

# 13) Horizontal & vertical lines + mixed practice

## Part 1: Horizontal & Vertical Lines

**VERTICAL**

$x$  stays constant

Equations:

$$x = a$$

$$x - a = 0$$

Note:  $a$  is  $x$ -int

**HORIZONTAL**

$y$  stays constant

Equations:

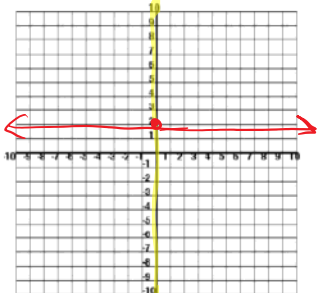
$$y = b$$

$$y - b = 0$$

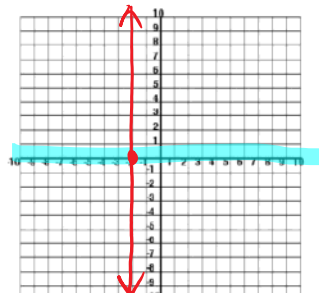
$b$  is  $y$ -int

Example 1: Graph the following:

a)  $3y - 6 = 0$  No  $x \Rightarrow$  horiz. or vert.  
 $\Rightarrow$  solve for  $y$   
 $\frac{3y}{3} = \frac{6}{3} \Rightarrow y = 2$



b)  $5x + 10 = 0$  No  $y \Rightarrow$  vertical  
 $\Rightarrow$  solve for  $x$   
 $\frac{5x}{5} = \frac{-10}{5} \Rightarrow x = -2$



**Part 2: Word Problems**

**Example 2:** The slope of a line represented by  $6x - ky + 1 = 0$  is  $\frac{2}{3}$ . Determine the value of  $k$ .

① Find slope in equation (isolating  $y$ )

$$6x - ky + 1 = 0$$

$$6x + 1 = ky$$

$$\frac{6x + 1}{k} = \frac{ky}{k}$$

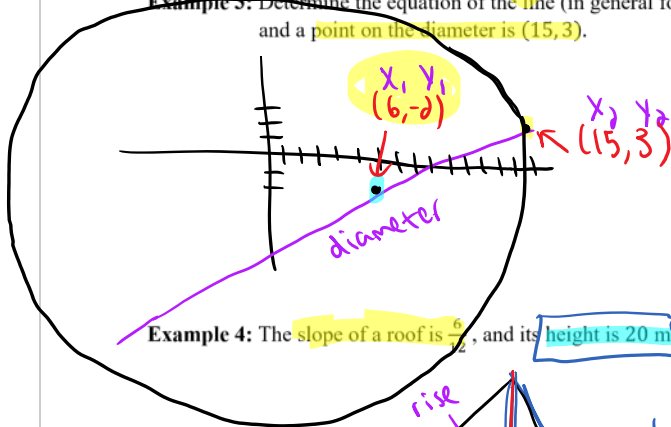
$$y = \frac{6}{k}x + \frac{1}{k}$$

②  $\frac{6}{k} = \frac{2}{3}$

$$18 = 2k$$

$$k = 9$$

**Example 3:** Determine the equation of the line (in general form) of the diameter of a circle if the center is  $(6, -2)$  and a point on the diameter is  $(15, 3)$ .



① Find slope of line:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-2)}{15 - 6} = \frac{5}{9}$$

② Point  $(6, -2)$  &  $m = \frac{5}{9}$

$$y - y_1 = m(x - x_1)$$

$$y - (-2) = \frac{5}{9}(x - 6)$$

$$y + 2 = \frac{5}{9}(x - 6)$$

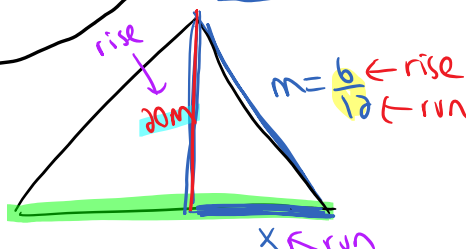
$$9y + 18 = 5(x - 6)$$

$$9y + 18 = 5x - 30$$

$$-9y - 18 = -5x + 30$$

$$0 = 5x - 9y - 48$$

**Example 4:** The slope of a roof is  $\frac{6}{12}$ , and its height is 20 m. Calculate the total horizontal span of the roof.



$$\frac{6}{12} = \frac{20}{x}$$

$$6x = 240$$

$$x = 40$$

Total span:  
 $40m \times 2 = 80m$

**Example 5:** Anya is building a picnic table for her backyard. The slope of the table legs is 4 and the table height is 100 cm. Find the length of a table leg to the nearest cm.

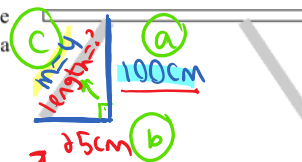
① Find "run" of the table

$$m = \frac{\text{rise}}{\text{run}}$$

$$4 = \frac{100\text{cm}}{x}$$

$$4x = 100\text{cm}$$

$$x = 25\text{cm}$$



② use  $a^2 + b^2 = c^2$  to find length

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

$$(100)^2 + (25)^2 = c^2$$

$$10000 + 625 = c^2$$

$$\sqrt{10625} = c$$

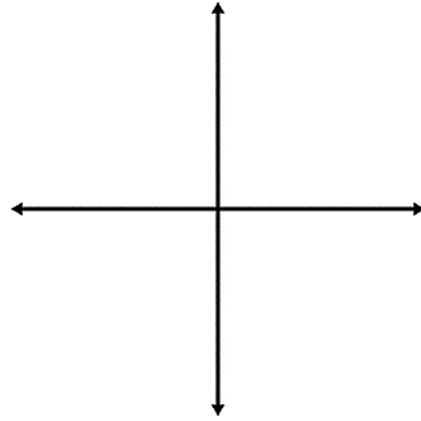
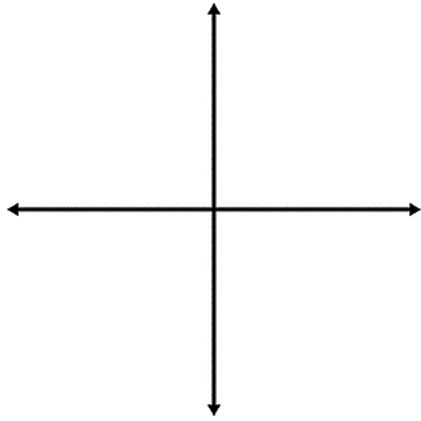
$$c = 103.1 \Rightarrow 103\text{cm}$$



assignment # 13  
 pages #49-56 questions #201-244 (skip #241-242)

# 13) Horizontal & vertical lines + mixed practice

## Part 1: Horizontal & Vertical Lines

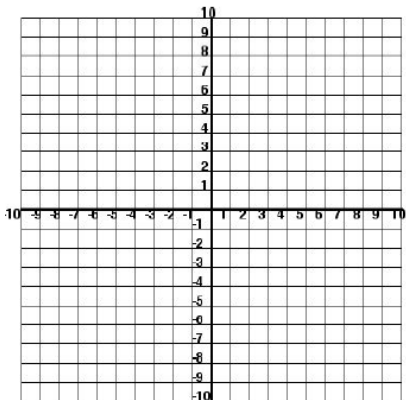


Equations: \_\_\_\_\_  
\_\_\_\_\_

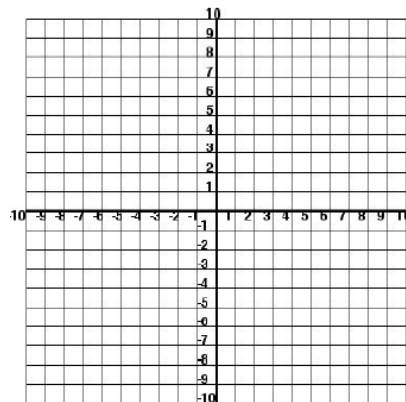
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**Example 1:** Graph the following:

a)  $3y - 6 = 0$



b)  $5x + 10 = 0$



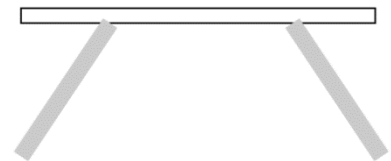
## Part 2: Word Problems

**Example 2:** The slope of a line represented by  $6x - ky + 1 = 0$  is  $\frac{2}{3}$ . Determine the value of  $k$ .

**Example 3:** Determine the equation of the line (in general form) of the diameter of a circle if the center is  $(6, -2)$  and a point on the diameter is  $(15, 3)$ .

**Example 4:** The slope of a roof is  $\frac{6}{12}$ , and its height is 20 m. Calculate the total horizontal span of the roof.

**Example 5:** Anya is building a picnic table for her backyard. The slope of the table legs is 4 and the table height is 100 cm. Find the length of a table leg to the nearest cm.



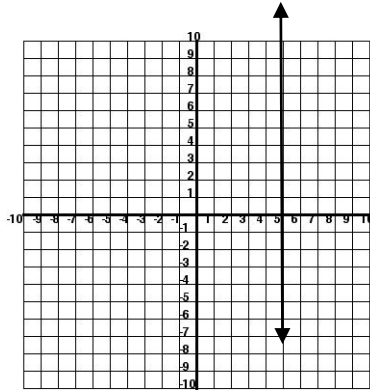
## Horizontal & Vertical Lines:

The equation of a horizontal line that is 3 units above the x-axis will be  $y = 3$  or  $y - 3 = 0$ .

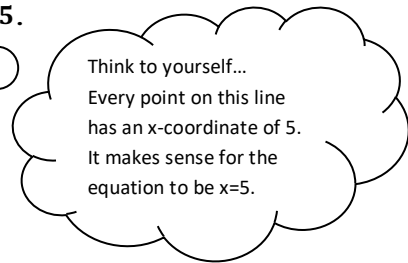
The equation of a horizontal line that is 12 units below the x-axis will be  $y = -12$  or  $y + 12 = 0$ .

The equation of a vertical line 7 units to the right of the y-axis will be  $x = 7$  or  $x - 7 = 0$ .

The equation of a vertical line 2 units to the left of the y-axis will be  $x = -2$  or  $x + 2 = 0$ .

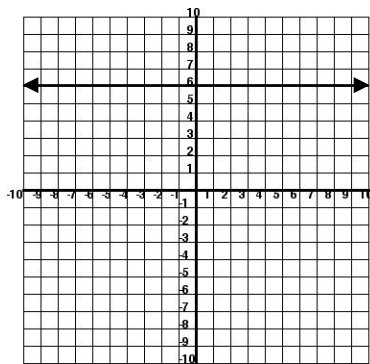


The equation of this line is  $x = 5$ .

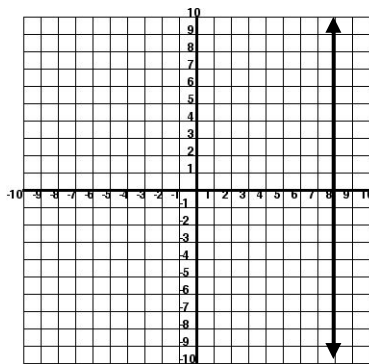


Write the equation of the following lines.

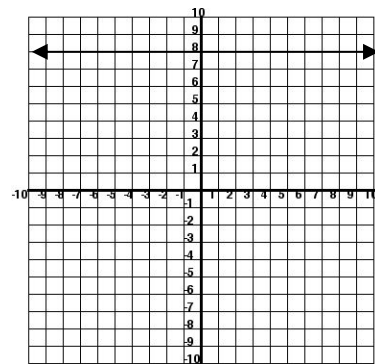
201.



202.

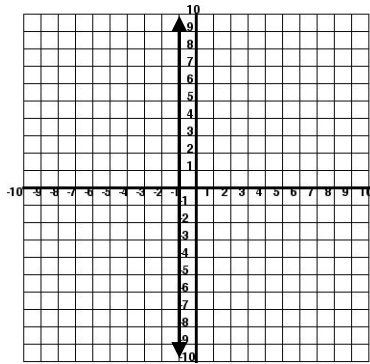


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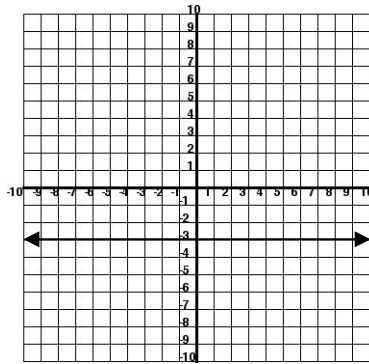


Write the equation of the following lines.

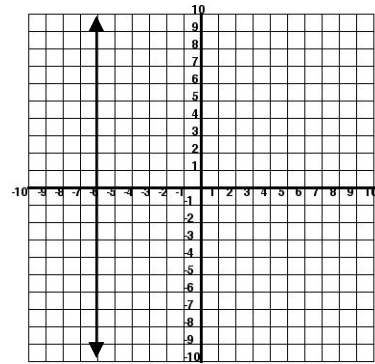
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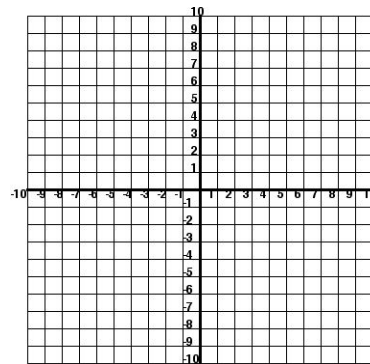
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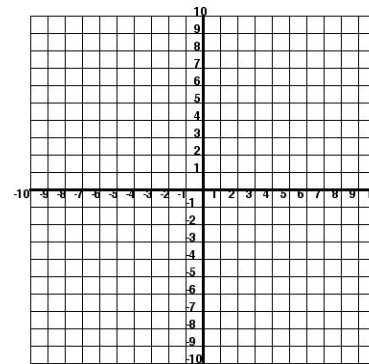
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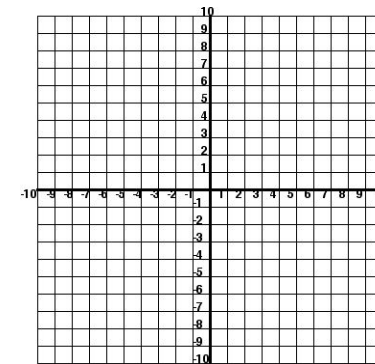
207. Graph the line represented by the equation  $2y - 4 = 0$ .



208. Graph the line represented by the equation  $3x - 2 = 0$ .



209. Graph the line represented by the equation  $y - 4 = 2y - 10$ .



**Mixed Practice:**

210. Which of the following equations represents the steepest line?

- a.  $5x + 4y - 12 = 0$
- b.  $6x + 2y = 14$
- c.  $-3x - 7y - 21 = 0$
- d.  $12x + 24y + 64 = 0$

211. Which of the following passes through  $(9, -8)$  and has an  $x$ -intercept of  $-3$ ?

- a.  $3x + 2y + 9 = 0$
- b.  $5x + 9y + 27 = 0$
- c.  $2x + 3y + 6 = 0$
- d.  $4x + 3y + 12 = 0$

212. What is unique about lines that are written in the form  $x = a$ .

213. What is unique about lines that are written in the form  $y = b$ .

214. What is the equation, in general form, of the line that passes through the point  $(6, -3)$  and is parallel to  $y = \frac{2}{3}x + 4$ .

215. Determine the slope of the line perpendicular to  $x - 2y - 3 = 0$ .

216. Determine the equation of the line that contains the diameter of the following circle.  
Centre  $(-4, 3)$   
Point on circumference  $(2, -1)$

217. The slope of the line represented by the equation  $8x - ky + 2 = 0$  is  $\frac{2}{3}$ .  
Determine the value of  $k$ .

Answer in general form.

218. What is the equation of a line with undefined slope and an x-intercept of 5. Write your answer in general form.

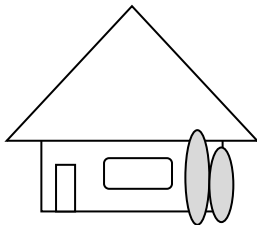
219. Write the equation  $y = \frac{1}{5}x - 4$  in the form  $Ax + By + C = 0$  where  $A$  is positive and all coefficients are rational numbers?

220. Find the value of  $k$  if  $2x + ky + 7 = 0$  is parallel to  $3x - 6y + 12 = 0$ .

221. Find all of the following points that are on the line  $3x = 2y + 24$ ?

- a. (8,0)
- b. (6,-3)
- c. (4,6)
- d. (-2,9)
- e. (0,-12)

222. The slope of the roof on Mr. J's hidden surf shack is  $\frac{4}{3}$ . If the roof is 14m tall, how wide is it?

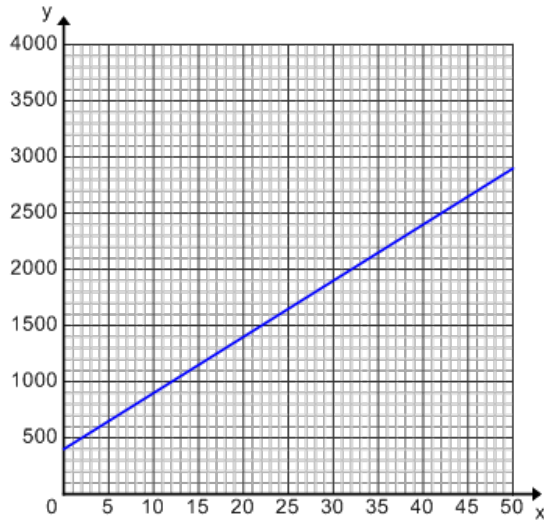


223. Anya is building a picnic table for her backyard. The slope of the table legs is 2 and the table height is 90cm. Find the length of a table leg to the nearest cm.





224. Write an equation that represents the graph below.



225. What is a possible relationship for the graph (and equation) above?

226. **Challenge#8**

The equation  $y = 75x + 1500$  represents the cost of a wedding reception. The total cost consists of \$1500 fee to rent the hall plus \$75 per guest. Express the equation of this relation using function notation.

## Linear Functions

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Function notation is used to show the relationship between two quantities.

The use of function notation allows the reader to identify the dependent and independent variable. Also, the letters chosen often identify what the variables represent.

Eg. The equation  $y = 75x + 1500$  represents the cost of a wedding reception. The total cost consists of \$1500 fee to rent the hall plus \$75 per guest. Express the equation of this relation using function notation.

$$C(n) = 75n + 1500 \quad \text{Cost is a function of the number of guests.}$$

227. The cost of a taxi ride in Victoria is \$5.25 plus \$0.35 per kilometer. Write an equation using function notation for this relation.

228. J-Tees Pedi-Cabs provide tours for visitors to Victoria. The cost is 25 cents per minute. Write an equation using function notation for this relation (in dollars).

229. JLA-Skuterz rent gas-powered scooters. The cost is \$40 per day plus 25 cents per kilometre ridden. Write an equation using function notation for this relation.

230. The skating rink at the recreation centre charges students \$5.00 admission. Write an equation for the cost ( $C$ ) as a function of the number of students ( $s$ ).

231. The skating rink will let a group of students book the entire rink for \$500. Write an equation for the cost ( $C$ ) as a function of the number of students ( $s$ ).

232. At the same skating rink, another option is to reserve the rink for \$200 and then pay \$4 per student. Write an equation for the cost ( $C$ ) as a function of the number of students ( $s$ ).

Find the range value for each of the following.

233.  $C(n) = 25n + 12$   
Find  $C(12)$ .

234.  $f(x) = \frac{1}{2}x - 3$   
Find  $f(-3)$ .

235.  $h(t) = -250t + 1200$   
Find  $h(20)$ .

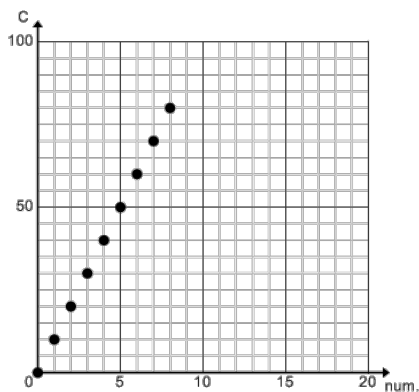
Find the domain value for each of the following.

236.  $C(n) = 25n + 12$   
Find  $n$  if  $C(n) = 24$ .

237.  $f(x) = \frac{1}{2}x - 3$   
Find  $x$  if  $f(x) = 12$ .

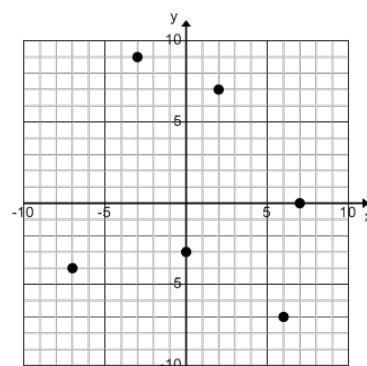
238.  $h(t) = -250t + 1200$   
Find  $t$  if  $h(t) = 1000$ .

239. Below is a graph of  $C(n)$ .



Find  $C(4)$ .

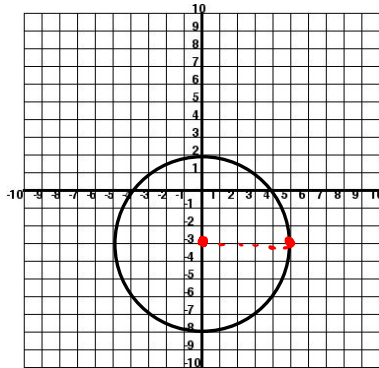
240. Below is a graph of  $f(x)$ .



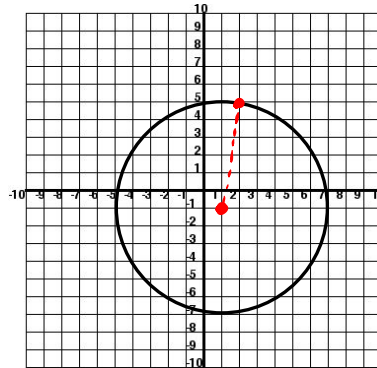
Find  $x$  if  $f(x) = 7$ .

Extended Practice

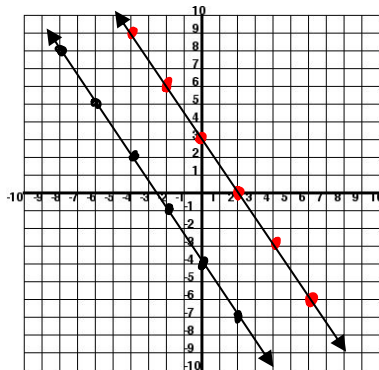
241. The centre of a circle is located at  $(0,-3)$ . Draw a tangent at  $(5,-3)$ . What is the equation of the tangent?



242. The centre of a circle is located at  $(1,-1)$ . Draw a tangent at  $(2,5)$ . What is the equation of the tangent?



243. Are the lines below parallel?

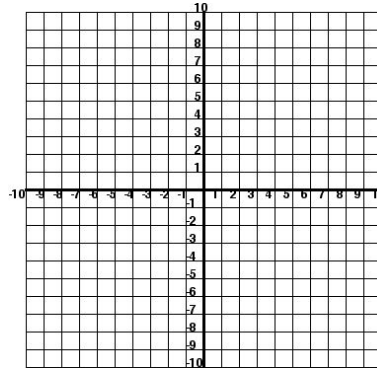


Explain how you know \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

244. Draw a line through  $A(1,2)$  and  $B(-3,-7)$ . Now draw a perpendicular line through  $C(9,-3)$ .



What is the equation of the perpendicular line?