work: 1.3 - Equations and Graphs in Two Variables
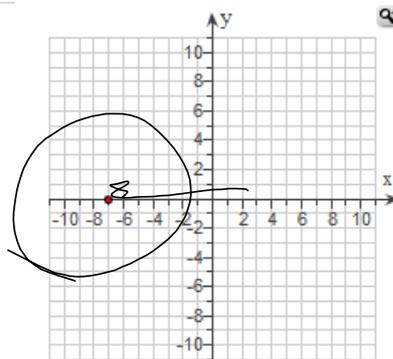
◀◀ ◀ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ▶ ▶▶

Ex. Score: 0 of 1 pt   **HW Score:** 0% (0 of

Give the ordered pair (x,y) of the point shown on the grid and determine where it lies.

The ordered pair associated with the given point is ☐.
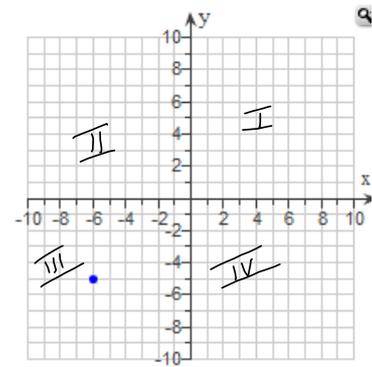(Type an ordered pair.)

$(-7,0)$

on y-axis.

<< ◄ (1) (2) (3)✓ (4) (5) (6) (7) (8) (9) (10) ► >>

Ex. Score: 0 of 1 pt   **HW Score:** 4.35

For the point shown in the xy-plane, write the corresponding ordered pair and name the quadrant in which it lies or the axis on which it lies.

The ordered pair associated with the given point is ☐.
(Type an ordered pair.)

$(-6, -5)$

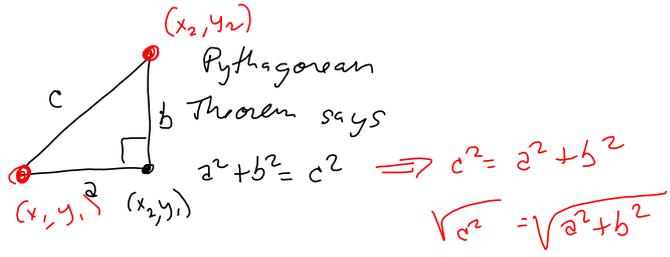$Q\,III$

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Ex. Score: 0 of 1 pt   **HW Score:** 8.7% (2 of 23 p

Find the distance between the two points and the midpoint of the line segment joining them.

$(1,10)$ and $(-2,14)$

The distance between the two points is ☐.
(Simplify your answer. Type an exact answer, using radicals as needed.)

(x_2, y_2)

Pythagorean
Theorem says

$a^2 + b^2 = c^2 \implies c^2 = a^2 + b^2$

(x_1, y_1) (x_2, y_1)

$\sqrt{c^2} = \sqrt{a^2 + b^2}$

$|c| = \sqrt{a^2 + b^2}$

$b = y_2 - y_1$

$a = x_2 - x_1$

$c = \pm\sqrt{a^2 + b^2}$

Assume Distance is positive, then

$c = \sqrt{a^2 + b^2}$

$c = \sqrt{a^2 + b^2}$

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

$=$ Distance from (x_1, y_1) to (x_2, y_2)

3

Ex. Score: 0 of 1 pt   **HW Score:** 8.7% (2 of 23 p

Find the distance between the two points and the midpoint of the line segment joining them.
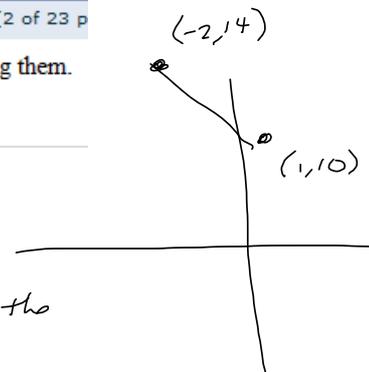
(x_1, y_1)
$(1,10)$ and $(-2,14)$ (x_2, y_2)

The distance between the two points is ☐ .
(Simplify your answer. Type an exact answer, using radicals as needed.)

$(-2, 14)$

$(1, 10)$

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

$$= \sqrt{(-2-1)^2 + (14-10)^2}$$

$$= \sqrt{(-3)^2 + (4)^2}$$

$$= \sqrt{9 + 16}$$

$$= \sqrt{25}$$

$$= \boxed{5 = D}$$

midpoint. Average the coordinates

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

$$= \left(\frac{1-2}{2}, \frac{10+14}{2} \right) = \left(\frac{-1}{2}, \frac{24}{2} \right) = \left(-\frac{1}{2}, 12 \right)$$

Find the distance between the pair of points. Also, find the midpoint of the line segment joining them.

$(9,1), (9 + 5\sqrt{3}, 6)$

$(x_1, y_1) \quad (x_2, y_2)$

$$① = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(9 + 5\sqrt{3} - 9)^2 + (6 - 1)^2}$$

$$= \sqrt{(5\sqrt{3})^2 + 5^2}$$

$$= \sqrt{75 + 25}$$

$$= \sqrt{100}$$

$$= \boxed{10 = D}$$

$$\left(5\sqrt{3}\right)^2 = 5^2 \sqrt{3}^2$$

$$= 25 \cdot 3 = 75$$

midpoint

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

$$\left(\frac{9 + 9 + 5\sqrt{3}}{2}, \frac{1 + 6}{2}\right) = \left(\frac{18 + 5\sqrt{3}}{2}, \frac{7}{2}\right)$$

OR $\quad \frac{18}{2} + \frac{5\sqrt{3}}{2} = 9 + \frac{5}{2}\sqrt{3}$

Find the distance between the pair of points. Also, find the midpoint of the line segment joining them.

$$\left(\frac{\pi}{4}, 2\right), \left(\frac{\pi}{2}, 0\right)$$

Find the distance.

$\dfrac{\pi}{2} - \dfrac{\pi}{4} = \dfrac{\pi}{2} \cdot \dfrac{2}{2} - \dfrac{\pi}{4} = \dfrac{2\pi - \pi}{4} = \dfrac{\pi}{4}$

d = ☐

(Simplify your answer. Type an exact answer, using π as needed.)

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

$= \sqrt{\left(\dfrac{\pi}{2} - \dfrac{\pi}{4}\right)^2 + (0 - 2)^2}$

$= \sqrt{\left(\dfrac{\pi}{4}\right)^2 + (-2)^2}$

$\dfrac{4}{1} \cdot \dfrac{16}{16} = \dfrac{64}{16}$

$= \sqrt{\dfrac{\pi^2}{16} + 4}$

$= \sqrt{\dfrac{\pi^2}{16} + \dfrac{64}{16}} = \sqrt{\dfrac{\pi^2 + 64}{16}}$

$= \dfrac{\sqrt{\pi^2 + 64}}{\sqrt{16}} = \dfrac{\sqrt{\pi^2 + 64}}{4}$ ← Can't be simplified any more.

$= \dfrac{1}{4}\sqrt{\pi^2 + 64}$

Find the center and the radius of the circle. Then graph the circle.

$x^2 + y^2 = 4$ $x^2 = (x-0)^2 \Rightarrow h = 0$

The center is ▯.
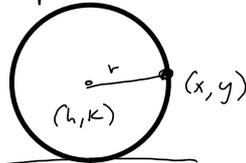(Type an ordered pair. Type an integer or a fraction.)

$$(h, k) = (0, 0)$$
$$r^2 = 4$$
$$r = 2$$

$\pm 2 \rightarrow +2.$
r is positive
distance.

circle of radius r is
the set of all points
a distance r from a
fixed point $(h, k) = $ center.

(h, k) r (x, y)

$D = \sqrt{(x-h)^2 + (y-k)^2} = r$

$\sqrt{(x-h)^2 + (y-k)^2}^2 = r^2$

$(x-h)^2 + (y-k)^2 = r^2$

Standard Equation of circle !

Find the standard equation for the circle having the given center and radius.

Center (0,0)

Radius 7

$$x^2 + y^2 = 7^2$$

$$x^2 + y^2 = 49$$

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Ex. Score: 0 of 1 pt   **HW Score:** 1

Find the standard equation of the circle passing through a given point with a given center.
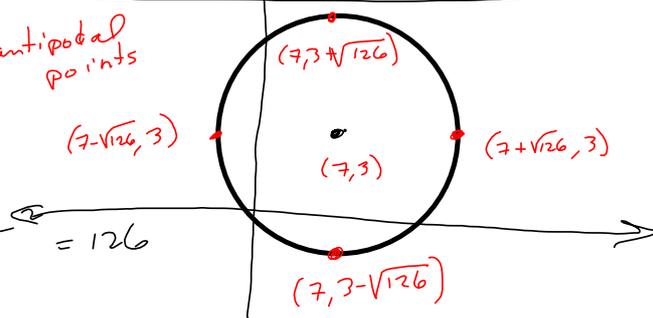
Center (7,3) and passing through $(-4,-2)$

(h,k) $(-4,-2) = (x,y)$

$$\sqrt{(x-h)^2 + (y-k)^2} = r$$ antipodal points

$$= \sqrt{(-4-7)^2 + (-2-3)^2}$$

$$= \sqrt{(-11)^2 + (-5)^2}$$

$$= \sqrt{121 + 25}$$

$$= \sqrt{126} = r \longrightarrow r^2 = \sqrt{126}^2 = 126$$

$$(x-7)^2 + (y-3)^2 = 126$$

$(7, 3+\sqrt{126})$

$(7-\sqrt{126}, 3)$ $(7,3)$ $(7+\sqrt{126}, 3)$

$(7, 3-\sqrt{126})$

$r \approx$ 11.22497216

|◀ ◀ (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) ▶ ▶▶

x. Score: 0 of 1 pt   H

Find the center and the radius of the following circle.

$x^2 + 12x + y^2 + 16y = 0$

The center is ☐. $(x-h)^2 + (y-k)^2 = r^2$
(Type an ordered pair.)

$x^2 + 12x \qquad + y^2 + 16y \qquad = 0$

$x^2 + 12x + 6^2 \quad + y^2 + 6y + 3^2 = 0 + 36 + 9$

$(x+6)^2 + (y+3)^2 = 45$
$(x-h)^2 + (y-k)^2 = r^2$
$(h,k) = (-6,-3)$

$r = \sqrt{45}$

$= \sqrt{3\cdot3\cdot5}$

$= \boxed{3\sqrt{5} = r}$

Complete the square!

$x^2 + bx = 0$

$x^2 + bx + \left(\frac{b}{2}\right)^2 = \frac{b^2}{4}$

$\left(x + \frac{b}{2}\right)^2 = \frac{b^2}{4}$

$\left(x+\frac{b}{2}\right)\left(x+\frac{b}{2}\right) = x^2 + \frac{b}{2}x + \frac{b}{2}x + \left(\frac{b}{2}\right)\left(\frac{b}{2}\right)$

$= \qquad = x^2 + bx + \frac{b^2}{4}$

$\left(\frac{b}{2}+\frac{b}{2}\right)x = \frac{2b}{2}x \qquad = x^2 + bx + \left(\frac{b}{2}\right)^2$
$= bx$

$3\overline{)45}$
$3\overline{)15}$
$\quad 5$
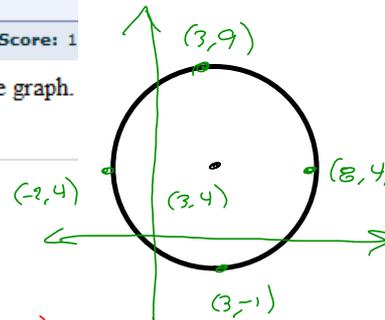
$45 = 3\cdot3\cdot5$

Ex. Score: 0 of 1 pt   **HW Score:** 1

Determine the center and radius of the following circle and sketch the graph.

$$x^2 + y^2 = 6x + 8y$$

Use the graphing tool on the right to graph the equation.

$$x^2 - 6x + 3^2 + y^2 - 8y + 4^2 = 0 + 9 + 16$$

$$(x-3)^2 + (y-4)^2 = 25 \qquad (h,k) = (3,4)$$

$$(x-3)^2 + (y-4)^2 = 5^2 \qquad r = 5$$

(3,9)

(8,4)

(-2,4)

(3,4)

(3,-1)

x. Score: 0 of 1 pt   HW Score: 13.

Find the intercepts and then use them to graph the equation.

$2x - 8 = y$

Use the graphing tool to graph the line. Use the intercepts when drawing the line. If only one intercept exists, use it and another point to draw the line.
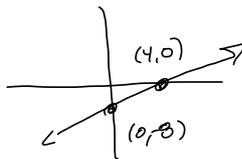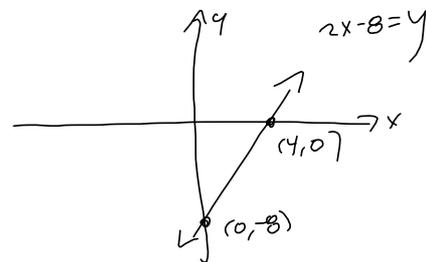
$2x - 8 = y$

$2x - y = 8$

x	y
0	-8
4	0

$-y = 8$ $2x = 8$

$y = -8$ $x = 4$

$(0, -8)$ $(4, 0)$

$2x - 8 = y$

x. **Score:** 0 of 1 pt   **HW Score:** 13.0

Sketch the graph of the following linear equation. Be sure to find and show the x- and y-intercepts.

$$\frac{1}{5}y - \frac{1}{2}x = 200$$

Use the graphing tool to graph the line. Use the intercepts when drawing the line. If only one intercept exists, use it and another point to draw the line.

$\frac{1}{5}y - \frac{1}{2}x = 200$

$(-400, 0)$ $(0, 1000)$

$\frac{1}{5}y - \frac{1}{2}x = 200$

$\frac{1}{5}y - \frac{1}{2}x = 200$

$-\frac{1}{2}x = 200$

$$\frac{x \mid y}{0 \mid 1000}$$
$$-400 \mid 0$$

$\frac{1}{5}y = 20$

$\frac{y}{5} = \frac{200}{1} \cdot \frac{5}{1}$

$\frac{y}{5} = \frac{1000}{5}$

$y = 1000$

$-\frac{1}{2}x = 200$

$x = -400$

13
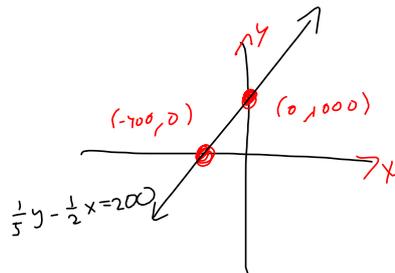
Ex. Score: 0 of 1 pt

HW Score: 13.0

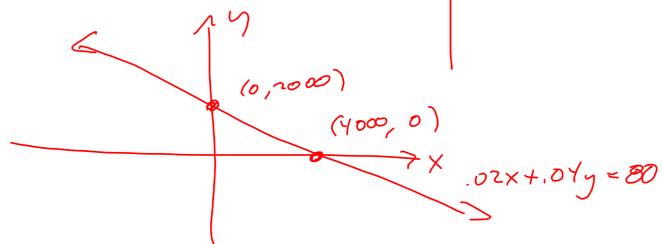Sketch the graph of the following linear equation. Be sure to find and show the x- and y-intercepts.

$0.02x + 0.04y = 80$

Use the graphing tool to graph the line. Use the intercepts when drawing the line. If only one intercept exists, use it and another point to draw the line.

$$\left(.02x + .04y = 80\right)(100)$$

$$2x + 4y = 8000$$

x	y
0	2000
4000	0

(0, 2000)

(4000, 0)

.02x + .04y = 80

15

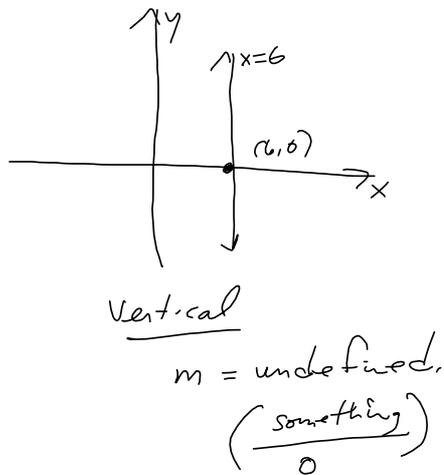| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

x. Score: 0 of 1 pt

Graph the equation by plotting points.

$x = 6$

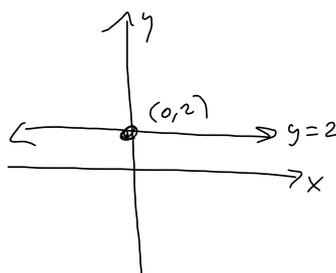Use the graphing tool on the right to graph the equation.

Click to
enlarge
graph

$x = 6$

$(6, 0)$

Vertical

$m = $ undefined.

$\left(\dfrac{\text{something}}{0} \right)$

Ex. Score: 0 of 1 pt

Graph the equation by plotting points.

$y - 2 = 0$ ⟹ $y = 2$

Use the graphing tool to graph the equation.

http://dlippman.imathas.com/graphcalc/graphcalc.html

Use a graphing calculator to estimate the solution to the equation to two decimal places.
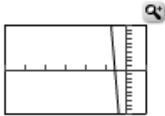Then find the solution algebraically and compare it with your estimate.

$6.7 - 6.5(8.1x - 5.2) = 0$

Analyze equation by analyzing $y = ax + b$

Use a graphing calculator to graph the equation. Choose the correct graph below.

○ A.

○ B.

All graphs are $[-10,10,1]$ by $[-10,10,1]$.

○ C.

○ D.

Finding x-intercept

for $y = 6.7 - 6.5(8.1x - 5.2)$

$(0, b)$

$(.3692, 0)$
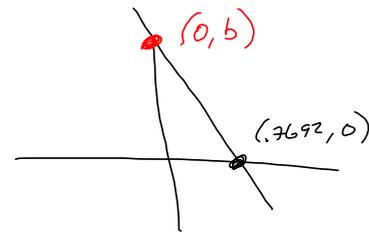
$6.7 - 6.5(8.1x - 5.2)$

$= 6.7 - (6.5)(8.1)x + (6.5)(5.2)$

$= -(6.5)(8.1)x + (6.7 + (6.5)(5.2))$

$= \quad ax \quad + \quad b$

Line w/ negative slope.