

Mathematics Vocabulary List For Pre-Algebra

1. **Absolute Value** - the distance from a number to zero on a number line. It is *always* positive.

$$|-6| = 6$$

$$|6| = 6$$

$$|-25| = 25$$

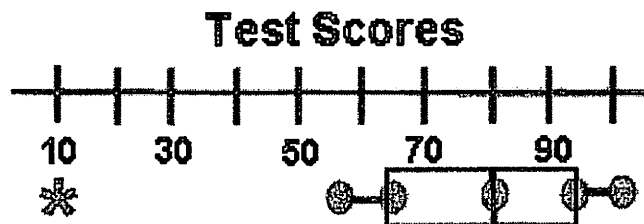
$$|25| = 25$$

2. **Associative Property** - For all real numbers a , b , and c , their sum or product is always the same regardless of their grouping.

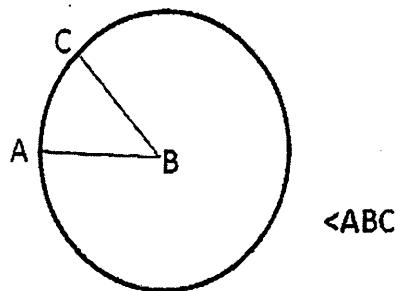
i.e. $(a + b) + c = a + (b + c)$

$$(a \times b) \times c = a \times (b \times c)$$

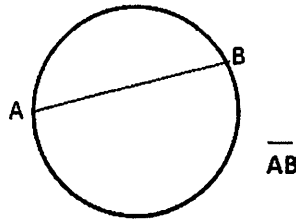
3. **Box-and-Whisker Plot** - A graph that displays the highest and lowest quarters of data as whiskers the middle two quarters of the data as a box, and the median.



4. **Central Angle** - An angle formed by two radii with its vertex at the center of a circle.



5. Chord - any segment that has its endpoints on the circle.



6. Combination - a selection of items in which order is not important.

Pick 2 players for a team from a group of 5: Jim, Al, Bob, Zoe, Paige

1. Make a list:

J,A	A,B	B,Z	Z,P
J,B	A,Z	B,P	
J,Z	A,P		
J,P			

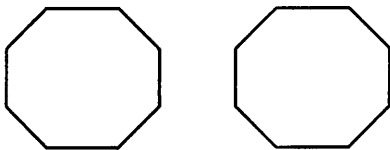
2. Use Factorials: ${}^5C_2 = \frac{5!}{(5-2)! \cdot 2!}$

7. Commutative Property - States that two or more numbers can be added or multiplied in any order and still arrive at the same sum or product.

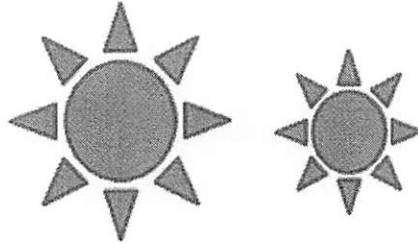
i.e. $8 + 20 = 20 + 8$

$7 \cdot 12 = 12 \cdot 7$

8. Congruent - two figures that have the same shape AND the same size.



9. Dilation - A transformation in which a figure is enlarged or reduced using a scale factor.



10. Distributive Property - If you multiply a sum by a number, you will get the same result if you multiply each addend by that number and then add the products.

i.e. $4(7 + 6) = 4(7) + 4(6)$

11. Experimental Probability - The ratio of the number of times an event occurs to the total number of trials, or times that the activity is performed.

i.e. I rolled a 6-sided dice 10 times and got 1, 6, 3, 4, 1, 2, 3, 5, 1, 4.
The experimental probability of rolling a 1 was $\frac{3}{10}$, 0.3 or 30%.

12. Exponent - a raised number that tells the power of the base.

i.e. $4^3 = 4 \cdot 4 \cdot 4 = 64$

$6^2 = 6 \cdot 6 = 36$

13. Factorial - The product of all whole numbers except zero that are less than or equal to a number.

i.e. 4 factorial = $4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$

0! is defined to be 1

14. **Function** - An input-output relationship that has exactly one output for each input.

i.e. $f(x) = x^2 + 1$

<u>x</u>	<u>y</u>
-2	5
0	1
1	2

15. **Fundamental Counting Principle** - If one event has m possible outcomes and a second event has n possible outcomes after the first event has occurred, then there are $m \cdot n$ total possible outcomes for the two events.

i.e. A password has 2 letters and 2 numbers. If repeating is allowed, how many passwords are possible?

$$26 \cdot 26 \cdot 10 \cdot 10 = 67,600$$

16. **Identity Property** - Has 2 parts. The sum of any number and ***Zero*** is that number. The product of any number and ***One*** is that number.

i.e. $8 + 0 = 8$

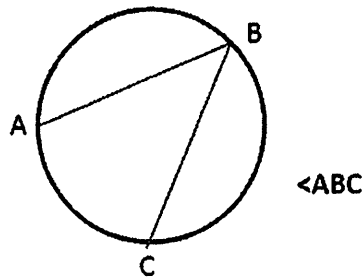
$$45(1) = 45$$

17. **Inequality** - A mathematical sentence that shows the relationship between quantities that are not equivalent.

i.e. $5 < 8$

$$5b + 2 \geq 12$$

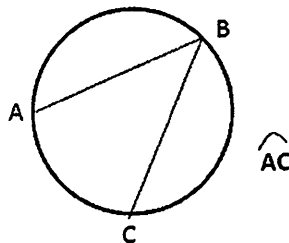
18. Inscribed Angle - An angle formed by two chords with its vertex on a circle.



19. Integers - the set of positive whole numbers, negative whole numbers and zero.

i.e. ...-4, -3, -2, -1, 0, 1, 2, 3, 4...

20. Intersected Arc - The arc formed due to an inscribed angle.



21. Irrational Number - A number that cannot be expressed as a ratio of two integers or as a repeating or terminating decimal.

i.e. 4.45683127406792103694396...

$\pi = 3.14159265358979323846...$

22. Iterative Pattern - A sequence of numbers that create a repeating pattern that can be written with an input/output model.

i.e. 17, 20, 23, 26, 29, 32...

$3N + 14 =$ next term in pattern.

Variable and Verbal Expressions

Write each as an algebraic expression.

- 1) the difference of 10 and 5

$$10 - 5$$

- 3) u decreased by 17

$$u - 17$$

- 5) x increased by 6

$$x + 6$$

- 7) the sum of q and 8

$$q + 8$$

- 9) twice q

$$2q$$

- 11) the quotient of 18 and n

$$\frac{18}{n}$$

- 2) the quotient of 14 and 7

$$\frac{14}{7}$$

- 4) half of 14

$$\frac{14}{2}$$

- 6) the product of x and 7

$$x \cdot 7$$

- 8) 6 squared

$$6^2$$

- 10) the product of 8 and 12

$$8 \cdot 12$$

- 12) n cubed

$$n^3$$

Write each as a verbal expression.

13) $\frac{x}{2}$

half of x

14) $a + 9$

a increased by 9

15) $19 - 3$

the difference of 19 and 3

16) $5n$

5 times a number

17) q^2
q squared

18) $\frac{40}{5}$
40 divided by 5

19) $\frac{a}{8}$
a divided by 8

20) $x + 8$
x plus 8

21) $n - 14$
a number minus 14

22) 2^2
2 squared

23) $\frac{60}{5}$
the quotient of 60 and 5

24) $n \cdot 6$
a number times 6

Evaluate each expression.

25) 5 squared
25

26) the product of 8 and 10
80

27) 20 decreased by 17
3

28) the quotient of 96 and 8
12

29) twice 6
12

30) 10 less than 17
7

31) 9 times 5
45

32) 10 increased by 8
18

33) 7 squared
49

34) the product of 4 and 5
20

8th Grade Summer Math Reinforcement Packet

When entering 9th grade, this is what your child should already know.

1. Know and understand rational numbers
2. Work with radical, positive and negative exponents
3. Understand how to reason about expressions and equations
4. Recognize equations for proportions ($y/x = m$ or $y = mx$)
5. Recognize special linear equations ($y = mx + b$)
6. Interpret the equation $y = mx + b$ as a graph of a straight line
7. Understanding that the constant of proportionality (m) is the slope
8. Understand that the slope (m) of a line is a constant rate of change
9. Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height)
10. Solve 1-step, 2-step and multi-step equations
11. Solve linear equations in one variable
12. Solve systems of two linear equations in two variables
13. Understand that a function is a rule that assigns to each input exactly one output
14. Describe functions using an equation
15. Translate between different representations of functions
16. Analyzing 2-D and 3-D figures using distance, angle, similarity, and congruence
17. Use ideas about distance and angles to understand transformation in the coordinate plane
18. Understand the effects of translations, rotations, reflections, and dilations in the coordinate plane
19. Understand congruence and similarity to describe and analyze 2-D figures
20. Understand the sum of the angles in a triangle is the angle formed by a straight line
21. Recognize the angles created when a transversal cuts parallel lines
22. Understand and apply the Pythagorean Theorem and its converse
23. Use the Pythagorean Theorem to find distances between points on the coordinate plane
24. Find volume of cones, cylinders, and spheres
25. Construct and interpret scatter plots for two sets of data
26. Know that straight lines are used to model relationships between 2 variables

You can use the Math in Focus e-textbook for help in completing this packet.

<http://my.hrw.com/>

Student Username: _____ Password: _____

I have checked the work completed. _____
Parent Signature

Be sure to show all work next to question for #1-10

Multiple Choice (10 × 2 points = 20 points)

Fill in the circle next to the correct answer.

1. Simplify $\left[\left(\frac{5}{6}\right)^3 \cdot \left(\frac{5}{6}\right)^{-5}\right]^2$. Write your answer using a positive exponent.

- (A) $\left(\frac{5}{6}\right)^4$ (B) $\left(\frac{5}{6}\right)^{-2}$ (C) $\left(\frac{6}{5}\right)^4$ (D) $\left(\frac{5}{6}\right)^{-4}$

2. Which of the following represents $5.14 \cdot 10^4$ in standard form?

- (A) 51,400 (B) 514 (C) 5,140 (D) 0.514

3. What is the value of y when $x = 5$ and $\frac{2y - 1}{5} = x$?

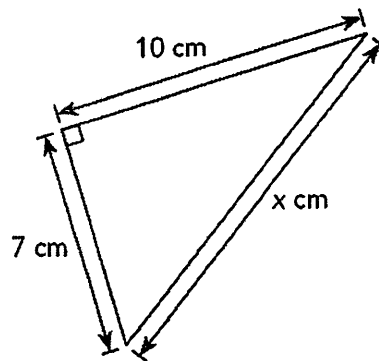
- (A) 1 (B) 12 (C) 13 (D) 10

4. The equation $y = 3x + 2$ is a function because _____

- (A) it is a nonlinear equation of a horizontal line
 (B) it is a linear equation of a slanted line
 (C) it is a linear equation of a vertical line
 (D) it is not a nonlinear equation

5. Find the value of x .

- (A) $\sqrt{149}$ cm
 (B) $\sqrt{51}$ cm
 (C) $\sqrt{17}$ cm
 (D) 149 cm

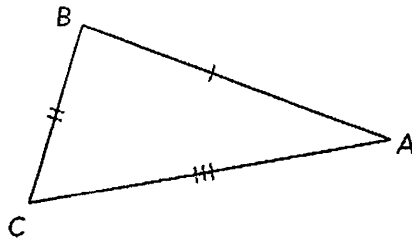


6. What is the distance between the points $A(3, 5)$ and $B(6, -5)$?

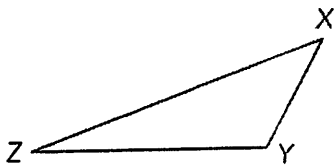
- (A) $\sqrt{13}$ units (B) $\sqrt{109}$ units (C) 109 units (D) $\sqrt{45}$ units

Be sure to show all work next to question for #1-10

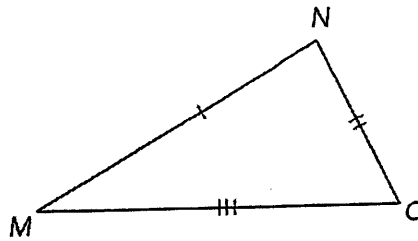
7. Which of the following triangles is congruent to triangle ABC?



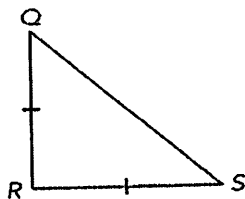
(A)



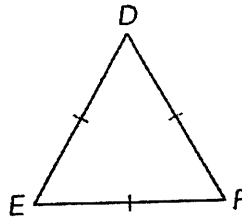
(B)



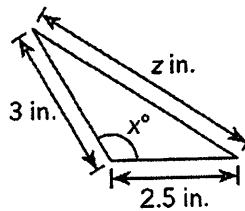
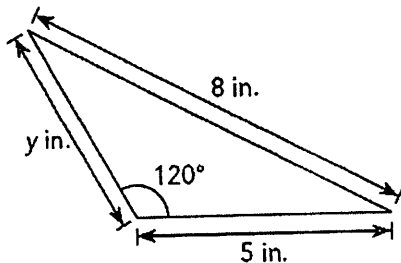
(C)



(D)



8. The two figures are similar. Find the value of each variable.



(A) $x = 120$; $y = 6$; $z = 4$

(B) $x = 60$; $y = 6$; $z = 4$

(C) $x = 120$; $y = 5.5$; $z = 5.5$

(D) $x = 120$; $y = 4$; $z = 6$

9. Which of the following scenarios is a simple event?

- (A) Obtaining two heads when a coin is tossed
- (B) Rolling a fair 20-sided number die and obtaining a sum of 17
- (C) Picking two blue marbles from a bag of blue and yellow marbles
- (D) Selecting the letter B from the word TABLE

10. Which of the following scenarios is an independent event?

- (A) Picking two oranges from a fruit basket of 3 oranges and 2 peaches
- (B) Selecting two novels from a bookshelf with 3 language books and 5 novels
- (C) Selecting two students from a class to participate in an interactive game
- (D) Spinning a spinner that is divided into four equal areas labeled 1 to 4 and obtaining two 4s in a row

Be sure to show all work next to question for #11-31

Short Answer and/or Constructed Response

(Questions 11 to 20: 10×2 points = 20 points, Questions 21 to 23: 3×4 points = 12 points,
Questions 24 to 27: 4×5 points = 20 points, Questions 28 to 31: 4×6 points = 24 points)

Write your answer on the answer blank provided.

11. Express $0.0\overline{23}$ as a fraction.

12. Write an equation of the line given its slope, $m = -3$,
and its y-intercept, $b = 10$.

13. Solve the system of linear equations using the elimination method.

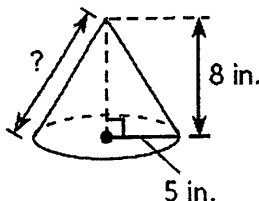
$$x = 3y$$

$$3x - 2y = 14$$

14. Identify the input and the output given the relation described:

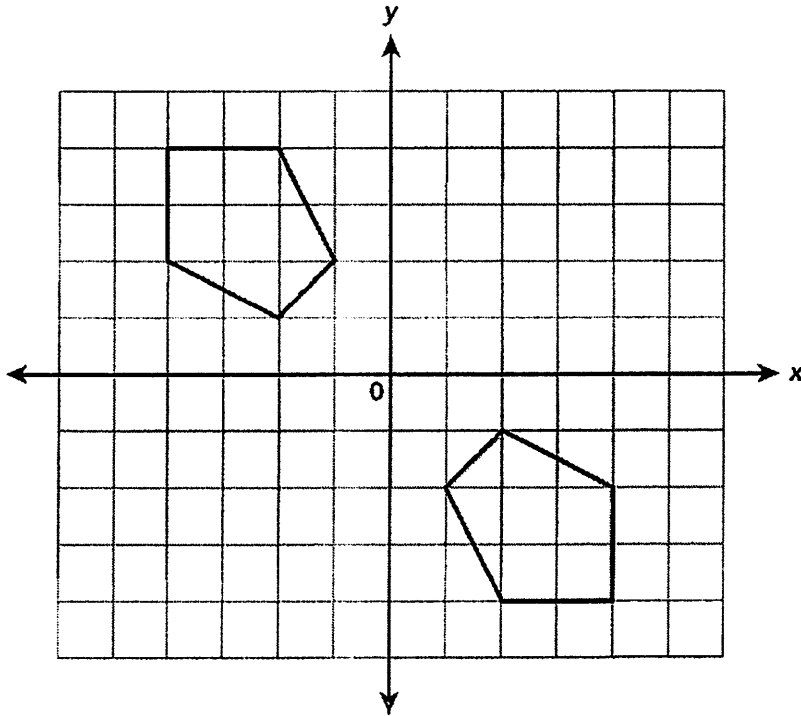
Mr. Edward wants to find the cost of parking his car at a shopping center for a few hours.

15. Find the missing dimension. Round your answer to the nearest tenth.



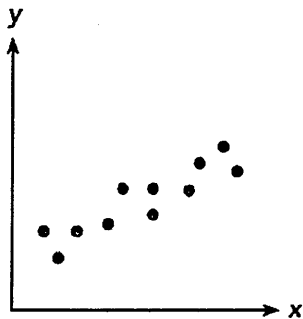
Be sure to show all work next to question for #11-31

16. Two symmetrical figures are shown on the coordinate plane. Write the equation of the line of reflection.



17. Find the coordinates of the image of point $P(5, 8)$ after it is translated 7 units to the left and 3 units up.

18. Describe the association between the bivariate data shown in the scatter plot.



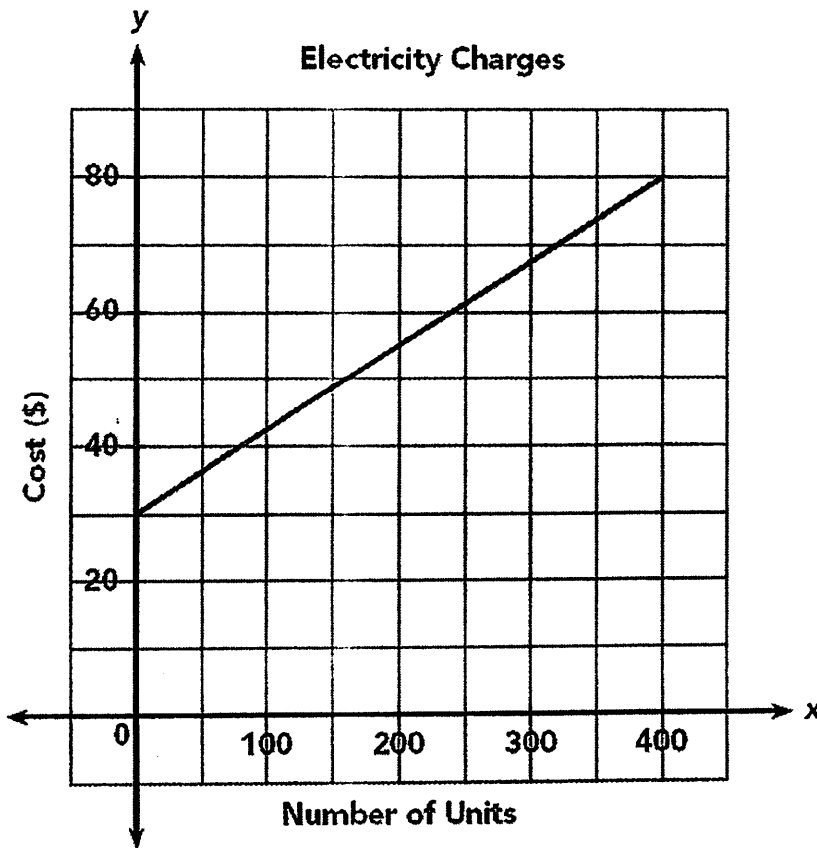
19. From the following data set, identify whether the data is quantitative or categorical in nature. Explain your answer.

Cloudy, sunny, windy

20. Picking two red pens from a pencil box with 10 red and blue pens is a compound event. Identify the simple events in this scenario.

Be sure to show all work next to question for #11-31

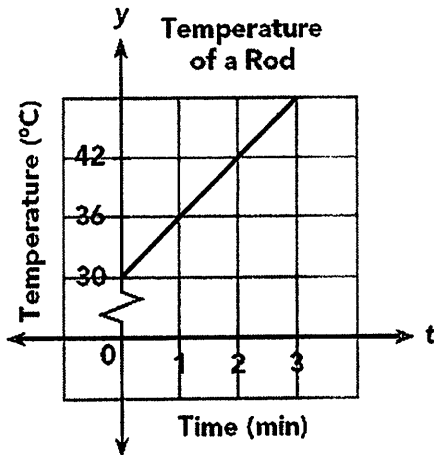
21. The graph shows the total cost, C dollars, of the electricity supplied to a house based on the number of units, x , of electricity used.



- a) Find the vertical intercept of the graph and explain what information it gives about the situation.
- b) Find the slope of the graph and explain what information it gives about the situation.
22. Four years ago, Samantha was three times as old as Danny. Four years from now, Samantha will be only twice as old as Danny. How old are they now?

Be sure to show all work next to question for #11-31

23. The graph shows the relation between the temperature of a metal rod, $y^{\circ}\text{C}$, and the time, x minutes, it has been heated over a fire.



- a) Tell whether the relation is a linear function. Then tell whether the function is increasing or decreasing.
- b) Write an algebraic equation to represent the function.
- c) Describe how the slope and y -intercept are related to the function.
24. A photograph is 6 centimeters wide and 8 centimeters high. An enlargement of the photograph has a height of 16 centimeters. Calculate the width of the enlargement.

Be sure to show all work next to question for #11-31

25. A survey was conducted to investigate the association between park location and exercising habits. The data is shown in the two-way table.

		Exercising Habits		
		Resident Exercises	Resident Does Not Exercise	Total
Park Location	Park is Within 1 Kilometer Radius of a Residence	160	65	225
	Park is Not Within 1 Kilometer Radius of a Residence	95	85	180
	Total	255	150	405

- a) Find the relative frequencies to compare the distribution of residences having a park within a 1 kilometer radius and residents exercising.
- b) Describe the association between residences having a park within a 1 kilometer radius and residents exercising.

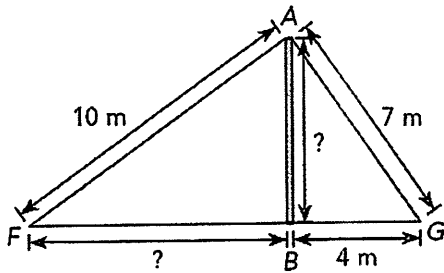
Be sure to show all work next to question for #11-31

26. In a class, there are 28 students. There are 8 more girls than boys.
- a) Write a system of two linear equations to represent this scenario.

- b) State, with reasons, whether the system of equations has a unique solution, is inconsistent, or is dependent.

- c) Can the system in a) be used to calculate the number of boys and the number of girls in the class? If so, find the number of boys and the number of girls in the class.

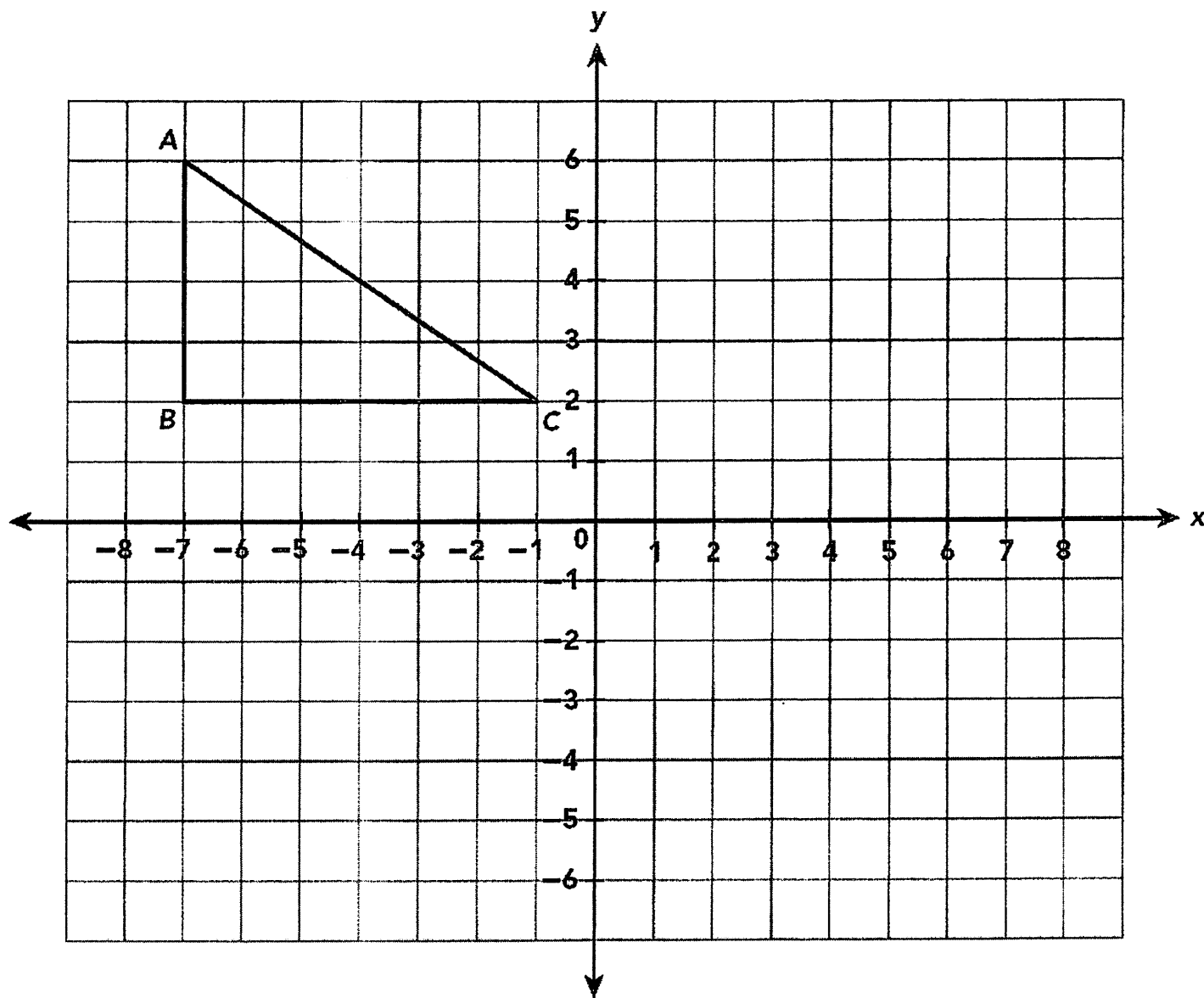
27. A tent pole, \overline{AB} , is held vertically by two ropes, \overline{AF} and \overline{AG} . AF is 10 meters and AG is 7 meters. Point B is 4 meters from point G .



- a) Find the length of the pole, \overline{AB} . Round your answer to the nearest tenth.
- b) Find the distance between point B and point F . Round your answer to the nearest tenth.

Be sure to show all work next to question for #11-31

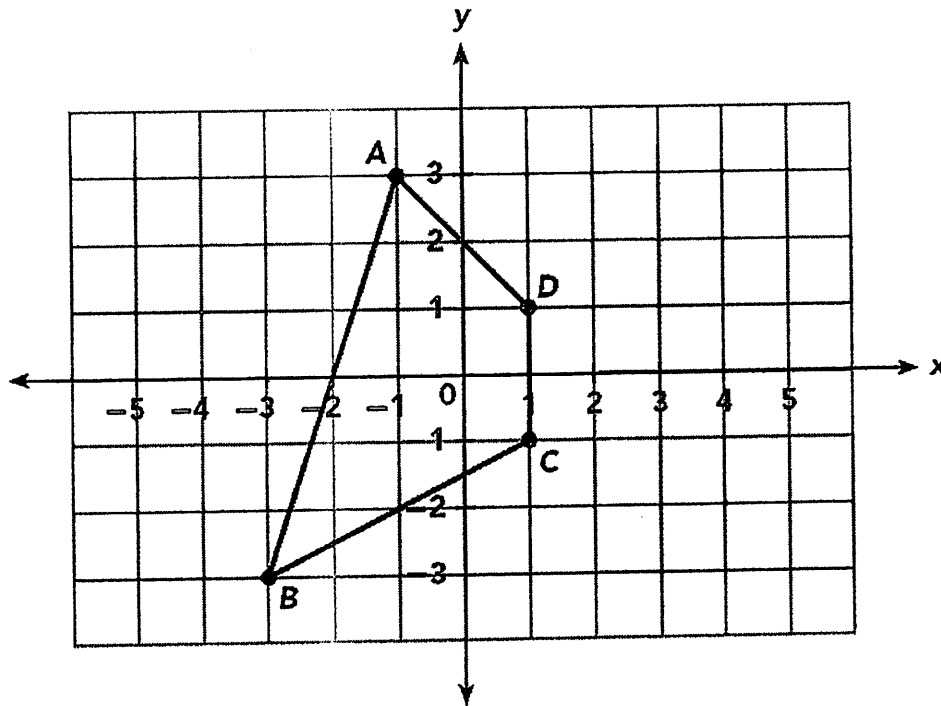
28. $\triangle ABC$ is first mapped onto $\triangle A'B'C'$ by a reflection in the y -axis. $\triangle A'B'C'$ is then mapped onto $\triangle A''B''C''$ by a 180° rotation about the origin, O .



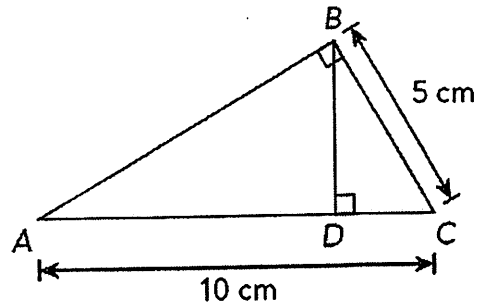
- Draw $\triangle A'B'C'$ and $\triangle A''B''C''$.
- Describe the transformation that maps $\triangle ABC$ onto $\triangle A''B''C''$.

Be sure to show all work next to question for #11-31

29. Draw the image of the figure below through a 90° counterclockwise rotation about the origin, O . Write the coordinates of the vertices of the image.



30. In the diagram, $\triangle ABC$ is divided into two similar smaller triangles.



- Identify the two similar triangles.
- Find the length of \overline{CD} .

Be sure to show all work next to question for #11-31

31. Data was collected from six different libraries in two different cities with similar neighborhoods to investigate the association between loan periods and the percent of books overdue in the fiction category. The results are shown in the tables below.

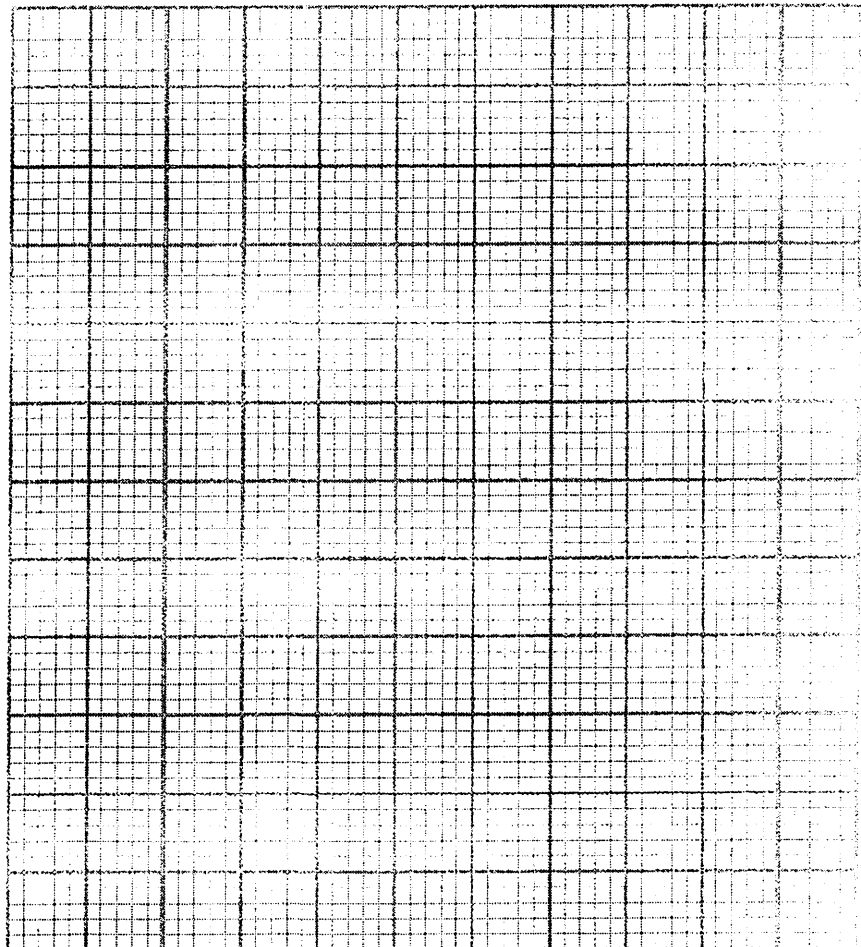
City A

Loan Period (Number of Days)	1	3	5	7	9
Percent of Books Overdue (%)	2	6	8	11	10

City B

Loan Period (Number of Days)	5	7	9	10
Percent of Books Overdue (%)	7	10	12	2

- Use the graph paper. Construct a scatter plot for this data and draw the line of best fit.
- Describe the association between loan period and the percent of books overdue.
- Identify the outlier.



alg 1