, b, in cents per mile	Rental rate, a, in dollars per day
Company J	15	19
Company K	10	30
Company L	12	25

The total cost, y, for renting the truck for one day and driving x miles is found by using the formula $y = a + 0.01bx$.

17 For which numbers of miles x is the cost of renting from Company J less than renting from Company K?

(A) $x < 44$
(B) $x < 55$
(C) $x < 220$
(D) $x < 980$

18 If the relationship between the total cost, y, of renting the truck from Company L and driving it x miles for one day is graphed in the xy-plane, what does the slope of the line represent?

(A) The daily rental cost for the truck
(B) The cost to drive the truck each mile
(C) The total cost for the miles driven
(D) The total cost for renting and driving the truck

QUESTIONS 19 AND 20 REFER TO THE FOLLOWING INFORMATION.

A sample of the population in two neighborhood towns, Town A and Town B, was surveyed in order to determine the most popular types of house styles. The results of the survey are shown in the table.

TYPES OF HOUSES

House Style	Ranch	Colonial	Cape Cod	Victorian
Town A	75	25	53	20
Town B	62	65	43	32

19 According to the table above, what is the probability that a randomly selected house in Town B is a colonial house?

(A) $\frac{65}{202}$
(B) $\frac{17}{18}$
(C) $\frac{31}{45}$
(D) $\frac{25}{62}$

20 What is the probability that a house randomly selected from Town A is a Victorian house?

(A) $\frac{5}{13}$
(B) $\frac{20}{43}$
(C) $\frac{4}{75}$
(D) $\frac{32}{375}$

21 Which of the following are the solutions to the equation $y - 5 = 3x^2 - 5x - 7$?

(A) $2, -\frac{1}{3}$

(B) $3, -1\frac{1}{3}$

(C) $\frac{5 \pm \sqrt{109}}{6}$

(D) $\frac{5}{6}$

22

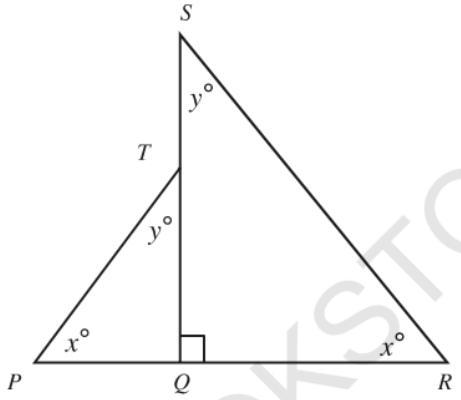


Figure not drawn to scale.

In the figure above, if $QP = 11.5$, $TQ = 15$, and $QR = 46$, what is the value of SQ?

(A) 65

(B) 60

(C) 49.5

(D) 42.5

23 $1 = \frac{3}{x-4} + \frac{4}{x-3}$

Which of the following are the values of x in the equation above?

(A) $7 \pm 2\sqrt{3}$

(B) $7 \pm \sqrt{62}$

(C) $7 \pm \sqrt{86}$

(D) 1, 13

24 A certain type of weather radar, known as a Base Reflectivity Radar, has a circumference of 572π miles. The central angle of a sector of the circle that the radar makes is $\frac{3\pi}{4}$.

What is the area, in square miles, of the sector of the circle?

(A) 858π square miles

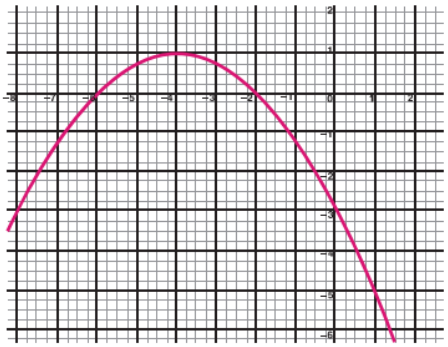
(B) $\frac{429\pi}{4}$ square miles

(C) $\frac{61,347\pi}{2}$ square miles

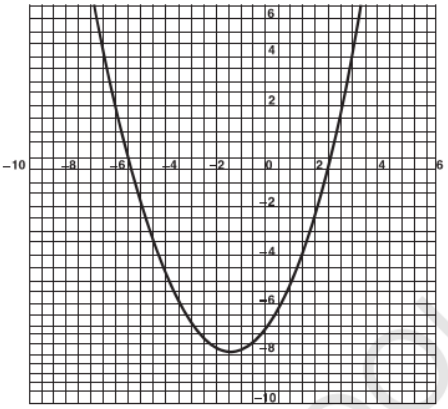
(D) $81,796\pi$ square miles

25 If c is a negative constant less than 1 and b is a positive constant greater than 1, which of the following could be the graph of $y = a(x + b)(x + c)$?

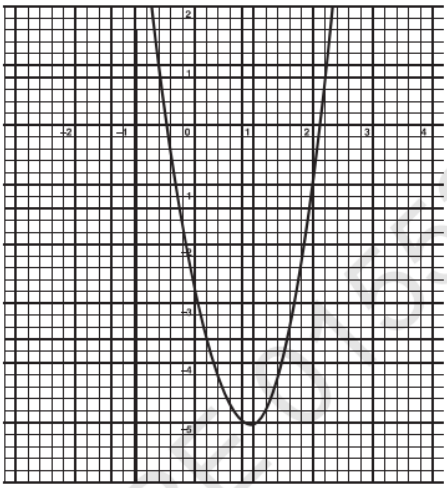
(A)



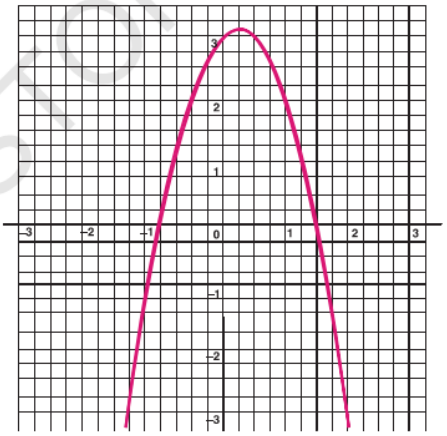
(B)



(C)



(D)



26 $2x - 5y < 6$

$x + ay < -3$

Which of the following must be true if the system of inequalities has solutions only in quadrants II and III?

(A) $a < 0$

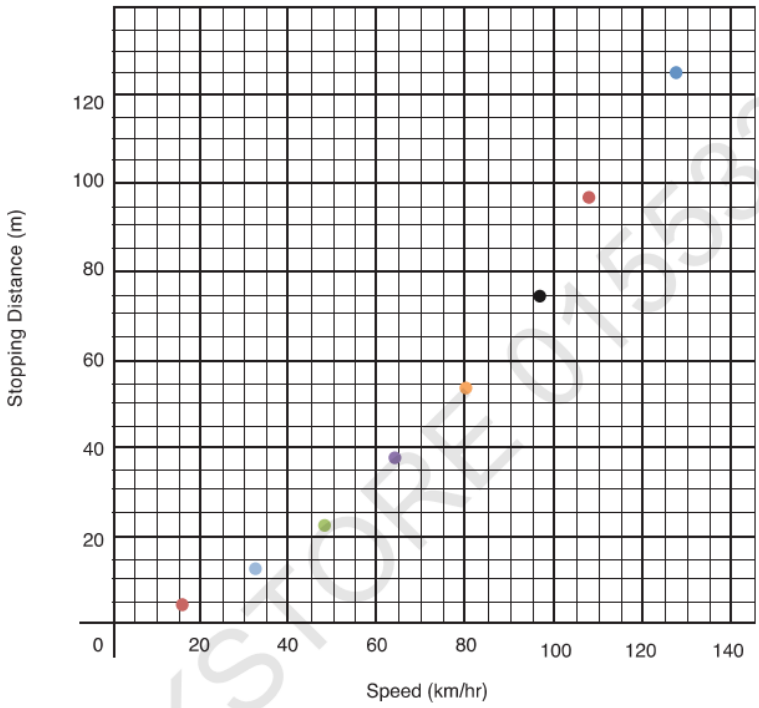
(B) $a = 0$

(C) $0 \leq a \leq 2.5$

(D) $a > 2.5$

QUESTIONS 27 AND 28 REFER TO THE FOLLOWING INFORMATION.

The graph below shows the results of a study to see how far a vehicle travels before coming to a complete stop at different speeds.



27 Which equation best models the relationship shown in the graph between the speed in kilometers per hour, x, and the stopping distance in meters, y?

(A) $y = \frac{1}{4}x$

(B) $y = x - 10$

(C) $y = 4.82(1.03)^x$

(D) $y = 4.82x^{1.03}$

28 Which of the following best describes the relationship represented in the graph?

(A) The relationship between the initial speed and the stopping distance is linear, because the points are close to a line.

(B) The relationship between the initial speed and the stopping distance is linear, because the points are all on a line.

(C) The relationship between the initial speed and the stopping distance is modeled by exponential growth, because the slope of the line connecting any two points increases as the initial speed increases.

(D) The relationship between the initial speed and the stopping distance is modeled by exponential decay, because the slope of the line connecting any two points increases as the initial speed increases.

29 A recent national poll of adults in the United States found that 64% favor stricter emissions on power plants. The margin of error for the poll was ± 4% with 95% confidence. Which of the following statements is a conclusion that can accurately be drawn from this poll?

(A) The true percentage of people who oppose stricter emissions of power plants is definitely between 32% and 40%.

(B) The true percentage of people who support stricter emissions of power plants is definitely between 60% and 68%.

(C) The pollsters are 95% confident that the true percentage of people who oppose stricter emissions of power plants is between 32% and 40%.

(D) The pollsters are 95% confident that the true percentage of people who support stricter emissions of power plants is between 60% and 68%.

30 The equation for the graph of a circle in the xy-plane is $x^2 + y^2 - 10x + 4y = -20$. What are the coordinates of the center of the circle?

(A) (5, –2)

(B) (–5, 2)

(C) (10, –4)

(D) (–10, 4)

31 A bowling alley charges $4.50 per hour to use a lane. They also charge $2.50 to rent a pair of bowling shoes. Miguel and his friend rent a pair of bowling shoes each. The total cost before taxes is $16.25. How many hours did they bowl?

32 If $4s - 3 < 2$ and s is an integer, what is the greatest possible value of $4s + 5$?

33 If $2a - b = 7$ and $2a + 2b = 16$, what is the value of $3a + 7b$?

34 The current population of a certain type of organism is about 100 million. The population is currently increasing at an annual rate that will make the population double in 18 years. If this pattern continues, what will the population of this country be, in millions of organisms, 54 years from now?

35 Sally sold pieces of her pottery for x dollars each at an art show. Paul sold pieces of his pottery for y dollars each at the same show. Paul sold four pieces of pottery for a total of $85 and Sally sold five pieces for a total of $40 more than Paul. How much more, in dollars, did Sally charge for each piece of her pottery than Paul charged for his? (Ignore the dollar sign when gridding in your answer.)

36 Carl knitted 4 more scarves this year than last year. If he knitted 16% more scarves this year than last year, how many did he knit this year?

37 $y = 2x + 5$

$y = -2(x + 1)^2 + 3$

If (x, y) is a solution to the system of equations above, what is one possible value of y?

38 The average weekly median household income in a country from 2010 through 2014 was $1,007. What is the least average weekly median household income for 2015 that would keep an average of at least $1,000? Grid in your answer without the dollar sign.

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

Section 3: Math Test—No Calculator

1. C	**5.** C	**9.** C	**13.** D	**17.** 1
2. D	**6.** B	**10.** B	**14.** B	**18.** 13
3. B	**7.** B	**11.** C	**15.** A	**19.** 4/3
4. B	**8.** C	**12.** C	**16.** 24	**20.** 4

1. C	**9.** A	**17.** C	**25.** B	**33.** 36
2. B	**10.** C	**18.** B	**26.** C	**34.** 800
3. D	**11.** B	**19.** A	**27.** C	**35.** 3.75
4. B	**12.** B	**20.** C	**28.** C	**36.** 29
5. A	**13.** A	**21.** A	**29.** D	**37.** 1 or 3
6. B	**14.** C	**22.** B	**30.** A	**38.** 965
7. D	**15.** A	**23.** A	**31.** 2.5	
8. B	**16.** C	**24.** C	**32.** 9	

SECTION 3: MATH TEST—NO CALCULATOR

20 Questions • 25 minutes

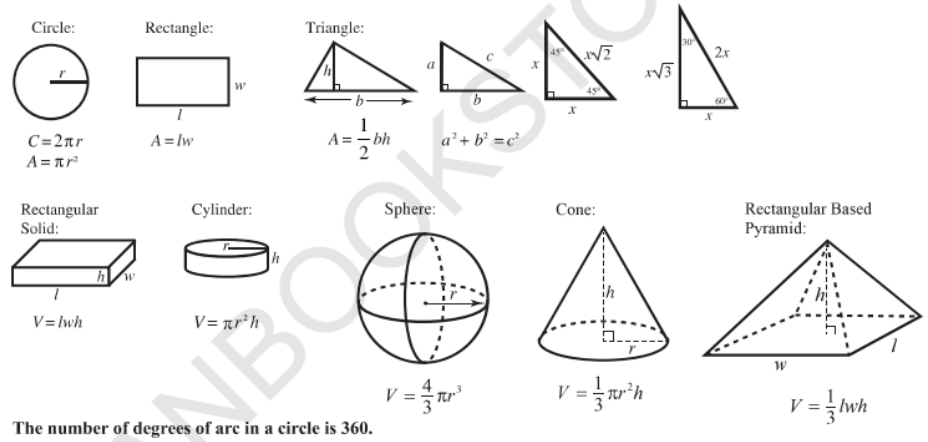
TURN TO SECTION 3 OF YOUR ANSWER SHEET TO ANSWER THE QUESTIONS IN THIS SECTION.

Directions: For **Questions 1–15,** solve each problem, select the best answer from the choices provided, and fill in the corresponding oval on your answer sheet. For **Questions 16–20,** solve the problem and enter your answer in the grid on the answer sheet. The directions **before Question 16** will provide information on how to enter your answers in the grid.

ADDITIONAL INFORMATION:

- The use of a calculator in this section **is not permitted.**
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference Information



The number of degrees of arc in a circle is 360.
The number of radians in the arc of a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

1 If $x + x + x + 7 = x + x + 9$, what is the value of x?

(A) 1
(B) 2
(C) 3
(D) 5

2 Which shows the simplified form of $(3x^2 - 7x + 5) - (-6x^2 + 5x - 4)$?

(A) $-3x^2 - 2x + 1$
(B) $-3x^2 - 12x + 9$
(C) $9x^2 - 2x + 1$
(D) $9x^2 - 12x + 9$

GO TO THE NEXT PAGE

3 $y \le 3x - 4$

$5x + 4y \ge 6$

Which point is a solution to the system of inequalities?

(A) (0, 0)
(B) (–1, 5)
(C) (2, –3)
(D) (3, 4)

4 Angie took $3x$ hours to make it on time for her brother's birthday party in another state, and she drove the route at an average of z miles per hour. If b is the number of hours Angie spent at rest stops, when she was NOT traveling, which of the following represents the total distance Angie traveled to get to her brother's party?

(A) $z(b - 3x)$
(B) $b - 3x$
(C) $z(3x - b)$
(D) $3xz - b$

5 If $3s - r = 9$ and $6s = 36$, what is the value of r?

(A) 3
(B) 6
(C) 9
(D) 12

6 Gary deposits $50 into an existing savings account. Each month he plans to increase the amount he deposits by $7. Using $y = 50 + 7(x - 1)$ to represent this situation, what is the meaning of y in the equation?

(A) The total amount that Gary has in the account after x months
(B) The number of months that Gary has been making deposits
(C) The amount that Gary deposits into his account in month x
(D) The increase in the monthly amount of Gary's deposits

7 If $f(x) = cx - \frac{d}{x}$, which of the following represents $f\left(\frac{1}{c}\right)$?

(A) $1 - cd$
(B) $1 + cd$
(C) $c^2 - \frac{d}{c}$
(D) $\frac{d}{c} - c^2$

8 The graph of a function has a y-intercept at 3 and an x-intercept at 1.5. Which of the following could be the equation for that function?

(A) $y = -\frac{3}{x-3} + 2$
(B) $y = \frac{1}{x-3} + 2$
(C) $y = \frac{3}{x-3} + 2$
(D) $y = \frac{3}{x-1} + 2$

9 The x-intercepts of the function $g(x)$ are –2, 3, and 5. Which of the following is a factor of $g(x)$?

(A) $x + 2$
(B) $x + 3$
(C) $x - 15$
(D) $x - 30$

10 The ratio of marbles in each package of marbles is 2 red: 3 green: 4 blue. How many green and blue marbles does Ina have if she bought 108 marbles?

(A) 12
(B) 36
(C) 48
(D) 84

11 What is the value of a, if

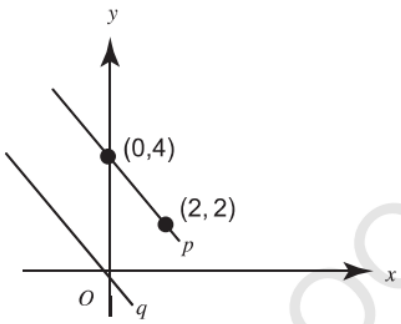
$x^{\frac{1}{5}} \bullet x^{\frac{4}{5}} = x^{-a}$?

(A) −5
(B) −1
(C) 1
(D) 5

12 In the figure above, lines p and q are parallel. If point (x, y) lies on line q, which of the following represents the relationship between x and y?

(A) $x + y = 0$
(B) $x - y = 0$
(C) $x + y = 1$
(D) $x - y = -1$

13



In a right triangle DEF, $\sin F = \frac{2}{3}$ and $m\angle E = 90°$. Which of the following statements is true?

(A) $\cos F = \frac{1}{3}$

(B) $\tan F = 2$

(C) $\cos D = \frac{2}{3}$

(D) $\sin D = \frac{1}{3}$

14 A circle is drawn on an xy-plane. The diameter of the circle has endpoints at (–9, 7) and (15, –3). Which of the following is an equation for the graph of the circle?

(A) $(x-3)^2 + (y-2)^2 = 169$
(B) $(x-3)^2 + (y-2)^2 = 676$
(C) $(x-6)^2 + (y-4)^2 = 169$
(D) $(x-6)^2 + (y-4)^2 = 676$

15 $\frac{3x^2 - 5x + 9}{x - 3}$

Which expression is equivalent to the expression above?

(A) $3x + 4 + \frac{21}{x-3}$

(B) $3x - 5 - \frac{6}{x-3}$

(C) $3x + 9 + \frac{36}{x-3}$

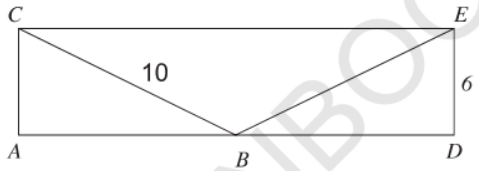
(D) $3x - 14 + \frac{51}{x-3}$

GO TO THE NEXT PAGE

16 A ball is tossed into the air from 6 meters off of the ground, with a velocity of 13 meters per second. The equation that represents the height of the ball (h, in meters) at time (t, in seconds) is $h = 6 + 13t - 5t^2$. How many seconds will it take for the ball to hit the ground?

17 If $b = 6$ is a solution to the equation $6b + m = 270$, where m is a constant, what is the value of m?

18



In the figure above, $ACED$ is a rectangle and B is the midpoint of $\overline{AD}$. What is the value of $\overline{AD}$?

19 What is the value of x, if

$\sqrt{x+10} - \sqrt{2x-5} = 0$?

20 $fx + gy = -16$

$3x - 8y = 32$

In the system of equations above, f and g are constants. If the system has infinitely many solutions, what is the value of $-\frac{g}{f}$?

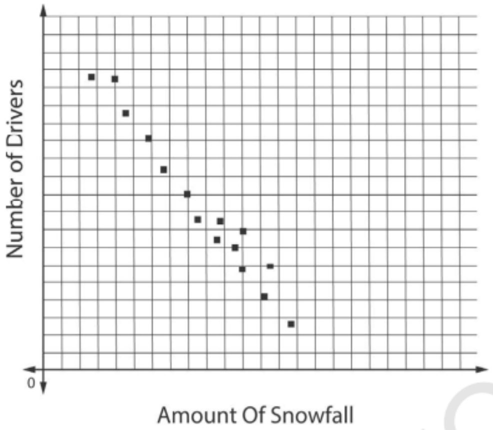
STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

1 A 6-pound bag of flour is poured into 24 containers, with the same amount in each container. How many ounces of flour is in each container?

(A) 2
(B) 4
(C) 6
(D) 8

2 A major city performed a recent study to see the effect that snowfall totals have on the number of drivers on the road. The results of the study are represented in the scatterplot, where the x-axis represents the amount of snowfall and the y-axis represents the number of drivers. Which statement best describes the results of the study?



(A) There is no correlation between the amount of snowfall and the number of drivers on the road.

(B) There is a positive correlation between the amount of snowfall and the number of drivers on the road.

(C) There is a negative correlation between the amount of snowfall and the number of drivers on the road.

(D) The scatterplot does not display enough data to interpret a correlation between the amount of snowfall and the number of drivers on the road.

3 How many quarters must Lilly charge for a box of cookies in order to make $18 after selling 3 boxes of cookies of equal value?

(A) 6

(B) 10

(C) 14

(D) 24

4 Martina earns $480 per week plus 15% commission on all of her sales. Which shows the amount she earns each week as a function of her total sales, x?

(A) $f(x) = 480(0.15x)$

(B) $f(x) = 480 + 0.15x$

(C) $f(x) = 480(15x)$

(D) $f(x) = 480 + 15x$

5 The city of Smallville had an increase of 8% in its tax revenues from last year to this year. For next year, the mayor projects the city's tax revenues to increase by 10% from this year. What will be the total percent increase from last year to next year's projection?

(A) 18%

(B) 18.8%

(C) 19%

(D) 19.8%

6 A random sample of people in a county were asked whether or not they drive more when gas prices decrease. Of the 682 people who responded, 471 of them said they do not drive more when gas prices decrease. If there are about 898,000 people living in the county, about how many people would be expected to not drive more when gas prices decrease?

(A) 280,000

(B) 320,000

(C) 580,000

(D) 620,000

7 A scale model drawing of the Moon shows its diameter as 6 inches. The scale of the drawing is 1 inch = 360 miles. What is the approximate diameter of the actual Moon?

(A) 2,160 miles

(B) 2,260 miles

(C) 3,060 miles

(D) 3,360 miles

8 There are 380 seats in a movie theater. The theater must collect at least \$600 in admission per movie screening in order to make a profit. The prices for admission are \$6.50 for children and \$8.25 for adults. Which system of inequalities best describes this situation?

(A) $\begin{aligned} x+y &\geq 380 \\ 6.5x+8.25y &\leq 600 \end{aligned}$

(B) $\begin{aligned} x+y &< 380 \\ 6.5x+8.25y &> 600 \end{aligned}$

(C) $\begin{aligned} x+y &\leq 380 \\ 6.5x+8.25y &\leq 600 \end{aligned}$

(D) $\begin{aligned} x+y &\leq 380 \\ 6.5x+8.25y &\geq 600 \end{aligned}$

9 A couch is on sale for 15% off the retail price r. A 6% sales tax is added to the sale price. Which expression represents the total cost of the couch, including the sales tax?

(A) $0.85r + 1.06$

(B) $0.85r + 1.06r$

(C) $0.85r \times 1.06$

(D) $0.85r \times 1.06r$

10 A hiking club bought energy bars for \$2.25 each and reusable water bottles for \$12.50 each and spent a total of \$447.50. Which equation can be used to determine the number of energy bars x and water bottles y that the club bought?

(A) $2.25x + 12.5y = 447.5$

(B) $12.5x + 2.25y = 447.5$

(C) $14.75(x + y) = 447.5$

(D) $\frac{x}{2.25}+\frac{y}{12.5}=447.5$

11 If $b \neq 1$ and…hich of the following expressions is equivalent to $\frac{a-3}{3b-3}$?

(A) $-b$

(B) $-\frac{1}{b}$

(C) $-a$

(D) $\frac{1}{a}$

12 Which of the following is equivalent to $3\sqrt[4]{x^3}$?

(A) $3x^{\frac{4}{3}}$

(B) $3x^{\frac{3}{4}}$

(C) $3\left(x^3\right)^4$

(D) $3\left(x^4\right)^{\frac{1}{3}}$

13 Aaron earns \$9 working part-time at the pool and \$11 working part-time at the bakery. He needs to make at least \$215 each week, but he cannot work more than a total of 25 hours each week. Which system of inequalities represents this situation?

(A) $\begin{aligned} 9x+11y &\geq 215 \\ x+y &\leq 25 \end{aligned}$

(B) $\begin{aligned} 9x+11y &< 215 \\ x+y &< 25 \end{aligned}$

(C) $\begin{aligned} 9x+11y &< 215 \\ x+y &> 25 \end{aligned}$

(D) $\begin{aligned} 9x+11y &> 215 \\ x+y &\leq 25 \end{aligned}$

14 A book company sells science textbooks and science laboratory activity books. If the maximum weight for one shipment of books is 50 pounds, which inequality can be used to determine the number of each book that can be shipped when the textbooks weigh 2.5 pounds each and the laboratory books weigh 1.25 pounds each?

(A) $2.5x + 1.25y > 50$
(B) $2.5x + 1.25y < 50$
(C) $2.5x + 1.25y \geq 50$
(D) $2.5x + 1.25y \leq 50$

15 What is the y-intercept of the line whose equation is $3x + 4y = 16$?

A) $\left(\frac{3}{4},0\right)$

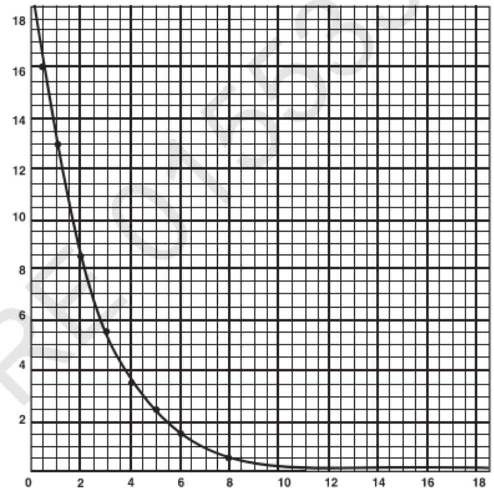
(B) $(4, 0)$

(C) $\left(0,\frac{3}{4}\right)$

(D) $(0, 4)$

QUESTIONS 16 AND 17 REFER TO THE FOLLOWING INFORMATION.

The graph below shows the amount of radioactive material in y grams that remains after x days in a container. Each point shows a measured amount that remains, and the best fit relation between those points is drawn to connect those points.



16 Which of the statements describes the relation between the amount of radioactive material and the number of days that have passed?

(A) Linear increasing
(B) Linear decreasing
(C) Exponential growth
(D) Exponential decay

17 About how much radioactive material remained after 9 days?

(A) 0.25 gram
(B) 0.5 gram
(C) 0.75 gram
(D) 1 gram

18

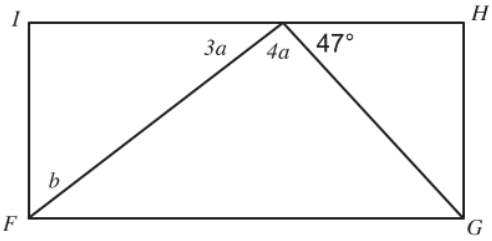


Figure not drawn to scale.

In the rectangle $FGHI$ above, what is the value of $\angle b$?

(A) 17°

(B) 20°

(C) 33°

(D) 45°

19 The population of a country has been growing at an annual rate of about 2.5%. The population in the year 2014 was estimated at 339,800. Which of the following equations shows the projected population of the country x years after 2010?

(A) $y = 339{,}800(1.025)^x$

(B) $y = 339{,}800(1.025)^{x-4}$

(C) $y = 339{,}800(2.5)^x$

(D) $y = 339{,}800(2.5)^{x-4}$

20 A city newspaper randomly surveyed 250 subscribers about their support for the mayor. Of the respondents, 27% said they supported the mayor, and the results had a margin of error of 3%. The newspaper ran a headline that less than 30% of city residents support the mayor. Which of the following statements best explains why the results do not support the conclusion stated in the headline?

(A) The sample size is too small.

(B) The percent of supporters could be exactly 30.

(C) The margin of error is too large to make any conclusions.

(D) The sample is likely biased and not representative of the city.

21 If $a > 0$ and $\left(3^{-a}\right)^{\frac{2}{3}} = \left(9^{\frac{1}{a}}\right)^{-6}$ what is the value of a?

(A) $3\sqrt{3}$

(B) $3\sqrt{2}$

(C) $2\sqrt{3}$

(D) $2\sqrt{2}$

QUESTIONS 22 AND 23 REFER TO THE FOLLOWING INFORMATION.

The tables below give the number of days of rain per month for one year in Town A and Town B.

Town A	
Days of Rain	Frequency
5	1
6	3
7	2
8	1
9	2
10	1
11	2

Town B	
Days of Rain	Frequency
1	1
3	3
5	2
9	1
12	2
15	1
19	2

22 Which of the following is true about the data shown in the table?

(A) The median number of days of rain is greater in Town A.

(B) The median number of days of rain is greater in Town B.

(C) The median number of days of rain is the same in both towns.

(D) There is not enough information to compare the mean, median, or mode.

23 Which of the following is true about the standard deviation of the data shown in the tables?

(A) The standard deviation of days of rain per month in Town A is greater.

(B) The standard deviation of days of rain per month in Town B is greater.

(C) The standard deviation of days of rain per month is the same in both towns.

(D) There isn't enough information to calculate the standard deviations.

24 The graph of a linear function has intercepts at $(a, 0)$ and $(0, a)$. Which of the following is true about the slope of the graph of the function?

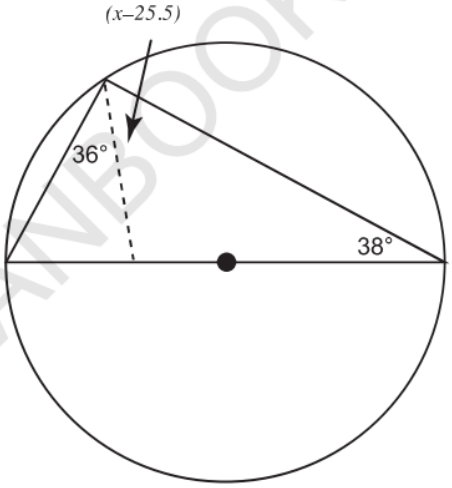
(A) It is positive.

(B) It is negative.

(C) It is zero.

(D) It is undefined.

25 What is the value of x in the diagram below?



not drawn to scale

(A) 16

(B) 41.5

(C) 54

(D) 79.5

QUESTIONS 26 AND 27 REFER TO THE FOLLOWING INFORMATION.

A poll surveyed 300 randomly selected voters for an upcoming city election. Of the respondents, 31% said that they will vote for Candidate A. The margin of error for the results was ± 4% with 95% confidence.

26 Which of the following statements is best supported by the data?

(A) The sample size is too small to make an inference about the election.

(B) The margin of error is too large to make an inference about the election.

(C) The sample is likely biased, so an inference about the election cannot be made.

(D) The sample is likely unbiased and large enough to make an inference about the election.

27 Which of the following statements can be best drawn from this data?

(A) The actual percentage of voters who will vote for Candidate A is 27%.

(B) The actual percentage of voters who will vote for Candidate A is 35%.

(C) The actual percentage of voters who will vote for Candidate A is most likely between 27% and 35%.

(D) The actual percentage of voters who will vote for Candidate A is most likely between 91% and 99%.

28 The diameter of Pluto's largest moon Charon is about 750 miles. The diameter of Pluto is about 2 times greater than the diameter of Charon. Which of the following best describes the volume of Pluto?

(A) The volume of Pluto is about two times as great as the volume of Charon.

(B) The volume of Pluto is about four times as great as the volume of Charon.

(C) The volume of Pluto is about six times as great as the volume of Charon.

(D) The volume of Pluto is about eight times as great as the volume of Charon.

29 $y = -2$

$y = ax^2 - b$

Which of the following values for a and b will make the system of equations have one solution?

(A) $a = 3, b = -3$

(B) $a = -2, b = -2$

(C) $a = -2, b = 2$

(D) $a = 3, b = 3$

30 $h(x) = -(x - 8)(x + 2)$

Which of the following is an equivalent form of the function h above in which the maximum value of h appears as a constant or coefficient?

(A) $h(x) = -x^2 + 16$

(B) $h(x) = -x^2 + 6x + 16$

(C) $h(x) = -(x + 3)^2 - 7$

(D) $h(x) = -(x - 3)^2 + 25$

31 Sorin rents a car for $49, plus mileage, for the weekend. The car rental company charges a fee for every mile over 100 miles driven. The equation $y = 49 + 0.24(x - 100)$ shows the total cost to rent the car and drive x miles. What is the fee, in cents per mile, for more than 100 miles?

32 Amber has $25 to spend. She wants to buy a book for $12 and pens that cost $2.75 each. What is the greatest number of pens she can buy?

33 A team scored 74 points in a basketball game, not including foul shots. They scored on a total of 33 field goals, including 2-point shots and 3-point shots. How many 2-point shots did the team score in the game?

QUESTIONS 34 AND 35 REFER TO THE FOLLOWING INFORMATION:

The data provided in the table shows the results of a 2010 census showing the estimated population of four countries, in millions of people, divided into males and females in each country.

	Canada	China	Mexico	United States	Total
Males	16.9	696.3	55.9	153.1	922.2
Females	17.1	645.0	57.5	157.2	876.8
Total	34	1,341.3	113.4	310.3	1,799.0

34 If a person is chosen at random, what is the probability that the person is a female from China? Express your answer as a decimal rounded to the nearest hundredth?

35 If a person is chosen at random, what is the probability that the person is NOT male? Express your answer as a decimal rounded to the nearest hundredth.

36

$$g(x)=\frac{1}{(x-6)^2+2(x-6)+1}$$

For what value of x is the function g above undefined?

QUESTIONS 37 AND 38 REFER TO THE FOLLOWING INFORMATION.

The value of a famous painting last sold for $300,000 ten years ago. Similar paintings have increased by about 14% annually in that time. The current owner of the painting is using the equation $V = 300(r)^t$ to model the value, V, in thousands of dollars t years after it was last sold.

37 What value should the current owner use for r?

38 What is the estimated value, to the nearest whole thousands of dollars, of the painting today? (Disregard the dollar sign when gridding your answer.)

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

1. B	**5.** C	**9.** A	**13.** C	**17.** 234
2. D	**6.** C	**10.** D	**14.** A	**18.** 16
3. D	**7.** A	**11.** B	**15.** A	**19.** 15
4. C	**8.** A	**12.** A	**16.** 3	**20.** 8/3 or 2.66 or 2.67

1. B	**9.** C	**17.** B	**25.** D	**33.** 25
2. C	**10.** A	**18.** C	**26.** D	**34.** .36
3. D	**11.** B	**19.** B	**27.** C	**35.** .49
4. B	**12.** B	**20.** D	**28.** D	**36.** 5
5. B	**13.** A	**21.** B	**29.** C	**37.** 1.14
6. D	**14.** D	**22.** A	**30.** D	**38.** 1112
7. A	**15.** D	**23.** B	**31.** 24	
8. D	**16.** D	**24.** B	**32.** 4	

EGYPTIAN SCHOLASTIC TEST

EST I – Math

Student's Name _____

National ID _____

Test Center _____

Duration: 90 minutes

Test sections: I- Calculators are not required, II – Calculator are required

45 Multiple Choice Questions and 13 Short Constructive Response Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Write your final result only on the answer sheet for the constructive response questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculators are allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- A formula sheet is available at the end of the booklet for your reference.

Section I
Calculators are not required
(30 minutes)

1

If $\frac{x+2}{5} = m$ and $m = -3$, what is the value of x?

(A) –17
(B) –15
(C) –5
(D) –1

2

If $d = m - \frac{50}{m}$, and m is a positive number, then as m increases in value, d

(A) increases in value.
(B) decreases in value.
(C) increases, then decreases.
(D) decreases, then increases.

3 Pieces of wire are soldered together so as to form the edges of a cube whose volume is 64 cubic inches. The number of inches of wire used is

(A) 24.
(B) 48.
(C) 64.
(D) 96.

4 Myra baked 6 sheets of cookies with r cookies on each sheet. Neil baked 7 sheets of cookies with p cookies on each sheet. Which of the following represents the total number t of cookies baked by Myra and Neil?

(A) $t = 13pr$
(B) $t = 42pr$
(C) $t = 6r + 7p$
(D) $t = 7r + 6p$

5 If $2y = \frac{1}{3}$, then $\frac{1}{4y} =$

(A) $\frac{3}{2}$
(B) $\frac{3}{4}$
(C) $\frac{1}{5}$
(D) $\frac{4}{3}$

6 $y = \frac{(x-3)^3}{4}$

Which expression is equivalent to x?

(A) $\sqrt{4y}+3$
(B) $\sqrt{4y+3}$
(C) $\sqrt[3]{4y}+3$
(D) $\sqrt[3]{4y+3}$

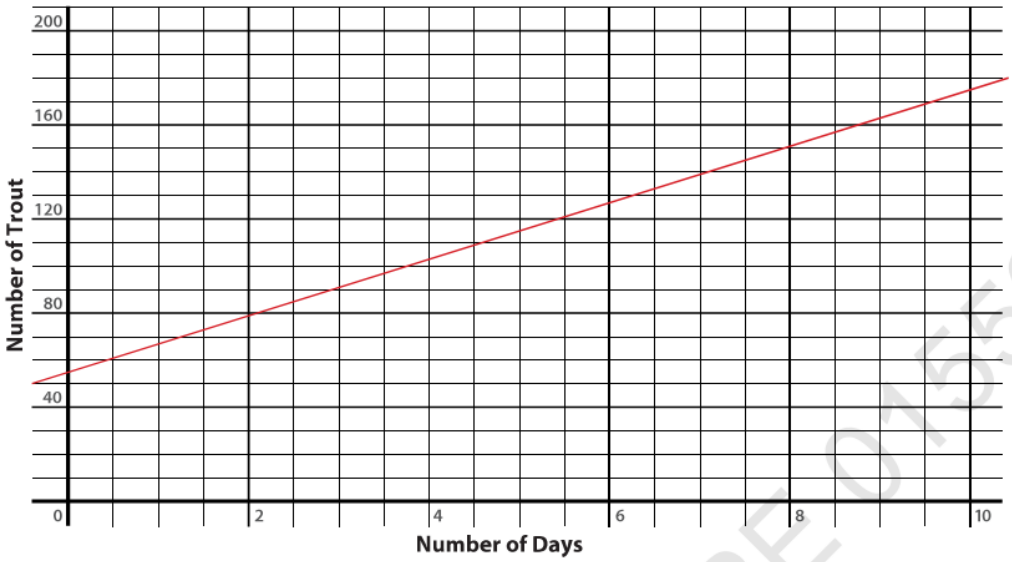
7 Hannah recently purchased a plant that grows 4.5 centimeters each week. The height of Hannah's plant can be found using the equation $h = 4.5w + 6$, where h is the height of the plant in centimeters, and w is the number of weeks. What is the meaning of the 6 in the equation?

(A) Hannah's plant will be 6 centimeters tall after 4.5 weeks.
(B) Hannah's plant grows 6 centimeters each week.
(C) Hannah's plant will grow for 6 weeks.
(D) Hannah's plant was initially 6 centimeters tall.

8 $(x)^6 + (2x^2)^3 + (3x^3)^2 =$

(A) $5x^5 + x^6$
(B) $17x^5 + x^6$
(C) $6x^6$
(D) $18x^6$

QUESTION 9 REFERS TO THE FOLLOWING GRAPH.



9 Stephen was studying the population of a certain trout pond. When he started his study, there were 55 trout in the pond. He observed the pond each day for 10 days and observed that there were 12 new trout each day. The graph above represents the relationship between the number of trout in the pond and the number of days. Which of the following is an equation for the graph?

(A) $y = 12x + 55$
(B) $y = 10x + 12$
(C) $y = 55x + 12$
(D) $y = 12x + 10$

10 Which of the following is equal to $\left(-\frac{27}{8}\right)^{-\frac{1}{3}}$?

(A) $-\frac{3}{2}$
(B) $-\frac{2}{3}$
(C) $\frac{2}{3}$
(D) $\frac{3}{2}$

11 The area of a square is $49x^2$. What is the length of a diagonal of the square?

(A) $7x$
(B) $7x\sqrt{2}$
(C) $14x$
(D) $\frac{7x}{\sqrt{2}}$

12 The distance, s, in feet that an object falls in t seconds when dropped from a height is obtained by use of the formula $s = 16t^2$. When graphed, what is the meaning of the slope between any two points in the graph?

(A) The height in feet from where the object falls
(B) The speed in feet per second of the object as it falls
(C) The time in seconds it takes for the object to fall to the ground
(D) The acceleration in feet per second squared of the object as it falls

13

$$D + B = 24$$
$$4D + 2B = 84$$

In a system of equations, the first equation represents the total number of dogs, D, and birds, B, in a pet store. The second equation represents the number of legs a dog has, $4D$, and the number of legs a bird has, $2B$. How many dogs and birds are in the pet store?

(A) $D = 6$; $B = 18$

(B) $D = 18$; $B = 6$

(C) $D = 24$; $B = 84$

(D) $D = 60$; $B = 24$

14 $f(x) = x^2 - 4x - 21$

Which of the following is an equivalent equation that shows the zeros of the function as coefficients or constants?

(A) $f(x) = (x - (-7))(x - 3)$

(B) $f(x) = (x - 7)(x - (-3))$

(C) $f(x) = (x - 2)^2 - 21$

(D) $f(x) = (x - 2)^2 - 25$

15 Which equation represents the equation of a line perpendicular to $y = 3x - 2$ that goes through the point (1, 3)?

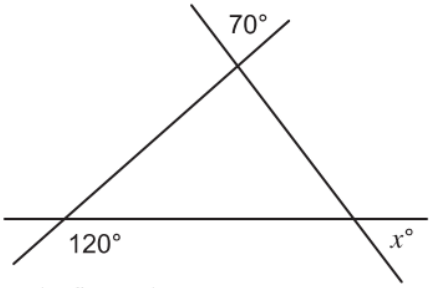
(A) $y = -3x + 6$

(B) $y = -\frac{1}{3}x + \frac{10}{3}$

(C) $y = -\frac{1}{3}x + \frac{9}{3}$

(D) $y = 3x$

16



In the figure above, $x =$

17 The factors of the function f are $(x+3)^2$ and $(3x-2)$. What is a zero of the function?

18 $5(4-8x) = d(5-6x) - 4x$

What value of d will make the equation have no solutions?

19 $\sqrt{4-x^2} = \sqrt{3x}$

What is one solution to the equation?

20 $2x + 3y = 7$

$ax - 12y = b$

According to the system of equations above, what is the value of ab that will make the system of equations have an infinite number of solutions?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

1 If $9x + 5 = 23$, what is the numerical value of $18x + 5$?

(A) 46
(B) 41
(C) 36
(D) 32

2 A pickup truck has maximum load capacity of 1,500 pounds. Bruce is going to load small radiators, each weighing 150 pounds, and large radiators, each weighing 250 pounds, into the truck. There are 15 radiators to choose from. Which system of linear inequalities represents this situation?

(A) $x + y < 15$
$150x + 250y < 1500$

(B) $x + y \geq 15$
$150x + 250y \geq 1500$

(C) $x + y > 15$
$150x + 250y > 1500$

(D) $x + y \leq 15$
$150x + 250y \leq 1500$

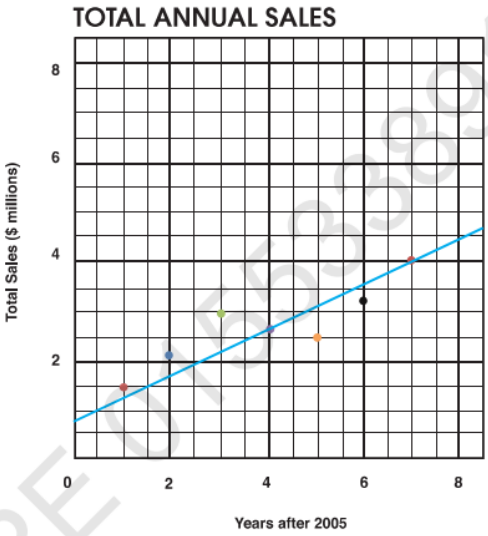
3 If 15 cans of food are needed for 7 adults for two days, how many cans are needed to feed 4 adults for seven days?

(A) 15
(B) 20
(C) 25
(D) 30

4 Fiona earns $28 per hour working for herself. She saves 25% of her income to pay taxes. Which function can be used to determine the non-taxed amount Fiona earns for working x hours,?

(A) $f(x) = 28(0.25x)$
(B) $f(x) = 28 + 0.25x$
(C) $f(x) = 28(0.75x)$
(D) $f(x) = 28 + 0.75x$

QUESTIONS 5 AND 6 REFER TO THE FOLLOWING INFORMATION.



The graph above represents the sales for a company after 2005.

5 Which phrase best describes the correlation between the years after 2005 and the total sales?

(A) Weak negative
(B) Strong negative
(C) Weak positive
(D) Strong positive

6 Which equation best models the data shown in the graph?

(A) $y = 0.4x + 1$
(B) $y = x + 0.5$
(C) $y = 1.5^x$
(D) $y = 0.5^x$

7 If a box of notepaper costs $4.20 after a 40% discount, what was its original price?

(A) $2.52
(B) $5.88
(C) $7.00
(D) $10.50

8 The average attendance to basketball games at a local university over the last 10 years can be modeled by the equation $y = 329x + 6489$, where y represents the average attendance at basketball games x years after 2004. Which of the following describes the meaning of 329 in the equation?

(A) The average attendance at basketball games in 2004

(B) The total attendance at basketball games in 2004

(C) The annual increase in average attendance to basketball games.

(D) The total increase in average attendance to basketball games for the last 10 years.

9 A local theater company sells t-shirts and tote bags at all of their performances. They charge \$20 for each t-shirt and \$12.50 for each tote bag. Which expression can be used to determine the total amount the company earns from selling x t-shirts and y tote bags?

(A) $12.5(x + y)$

(B) $20(x + y)$

(C) $20x + 12.5y$

(D) $12.5x + 20y$

10 A local library had 25,825 books at the beginning of 2010. Since then, it has added 375 books each year. The library can fit a maximum of 35,000 books. If x represents the number of years after the start of 2010, which inequality shows the number of years that the library can continue adding books at this pace without adding space?

(A) $35{,}000 - 375 \leq x$

(B) $35{,}000 \leq 375x$

(C) $35{,}000 \geq 375x - 25{,}825$

(D) $35{,}000 \geq 375x + 25{,}825$

11 Which of the following is equivalent to $(6 - 5i)(3 + 2i)$?

(A) $8 - 3i$

(B) $18 - 10i$

(C) $28 - 3i$

(D) 28

12 A study was performed to determine if a new medication, Z, helps people who suffer from a certain affliction. A group of 500 randomly selected people who have the affliction were included in the study. Of the group, 200 people were given Z, 200 people were given an old medication, Y, and another 100 people received no treatment. The data showed that people who received Z had significantly decreased effects of the affliction, more than people who received no treatment or who were given medicine Y. Based on the design and results of the study, which of the following is an appropriate conclusion?

(A) Z is likely to lessen the effects of the affliction in people who suffer from the affliction.

(B) Z is likely to lessen the effects of the affliction better than any other medication.

(C) Z is likely to lessen the effects of the affliction for anyone who takes the medication.

(D) Z is likely to lessen the effects of the affliction for those who received no treatment.

13 A group of 27 people visit a city. The people rent either a bicycle or rollerblades. People pay \$7 to rent a bicycle for the day or \$5 to rent rollerblades for an hour. If the total cost for rentals is \$171, how many people rent bicycles?

(A) 9

(B) 12

(C) 15

(D) 18

14 Scientists are creating a new pesticide spray that will help control the mosquito population. When the pesticide spray is complete and on the market, consumers will be able to buy it in a container that can be set on a circular-rotating mechanism in the middle of a yard. The spray will shoot out and cover a distance of 60 feet. If 60 feet represents the radius of the circle created by the rotating mechanism, what is the area of the sector of the circle created by a 60-degree angle at its center?

(A) 360π
(B) 600π
(C) 840π
(D) 1000π

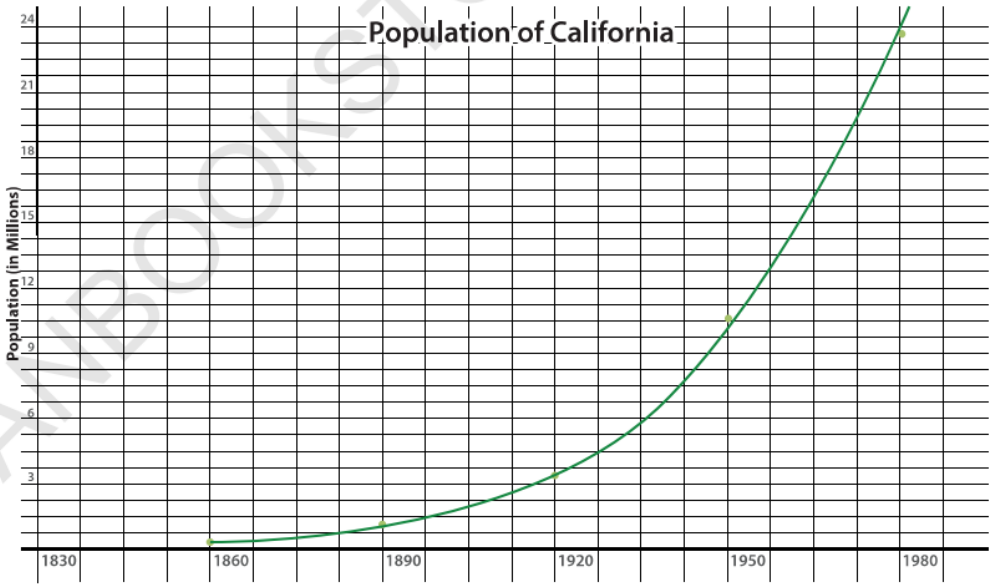
15
$$y = 2x - 5$$
$$y = (x-2)^2 - 9$$

Which choice shows the solutions to the system of equations?

(A) (–1, 0), (5, 0)
(B) (0, –5), (3, –8)
(C) (0, –5), (6, 7)
(D) (5, 0), (6, 7)

QUESTIONS 16 AND 17 REFER TO THE FOLLOWING INFORMATION.

The graph provided shows the population of California, in millions, from the years 1860 to 1980. Each point represents the population at a particular year. The best fit relation between the points is drawn to connect them.



16 Which phrase describes the relationship between the population and the number of years?

(A) Linear increasing
(B) Linear decreasing
(C) Exponential growth
(D) Exponential decay

17 Based on the graph, which of the following would be the best prediction of the population of California in 1990?

(A) 20 million
(B) 23 million
(C) 25 million
(D) 30 million

18 A rectangular sign is cut down by 10% of its height and 30% of its width. What percent of the original area remains?

(A) 37%
(B) 57%
(C) 63%
(D) 70%

19 A recent report states that if you were to eat each meal in a different restaurant in New York City, it would take you more than 19 years to cover all of New York City's eating places, assuming that you eat three meals a day. On the basis of this information, the number of restaurants in New York City

(A) exceeds 20,500.
(B) is closer to 20,000 than 21,000.
(C) exceeds 21,000.
(D) exceeds 21,000 but does not exceed 21,500.

20 If a cubic inch of gold weighs 0.70 pounds, how much does a cubic foot of gold weigh?

(A) 700 pounds
(B) 1,210 pounds
(C) 1,296 pounds
(D) 1,728 pounds

21 $\frac{3x-1}{2x+3} - \frac{2x+3}{3x-1}$

Which of the following is equivalent to the expression above?

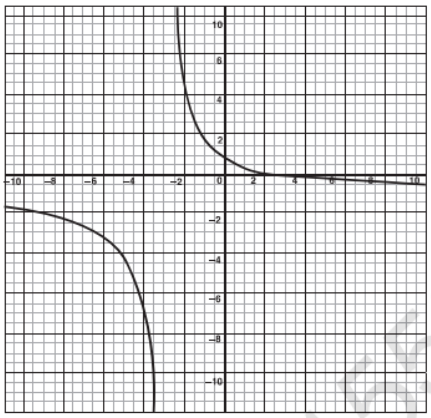
(A) $\frac{5x^2-18x-8}{6x^2+7x-3}$

(B) $\frac{x-4}{6x^2+7x-3}$

(C) $\frac{5x^2+10}{6x^2+7x-3}$

(D) $\frac{5x^2-12x-8}{6x^2+7x-3}$

22



Which of the following is an equation for the graph?

(A) $y = \frac{6}{x+3} - 1$

(B) $y = \frac{6}{x-3} - 1$

(C) $y = \frac{1}{x+3} - 1$

(D) $y = \frac{1}{x-3} - 1$

23 $f(x) = \frac{3}{x-1}$
$g(x) = (x-4)^2$

What is the value of $g(f(4))$?

(A) –3
(B) 0
(C) 1
(D) 9

24 The number of people living in a certain city has been growing at a constant rate of about 3.8% each year since 1980. The population in 2000 was 38,500. If y is the population of the city x years after 1980, which equation best represents this situation?

(A) $y = 18{,}260(1.038)^x$
(B) $y = 38{,}500(1.38)^x$
(C) $y = 38{,}500(1.038)^x$
(D) $y = 81{,}172(1.38)^x$

GO TO THE NEXT PAGE

25 If $f(x) = x^2 - 2x - 8$, for which value(s) of x does $f(x) = 0$?

(A) $x = -4, 2$
(B) $x = 2, 4$
(C) $x = -4, -2$
(D) $x = -2, 4$

QUESTIONS 26 AND 27 REFER TO THE FOLLOWING INFORMATION.

A recent poll surveyed a random selection of 850 likely voters in a state election. Of the sample, 31% say that they favor candidate A, and 18% say that they favor candidate B. The margin of error reported for this was ± 3.4% with 95% confidence.

26 Which of the following statements can accurately be drawn from this data?

(A) The margin of error is too large to make any conclusions.
(B) The sample of likely voters don't represent all voters.
(C) The sample size is too small to represent the voters across the entire state.
(D) The sample was randomly selected and is large enough to make conclusions.

27 Which of the following statements can accurately be drawn from this data?

(A) The true percentage of likely voters who will vote for candidate A is 31%.
(B) The true percentage of likely voters who will vote for candidate A is most likely between 27.6% and 34.4%.
(C) The true percentage of likely voters who will vote for candidate B is 18%.
(D) The true percentage of likely voters who will vote for someone other than candidate A or candidate B is most likely between 45.6% and 52.4%.

28 In a certain course, a student takes eight tests, all of which count equally. When figuring out the final grade, the instructor drops the best and the worst grades and averages the other six. The student calculates that his average for all eight tests is 84%. After dropping the best and the worst grades, the student averages 86%. What was the average of the best and the worst grades?

(A) 68
(B) 73
(C) 78
(D) 88

29 $x^2 + y^2 - 8x + 12y = 144$

What is the length of the radius of the circle with the equation above?

(A) 6
(B) 12
(C) 14
(D) 24

30 $2(2x+3) = n\left(x + \frac{6}{8}\right) - 4x$

Which value of n gives the equation above an infinite number of solutions?

(A) 2
(B) 4
(C) 6
(D) 8

AGES OF THE UNITED NATIONS SECRETARIES GENERAL	
Name	**Age (years)**
Trygve Lie	49
Dag Hammarskjold	47
U Thant	52
Kurt Waldheim	53
Javier Perez de Cuellar	61
Boutros Boutros-Ghali	69
Kofi Annan	58
Ban Ki-Moon	52

31 The table above lists the ages of the first eight United Nations Secretaries General at the beginning of each term in office. What is the mean age? (Round your answer to the nearest tenth.)

32 If $\frac{x}{12}+\frac{x}{18}=1$, what is the value of x?

33 An African elephant can lift a total of approximately 660 pounds with its trunk. A small bundle of twigs weighs 12 pounds. If an African elephant lifts a small log that weighs 50 pounds, what is the greatest number of small twig bundles that it could theoretically lift in addition to the log?

QUESTIONS 34 AND 35 REFER TO THE FOLLOWING INFORMATION.

Population of United States by Gender and Age in 2010 (in millions)

	0–24 years	**25–49 years**	**50–74 years**	**75–100 years**	**Total**
Males	53.6	52.2	38.6	7.3	151.7
Females	51.2	52.6	41.8	11.2	156.8
Total	104.8	104.8	80.4	18.5	308.5

34 What percent of males were 49 years or younger in 2010? Round your answer to the nearest tenth.

35 What is the probability that a randomly selected female is between the ages of 25 and 74? Write your answer as a decimal to the nearest hundredth.

36

$5x + 4y = 11$

$6x - 8y = 10$

In the system of equations above, what is the value of y?

37

A car travels from town A to town B, a distance of 360 miles, in 9 hours. How many hours would the same trip have taken had the car traveled 5 mph faster?

38

$$\frac{2}{x+2} + \frac{3}{x-5} = \frac{4x+7}{x^2-3x-10}$$

What is the solution to the equation shown above?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

1. A
2. A
3. B
4. C

5. A
6. C
7. D
8. D

9. A
10. B
11. B
12. B

13. B
14. B
15. B
16. 50

17. 2/3, or .666, or .667
18. 6
19. 1
20. 224

1. B
2. D
3. D
4. C
5. D
6. A
7. C
8. C

9. C
10. D
11. C
12. A
13. D
14. B
15. C
16. C

17. D
18. C
19. A
20. B
21. A
22. A
23. D
24. A

25. D
26. D
27. B
28. C
29. C
30. D
31. 55.1
32. 7.2 or 36/5

33. 50
34. 69.7
35. .60
36. 1/4 or .25
37. 8
38. 11