

Today: A few more 1.2 word problems and some

1.3 - Cartesian coordinates, Distance, Midpoint.

Circles fall under distance formula concept

A carpenter used 43 ft of molding in three pieces to trim a garage door.

If the long piece was 3 ft longer than twice the length of each shorter piece, then how long was each piece?

Let  $x =$  length of long piece in feet.  
 $y =$  .. .. the shorter pieces (in ft)

Then  $x + y + y = 43 \implies x + 2y = 43$   
 and  $2y + 3 = x \implies x = 2y + 3$

Substitute:

$$x + 2y = 2y + 3 + 2y = 43$$

$$4y + 3 = 43$$

$$4y = 40$$

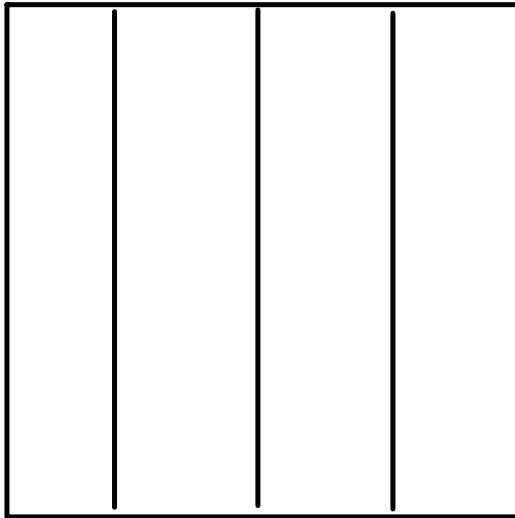
$$\frac{4y}{4} = \frac{40}{4}$$

$$y = \frac{40}{4} = \boxed{10 = y} \text{ so}$$

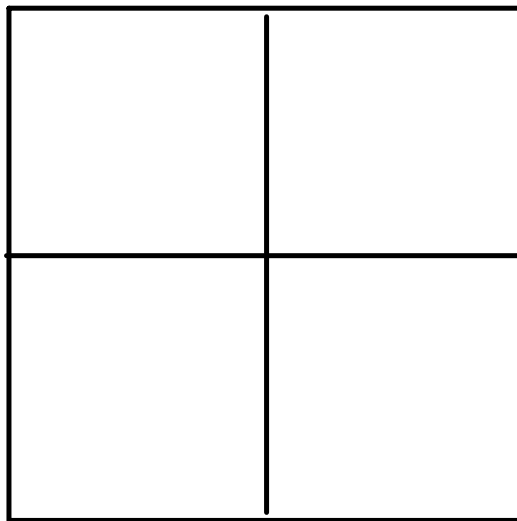
$$x = 2y + 3 = 2(10) + 3 = \boxed{23 = x}$$

Fritz plans to fence off a square feed lot and then cross-fence to divide it into four smaller feed lots.

If he uses 372 feet of fencing, then how much area will be fenced in?



Cross-fence, idiot.



Much better

$$x + x + x + x + x + x = 372$$

$$6x = 372$$

$$x = \frac{372}{6} = 62$$

$$x^2 = ?$$

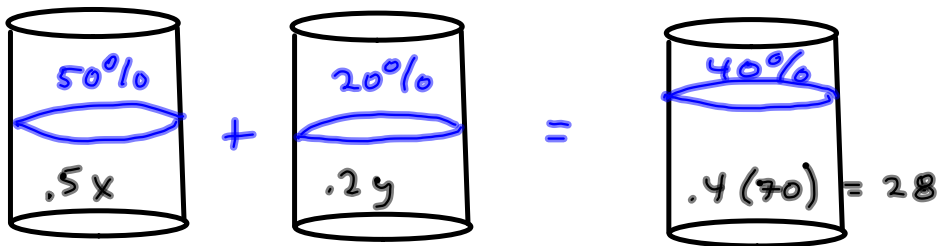
$$62^2 = 3844 = \text{Area (in ft}^2\text{)}$$

Fritz plans to fence off a square feed lot and then cross-fence to divide it into four smaller feed lots.

If he uses 372 feet of fencing, then how much area will be fenced in?

Let  $x$  = length of a side (in ft)

How many gallons of a 50% antifreeze solution must be mixed with 70 gallons of 20% antifreeze to get a mixture that is 40% antifreeze? Use the six-step method.



How much pure Antifreeze?

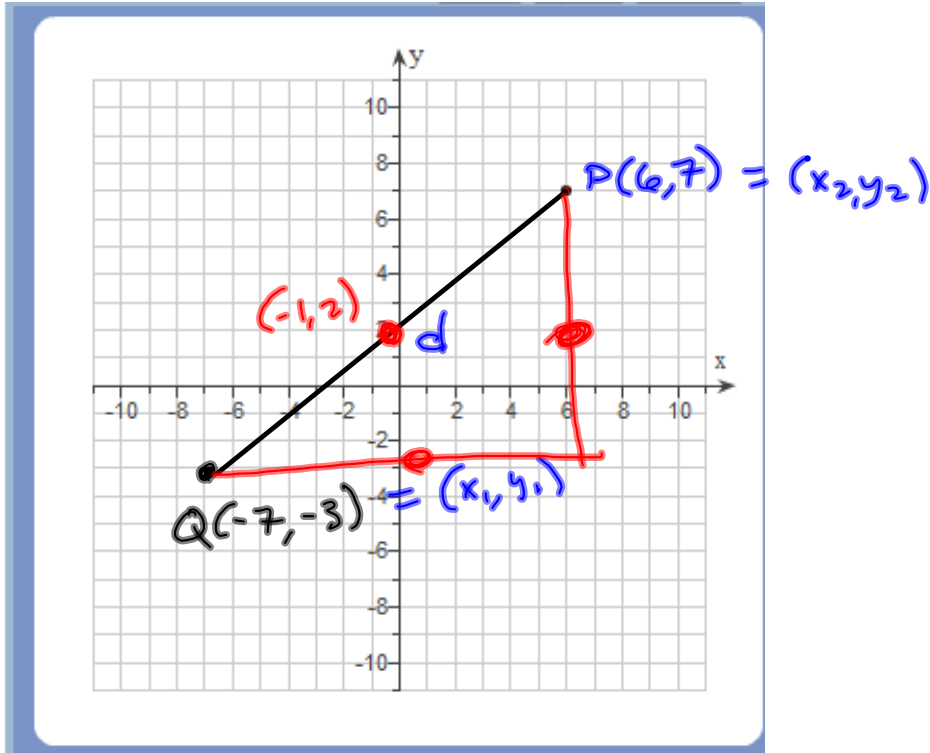
Let  $x =$  amt of 50% antifreeze (in gals)  
 $y =$  " " 20% " " " "

Total Anti-freeze  $.5x + .2y = 28$

Total Volume  $x + y = 70$

$$\left( \frac{.5 \text{ gal antifreeze}}{\cancel{+ 1 \text{ gal } 50\% \text{ mix}}} \right) \left( \cancel{x \text{ gals } 50\% \text{ mix}} \right)$$

## §1.3 - Cartesian Coordinates



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

$$= \sqrt{(6 - (-7))^2 + (7 - (-3))^2}$$

$$= \sqrt{13^2 + 10^2}$$

$$= \sqrt{169 + 100}$$

$$= \sqrt{269} \approx 16.40122$$

$$14^2 = 196$$

Midpoint:

$$\text{mid}(P, Q) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left( \frac{6 + (-7)}{2}, \frac{7 + (-3)}{2} \right)$$

$$= \left( -\frac{1}{2}, 2 \right)$$

A circle is the set of all points equidistant from a single, fixed, point,  $(h, k)$  = the center.

Let  $(x, y)$  be a point on the circle.

Let the distance to the center be  $r$ .

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

Distance from  $P(x, y)$  to  $Q(h, k)$  is  $r$ .

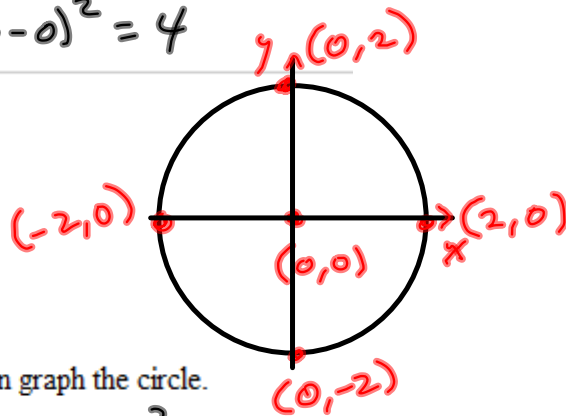
$$(x-h)^2 + (y-k)^2 = r^2$$

is standard equation of the circle thru  $(h, k)$ , with radius  $r$ .

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

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

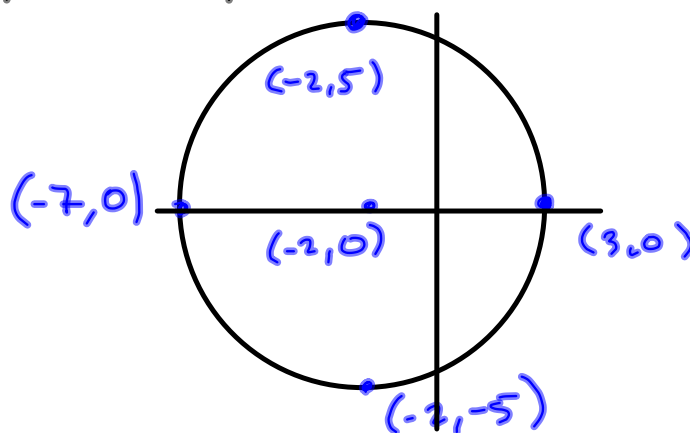
$$(h, k) = (0, 0), \quad r = 2$$



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

$$(x+2)^2 + y^2 = 25 \quad (x-(-2))^2 + (y-0)^2 = 5^2$$

$$(h, k) = (-2, 0) \quad r = 5$$



These require completing the square skill to write in standard form.

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

$$x^2 + y^2 - 4y = 0$$

$$x^2 + y^2 - 4y + 2^2 = 0 + 4$$

$$\frac{4}{2} = 2 \rightsquigarrow 2^2$$

$$x^2 + (y-2)^2 = 4$$

$$(h, k) = (0, 2)$$

$$r = 2$$

$$(y-k)^2 = y^2 - 4y$$

$$(y-2)^2 = y^2 - 2(2y) + 2^2 = y^2 - 4y + 4$$

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

$$x^2 + y^2 = \frac{x}{10} - \frac{y}{8} - \frac{1}{400}$$

$$x^2 - \frac{1}{10}x + \left(\frac{1}{20}\right)^2 + y^2 + \frac{1}{8}y + \left(\frac{1}{16}\right)^2 = -\frac{1}{400} + \frac{1}{400} + \frac{1}{256}$$

$$\frac{\frac{1}{10}}{2} = \frac{1}{20} \rightsquigarrow \left(\frac{1}{20}\right)^2 = \frac{1}{400} \quad \frac{\frac{1}{8}}{2} = \frac{1}{16} \rightsquigarrow \left(\frac{1}{16}\right)^2 = \frac{1}{256}$$

$$\left(x - \frac{1}{20}\right)^2 + \left(y + \frac{1}{16}\right)^2 = \left(\frac{1}{16}\right)^2$$

$$(h, k) = \left(\frac{1}{20}, -\frac{1}{16}\right), r = \frac{1}{16}$$

$$\frac{\frac{1}{10}}{2} = \frac{1}{10} \cdot \frac{1}{2} = \frac{1}{20}$$

$$\frac{1}{10} \div 2 = \frac{1}{10} \cdot \frac{1}{2} = \frac{1}{20}$$

The different forms of an equation of a line.

Graphing Lines with intercept method.

$$2x - 8 = y$$

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

$$0.03x + 0.06y = 150$$

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Horizontal and Vertical Lines - Show me the one intercept they have.

I hate these "Graph by plotting points." That's only a last resort, if you have zero insight on what the darn thing looks like. Otherwise, always look to the essence.

Graph the equation by plotting points.

$$4 - x = -2$$

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A person got \$171,580 for his house after paying a sales commission that was 8% of the selling price.

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What was the selling price?