Department of Education

Student Name_____

OHIO GRADUATION TESTS

Mathematics

March 2006

This test was originally administered to students in March 2006. This publicly released material is appropriate for use by Ohio teachers in instructional settings. This test is aligned with Ohio's Academic Content Standards.

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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. A producer has $2 million budgeted for costs related to filming a movie on location. She estimates the costs to be:

   $$c = \$108{,}000n + \$175{,}000$$

   where c = costs in dollars and n = number of days.

   What is the greatest number of days she can film on location and remain within the budget?

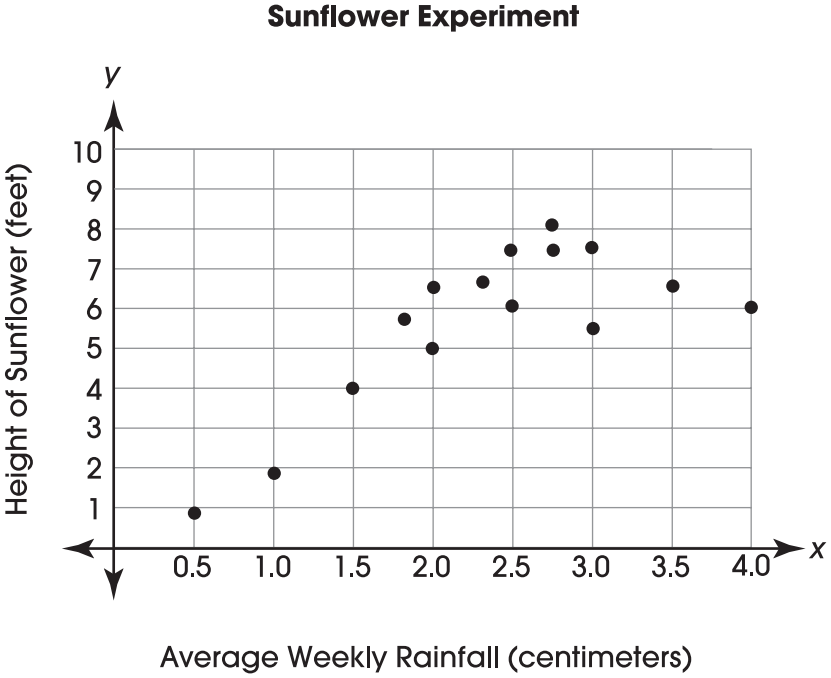
   A. 11 days

   B. 16 days

   C. 18 days

   D. 20 days

2. A scientist is studying the effect of rainfall on the height of a certain species of sunflower. The scatterplot shows the results.



What conclusion do the data support?

A. This species of sunflower will not grow over 7 feet high.

B. With over 4.0 centimeters of rain per week, this species of sunflower will grow over 12 feet high.

C. If the rainfall is less than 2 centimeters, then this species of sunflower can still reach its maximum height.

D. This species of sunflower grows tallest when there are between 2.5 and 3 centimeters of rain per week.

3. Jennifer wants to close off a rectangular area in her lawn so that she can leave her dog outside. She buys enough fencing to close off 252 square feet of lawn.

   If the length of the enclosure is 21 feet, what is the width?

   A. 12 feet

   B. 14 feet

   C. 231 feet

   D. 273 feet

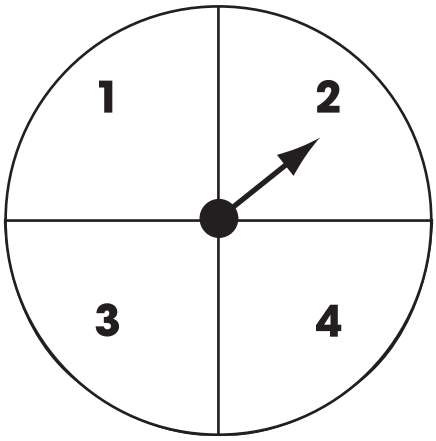
4. Adam was going to buy a new lawn mower from Lawn Care Depot for $169, less a 10% discount. He saw the same mower on sale at Tractors-R-Us. Their mower originally cost $210 and was on sale for $\frac{1}{3}$ off.

   In your **Answer Document**, determine the sale price of the mower at each store. Show your work or provide an explanation to support your answer.

   Identify which store would be the most economical place to purchase the mower.

For question 4, respond completely in your **Answer Document**. (2 points)

5. Teresa is playing a new board game. She must spin the spinner twice and get the same number both times in order to place her piece on the board. The diagram below shows the result of her first spin. Each number on the spinner has an equal chance of occurring.



What is the probability that Teresa's next spin will allow her to move her piece onto the board?

A. $\frac{1}{16}$

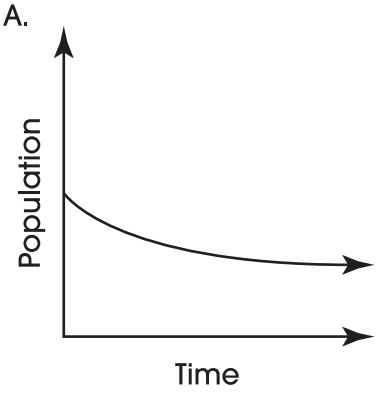
B. $\frac{1}{4}$

C. $\frac{1}{2}$

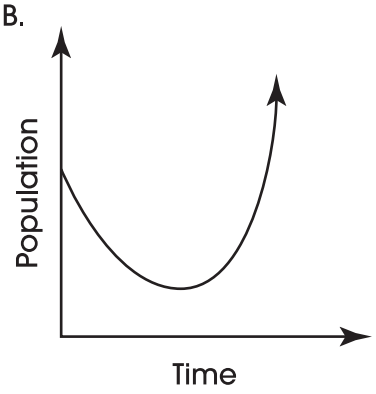
D. $\frac{3}{4}$

6. Which graph represents a linear function?

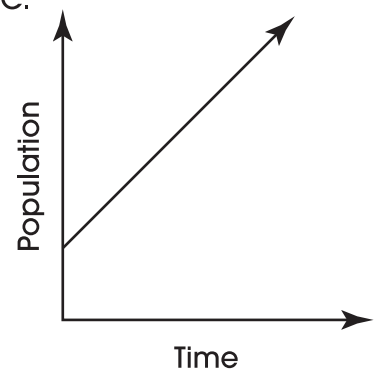
A.



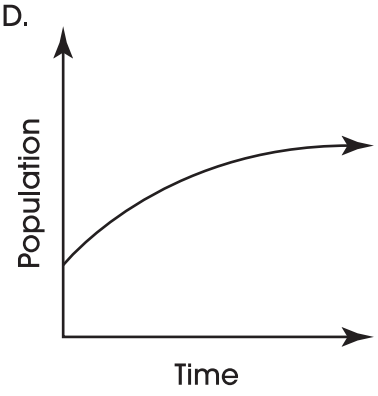
B.



C.



D.



7. Alicia is 5 feet tall. She casts a shadow that measures $6\frac{1}{2}$ feet long at the same time that a sculpture in the park casts a shadow 12 feet long.

   Which of the following is the approximate height of the sculpture?

   A. 9 feet

   B. 16 feet

   C. 27 feet

   D. 78 feet

8. Jerry is planning to buy a stereo system priced at $840 through an installment plan. This plan requires a down payment of $190 and 24 monthly payments of $32.35.

   How much more will Jerry pay for the stereo system by using the installment plan rather than paying cash?

   A. $ 63.60

   B. $ 126.40

   C. $ 253.60

   D. $ 650.00

9. Which graphical representation would be most useful in comparing the change in average earnings of male employees versus average earnings of female employees over the course of a 50-year period?

   A. circle graph

   B. double line graph

   C. box-and-whisker plot

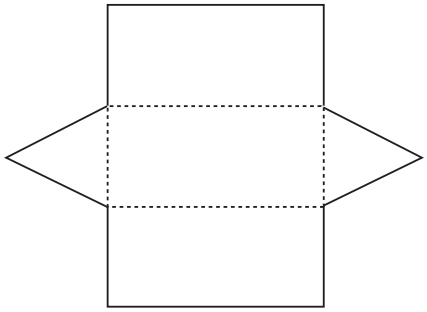
   D. back-to-back stem-and-leaf plot

10. Mrs. Foyle told Yolanda that her test had 38 problems worth a total of 100 points. Each test problem is worth either 5 points or 2 points. Yolanda wanted to determine how many 2-point and how many 5-point questions are on the test.

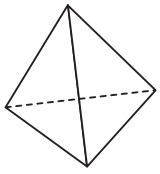
    In your **Answer Document**, determine how many questions of each point-value are on the test. Show your work or provide an explanation to support your answer.

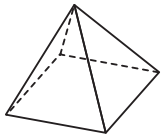
For question 10, respond completely in your **Answer Document**. (2 points)

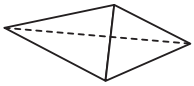
11. The figure shows the net for a three-dimensional object.

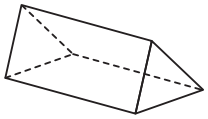


When folded, which object will this net produce?

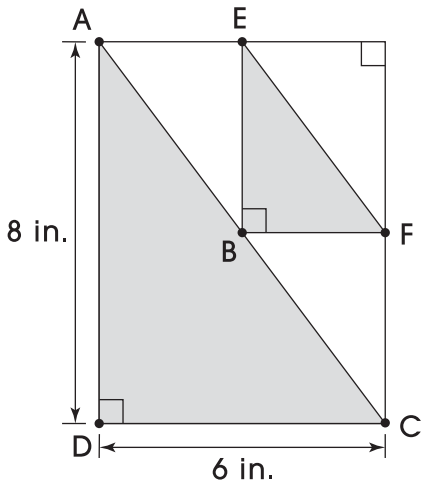
A. 

B. 

C. 

D. 

12. Jennifer is designing a quilt. The pattern for one part is shown in the rectangle.



Triangles ADC and EBF are similar. $\overline{AB} = \overline{BC}$.

What is the length of $\overline{EF}$?

A. 5 in.

B. 6 in.

C. 10 in.

D. 12 in.

13. An aquarium is 60 centimeters long, 20 centimeters wide and 30 centimeters high.

What volume of water, in cubic centimeters, does the aquarium contain if it is $\frac{2}{3}$ full?

A. 1,200 cm^3

B. 11,000 cm^3

C. 24,000 cm^3

D. 36,000 cm^3

14. Jack has a box with 10 unlabeled computer CD-ROMs. He knows that 2 are music CDs, 3 are game CDs, and 5 are picture CDs.

    Jack randomly selects a CD from the box. Which value represents the probability that the selected CD is a music or picture CD?

    A. $\frac{1}{10}$

    B. $\frac{3}{10}$

    C. $\frac{7}{10}$

    D. $\frac{4}{5}$

15. The first five rows of a number array are shown below.

Row 1					1
Row 2				2	3
Row 3			4	5	6
Row 4		7	8	9	10
Row 5	11	12	13	14	15

    What is the sum of the numbers in row 8?

    A. 175

    B. 224

    C. 231

    D. 260

On the March 2006 Ohio Graduation Mathematics Test, questions 16-21 are field test questions that are not released.

22. The following table contains math contest scores of two teams in a high school math contest.

High School Math Contest Scores

Team A	Team B
90	87
85	100
87	87
83	78
80	78

In your **Answer Document**, calculate the mean and median for each team. Determine which team scored better in the contest by comparing these measures.

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

23. The figure shows four points on the number line.

Which point represents $\sqrt{27}$?

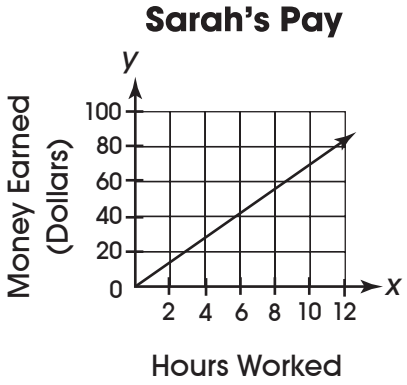
A. R

B. S

C. T

D. V

24. The graph, as shown, represents the amount of money Sarah can earn at her part-time job.



Which of the following equations best represents the relationship between Sarah's pay and the hours she works?

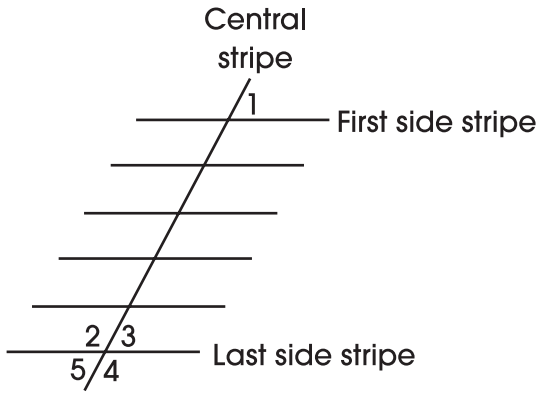
A. $y = 4x$

B. $y = 6.5x$

C. $y = 4x + 10$

D. $y = 6.5x + 10$

25. A worker painted stripes for spaces in a parking lot. The worker first painted a center stripe that marked the front of the parking spaces. Then he painted parallel stripes marking the sides.



Which angles will be congruent to angle 1 if all the side stripes are parallel?

A. $\angle 2$ and $\angle 3$

B. $\angle 2$ and $\angle 5$

C. $\angle 3$ and $\angle 5$

D. $\angle 4$ and $\angle 5$

26. The power output of a nuclear reactor is 2.4×10^7 watts.

Which number expresses the same value in standard notation?

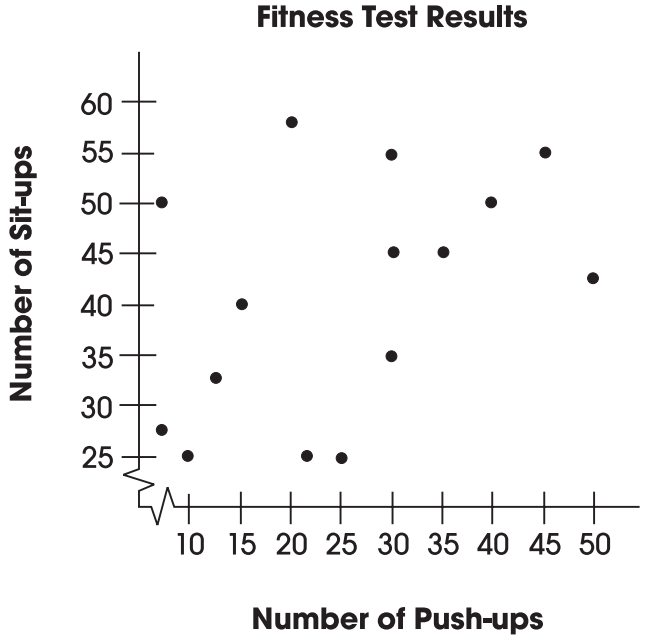
A. 2,400,000 watts

B. 9,400,000 watts

C. 16,800,000 watts

D. 24,000,000 watts

27. The scatterplot below indicates the number of sit-ups and push-ups completed by each student in Mr. Jenkin's physical education class.



If Mary did 35 push-ups, approximately how many sit-ups did she complete?

A. 30

B. 35

C. 45

D. 50

28. The maximum heart rate is the highest number of beats per minute recommended for a person while exercising. The rate is dependent upon the age of the person as shown below. The relationship is linear.

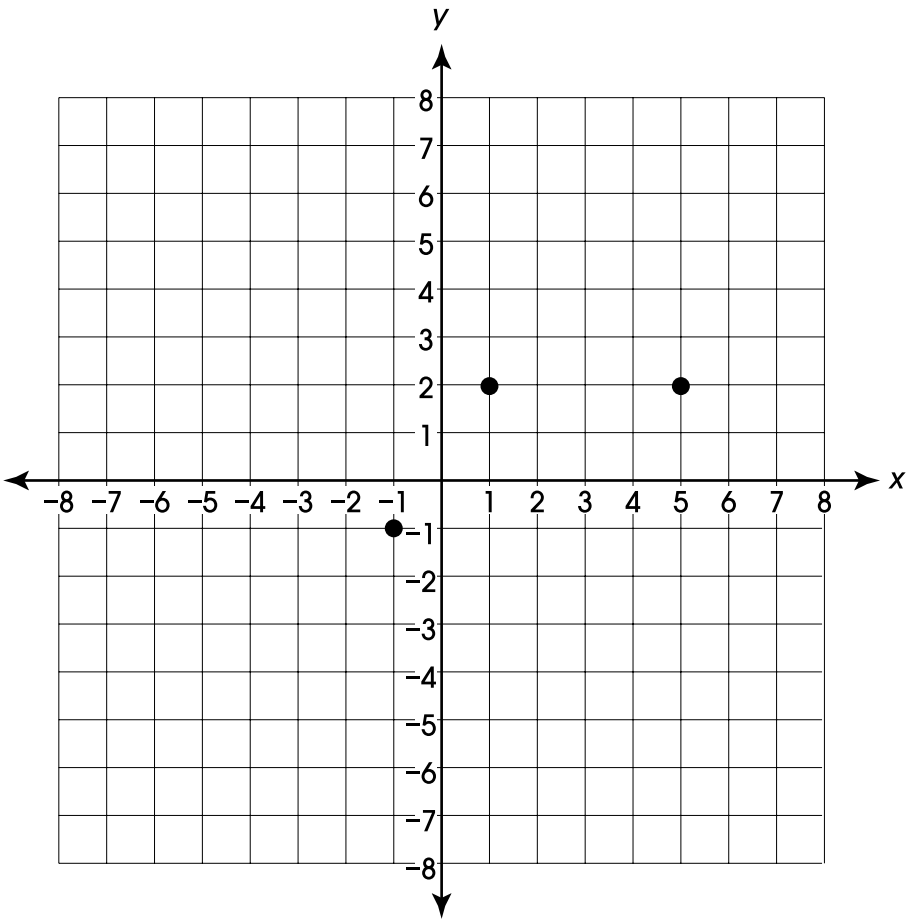
Age	Maximum Heart Rate
10	210
15	205
20	
25	
30	
35	
40	
45	
50	

In your **Answer Document,** copy and complete the table.

Write an equation that can be used to find the maximum heart rate for any age. Show your work or provide an explanation for how you determined your equation.

For question 28, respond completely in your **Answer Document**. (2 points)

29. Three vertices of a quadrilateral are (−1, −1), (1, 2) and (5, 2).



When used as the last vertex, which point would make the quadrilateral a trapezoid?

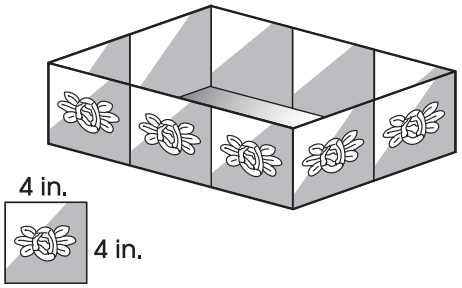
A. (3, 0)

B. (3, −2)

C. (−5, 0)

D. (7, −1)

30. Artie constructed a decorative planter using ten 4-inch squares attached to a rectangular base as shown below.



What is the volume of his planter?

A. 160 cubic inches

B. 192 cubic inches

C. 256 cubic inches

D. 384 cubic inches

31. Marty bought 4 new books today. He plans to read 2 of these while on vacation. How many combinations of 2 books from the group of 4 books could he choose to read?

A. 2

B. 4

C. 6

D. 12

32. Which equation is equivalent to $x^2 - 100x + 2{,}400 = 0$?

A. $(x - 40)(x - 60) = 0$

B. $(x - 30)(x - 80) = 0$

C. $(x + 20)(x - 120) = 0$

D. $(x + 20)(x + 120) = 0$

33. Which number is **not** a perfect square?

A. 729

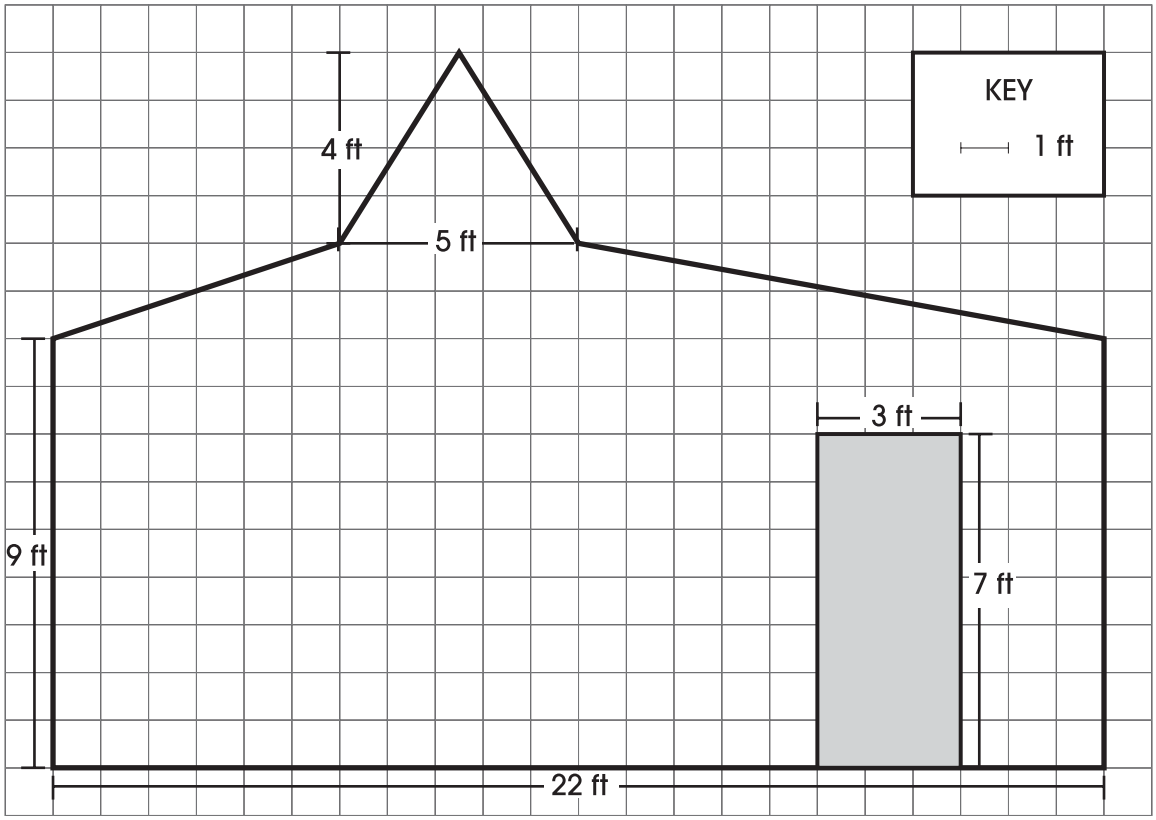
B. 1,280

C. 3,600

D. 5,329

34. The diagram below shows the dimensions of a wall that needs to be painted. The door represented by the shaded rectangle is **not** to be painted.

For question 34, respond completely in your **Answer Document**. (2 points)



In your **Answer Document**, determine the area, to the nearest square foot, of the wall that is to be painted. Show your work or provide an explanation for your answer.

35. A video game company reports the sales of video games for the first 11 months.

Monthly Sales of Video Games

Month	Sales (in millions)
1	4.5
2	5.2
3	4.7
4	4.6
5	5.2
6	4.7
7	5.6
8	5.3
9	4.8
10	5.2
11	4.8

The company's goal is to sell an average of 5 million games per month.

What is the minimum number of video games the company must sell in the 12th month to meet its goal?

A. 4.8

B. 5.0

C. 5.2

D. 5.4

36. A local art museum charges admission to groups according to the following rates.

> Groups of fewer than 50 people are charged a rate of $4.00/person.
> Groups of 50 people or more are charged a reduced rate of $3.50/person.

How much money will a group of 49 people save in admission costs if it can recruit one additional member?

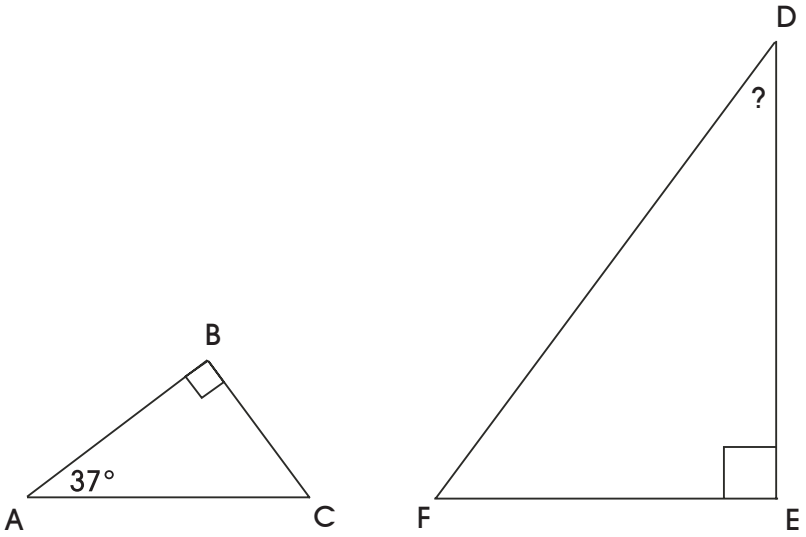
A. $ 0.50

B. $ 21.00

C. $ 175.00

D. $ 196.00

37. $\Delta ABC \sim \Delta DEF$.



What is the measure of angle D?

A. 37°

B. 45°

C. 53°

D. 74°

38. If *X* is a real number, which statement is **false**?

    A. *X* may be both an integer and an even number.

    B. *X* may be both an integer and a rational number.

    C. *X* may be both a rational number and a negative number.

    D. *X* may be both a rational number and an irrational number.

39. A large corporation uses a telephone chain to notify employees of company closings due to bad weather. The plant manager calls 5 people in the first round of the telephone chain. Each of those people calls 5 other people in the second round of the telephone chain. If the pattern continues, how many employees are called in the 4th round of the telephone chain?

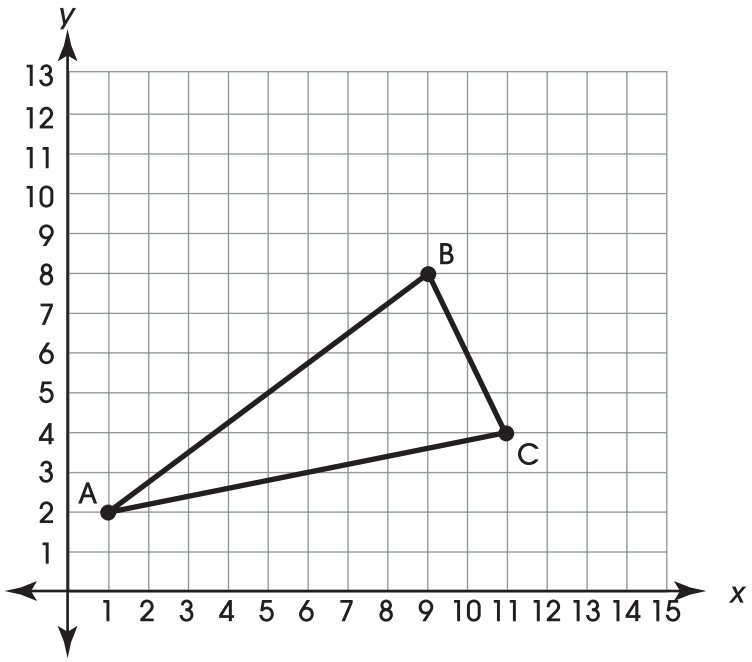
    A. 125

    B. 126

    C. 625

    D. 626

40. Triangle ABC is shown on the graph.

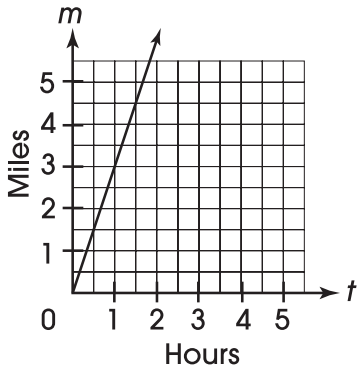


In your **Answer Document**, show that the segment connecting the midpoints of $\overline{AB}$ and $\overline{BC}$ is parallel to $\overline{AC}$ and one-half its length. Show your work or provide an explanation for your answer.

For question 40, respond completely in your **Answer Document**. (4 points)

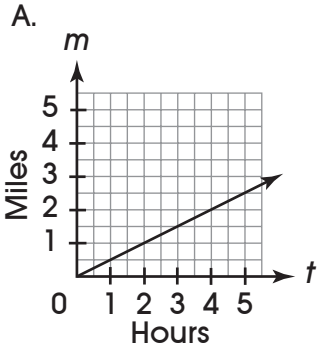
41. Jessica participated in a walk-a-thon to raise money for a local charity. She began walking at a rate of 3 miles per hour. The graph represents her distance walked as a function of time.

Jessica's Walk

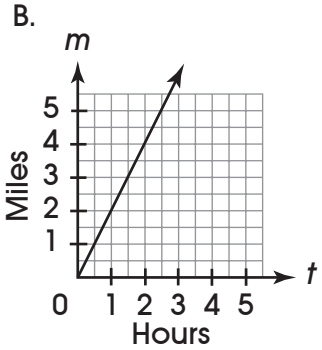


If Jessica had walked at an average rate of 2 miles per hour, which of the following accurately illustrates how this graph would appear, using the same scale?

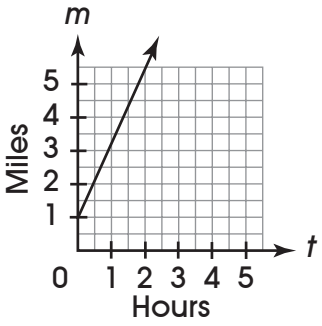
A.



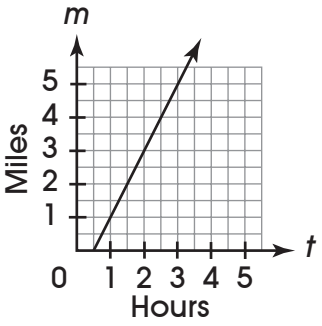
B.



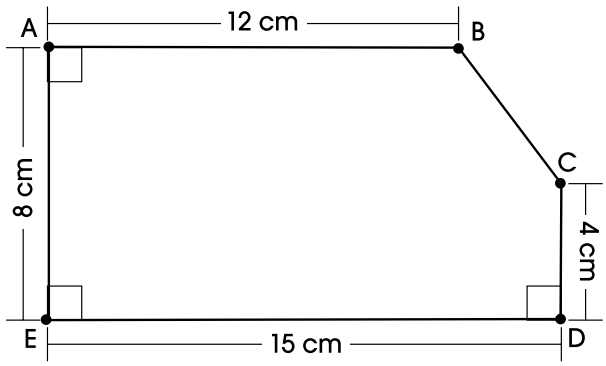
C.



D.



42. The diagram below gives the lengths of all but one side of pentagon ABCDE.



What is the perimeter of pentagon ABCDE?

A. 39 cm

B. 42 cm

C. 43 cm

D. 44 cm

43. The area of Alaska is about 6×10^5 square miles. The area of Rhode Island is about 1.5×10^3 square miles.

What is the difference between the area of Alaska and the area of Rhode Island?

A. 4.5×10^2 square miles

B. 4.5×10^5 square miles

C. 5.985×10^5 square miles

D. 5985×10^5 square miles

44. In 1993, the median age of brides in Ohio was 27.0 years and the median age of grooms was 28.9 years.

    Based on this information, which of the following statements must be true?

    A. Most brides were 27 years old.

    B. The youngest groom was 28.9 years old.

    C. Half of the grooms were 28.9 years old or older.

    D. All the grooms were older than the brides were.

BACK COVER