Student Name _____

OHIO GRADUATION TESTS

Mathematics

Spring 2008

This test was originally administered to students in March 2008. This publicly released material is appropriate for use by Ohio teachers in instructional settings. This test is aligned with Ohio's Academic Content Standards.

MATHEMATICS TEST

Directions: For multiple-choice questions, solve each problem, choose the correct answer, and then mark the corresponding circle in the Answer Document. If you change an answer, be sure to erase the first mark completely. Located in the math section of the answer document is grid paper that may be useful for multiple-choice items.

For written response questions, answer completely, showing all work, in the space provided in the Answer Document. You may not need to use the entire space provided. Be sure all answers are complete and appear in the Answer Document.

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1. The owner of a sporting goods store is following a pattern to arrange baseballs into 7 rows for a wall display. The table shows the number of baseballs in the first four rows of this pattern.

Row	Number of Baseballs
1	25
2	24
3	22
4	19
5	...
6	...
7	?

How many baseballs are in the seventh row of this pattern?

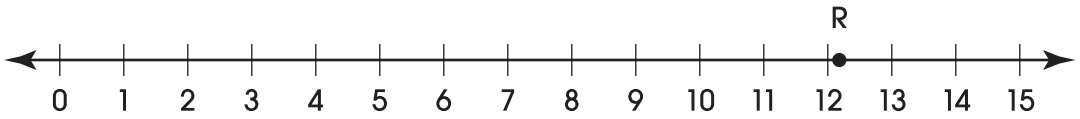
A. 17

B. 15

C. 10

D. 4

2. On the number line point R represents the square root of a number.



Which value could be the square of the number represented by point R?

A. 137

B. 149

C. 165

D. 173

3. A restaurant manager is planning a survey to determine which three desserts are most preferred by his customers.

   Which sample would best represent the customers at the restaurant?

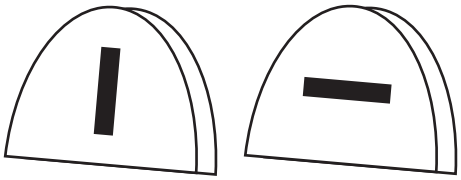
   A. Survey all children who enter the restaurant.

   B. Survey all customers over 50 years old for one week.

   C. Survey all of the men that come into the restaurant for one week.

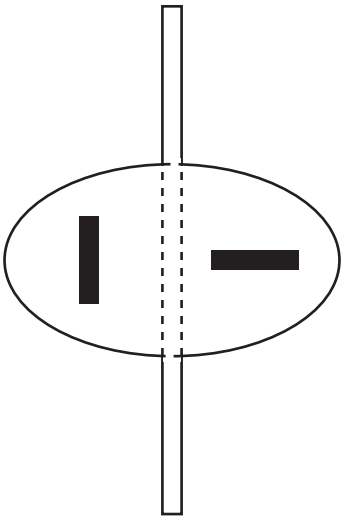
   D. Survey every fifth customer that enters the restaurant for one week.

4. The figure shows two views of the same object.

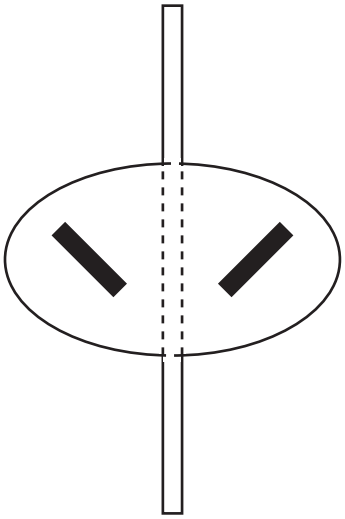


Which net will make the figure shown?

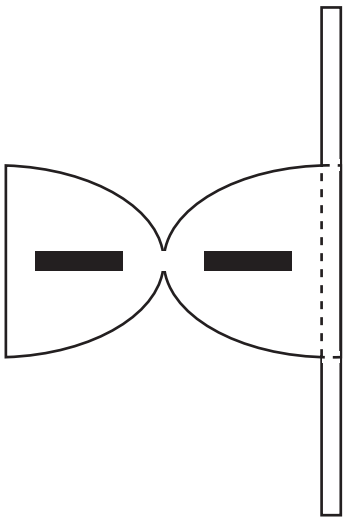
A.



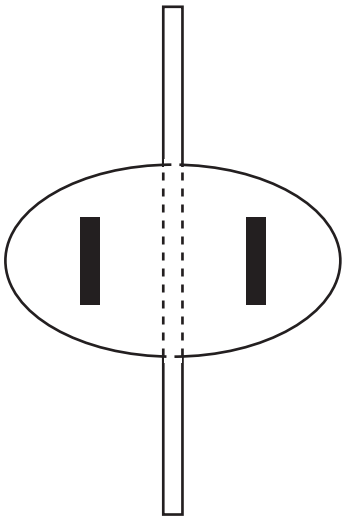
B.



C.



D.



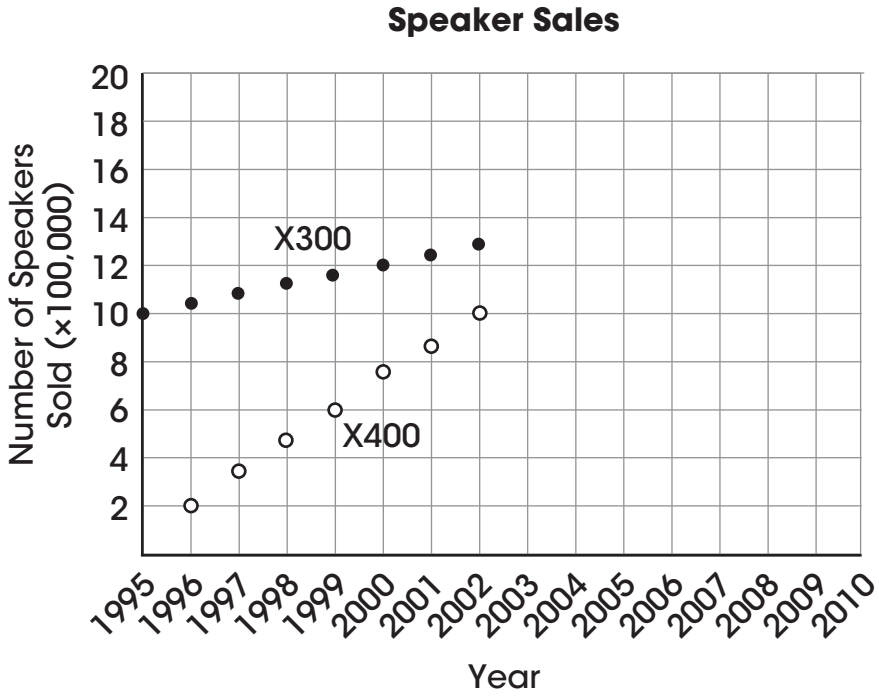
5. Carmella has a coupon that allows her to buy one pair of shorts at the regular price and get a second pair at half the regular price. The shorts cost $25.50 per pair.

   When Carmella arrives at the store, she finds that the shorts are on sale for 30% off the regular price. This sale does not allow coupons to be used on the discounted items.

   In your **Answer Document**, explain whether two pairs of shorts would cost less by using the coupon or by buying two pairs of shorts at the sale price. Provide mathematical calculations and/or reasoning to support your answer.

For question 5, respond completely in your **Answer Document**. (2 points)

6. The graph shows the total sales per year for the X300 and X400 speakers produced by an audio manufacturing company.



The manufacturer plans to discontinue the X300 speaker when the total sales for the X400 speaker are greater than the total sales for the X300 speaker.

Based on the trend in the graph, what is the earliest year that the sales of the X400 speaker will be greater than the sales of the X300 speaker?

A. 2000

B. 2003

C. 2006

D. 2009

7. Michael paid $6.00 for a ticket to a football game. Soft drinks at the game cost $0.75. Michael bought x drinks at the game.

   Which equation represents the total amount (y) he spent?

   A. $y = (6 + 0.75)x$

   B. $y = 6x + 0.75$

   C. $y = 6 - 0.75x$

   D. $y = 6 + 0.75x$

8. One style of jacket comes in three sizes: small, medium or large. These jackets have either buttons or a zipper. The jackets are available in five different colors. How many different combinations of this jacket are available?

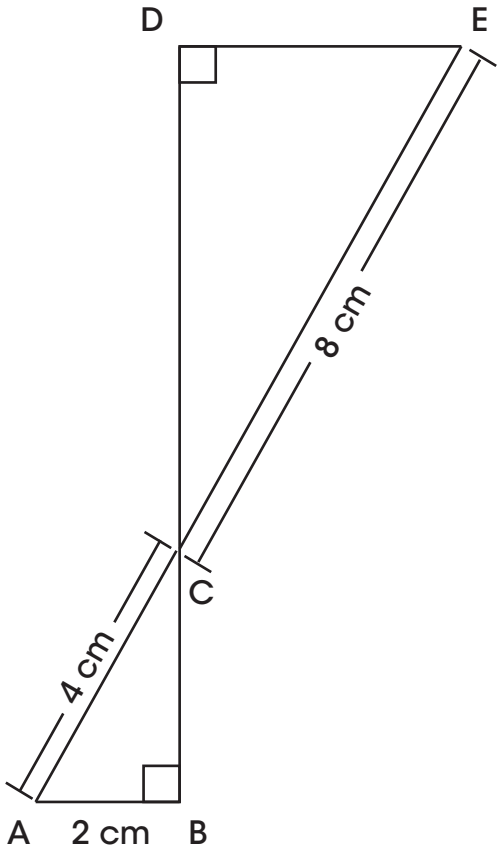
   A. 10

   B. 15

   C. 25

   D. 30

9. $\overline{ED}$ and $\overline{AB}$ are both perpendicular to $\overline{BD}$. In triangle ABC, the length of $\overline{AC}$ is 4 cm and the length of $\overline{AB}$ is 2 cm.



If the length of $\overline{EC}$ is 8 cm, what is the length of $\overline{ED}$?

A. 4 cm

B. $4\sqrt{2}$ cm

C. $8\sqrt{2}$ cm

D. 16 cm

10. When $x > 1$, which expression has a value less than x?

    A. $2.5x^2$

    B. $x^3 + 4$

    C. $\sqrt{x} - 2$

    D. $\sqrt{x} + x$

11. A sports club is planning a cookout. The food service charges $1.75 per person plus a flat fee of $200. The club can only spend $500 for food service.

    In your **Answer Document**, determine the maximum number of people the club will be able to serve. Use a table, graph, equation or inequality to support your answer.

For question 11, respond completely in your **Answer Document**. (2 points)

12. Mirachelle picked a colored cube from a bag of cubes, recorded the color and returned the cube to the bag. She did this 10 times. The table below shows the color of each cube as it was selected.

Color of Cube

Pick	Color
1	yellow
2	brown
3	green
4	yellow
5	orange
6	yellow
7	green
8	brown
9	yellow
10	green

Using the information from the table, how many times would a yellow cube be expected in 30 picks?

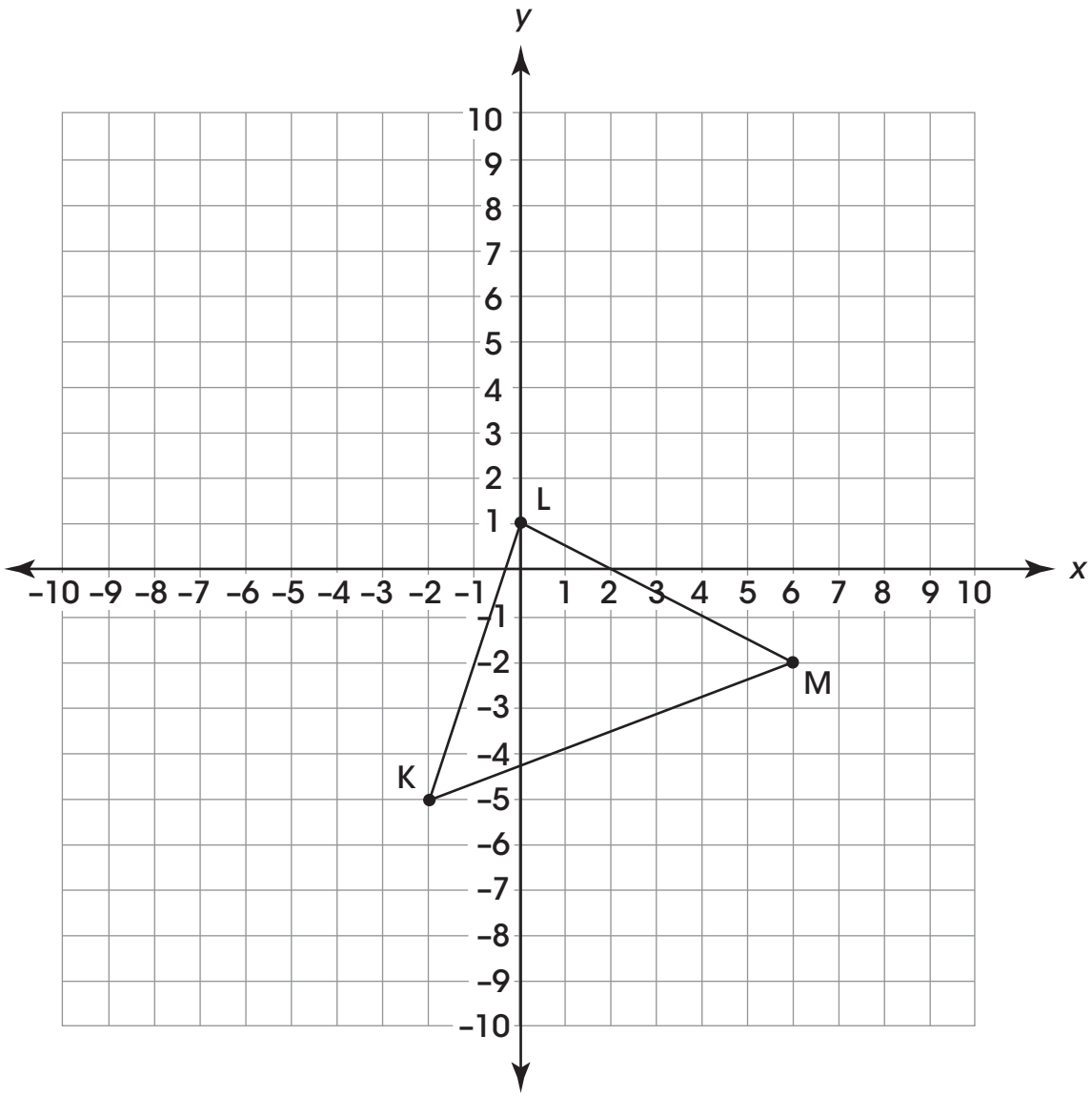
A. 4

B. 10

C. 12

D. 30

13. The coordinates of triangle KLM are K: (–2, –5), L: (0, 1) and M: (6, –2).



What type of triangle is KLM?

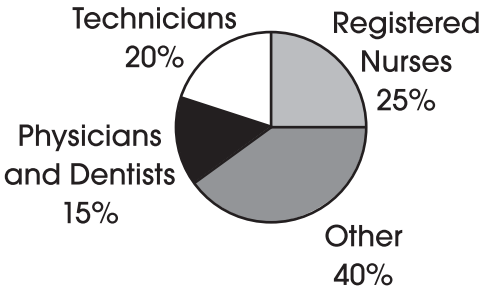
A. obtuse isosceles

B. acute scalene

C. right isosceles

D. right scalene

14. Central Health Center employs 360 individuals. The graph shows the different types of positions at Central Health Center.



Approximately 48% of the physicians and dentists employed by Central Health Center are women. How many of the physicians and dentists are women?

A. 26

B. 28

C. 36

D. 37

15. Weekly salaries of the employees at a local video store are shown in the table below.

Weekly Salaries at Video Store

Weekly Salaries	Number of Employees at this Salary
$1,000	1
$ 500	2
$ 350	4
$ 120	8
$ 80	6

What is the mean weekly salary at this video store?

A. $230.48

B. $242.00

C. $322.67

D. $350.00

16. Before her trip to Canada, Liz exchanged 300 U.S. dollars for Canadian dollars at a rate of 1 U.S. dollar to 1.35 Canadian dollars.

    When Liz arrived in Canada, the exchange rate was 1 Canadian dollar to 0.76 U.S. dollars.

    In your **Answer Document**:

    - Determine the amount of money in Canadian dollars that Liz received for her 300 U.S. dollars.
    - Determine whether Liz would have received more Canadian money for her 300 U.S. dollars if she had waited to exchange her money in Canada.

    Show your work or provide an explanation for your answers.

For question 16, respond completely in your **Answer Document**. (2 points)

17. Roni and Kelsey bought the same types of flowers from a florist. Roni bought 5 roses and 2 carnations and was charged $17.85 before tax. Kelsey purchased 1 rose and 6 carnations and was charged $12.25 before tax.

    How much did the florist charge for 1 carnation before tax?

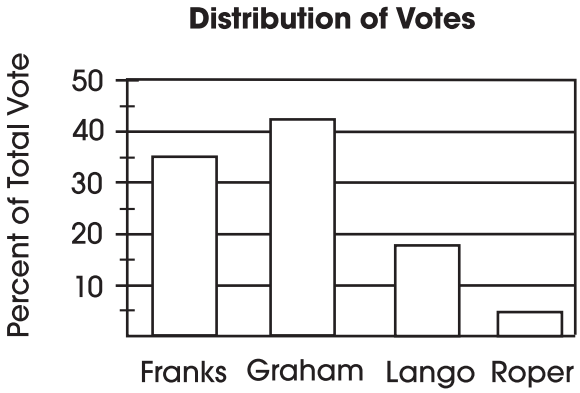
    A. $1.12

    B. $1.55

    C. $2.15

    D. $2.80

18. The graph shows the percent of the total votes cast for each of the four candidates in Andersonville's city council election.



If 2,542 people voted in this election, about how many votes did Lango receive?

A. 76

B. 141

C. 458

D. 915

19. Earth has a surface area of 1.97×10^8 square miles. A new planet has a surface area 13 times the surface area of Earth.

What is the surface area of the new planet?

A. 1.515×10^7 square miles

B. 2.10×10^8 square miles

C. 2.56×10^8 square miles

D. 2.56×10^9 square miles

20. The city flag for Celina, Ohio, is shown below.

The flag has a total area of 5,472 square centimeters. In the center of the flag is a circular design. The diameter of this design is 48 centimeters. What is the approximate area of the flag that is **NOT** covered by the circular design?

A. 1,763 cm^2

B. 1,809 cm^2

C. 3,663 cm^2

D. 5,321 cm^2

21. For his business, Gil has determined that the time it takes to finish a job varies inversely with the number of workers. This can be expressed as:

$$T = \frac{k}{w}$$

where T = time, k is a constant, and w = number of workers.

Gil's records show that 18 workers can finish a job in 6 days.

How many days will it take 12 workers to do the same job?

A. 4

B. 9

C. 12

D. 36

22. The transportation department has selected three possible routes for a new section of highway and wants to know which route landowners and residents of the affected areas prefer. The transportation department plans to survey the public by posting the three possible routes on the department's Web site with a request that all visitors to the Web site vote for their preferred route.

In your **Answer Document**, explain why the design of the survey does **not** provide a representative sample of the landowners and residents of the affected area. Give an example of how the design of the survey could be changed to better represent the affected population.

For question 22, respond completely in your **Answer Document**. (2 points)

On the March 2008 Ohio Graduation Mathematics Test, questions 23–28 are field test questions that are not released.

29. Madison is filling balloons with helium. When full, the balloons are nearly spherical in shape with a diameter of 12 inches.

    What is the approximate volume of each balloon when it is full?

    A. 115 cubic inches

    B. 450 cubic inches

    C. 680 cubic inches

    D. 900 cubic inches

30. Which sequence of numerals is equivalent to:

    $\frac{2}{3}$, 10%, 0.8, 6?

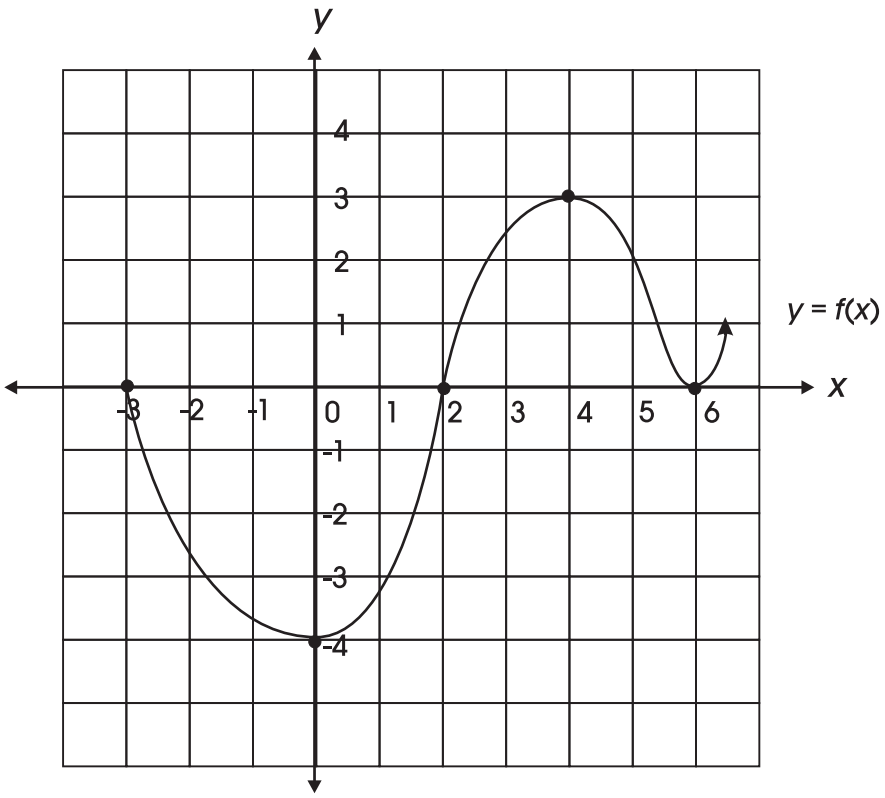
    A. $\frac{4}{6}$, $\frac{1}{10}$, $\frac{8}{100}$, 0.06

    B. 0.67, 1.0, 8%, 6.00

    C. $66\frac{2}{3}$%, $\frac{2}{20}$, $\frac{4}{5}$, 6.0

    D. $\frac{2}{3}$, 0.01, 80%, 6%

31. The graph of the function $f(x)$ is shown below.



Which of the following is NOT a zero of $f(x)$?

A. –4

B. –3

C. 2

D. 6

32. Joel plays tic-tac-toe on his computer. The computer plays first and randomly places an "X" in one of the grid squares as labeled in the diagram.

A	B	C
D	E	F
G	H	I

The frequency table shows the computer's first move for 50 games.

Computer's First Move (50 Games)

Location on Grid	A	B	C	D	E	F	G	H	I
Number of Games	5	3	8	2	8	3	6	8	7

Based on these results, what is the experimental probability that the computer will place an "X" in a corner square on the first move of its next game?

A. $\frac{4}{9}$

B. $\frac{19}{59}$

C. $\frac{9}{25}$

D. $\frac{13}{25}$

33. Federico is paid $8.50 per hour for the first 40 hours he works each week. For each hour Federico works over 40 hours, he is paid for one-and-a-half hours. One week Federico works 48 hours.

    How much does Federico earn for working 48 hours in one week?

    A. $340

    B. $408

    C. $442

    D. $612

34. The vertices of Triangle I are (1, 3), (2, 1) and (5, 0). Triangle I is reflected across the *x*-axis, resulting in Triangle II. Triangle II is then rotated 180° about the origin, resulting in Triangle III.

    In your **Answer Document**, draw and label Triangles I, II and III on the same coordinate plane.

    Describe a single transformation that would map Triangle I directly onto Triangle III.

For question 34, respond completely in your **Answer Document**. (4 points)

35. A band pays for the use of a location for a concert. The band charges $25 per ticket. If n represents the number of tickets sold and c represents the cost of the location, which inequality below describes how many tickets need to be sold to make a profit?

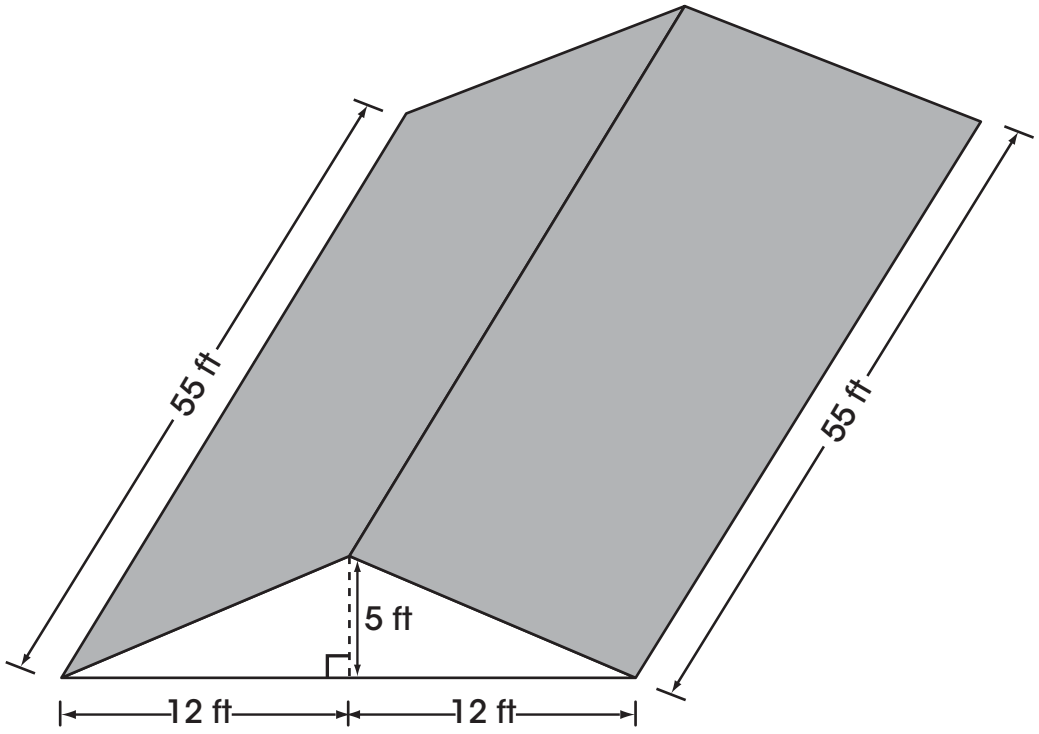
A. $25c < n$

B. $25c > n$

C. $25n < c$

D. $25n > c$

36. Tammy is roofing a house. She must buy enough shingles to cover the shaded rectangular areas on both sides of the roof, as shown in the diagram below.



What is the area she must cover?

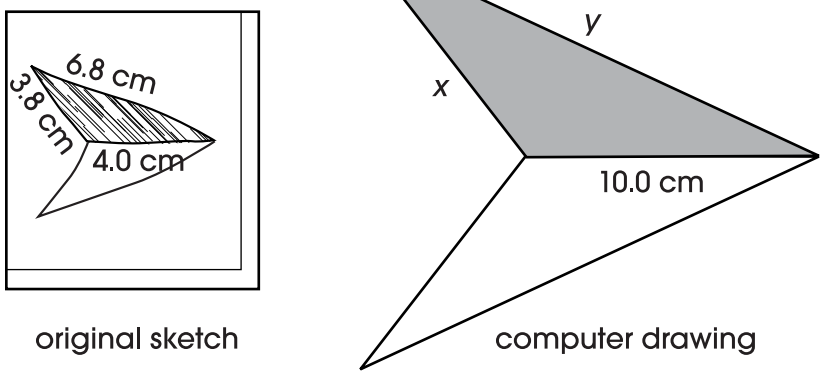
A. 715 ft^2

B. 835 ft^2

C. 1,430 ft^2

D. 6,600 ft^2

37. An airline executive drew a sketch of a logo on a napkin.



original sketch computer drawing

She gave the logo to a graphic designer so he could make a mathematically similar version with a computer drawing program. The center line of the new logo needs to be 10 centimeters long. Which of these proportions could the graphic designer use to find the value of y?

A. $\frac{4.0}{3.8} = \frac{y}{10.0}$

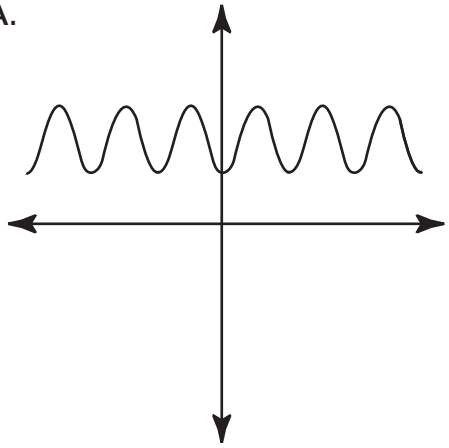
B. $\frac{3.8}{y} = \frac{6.8}{10.0}$

C. $\frac{6.8}{4.0} = \frac{y}{10.0}$

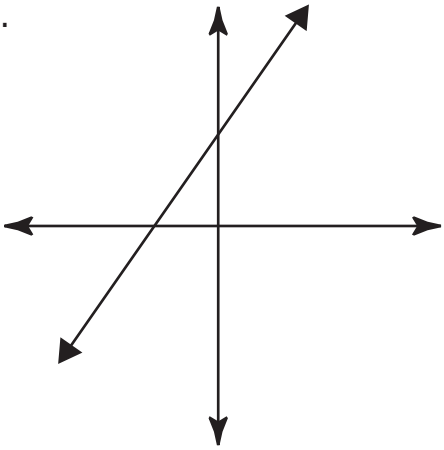
D. $\frac{y}{6.8} = \frac{10.0}{3.8}$

38. Which graph represents a linear function?

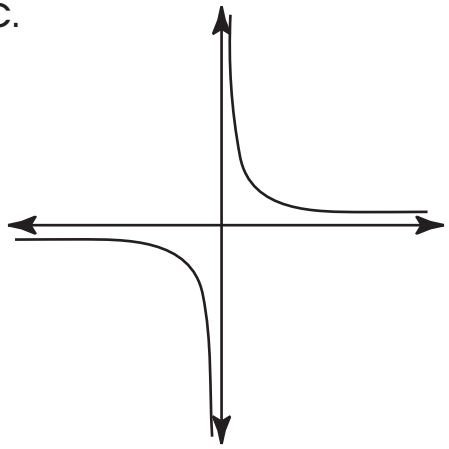
A.



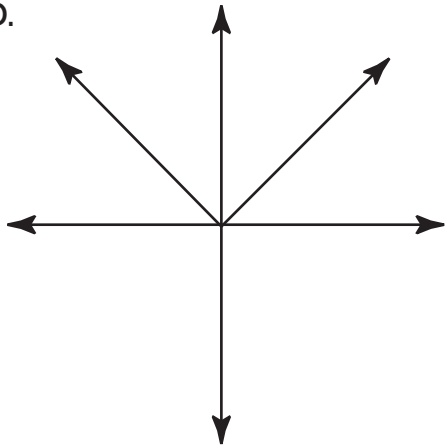
B.



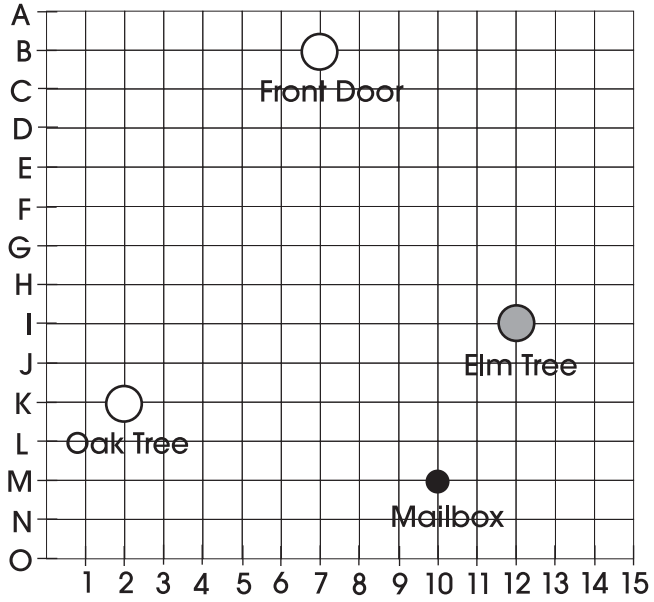
C.



D.



39. In honor of the new millennium, Stephanie buried a time capsule in her front yard. She sketched the location of key landmarks as shown below. She noted that the capsule was buried equidistant from the oak tree and the elm tree. It is also equidistant from the mailbox and the front door.



Which pair of coordinates is the closest estimate for the location of the time capsule?

A. (4, G)

B. (7, H)

C. (8, G)

D. (10, H)

40. Selena was given five different cells to measure. The table below shows Selena's results.

Cell Sizes

Sample Number	Type of Cell	Diameter of Cell in millimeters
1	*Escherichia coli* bacterium	1.5×10^{-3}
2	red blood cell	0.008
3	*Haemophilus Influenzae* bacterium	0.0012
4	*Bacilius megaterium* bacterium	4.0×10^{-3}
5	*Staphylococcus aureus* bacterium	0.0009

In your **Answer Document**, write all of the measurements in scientific notation.

Order the values from smallest to largest.

For question 40, respond completely in your **Answer Document**. (2 points)

41. The table shows values for a function.

x	*y*
1	4
2	9
3	16
4	25

Which equation represents this function?

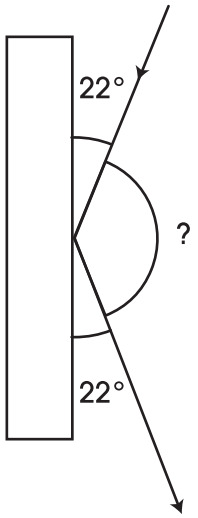
A. $y = x^2$

B. $y = x^2 + 1$

C. $y = (x - 1)^2$

D. $y = (x + 1)^2$

42. When a marble hits a wall, it bounces off the wall at the same angle it hits the wall.



If a marble hits a wall at a 22 degree angle, what is the measure of the angle between the two paths of the marble?

A. 44°

B. 68°

C. 136°

D. 158°

43. Drake's school awarded 450 raffle tickets as incentives. The principal will draw one winning ticket. The winner will receive a CD player. Drake received 3 tickets for good attendance, 5 for making the honor roll, and 2 for tutoring other students.

    What is the probability that one of Drake's tickets will be selected by the principal?

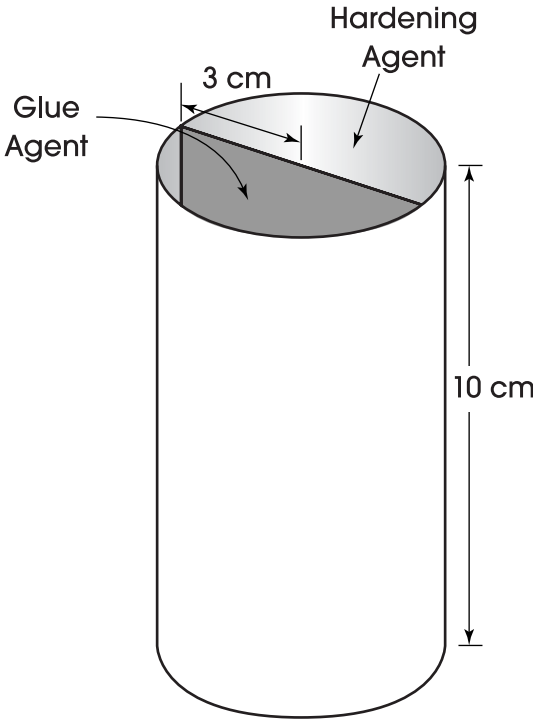
    A. $\frac{1}{15}$

    B. $\frac{1}{45}$

    C. $\frac{1}{441}$

    D. $\frac{1}{450}$

44. A compound glue comes in a cylindrical tube divided down the middle to separate the glue agent from the hardening agent as shown.



What is the approximate volume of the section of the tube containing the hardening agent?

A. 71 cm^3

B. 141 cm^3

C. 424 cm^3

D. 565 cm^3