EdKonnect Academy
High Quality Online Tutoring
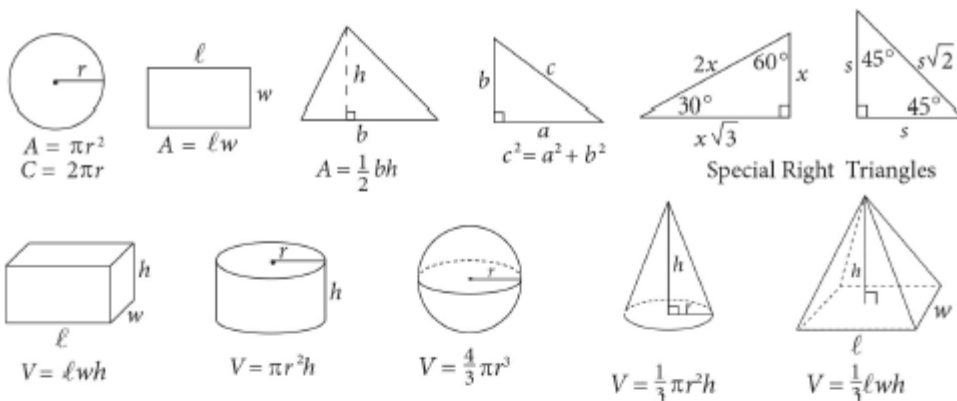
Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16–20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

1. The use of a calculator **is not permitted**.

2. All variables and expressions used represent real numbers unless otherwise indicated.

3. Figures provided in this test are drawn to scale unless otherwise indicated.

4. All figures lie in a plane unless otherwise indicated.

5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2} bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3} \pi r^3$

$V = \frac{1}{3} \pi r^2 h$

$V = \frac{1}{3} \ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

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1. If two times a number is equal to that number minus 4, what is the number?

A) −7
B) −6
C) −4
D) −3

2. The number of soil samples, s, that Sonal needs for an experiment must be greater than 6 but less than or equal to 13. Which of the following represents an acceptable number of soil samples for Sonal's experiment?

A) $6 < s < 13$
B) $6 \leq s < 13$
C) $6 < s < 13$
D) $6 \leq s \leq 13$
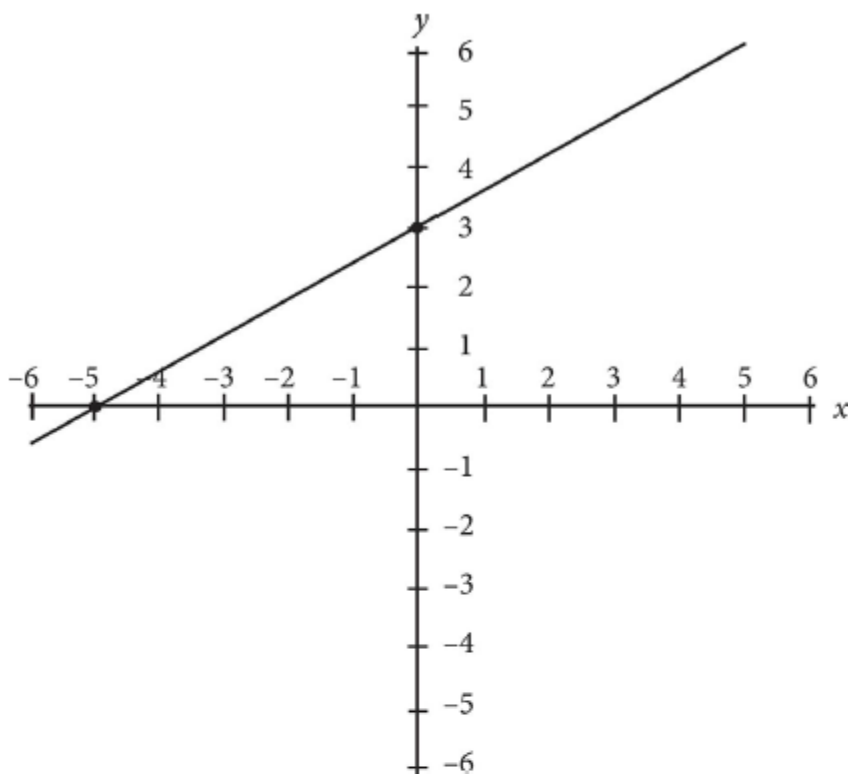
3. In the figure above, the graph of $y = f(x)$ is shown. Which of the following could be the equation of $f(x)$?

A) $f(x) = -\dfrac{3}{5}x + 3$

B) $f(x) = -\dfrac{3}{5}x - 3$

C) $f(x) = \dfrac{3}{5}x - 3$

D) $f(x) = \dfrac{3}{5}x + 3$

4. If $x + y = 0$, which of the following must be equivalent to $x - y$?

A) $-2y$

B) $\dfrac{x}{y}$

C) x

D) x^2

5. Which of the following is equivalent to $2x^2 - 6x - 8$?

A) $2(x - 4)(x + 1)$
B) $3(x + 4)(x - 1)$
C) $2(x - 3)(x + 2)$
D) $3(x - 4)(x - 2)$

6. Ryan and Allison build a ramp to help their elderly cat, Simms, walk up to their bed. They need the ramp to make a 35° angle with their bedroom floor. How long must the ramp be to reach the top of their bed that is exactly three feet off the ground?

A) $\dfrac{\sin 35°}{3}$

B) $\dfrac{\sin 55°}{3}$

C) $\dfrac{3}{\sin 55°}$

D) $\dfrac{3}{\sin 35°}$

7. If $3a + 2b = 24$ and $4a + 5b = 53$, what is the value of $a + b$?

A) 2
B) 7
C) 9

D) 11

8. Given the equation $y = 3x^2 + 4$, what is the function of the coefficient of 3 ?

A) It moves the graph of $y = 3x^2 + 4$ three units higher than the graph of $y = x^2 + 4$.
B) It moves the graph of $y = 3x^2 + 4$ three units lower than the graph of $y = x^2 + 4$.
C) It makes the graph of $y = 3x^2 + 4$ wider than the graph of $y = x^2 + 4$.
D) It makes the graph of $y = 3x^2 + 4$ narrower than the graph of $y = x^2 + 4$.

9. Steven needs to buy t theme park tickets for himself and his family. Each ticket costs \$80, and the number of tickets he needs to buy can be modeled by the expression $t^2 - 4t - 90 = 6$ when $t > 0$. What is the total cost of the theme park tickets that Steven purchased?

A) \$640
B) \$800
C) \$960
D) \$1,120

$$2c + 3d = 17$$
$$6c + 5d = 39$$

10. In the system of linear equations above, what is the value of $4c - 4d$?

A) −4
B) 1
C) 4
D) 13

11. If $x^2 + 2xy + y^2 = 64$ and $y - x = 12$, which of the following could be the value of x ?

   A) −10
   B) −4
   C) 2
   D) 10

12. Samantha offers two different packages of yoga classes at her yoga studio. She offers two hot yoga sessions and three zero gravity yoga sessions at a total cost of $400. She also offers four hot yoga sessions and two zero gravity sessions at a price of $440. Samantha wants to offer a larger package for long-time clients in which the cost must exceed $800. If Samantha does not wish to include more than 13 sessions for the long-time client package, will she be able to create this package for her clients?

   A) No, because the closest package that she can offer consists of three hot yoga and three zero gravity yoga sessions.
   B) No, because the closest package that she can offer consists of four hot yoga and four zero gravity yoga sessions.
   C) Yes, because she can offer five hot yoga and five zero gravity yoga sessions.
   D) Yes, because she can offer six hot yoga and six zero gravity yoga sessions.

13. Cuthbert is conducting a chemistry experiment that calls for a number of chemicals to be mixed in various quantities. The one amount of which he is unsure is grams of potassium, p. If Cuthbert is certain that $(3p^2 + 14p + 24) - 2(p^2 + 7p + 20) = 0$, what is one possible value of $3p + 6$, the exact number of grams of potassium that Cuthbert would like to use for this experiment?

A) 20

B) 18

C) 12

D) 10

14. What is the value of $(2 + 8i)(1 - 4i) - (3 - 2i)(6 + 4i)$? (Note: $i = \sqrt{-1}$)

A) 8

B) 26

C) 34

D) 50

15. If $2\sqrt{x} = x - 3$, which of the following is the solution set for x ?

A) $\{-1, 9\}$

B) $\{1, -9\}$

C) $\{9\}$

D) $\{1, 9\}$

DIRECTIONS

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.

2. Mark no more than one circle in any column.

3. No question has a negative answer.

4. Some problems may have more than one correct answer. In such cases, grid only one answer.

5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If is entered into the grid, it will be interpreted as $\frac{31}{2}$, not as $3\frac{1}{2}$.)

6. **Decimal Answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer: $\frac{7}{12}$

Write answer in boxes. → Fraction line

Grid in result.

Answer: 2.5

Decimal point

Acceptable ways to grid $\frac{2}{3}$ are:

Answer: 201 – either position is correct

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

16. A group of students at Omega High School is using staples and popsicle sticks to build a scale model of the Great Wall of China as part of a project detailing China's military history. The

number of staples the students will need is three times the number of popsicle sticks they will need. If the students determine they need 84 staples for this particular project, how many popsicle sticks will they need?

17. A standard parabola in the x,y-coordinate plane intersects the x-axis at $(5, 0)$ and $(-5, 0)$. What is the value of the x-coordinate of this parabola's line of symmetry?

18. Danielle is a civil engineer for Dastis Dynamic Construction, Inc. She must create blueprints for a wheelchair accessible ramp leading up to the entrance of a mall that she and her group are building. The ramp must be exactly 100 meters in length and make a 20° angle with the level ground. What is the horizontal distance, in meters, from the start of the ramp to the point level with the start of the ramp immediately below the entrance of the mall, rounded to the nearest meter? (Note: Disregard units when inputting your answer, $\sin 20° \approx 0.324$, $\cos 20° \approx 0.939$, $\tan 20° \approx 0.364$)

19. If twice a number is equal to that number minus five, what is three times that number plus seventeen minus that number?

20. Given that the equation $3x^2 + 2x - 8 = 0$ has two distinct solutions, what is the value of the smaller solution subtracted from the larger solution?

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

Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

DIRECTIONS

For questions 1–30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet.
For questions 31–38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

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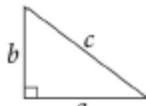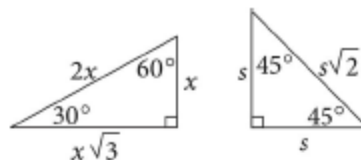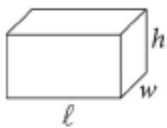
REFERENCE
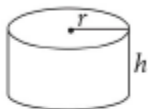
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

$x\sqrt{3}$

Special Right Triangles

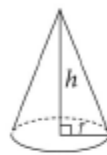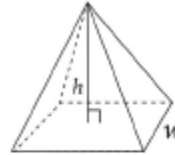$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The sum of the measures in degrees of the angles of a triangle is 180.

1. A pencil-making machine is slowly filling a bin with pencils. After about five minutes, the machine jams, preventing pencils from falling into the bin. A technician notices the problem ten minutes later and clears the jam, causing all of the backed-up pencils to fall into the bin. In order to make up for lost time, the technician then increases the rate at which the machine operates. Which of the following graphs could represent this situation?
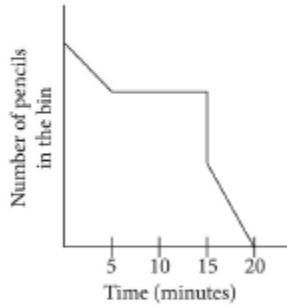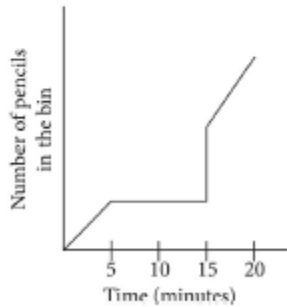
A)
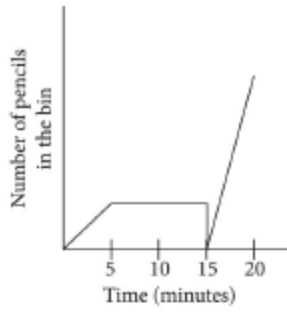
B)
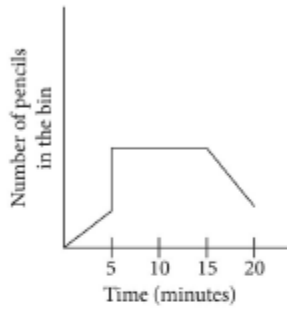
C)

D)

2. A submarine currently operating at 100 feet below the surface of the ocean begins to dive to increased depths at a rate of 30 feet per minute. Which of the following equations represents the submarine's depth below the surface, d, in feet, m minutes after beginning to dive?

A) $d = 100 + 30m$

B) $d = 100 - 30m$

C) $d = 100 - 30$

D) $d = 100m - 30$

3. A craft store sells specialty beads for \$1.00 for a single bead but will give a discount if a customer buys more than one bead. For each bead after the first, the price per bead goes down until it reaches 75 cents per bead, the lowest possible price, once 5 or more beads are purchased. Which of the following graphs represents the cost per bead in cents, y, of buying x beads in a single visit?

A)

B)

C)

D)
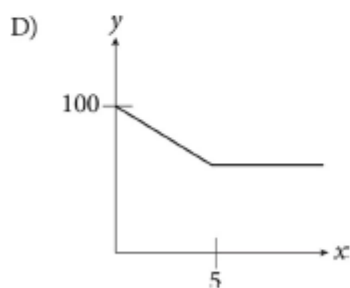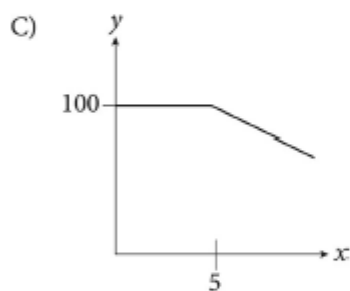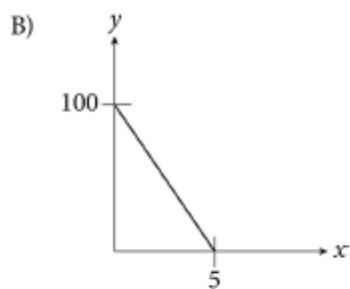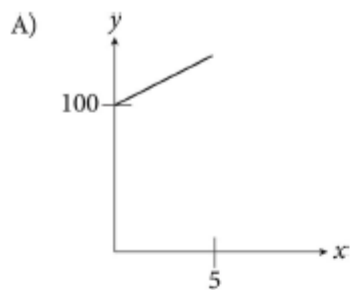
4. For the function defined as $g(x) = \dfrac{x-2}{3}$, what is the value of $g(-4)$?

A) -2

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

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

D) 2

5. If $18 + d = 12$, what is the value of $5d$?

A) −30
B) −18
C) −6
D) 6

6. The principal at a large high school in a major city believes that the math teachers for each class assign drastically different amounts of homework to their respective students. Which method of sampling would be best to estimate the average number of hours of homework assigned to students by the different math teachers?

A) Select one math teacher at random and survey the number of assigned homework hours in each of his or her classes.
B) Post an online poll to the school's social media account that asks students how much math homework they get each night.
C) Select 5 students from each math class in the high school and then record the number of hours assigned to each student selected.
D) Select the student with the highest grade in each math class and then survey those students to see how much homework they do each night.
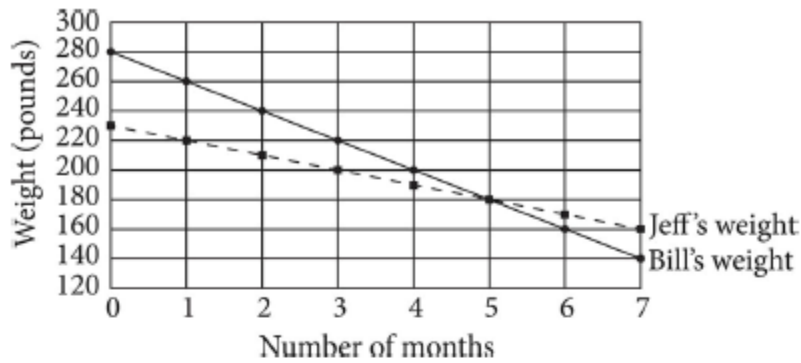
7. Bill and Jeff are participating in two different weight loss programs. The graphs above show how much weight each one has lost over a number of months. On average, how many more pounds did Bill lose per month than did Jeff?

A) 5

B) 10

C) 20

D) 50

8. Which of the following is equivalent to $9y^4 + 6y^3 + 3$?

A) $3y^2(3y^2 + 6y + 3)$

B) $3y^2(3y^2 + 2y) + 3$

C) $3y^2(6y^2 + 3y + 1)$

D) $15y^7 + 3$

9. A recent biological study performed on a large random sample of North American birds found that 46% of birds' nests experienced full or partial nest predation, in which some type of predator raided the nest before the hatchlings had flown off. The margin of error for the study was 3%. Which of the following is the best interpretation of the margin of error for this study?

A) The percentage of North American birds whose nests get raided by predators is likely somewhere between 43% and 49%.

B) There is a 3% chance that the study's finding about nest predation for North American birds is incorrect.

C) It is unlikely that fewer than 43% of birds' nests will get raided this coming year.

D) The research indicates that no more than 49% of birds' nests will likely get raided by predators.

10. The function $g(x) = 16^x$ is defined for all real values of x. What is $g\left(\dfrac{1}{2}\right) + g\left(\dfrac{1}{4}\right)$?

A) 2

B) 6

C) 8

D) 16

11. A customer bought a clock for $27.50, which included a 10% sales tax. What was the price of the clock before tax?

A) $2.75

B) $25.00

C) $30.25

D) $30.56

| List X	List Y
5	9
8	10

13	11
13	15
15	19
18	20

12. Which of the following answers is a true statement about the two lists in the table above?

A) The means are the same, and the medians are different.
B) The means are the same, and the standard deviations are the same.
C) The medians are the same, and the standard deviations are the same.
D) The medians are different, and the means are different.

13. A right square pyramid has a volume of 324 cubic centimeters and a height of 12 centimeters. What is the length of one side of the base, in centimeters?

A) $18\sqrt{2}$

B) 18

C) 9

D) $3\sqrt{3}$

▼

Questions 14 and 15 refer to the following information.

Student Performance for Three Study Strategies
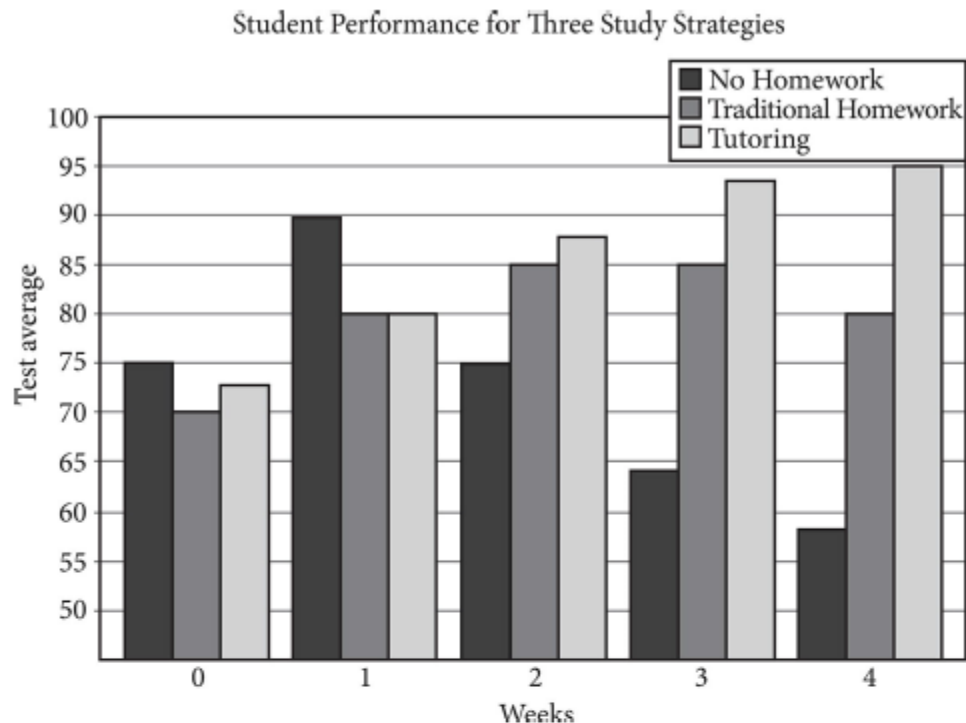
A researcher is studying the effectiveness of various study strategies on student performance. The researcher has randomly assigned the 30 students equally into one of three groups: a "no homework" group that learns only in class, a "traditional homework" group that receives assignments as they usually do in this class, and a "tutoring" group in which students come to the researcher for a 10-minute tutoring session twice per week. Each week, the researcher administers the same test to all students and tracks their average score. The results are shown in the table above.

14. Which of the following groups showed an increase in test performance in each week of the study?

   I. Tutoring
   II. Traditional Homework
   III. No Homework

A) I only
B) II only

C) I and III only

D) I, II, and III

15. Which of the following best approximates the ratio of the improvement in test average for students in the Traditional Homework group to the students in the Tutoring group from the start of the study to week 4 of the study?

A) 3 to 4

B) 1 to 3

C) 2 to 5

D) 1 to 2

▲

16. For a right rectangular pyramid with height h and a square base with side length s, the volume is $V = \frac{1}{3}hs^2$. Which of the following defines the side length of the base of the pyramid in terms of the volume and height of the pyramid?

A) $\sqrt{\dfrac{3V}{h}}$

B) $\sqrt{\dfrac{h}{3V}}$

C) $\dfrac{3V}{h}$

D) $\dfrac{h}{3V}$

Breakfast Drink of Choice

Hot		Cold		
Tea	Coffee	Water	Milk	Juice
5.3%	26.9%	18.8%	17.2%	31.8%

17. A national survey determined the breakfast beverage of choice for American high school students. The results are summarized in the table above. Based on this information, which of the following is closest to the probability that a student drinks coffee, given that she does not drink a cold drink at breakfast?

A) 0.84
B) 0.66
C) 0.32
D) 0.27

18. From the year 2005 to the year 2015, the production of corn in a certain state has increased by 15%. During the same interval, the production of wheat has fallen by 40%. If the state produced identical amounts of each crop in 2005, but it produced 161 million bushels of corn in 2015, how much wheat, in millions of bushels, was produced by the state in 2015 ?

A) 84
B) 111.09
C) 233.33
D) 350

$$0.27(a + b) = 0.15a + 0.35b$$

19. An athletic trainer is attempting to produce a carbohydrate-electrolyte solution that is at 27% carbohydrates by mass, which is the maximum amount of saturation allowed by her league. A supply company provides solutions that are at 15% and 35% carbohydrates by mass, respectively. Based on the equation above, if the trainer uses 10 quarts of the 15% solution, how many quarts of the 35% solution will she need?

A) 180

B) 90

C) 30

D) 15

$$f(x) = (x - b)^2 - 4$$

20. In the function above, b is a constant. When plotted in the xy-plane, the function is a parabola with a vertex at $(b, 4)$. Which of the following is true of the parabola?

A) Its y-intercept is at $(-b, 0)$.
B) Its y-intercept is at $(0, -b)$.
C) Its y-intercept is at $(0, b^2 - 4)$.
D) Its y-intercept is at $(b^2 - 4, 0)$.

21. A teacher is looking at the set of recent test scores from her class. After investigating, she realized that she transposed two different test grades. The 19 should be 91, while another student who had an 86 should have had a 68. After correcting these two mistakes, which of the following must increase in the updated data set?

A) The range
B) The standard deviation
C) The median
D) The mean
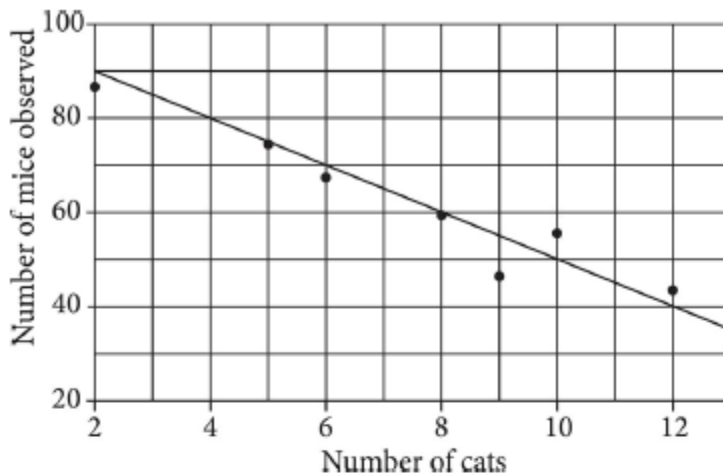
22. A researcher is studying the use of cats to control mice populations in granaries. The scatterplot above shows the numbers of cats owned, x, and the number of mice observed, y, for several different farms. A line of best fit is plotted for the data. Which of the following could be the equation of that line?

A) $y = -0.2x + 100$

B) $y = 0.2x + 100$

C) $y = 5x + 100$

D) $y = -5x + 100$

23. An online survival game begins a marathon session with over 65,000 players active on the server. Every hour, the half of the active players whose scores are the lowest get eliminated from the game. If $g(t)$ is the number of players remaining in the game after t hours, which of the following best describes the function g ?

A) The function g increases exponentially.

B) The function g decreases exponentially.

C) The function g increases linearly.

D) The function g decreases linearly.

x	y

-3b	18b
-2b	13b
0	3b
2b	-7b

24. In the table above, b is a constant. If the xy-table describes some points on a linear function between x and y, which of the following equations could represent that function?

A) $5x + y = 2b$
B) $x - 5y = -3b$
C) $5x + y = 3b$
D) $x - 5y = -7b$

$$8a + 20 = 7 + \frac{3}{4}(8a + 20)$$

25. Based on the equation above, which of the following is equal to $2a + 5$?

A) -7

B) $-\dfrac{5}{2}$

C) 7

D) 10

$$1.3x - 0.6y = -0.7$$
$$6.5x - 1.5y = -0.5$$

26. When two equations above are graphed in the xy-plane, there is a single solution at (x, y). What is the y-coordinate of that solution?

A) −1.33

B) −1.125

C) 2

D) 3.25

27. Sally is modeling the change in diets among Native American populations around the Great Lakes by looking at the change over time of goosefoot seed remains in midden heaps. Midden heaps were locations where early peoples would dump the remains of food. She notices that the number of goosefoot seeds deposited in midden heaps has decreased by roughly 7% per century, c, since the earliest time period she studies. She estimates there were roughly 500 goosefoot seed remains deposited initially. Which of the following functions models $S(c)$, the number of seeds found per century?

A) $S(c) = 500(1.07)^c$

B) $S(c) = 500(0.93)^c$

C) $S(c) = 500^{0.93c}$

D) $S(c) = 500^c$

$$C = 0.0045P + 5.22$$

28. A production line manager uses the equation above to predict the production cost per item produced in dollars, C, based on the number of products made, P. In the context of the model, what is the meaning of 5.22 ?

A) The initial production cost, in dollars, of each product made

B) The approximate production cost increase, in dollars per item, for each item made

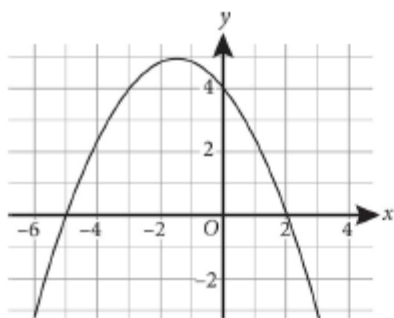C) The approximate production cost, in dollars per item, for every 0.0045 products made

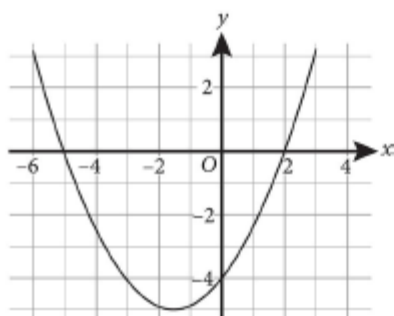D) The approximate production cost decrease, in dollars per item, for every 0.0045 products made
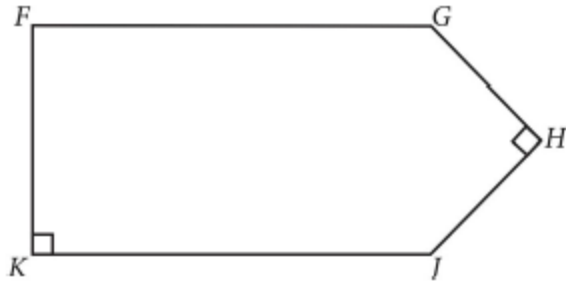
29. In the figure above, $\overline{FG} \parallel \overline{JK}$, $FG = JK$, and $GH = HJ$. What is the measure of angle J if $FK = HJ\left(\sqrt{2}\right)$?

A) 90°
B) 120°
C) 135°
D) 160°

30. The function $h(x)$ is defined as $h(x) = a(x - 2)(x + 5)$ for all real values of x. If a is a negative number, which one of the following could be a graph of $h(x)$?
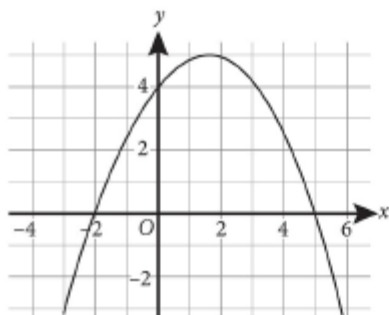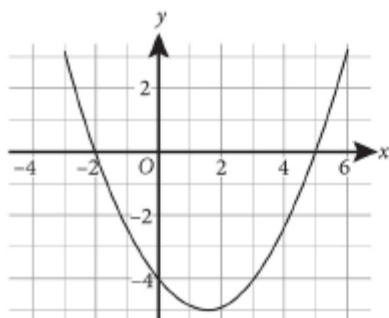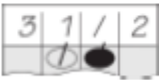
A)

B)

C)

D)

DIRECTIONS

For questions 31–38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.

2. Mark no more than one circle in any column.

3. No question has a negative answer.

4. Some problems may have more than one correct answer. In such cases, grid only one answer.

5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If $3\frac{1}{2}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not as $3\frac{1}{2}$.)

6. **Decimal Answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer: $\frac{7}{12}$

Write answer in boxes. — Fraction line

Grid in result.

Answer: 2.5 — Decimal point

Acceptable ways to grid $\frac{2}{3}$ are:

Answer: 201 – either position is correct

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

$$650, \ a, \ 1550, \ 1750, \ 2300, \ 2650$$

31. If the mean of the list above is 1650, what is the value of a ?

32. John is buying some burgers and fries for his friends. Burgers cost $4.30 each and fries cost $3.10 per order. There is no tax on the food. If he has $50 and buys 6 orders of fries, what is the maximum number of burgers he can buy?
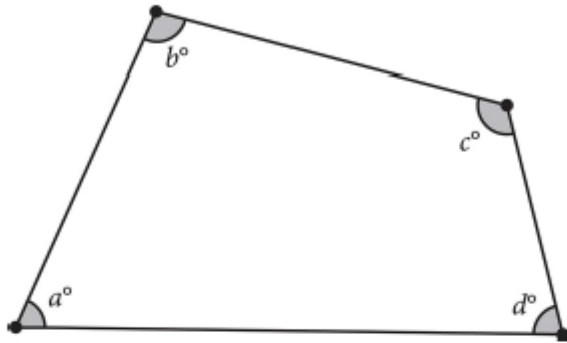
Note: Figure not drawn to scale.

33. If $a = 118$ and $b = 67$ in the quadrilateral above, what is the value of $c + d$?

$$-3x + 2 = p(x - q)$$

34. In the equation above, p and q are constants. If there are infinitely many solutions to the equation, what is the value of q ?

35. A parabola described by the equation $y = x^2 - 6x + c$ is intersected exactly once in the xy-plane by the equation $y = -1$. What is the value of c ?

36. In a certain function, a is a constant. The value of the function is 5 when $x = b$. If the function can be modeled using the equation $f(x) = ax^2$, what is the value of the function when $x = 3b$?

▼

Questions 37 and 38 refer to the following information.

To leave the Moon's gravity well, a shuttle must reach speeds of 8568 kilometers per hour. This speed is known as escape velocity because, if not reached, the shuttle would not be able to escape the Moon's gravity and return to Earth.

37. If the space shuttle traveling at escape velocity has 150 km left before reaching lunar orbit, in approximately how many seconds will the shuttle reach orbit? (Round your answer to the nearest second).

38. What is the space shuttle's escape velocity in meters per second, rounded to the nearest hundred? (1 kilometer = 1000 meters)?

▲

END OF TEST

DO NOT RETURN TO A PREVIOUS SECTION.