

## **WARMUP**

How did you feel about the STAR test?  
Do you think that the review helped to  
prepare you? Do you have any  
suggestions for review for next year?

**CHAPTER 13:  
COORDINATE GEOMETRY**

**SECTION 13.1 & 13.2  
THE DISTANCE FORMULA  
& SLOPE OF A LINE**

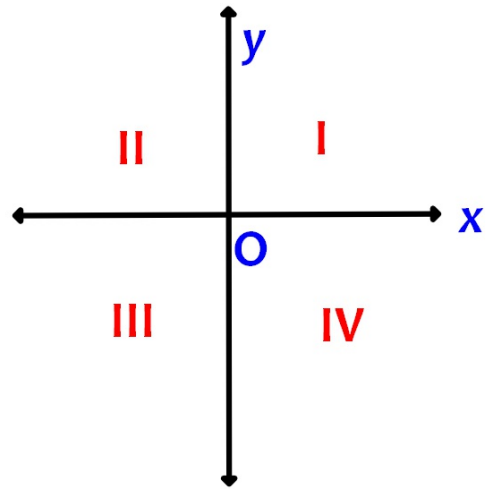
Standards:

## QUICK REVIEW OF GRAPHS

Origin:  $(0,0)$  - Point O

Axes: x-axis, y-axis

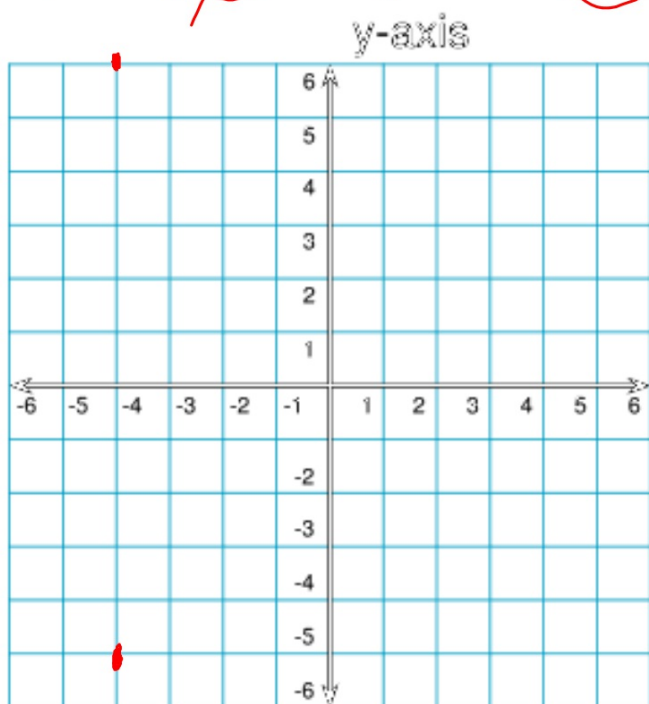
quadrants: regions I, II, III, IV



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**1-3: Find the distance between the two points.**

1)  $(\cancel{-4}, -5)$  and  $(\cancel{-4}, 6)$



x-axis

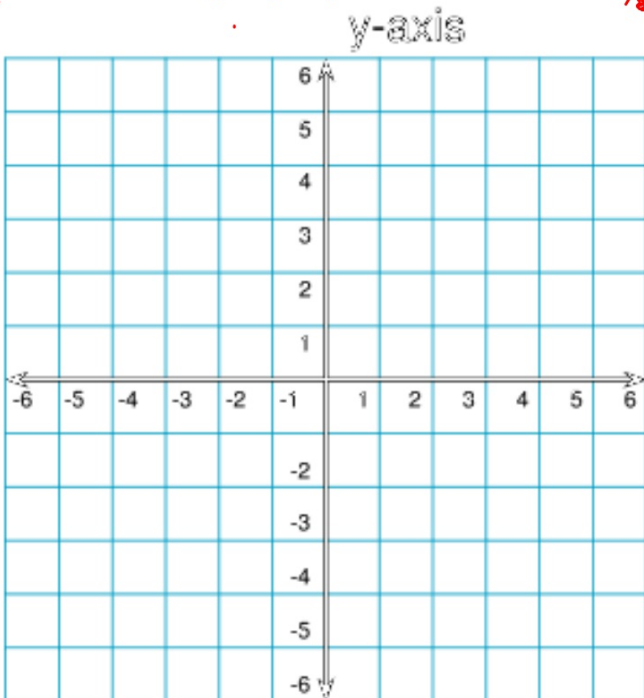
$$\begin{aligned} &|-5 - 6| \\ &|-11| = 11 \end{aligned}$$

**Answer**

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**1-3: Find the distance between the two points.**

2)  $(5, 8)$  and  $(-7, 8)$



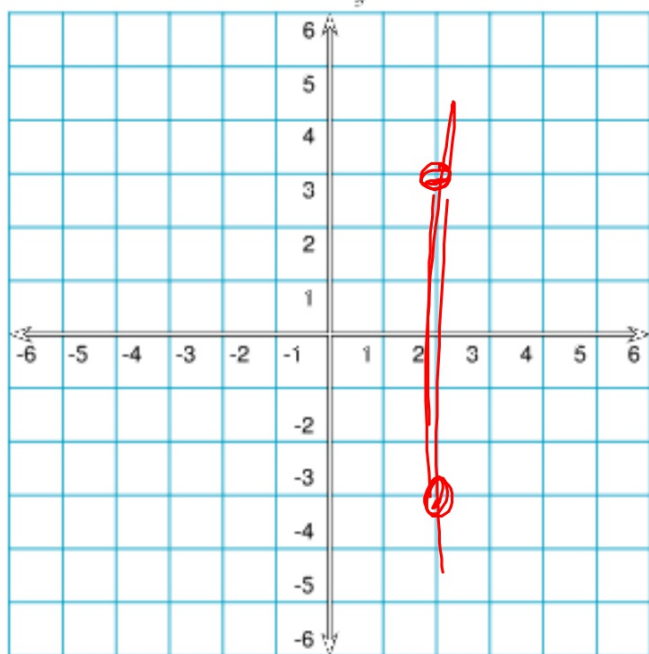
$$\begin{aligned} & |5 - (-7)| \\ &= |12| = 12 \end{aligned}$$

**Answer**

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**1-3: Find the distance between the two points.**

3) ~~(2,3)~~ and ~~(2,-3)~~ \_\_\_\_\_



$$|3 - (-3)| = 6$$

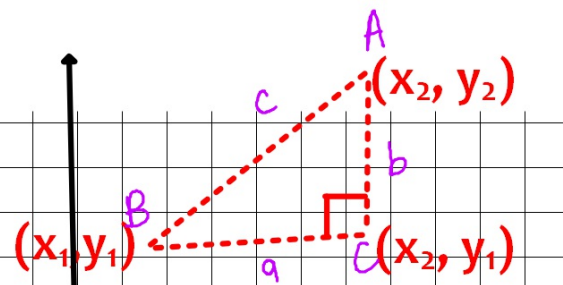
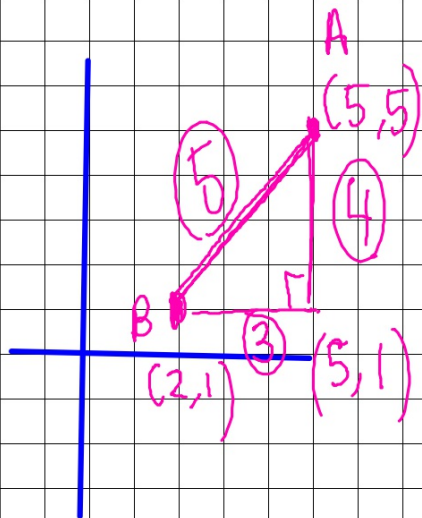
**Answer**

**THEOREM: THE DISTANCE FORMULA**

The distance  $d$  between points  $(x_1, y_1)$  and  $(x_2, y_2)$  is given by

$$\sqrt{(5-2)^2 + (5-1)^2} = \sqrt{25}$$

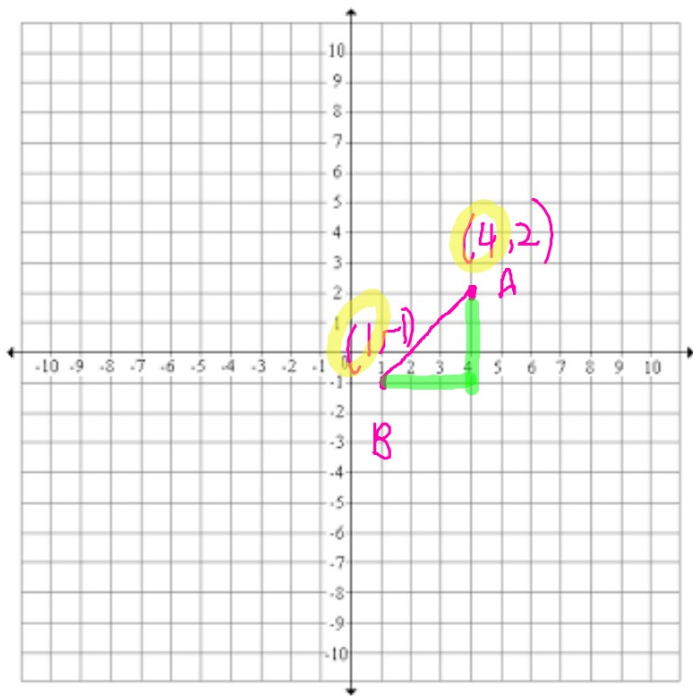
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



4-7: Find the distance between the two points.

4)  $(4, 2)^A$  and  $(1, -1)^B$

$$\sqrt{9 + 9} = \sqrt{18} \\ 3^2 \quad 3^2 \quad 3\sqrt{2}$$



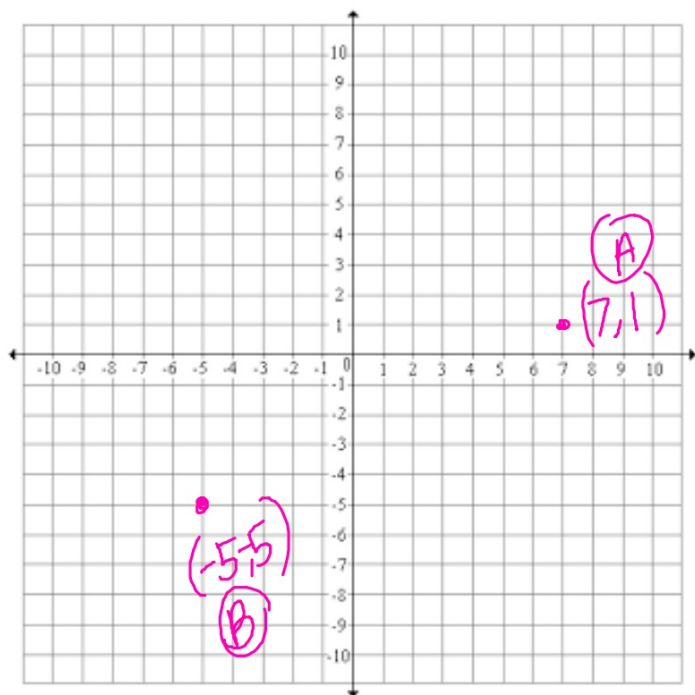
$$(A \text{ first}) (4-1)^2 + (2-(-1))^2$$

$$(B \text{ first}) (1-4)^2 + (-1-2)^2$$

**Answer**

**4-7: Find the distance between the two points.**

5)  $(-5, -5)$  and  $(7, 1)$



$$(7 - (-5))^2 + (1 - (-5))^2$$

$$(12)^2 + (6)^2$$

$$\sqrt{144 + 36} = \sqrt{180}$$

**Answer**

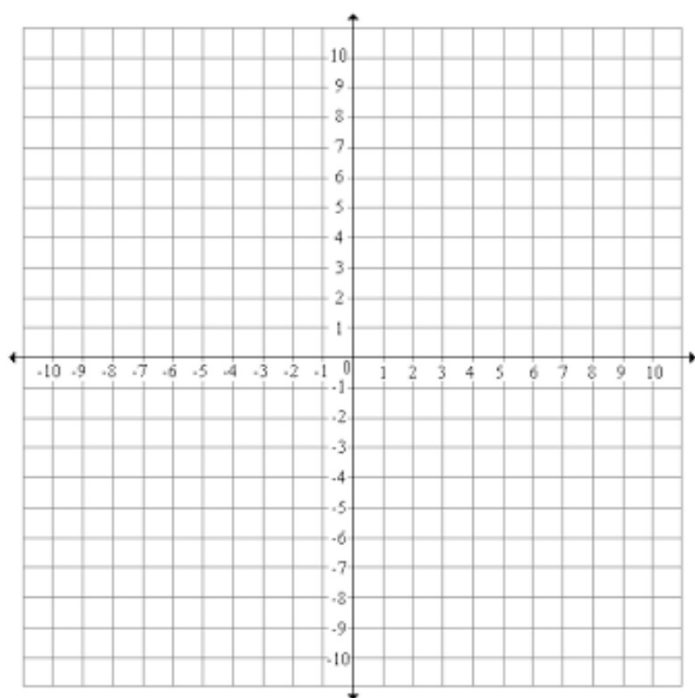
$$6\sqrt{5}$$

$$\begin{array}{r} 9.20 \\ 9.4 \overline{) 5} \\ \hline 6\sqrt{5} \end{array}$$

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**4-7: Find the distance between the two points.**

7)  $(-7, -2)$  and  $(-1, 6)$



**Answer**

8-9: Given points A, B, and C, find  $\overline{AB}$ ,  $\overline{AC}$ , and  $\overline{BC}$ . Are A, B, and C collinear? If so, which point lies between the other two?

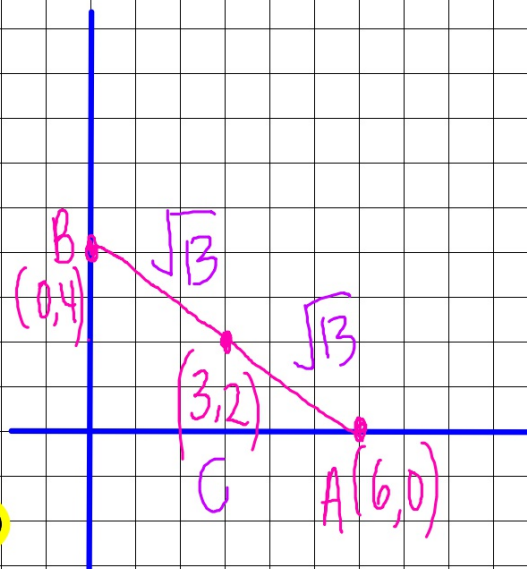
8)  $A(6,0)$ ,  $B(0,4)$ ,  $\underline{C(3,2)}$

$\overline{AB}$   
 $(2\sqrt{13})$   
 $6^2 + 4^2 = \sqrt{52} = 2\sqrt{13}$

$\overline{AC} = \sqrt{3^2 + 2^2} = \sqrt{9+4} = \sqrt{13}$

$\overline{BC} = \sqrt{3^2 + 2^2} = \sqrt{9+4} = \sqrt{13}$

$\overline{AC} + \overline{BC} = \overline{AB}$



**Answer**

8-9: Given points A, B, and C, find AB, AC, and BC. Are A, B, and C collinear? If so, which point lies between the other two?

9)  $A(3,8)$ ,  $B(2,2)$ ,  $C(4,0)$

$$AB = \sqrt{1^2 + 6^2} = \sqrt{37}$$

$$AC = \sqrt{1^2 + 8^2} = \sqrt{65}$$

$$BC = \sqrt{2^2 + 2^2} = \sqrt{8}$$

(NO)

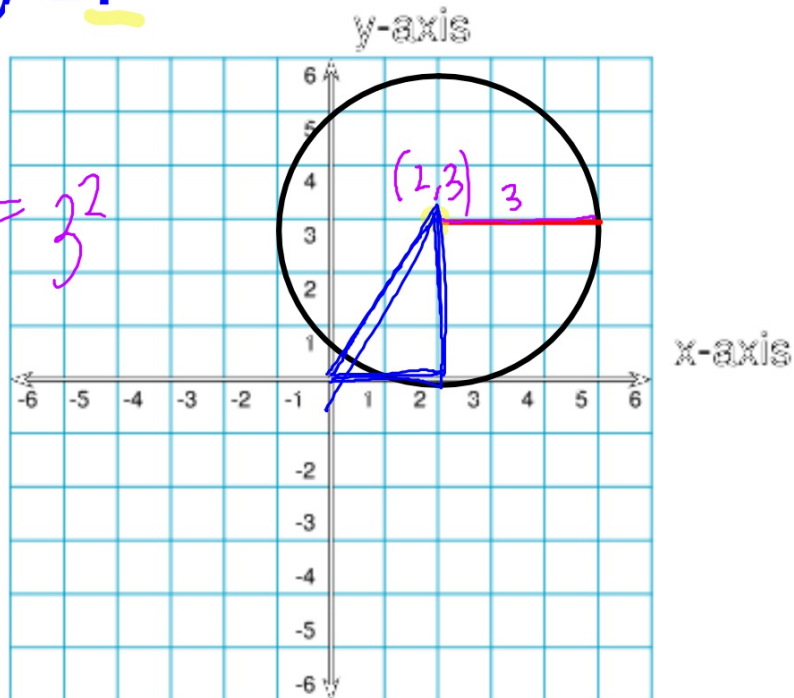
**Answer**

## EQUATION OF A CIRCLE

An equation of the circle with center  $(a, b)$  and radius  $r$ :

$$(x - a)^2 + (y - b)^2 = r^2$$

$$(x - 2)^2 + (y - 3)^2 = 3^2$$

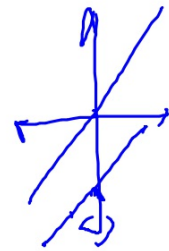




10-12: Write an equation of the circle that has the given center and radius.

11)  $C(-3, -8)$   $r=6$

$$(x - (-3))^2 + (y - (-8))^2 = 6^2$$



$$(x + 3)^2 + (y + 8)^2 = 36$$



**Answer**

$$(x + 3)^2 + (y + 8)^2 = 36$$

10-12: Write an equation of the circle that has the given center and radius.

12)  $C(1, -2)$   $r = \sqrt{3}$

$C(5, -7)$   $r = \sqrt{7}$

$$(x-1)^2 + (y-(-2))^2 = (\sqrt{3})^2 \quad (x-5)^2 + (y+7)^2 = 7$$

$$(x-1)^2 + (y+2)^2 = 3$$

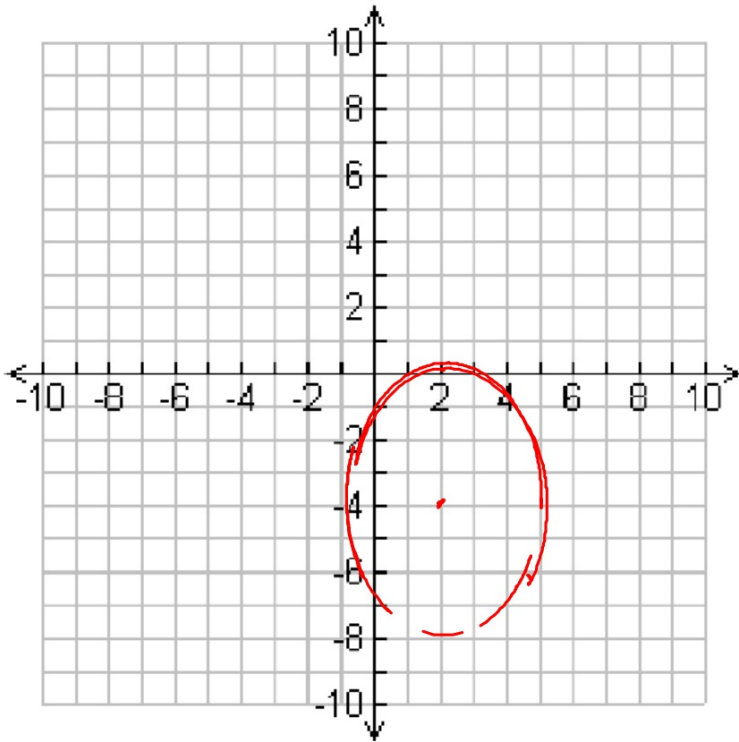
**Answer**

$$(x-1)^2 + (y+2)^2 = 3$$

13-15: Find the center and radius of each circle. Sketch the graph.

$$13) (x - 2)^2 + (y + 4)^2 = \sqrt{9} \quad C = (2, -4)$$

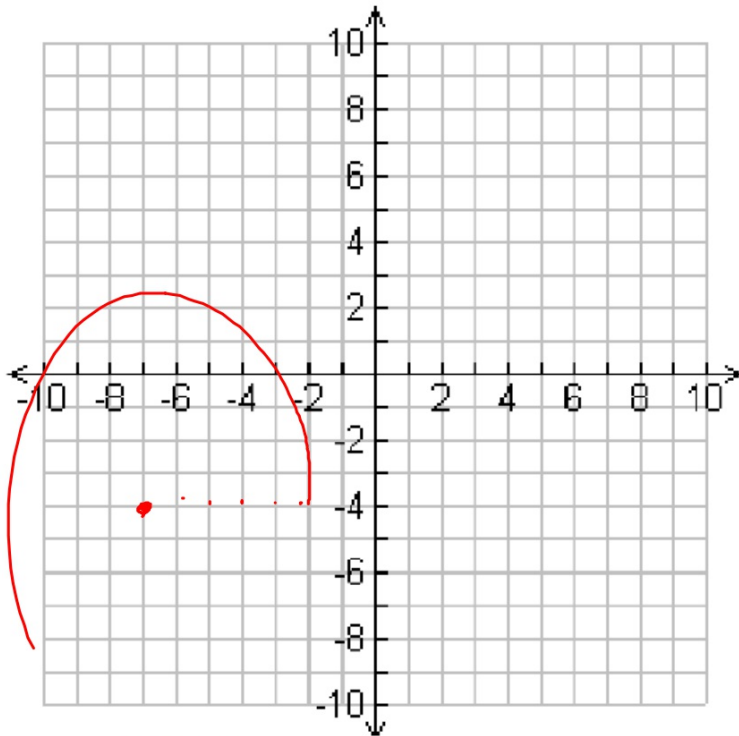
$$R = 3$$



**Answer**

13-15: Find the center and radius of each circle. Sketch the graph.

$$14) (x + 7)^2 + (y + 3)^2 = \underline{25}$$



$$C = (-7, -3)$$
$$r = 5$$

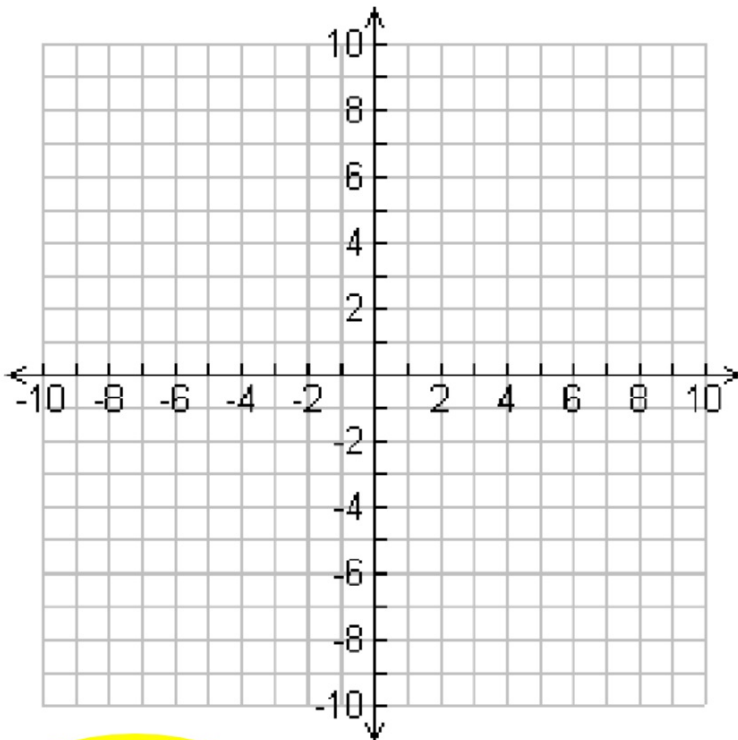
**Answer**

13-15: Find the center and radius of each circle. Sketch the graph.

$$15) \quad x^2 + (y - 1)^2 = \sqrt{49}$$

$$C = (0, 1)$$

$$r = 7$$



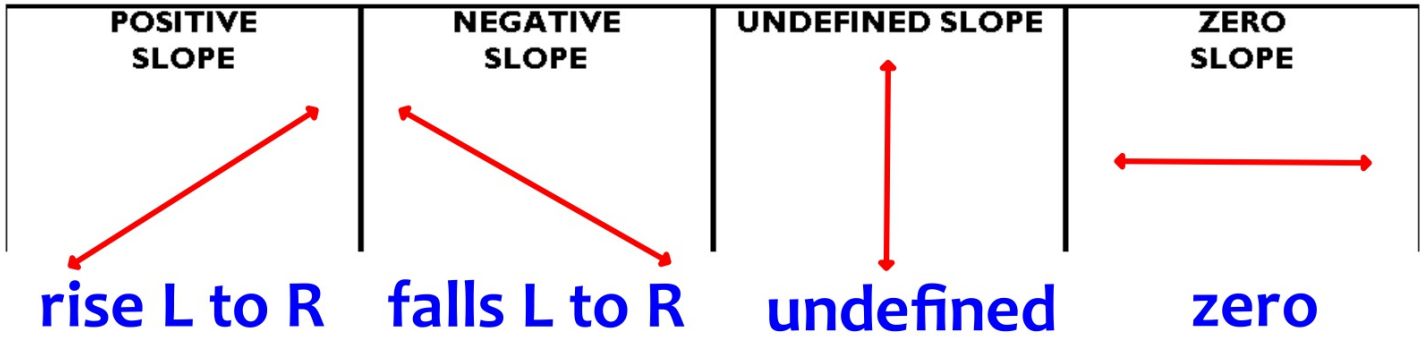
**Answer**

## NOTES SECTION 13.2: SLOPE OF A LINE

### SLOPE OF A LINE

The slope,  $m$ , of the nonvertical line through points  $(x_1, y_1)$  and  $(x_2, y_2)$  is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{change in } y}{\text{change in } x} \quad (\text{difference})$$



| **16-19: Find the slope of the line through the points.**

16)  $(-1, 0)$  and  $(3, -5)$

**Answer**

| **16-19: Find the slope of the line through the points.**

17)  $(3,8)$  and  $(3,-2)$

**Answer**

**undefined**

| **16-19: Find the slope of the line through the points.**

18)  $(-1, -2)$  and  $(-2, -2)$

**Answer**

$$m=0$$

| 16-19: Find the slope of the line through the points.

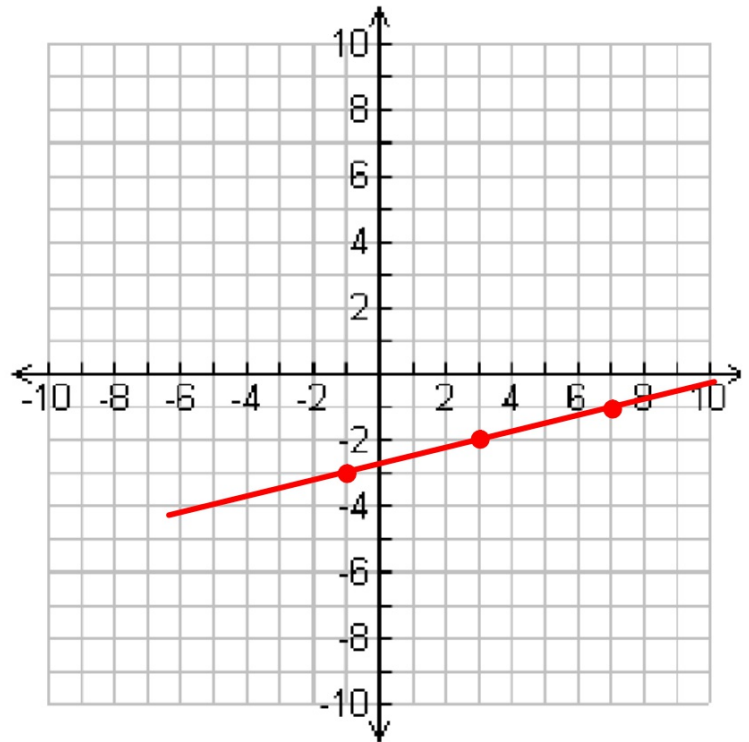
19)  $(-4, -2)$  and  $(-1, 3)$

**Answer**

$$m = 5/3$$

20-21: A point P on a line and the slope of the line are given. Sketch the line and find the coordinates of 2 other points on the line.

20)  $P(3, -2)$  and  $m = 1/4$



$(7, -1)$   
 $(-1, -3)$

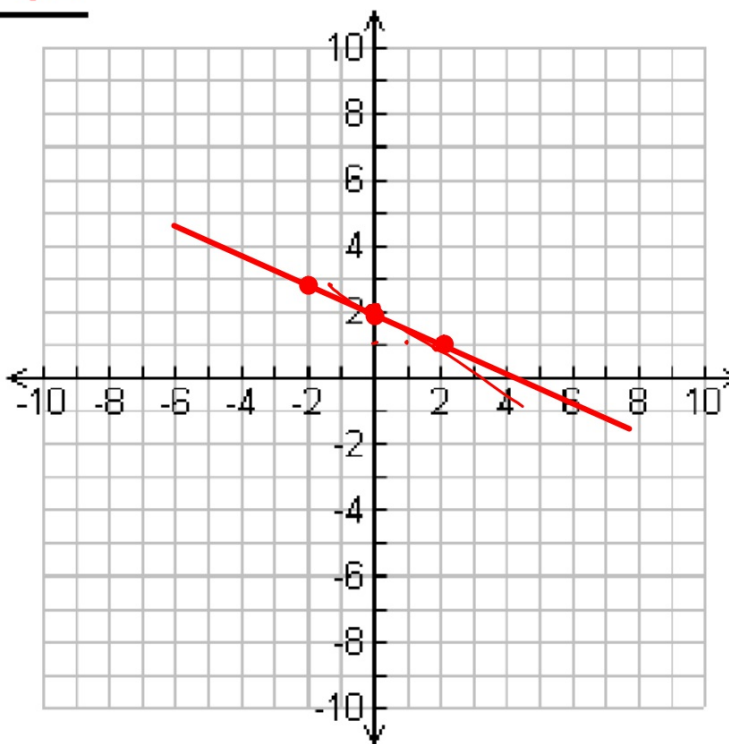
**Answer**

20-21: A point P on a line and the slope of the line are given. Sketch the line and find the coordinates of 2 other points on the line.

21)  $P(0,2)$  and  $m=-1/2$

$(-2,3)$

$(2,1)$



Answer

22) A line with slope  $\frac{3}{8}$  passes through the points  
 $(-1, 1)$  and  $(7, \underline{\quad})$

**Answer**

**(7,4)**

23) A line with slope  $-\frac{1}{3}$  passes through the points  
 $(-5, 4)$  and  $(\underline{\quad}, -5)$

**Answer**

**(22, -5)**

# HOMework

## Assignment #13.1

- Pages 526-527 #1-27 odd
- Pages 532-533 #2-24 even

Find the distance between the two points. If necessary, you may draw graphs but you shouldn't need to use the distance formula.

1.  $(-2, -3)$  and  $(-2, 4)$
2.  $(3, 3)$  and  $(-2, 3)$
3.  $(3, -4)$  and  $(-1, -4)$
4.  $(0, 0)$  and  $(3, 4)$

Use the distance formula to find the distance between the two points.

5.  $(-6, -2)$  and  $(-7, -5)$
6.  $(3, 2)$  and  $(5, -2)$
7.  $(-8, 6)$  and  $(0, 0)$
8.  $(12, -1)$  and  $(0, -6)$

Find the distance between the points named. Use any method you choose.

9.  $(5, 4)$  and  $(1, -2)$
10.  $(-2, -2)$  and  $(5, 7)$
11.  $(-2, 3)$  and  $(3, -2)$
12.  $(-4, -1)$  and  $(-4, 3)$

Given points  $A$ ,  $B$ , and  $C$ . Find  $AB$ ,  $BC$ , and  $AC$ . Are  $A$ ,  $B$ , and  $C$  collinear? If so, which point lies between the other two?

13.  $A(0, 3)$ ,  $B(-2, 1)$ ,  $C(3, 6)$
14.  $A(5, -5)$ ,  $B(0, 5)$ ,  $C(2, 1)$
15.  $A(-5, 6)$ ,  $B(0, 2)$ ,  $C(3, 0)$
16.  $A(3, 4)$ ,  $B(-3, 0)$ ,  $C(-1, 1)$

Find the center and the radius of each circle.

17.  $(x + 3)^2 + y^2 = 49$
18.  $(x + 7)^2 + (y - 8)^2 = \frac{36}{25}$
19.  $(x - j)^2 + (y + 14)^2 = 17$
20.  $(x + a)^2 + (y - b)^2 = c^2$

Write an equation of the circle that has the given center and radius.

21.  $C(3, 0)$ ;  $r = 8$
22.  $C(0, 0)$ ;  $r = 6$
23.  $C(-4, -7)$ ;  $r = 5$
24.  $C(-2, 5)$ ;  $r = \frac{1}{3}$

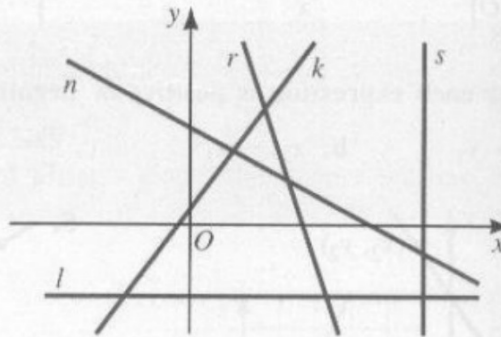
25. Sketch the graph of  $(x - 3)^2 + (y + 4)^2 = 36$ .
26. Sketch the graph of  $(x - 2)^2 + (y - 5)^2 \leq 9$ .

In Exercises 27–32 find and then compare lengths of segments.

27. Show that the triangle with vertices  $A(-3, 4)$ ,  $M(3, 1)$ , and  $Y(0, -2)$  is isosceles.

28.  $A(6, -4)$ ,  $H(-4, -2)$ , and

- Name each line in the figure whose slope is:
  - positive
  - negative
  - zero
  - not defined
- What can you say about the slope of (a) the  $x$ -axis? and (b) the  $y$ -axis?



Find the slope of the line through the points named. If the slope is not defined, write *not defined*.

- |                      |                     |                        |
|----------------------|---------------------|------------------------|
| 3. (1, 2); (3, 4)    | 4. (1, 2); (-2, -5) | 5. (1, 2); (-2, 5)     |
| 6. (0, 0); (5, 1)    | 7. (7, 2); (2, 7)   | 8. (3, 3); (3, 7)      |
| 9. (6, -6); (-6, -6) | 10. (6, -6); (4, 3) | 11. (-4, -3); (-6, -6) |

Find the slope and length of  $\overline{AB}$ .

- |                         |                         |
|-------------------------|-------------------------|
| 12. A(3, -1), B(5, -7)  | 13. A(-3, -2), B(7, -6) |
| 14. A(8, -7), B(-3, -5) | 15. A(0, -9), B(8, -3)  |

In Exercises 16–19 a point  $P$  on a line and the slope of the line are given. Sketch the line and find the coordinates of two other points on the line.

16.  $P(-2, 1)$ ; slope =  $\frac{1}{3}$

17.  $P(-3, 0)$ ; slope =  $\frac{2}{5}$

18.  $P(2, 4)$ ; slope =  $-\frac{3}{2}$

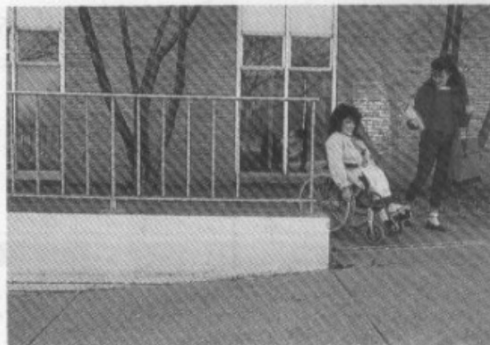
19.  $P(0, -5)$ ; slope =  $-\frac{1}{4}$

In Exercises 20 and 21 show that points  $P$ ,  $Q$ , and  $R$  are collinear by showing that  $\overline{PQ}$  and  $\overline{QR}$  have the same slope.

20.  $P(-1, 3)$   $Q(2, 7)$   $R(8, 15)$

21.  $P(-8, 6)$   $Q(-5, 5)$   $R(4, 2)$

22. A wheelchair ramp is to be built at the town library. If the entrance to the library is 18 in. above ground, and the slope of the ramp is  $\frac{1}{15}$ , how far out from the building will the ramp start?



Complete.

23. A line with slope  $\frac{3}{4}$  passes through points  $(2, 3)$  and  $(10, \underline{\quad?})$ .

24. A line with slope  $-\frac{5}{2}$  passes through points  $(7, -4)$  and  $(\underline{\quad?}, 6)$ .

