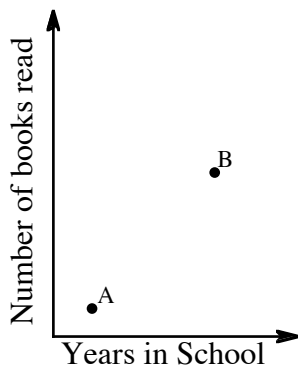


Every point on a graph represents two pieces of information. The two pieces of information correspond to the labels on each of the two axes. In general, a point on a graph is named or interpreted (described) by first considering the horizontal axis, then the vertical axis. For information about using the (x, y) coordinate plane, see the Math Notes box on page 10 in the student text.

Example 1

Explain all that you can about points A and B on the graph below.

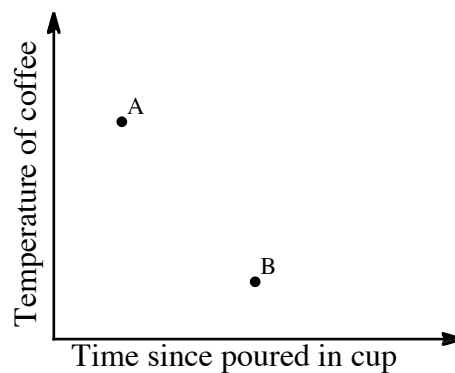


By reading the axes we see that the graph shows us the relationship between the number of years a person has been in school and the number of books that person has read. The farther to the right a point is, the more years a person has spent in school. The higher a point is vertically, the more books the person has read.

Point A represents someone who has not been in school very many years and, consequently, has not read many books. Point B represents someone who has been in school for several years and has read a fair number of books. Another way to interpret the graph is to note that point B represents a person who has been in school about three times longer than the person represented by point A and who has read about three times as many books.

Example 2

Explain all that you can about points A and B on the graph below.



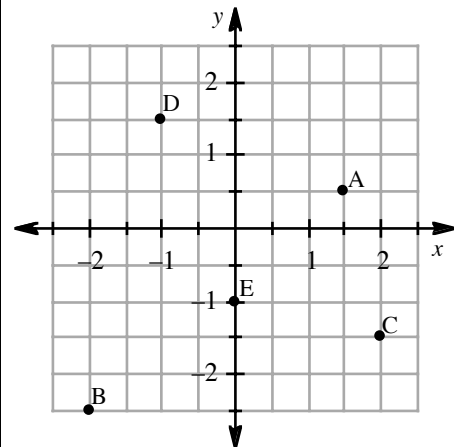
This graph shows the relationship between the temperature of a cup of coffee and the time since the coffee was poured. The farther to the right a point is, the more time has passed since the coffee was poured. The higher a point is vertically, the greater the temperature.

Point A represents a cup of coffee which was poured recently and is still hot. Point B represents a cup of coffee that was poured awhile ago and is cooler in temperature.

Example 3

Find the coordinates of points A and B in the graph at right.

To find the coordinates of point A, start at the center of the graph where the x - and y -axes cross (this is the point $(0, 0)$, called the origin). Go to the right along the x -axis until you reach the point below point A. This number, in this case 1.5, is the x -coordinate of point A. Then go up or down from there to the point. The number along the vertical y -axis that matches the point, in this case 0.5, is the y -coordinate of point A. The coordinates are written $(1.5, 0.5)$, called an ordered pair, because the x -coordinate is always written first. An x -coordinate is negative if it is to the left of the y -axis; a y -coordinate is negative if it is below the x -axis.



Problems

Explain what points A, B, and/or C represent on each of these graphs.

-
-
-
-
-
-
-

Use the graph in Example 3 above to find the coordinates of each of the following points.

- Point C
- Point D
- Point E

Answers

1. Point A shows that a newer car has greater value. Point C is older than point B and point C has less value than points A or B.
2. Point A is older than point B but taller. Point C is the oldest, taller than point B but shorter than point A.
3. Point C has been a scout the longest and has the least number of badges. Point B has the most badges. Point A has been a scout the shortest time and has more badges than point C.
4. The temperature at point A is lowest and it is earliest in the year. At points B and C, later in the year, the temperatures are about the same and warmer than point A.
5. Point A is the point in time when Jon's and Emma's accounts have the same amount of money in them.
6. Point A is when the football is kicked, point B is the highest point, and point C is when it hits the ground.
7. Point A is AOH's base price, point B is CompUs's base price, and point C is where the cost of using the internet is the same.
8. C(2, -1.5)
9. D(-1, 1.5)
10. E(0, -1)

Guess and Check is a problem solving strategy students can use to solve many types of problems, especially complex word problems. When using Guess and Check, students begin by choosing a value for one part of the problem (the guess), then use the information in the problem to develop mathematical relationships based on the guess. The result of the guess is compared to the expected outcome (answer) of the problem. This information is used to refine the guess to find a value closer to the answer. It is usually helpful to organize the information in a table so that patterns and relationships are easier to see. See the Math Notes box on page 28 for vocabulary words that are commonly used in word problems.

Example

The product of two numbers is 126. One of the numbers is 5 more than the other. Find the two numbers.

Start by guessing a value for the first number, such as 5. Use the information in the problem to find the value of the second number. The second number is 10 because 5 more than 5 is 10. Calculate the product of the two numbers, compare the result to the expected product, and record the work in a table.

Guess First Number	Second number	Product	Check. Is the product 126?
5	$5 + 5 = 10$	$5(10) = 50$	No, too low

Because the product is 50, well below the expected 126, the guess of 5 is too low and the next guess should be higher. Make as many guesses as it takes to get the correct answer.

Guess First Number	Second number	Product	Check. Is the product 126?
5	$5 + 5 = 10$	$5(10) = 50$	No, too low
10	$5 + 10 = 15$	$10(15) = 150$	No, too high
8	$5 + 8 = 13$	$8(13) = 104$	No, too low
9	$5 + 9 = 14$	$9(14) = 126$	Yes.

The two numbers with a product of 126 are 9 and 14.

Problems

Use Guess and Check to solve each of these problems. State the solution in a complete sentence.

1. The product of two numbers is 450. The smaller number is seven less than the larger number. What are the numbers?
2. The area of a rectangle is 810 square centimeters. The length is 3 centimeters greater than the width. Find the length and width of the rectangle.
3. The perimeter of a triangle is 47 inches. The first side is twice the length of the second side. The third side is seven more than the second side. What is the length of each side?
4. The perimeter of a triangle is 53 inches. The second side is 3 inches longer than the first side. The third side is 1.5 times the length of the second side. What is the length of each side?
5. Yanavi drew a rectangle on graph paper. One side of the rectangle is two units longer than the other. The area of the rectangle is 399 squares. What is the length of each side?
6. Aimee cut a 126 centimeter piece of string into two pieces so that one piece is two times as long as the other. How long is each piece?
7. Maria Elena has 84 feet of fence to put around her rectangular flower bed. How long and how wide will the flower bed have to be so that she has 437 square feet of area to plant flowers?
8. Three friends, Riccardo, Giacomo, and Chiara, mowed lawns to earn money to buy a canoe. They all mowed the same number of lawns. Chiara also received a \$7 tip. Together they earned \$574 including the tip. How much money did each friend earn?
9. The sum of the ages of Peggy and Elizabeth is 98 years. Elizabeth is 14 years younger than Peggy. How old is each person?
10. Hannah and Mary each earn \$10 per hour to paint. Together they earned \$460. Mary painted for 14 more hours than Hannah. How long did each girl paint?

Answers

1. The numbers are 18 and 25.
2. The width is 27 cm and the length is 30 cm.
3. The side lengths are 10, 17, and 20 in.
4. The side lengths are 13, 16, and 24 inches.
5. The side lengths are 19 and 21 units.
6. The lengths of the pieces are 42 and 84 cm.
7. The dimensions are 19 and 23 feet.
8. Riccardo and Giacomo each earned \$189; Chiara earned \$196.
9. Elizabeth is 42 and Peggy is 56.
10. Hannah painted 16 hours, Mary 30 hours.