

Section 13.1

Find the distance between the following set of points:

1. (1, 2) and (6, 14)

2. (3, -8) and (-4, 1)

3. (6, -7) and (0, 1)

$$5 \begin{array}{c|c} X & Y \\ \hline 1 & 2 \\ 6 & 14 \end{array} 12$$

$$d^2 = 5^2 + 12^2$$

$$d^2 = 25 + 144$$

$$d^2 = 169$$

$$d = 13$$

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

$$= \sqrt{(4 - 2)^2 + (6 - 1)^2}$$

$$= \sqrt{12^2 + 5^2}$$

$$7 \begin{array}{c|c} X & Y \\ \hline 3 & -8 \\ -4 & 1 \end{array} 9$$

$$d^2 = (-7)^2 + 9^2$$

$$d^2 = 49 + 81$$

$$d = \sqrt{130}$$

$$d = \sqrt{(0 - 6)^2 + (1 - (-7))^2}$$

$$= \sqrt{(-6)^2 + (8)^2}$$

$$= \sqrt{36 + 64}$$

$$d = \sqrt{100} = 10$$

4. (5, -8) and (5, 1)

5. (0, -7) and (6, -7)

6. (-3, 9) and (8, -1)

$$0 \begin{array}{c|c} X & Y \\ \hline 5 & -8 \\ 5 & 1 \end{array} 9$$

$$d^2 = 0^2 + 9^2$$

$$d^2 = 81$$

$$d = \sqrt{81} = 9$$

$$d = \sqrt{(6 - 0)^2 + (-7 - (-7))^2}$$

$$= \sqrt{6^2 + 0^2}$$

$$d = \sqrt{36} = 6$$

$$11 \begin{array}{c|c} X & Y \\ \hline -3 & 9 \\ 8 & -1 \end{array} 10$$

$$d^2 = 11^2 + (-10)^2$$

$$= 121 + 100$$

$$d = \sqrt{221}$$

7. Given X(-2, -4), Y(2, 4), and Z(2, -6), use the distance formula to show that  $\triangle XYZ$  is a right triangle.

$$d_{XY} = \sqrt{(2 - (-2))^2 + (4 - (-4))^2}$$

$$= \sqrt{(2 + 2)^2 + (4 + 4)^2}$$

$$= \sqrt{4^2 + 8^2}$$

$$d_{XY} = \sqrt{16 + 64} = \sqrt{80} = 4\sqrt{5}$$

$$d_{YZ} = \sqrt{(2 - 2)^2 + (-6 - 4)^2}$$

$$= \sqrt{0^2 + (-10)^2}$$

$$= \sqrt{100}$$

$$d_{YZ} = 10$$

$$d_{XZ} = \sqrt{(2 - (-2))^2 + (-6 - (-4))^2}$$

$$= \sqrt{4^2 + (-2)^2}$$

$$= \sqrt{16 + 4}$$

$$d_{XZ} = \sqrt{20} = 2\sqrt{5}$$

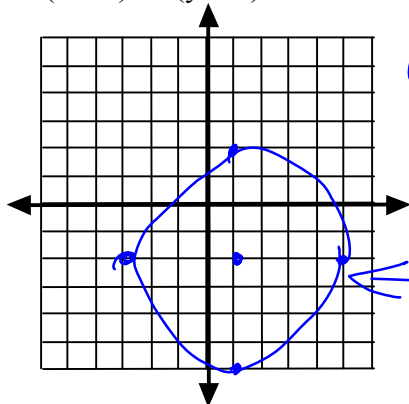
$$(4\sqrt{5})^2 + (2\sqrt{5})^2 = 10^2$$

$$80 + 20 = 100 \quad \checkmark \triangle XYZ \text{ IS RIGHT}$$

Find the center and radius of each circle and graph:

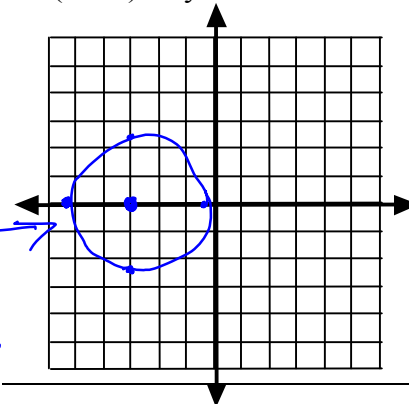
8.  $(x - 1)^2 + (y + 2)^2 = 16$

9.  $(x + 3)^2 + y^2 = 7$



$C = (1, -2)$   
 $r = 4$

Don't laugh!!  
It's a circle



$C = (-3, 0)$   
 $r = \sqrt{7} \approx 2.6$

<p>10. Write the equation of the circle with center (5, -8) and radius 13. <math>r</math></p> $(x-h)^2 + (y-k)^2 = r^2$ $(x-5)^2 + (y-(-8))^2 = 13^2$ $(x-5)^2 + (y+8)^2 = 169$	<p>11. Write the equation of the circle with center (2, -5) and passes through (-1, 3). <math>h, k</math></p> $-3 \left[ \begin{array}{c c} 2 & -5 \\ \hline -1 & 3 \end{array} \right] 8$ $r^2 = (-3)^2 + 8^2$ $r^2 = 9 + 64$ $r = \sqrt{73}$ $(x-2)^2 + (y-(-5))^2 = \sqrt{73}^2$ $(x-2)^2 + (y+5)^2 = 73$
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Section 13.2

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

12. (2, 5) and (1, 7)

$$-1 \left[ \begin{array}{c|c} 2 & 5 \\ \hline 1 & 7 \end{array} \right] 2$$

$$m = \frac{2}{-1} = \boxed{-2}$$

13. (4, 9) and (4, -3)

$$0 \left[ \begin{array}{c|c} 4 & 9 \\ \hline 4 & -3 \end{array} \right] -12$$

$$m = \frac{-12}{0} = \boxed{\text{undefined}}$$

14. (-2, 6) and (1, 9)

$$3 \left[ \begin{array}{c|c} -2 & 6 \\ \hline 1 & 9 \end{array} \right] 3$$

$$m = \frac{3}{3} = \boxed{1}$$

15. (2, 8) and (-3, 8)

$$-5 \left[ \begin{array}{c|c} 2 & 8 \\ \hline -3 & 8 \end{array} \right] 0$$

$$m = \frac{0}{-5} = \boxed{0}$$

16. A line with slope  $\frac{2}{5}$  passes through (4, -10) and (2, y). Find y.

$$\frac{2}{5} = \frac{y - (-10)}{2 - 4}$$

$$\frac{2}{5} = \frac{y + 10}{-2}$$

$$-4 = 5y + 50$$

$$-54 = 5y$$

$$\boxed{-54/5 = y}$$

Section 13.3

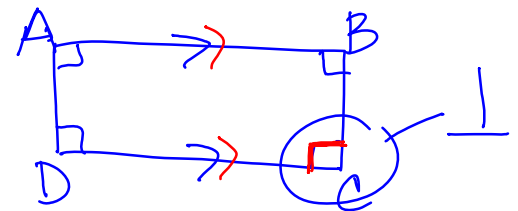
17. Given A(6, -7) and B(0, 1), (a) find the slope of  $\overline{AB}$ , (b) find the slope of a line parallel to  $\overline{AB}$ , and (c) find the slope of a line perpendicular to  $\overline{AB}$ .

a)  $-6 \left[ \begin{array}{c|c} 6 & -7 \\ \hline 0 & 1 \end{array} \right] 8$   $m = \frac{8}{-6} = \boxed{\frac{4}{-3}}$     b)  $\boxed{\frac{4}{-3}}$     c)  $\boxed{\frac{3}{4}}$

18. Given that ABCD is a rectangle:

a. If the slope of  $\overline{AB}$  is  $\frac{-2}{5}$ , then the slope of  $\overline{CD}$  is  $\underline{\frac{-2}{5}}$ .

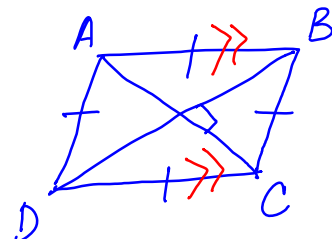
b. If the slope of  $\overline{BC}$  is  $\frac{-2}{5}$ , then the slope of  $\overline{AD}$  is  $\underline{\frac{5}{2}}$ .



19. Given that ABCD is a rhombus:

a. If the slope of  $\overline{BD}$  is 4, then the slope of  $\overline{AC}$  is  $\underline{-1/4}$ .

b. If the slope of  $\overline{AB}$  is  $\frac{3}{5}$ , then the slope of  $\overline{CD}$  is  $\underline{3/5}$ .



Section 13.5

Find the coordinates of the midpoint of the segment that joins the given points.

20. (7,-2) and (1,-1)

$$M = \left( \frac{7+1}{2}, \frac{-2+(-1)}{2} \right) = \left( 4, -\frac{3}{2} \right)$$

21. (-4,5) and (2,-5)

$$M = \left( \frac{-4+2}{2}, \frac{5+(-5)}{2} \right) = (-1, 0)$$

22. (3a, b) and (-a, b + 8)

$$M = \left( \frac{3a+(-a)}{2}, \frac{b+(b+8)}{2} \right) = \left( \frac{2a}{2}, \frac{2b+8}{2} \right) = (a, b+4)$$

23. If M(6,2) is the midpoint of  $\overline{AB}$  where the coordinates of A are (8,-7), find the coordinates of B.

$$M = \left( \frac{x_2+x_1}{2}, \frac{y_2+y_1}{2} \right)$$

$$(6,2) = \left( \frac{8+x}{2}, \frac{-7+y}{2} \right)$$

$$6 = \frac{8+x}{2} \quad \text{and} \quad 2 = \frac{-7+y}{2}$$

$$12 = 8+x \quad \text{and} \quad 4 = -7+y$$

$$x = 4 \quad \text{and} \quad y = 11$$

$$B = (4, 11)$$

24. Find the equation of the circle whose diameter extends from A(6,-3) to B(-4, 1).

$$d_{AB} = \sqrt{(-4-6)^2 + (1-(-3))^2} = \sqrt{2^2 + 4^2} = \sqrt{4+16} = \sqrt{20} = 2\sqrt{5}$$

$$r = \frac{2\sqrt{5}}{2} = \sqrt{5}$$

$$\text{center} = \left( \frac{6+(-4)}{2}, \frac{-3+1}{2} \right) = (1, -1)$$

$$(x-1)^2 + (y+1)^2 = 5$$

Section 13.6

25. Graph the following equations:

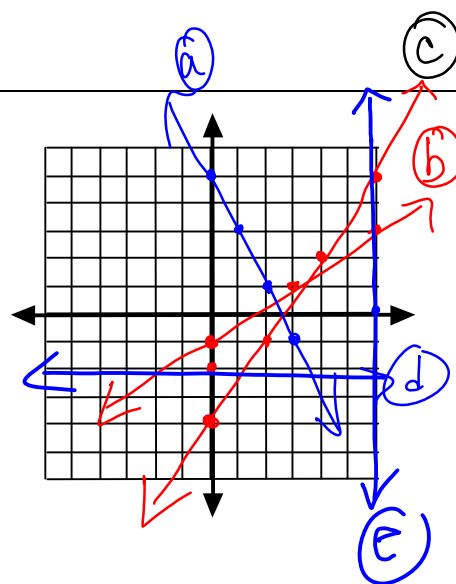
a.  $y = -2x + 5$

b.  $y = \frac{2}{3}x - 1$

c.  $3x - 2y = 8$   
 $-2y = -3x + 8$   
 $y = \frac{3}{2}x - 4$

d.  $y = -2$

e.  $x = 6$



Section 13.7

Write the equation of the line given the following information:

<p>26. A line with slope <math>\frac{-3}{4}</math> and y-intercept -5.</p> $y = -\frac{3}{4}x - 5$	<p>27. A line with slope 2 that passes through (-3,8).</p> $y = mx + b$ $8 = 2(-3) + b$ $8 = -6 + b$ $b = 14$ $y = 2x + 14$
<p>28. A line with slope <math>\frac{1}{2}</math> that passes through (0,-4).</p> $y = \frac{1}{2}x - 4$	<p>29. A line that passes through (3,-2) and (4,1).</p> $\begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix} \cdot 3$ $-2 = 3(3) + b$ $-2 = 9 + b$ $-11 = b$ $m = \frac{3}{1} = 3$ $y = 3x - 11$
<p>30. A line that passes through (6,4) and parallel to the line <math>y = -2x + 4</math>.</p> $m = -2$ $4 = -2(6) + b$ $4 = -12 + b$ $16 = b$ $y = -2x + 16$	<p>31. A line that passes through (6,4) and perpendicular to the line <math>y = -2x + 4</math>.</p> $m = \frac{1}{2}$ $4 = \frac{1}{2}(6) + b$ $4 = 3 + b$ $1 = b$ $y = \frac{1}{2}x + 1$

QED