# Grade 9 Lines Test

by Nathan Oldridge (ChemistNate)

**Putting Lines in Each Form**

1. Convert each of these to slope/y-intercept form.

a) $6x-4y=12$

b) $(y-3)=-2(x-(-5))$

2. Convert each of these to Standard Form.

a) $y=\frac{2}{3}x-7$

b) $(y-\frac{4}{5})=-\frac{2}{3}(x-2)$

**Identifying Slope and y-intercept**

3. Identify the slope and y-intercept for each of these lines.

| | Equation | Slope | Y-intercept |
|---|---|---|---|
| a) | $y=\frac{2}{5}x-9$ | | |
| b) | $y=8-2x$ | | |
| c) | $y=-3$ | | |
| d) | $x=6$ | | |
| e) | $3x-y=2$ | | |

**Create the Equation**

4. What is the equation of a line that has slope $\frac{5}{3}$ and passes through A( 6 , 12 )?

5. What is the equation of a line that passes through B( 4 , 6 ) and C( -2, -12 )

6. What is the equation of a line that has an x-intercept at 8 and a y-intercept at -3 ?

**Collinearity**

7. Are the points J( 5 , 4 ) K( 1 , 1) and L( -15, -11) collinear? Prove it.

8. Find another point that is collinear with M(10, 4) and N(-12, 6).

**Fill In The Blanks**

9.

a) The slope of a horizontal line is _____.

b) If a line goes downward to the right, its slope must be _____.

c) A line that passes through (0,0) is an example of _____ variation.

d) The formula for slope is _____

e) The slopes of _____ lines are the same.

f) The slopes of _____ lines are negative reciprocals.

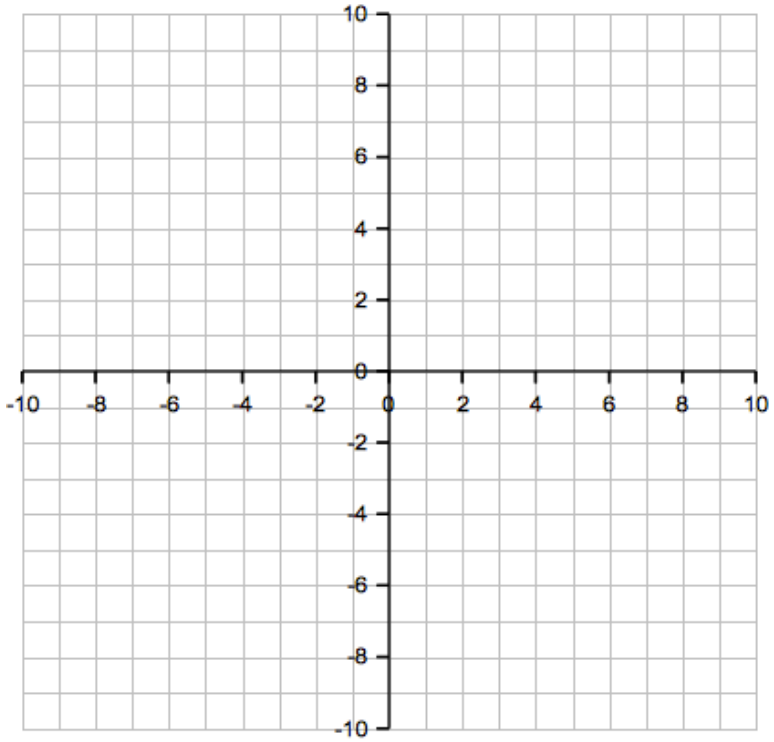
g) The negative reciprocal of $\frac{4}{7}$ is _____

**Graphing**

10. Graph each set of lines using the slope/y-intercept method. Solve the system. "Solve the system" means find the point where the two lines meet.

a) $y=-2x+9$

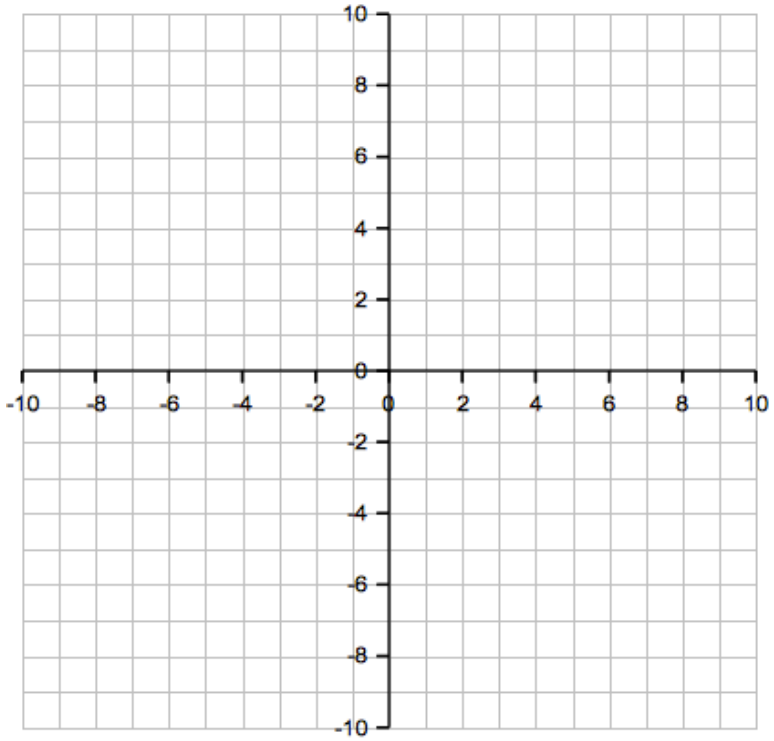
b) $y=\frac{1}{4}x$



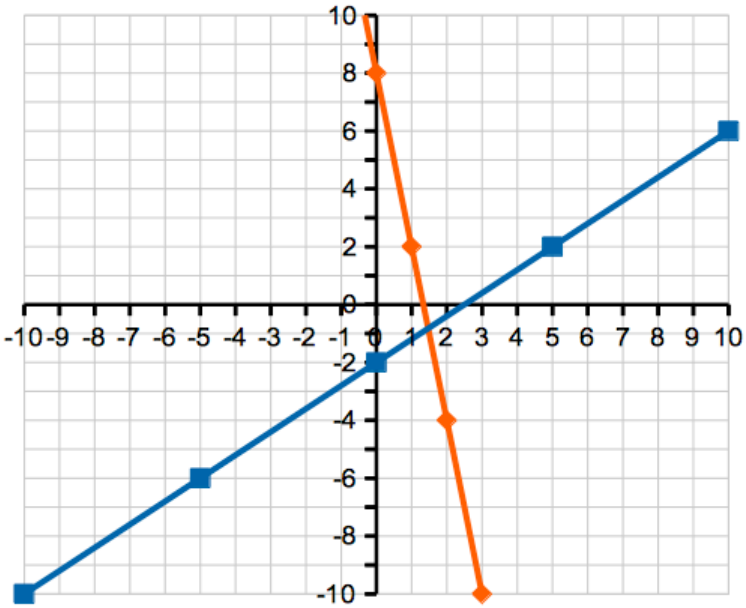

11. Graph each set of lines by finding the x- and y-intercepts. Solve the system.

a) $0=2x-3y-12$

b) $x+3y=-6$



12. Create the equation for each of these lines, in *any* form.



13. You are going to walk as far up Yonge Street as you can in one day. You begin from the very start near the waterfront, and walk North. The chart on the right is how far you got in the first couple of hours.

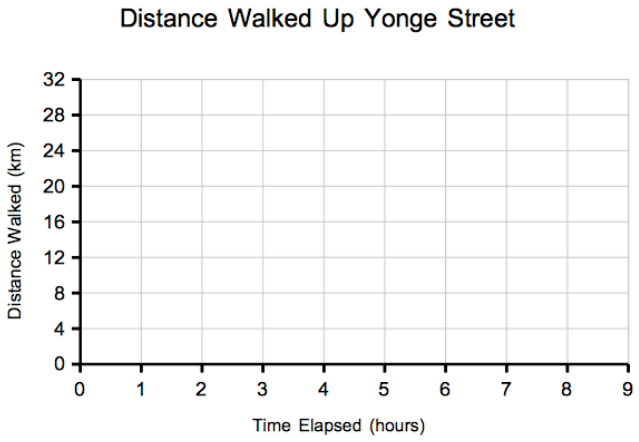
| Time Elapsed (hours) | Distance Walked (km) |
|---|---|
| 0 | 0 |
| 1 | 4 |
| 2 | 8 |
| 3 | |
| 4 | |
| 5 | |
| | |
| | |
| | |

a) Fill in the table up to 5 hours. Assume you kept up the same speed.

b) What property of a distance-time graph would your **speed** represent?

c) After 5 hours, you slow down to a speed of 2 km/hour. Fill in the table for hours 6, 7 and 8.

d) Sketch this on a graph.



**Putting Lines in Each Form**

1. Convert each of these to slope/y-intercept form.

a) $6x-4y=12$

$-4y=-6x+12$

$y=\frac{(-6x+12)}{-4}$

$y=\frac{3}{2}x-3$

b) $(y-3)=-2(x-(-5))$

$y-3=-2x-10$

$y=-2x-10+3$

$y=-2x-7$

2. Convert each of these to Standard Form.

a) $3\times\ y=(\frac{2}{3}x-7)\times 3$

$3y=2x-21$

$0=2x-3y-21$

b) $(y-\frac{4}{5})=-\frac{2}{3}(x-2)$

$y-\frac{4}{5}=-\frac{2}{3}x+\frac{4}{3}$

$y=-\frac{2}{3}x+\frac{4}{3}+\frac{4}{5}$

$y=-\frac{2}{3}x+\frac{32}{15}$

$15\times y=(-\frac{2}{3}x+\frac{32}{15})\times 15$

$15y=-10x+32$

$10x+15y-32=0$

3. Identify the slope and y-intercept for each of these lines.

| | Equation | Slope | Y-intercept |
|---|---|---|---|
| a) | $y=\frac{2}{5}x-9$ | 2/5 | -9 |
| b) | $y=8-2x$ | -2 | 8 |
| c) | $y=-3$ | 0 (horizontal line) | -3 |
| d) | $x=6$ | undefined (vertical line) | none |
| e) | $3x-y=2$<br>$y=3x-2$ | 3 | -2 |

4. What is the equation of a line that has slope $\frac{5}{3}$ and passes through A( 6 , 12 )?

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

$y-12=\frac{5}{3}(x-6)$

$y=\frac{5}{3}x-10+12$

$y=\frac{5}{3}x+2$ (also acceptable is $5x-3y+2=0$ )

5. What is the equation of a line that passes through B( 4 , 6 ) and C( -2, -12 )

$m=\frac{y_2-y_1}{x_2-x_1}=\frac{6-(-12)}{4-(-2)}=\frac{18}{6}=3$

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

$y-6=3(x-4)$

$y=3x-12+6$

$y=3x-6$ (also acceptable is $3x-y-6=0$ )

6. What is the equation of a line that has an x-intercept at 8 and a y-intercept at -3 ?

This represents two points: (8,0) and (0,-3).

$m=\frac{y_2-y_1}{x_2-x_1}=\frac{0-(-3)}{8-0}=\frac{3}{8}$

We already know the y-intercept, so just plug it into slope/y-intercept form: $y=\frac{3}{8}x-3$

Or we can do it the long way: $y-y_1=m(x-x_1)$

$y-0=\frac{3}{8}(x-8)$

$y=\frac{3}{8}x-3$

7. Are the points J( 5 , 4 ) K( 1 , 1) and L( -15, -11) collinear? Prove it.

Find two slopes, if they are the same, they are collinear.

$m_{JK}=\frac{y_2-y_1}{x_2-x_1}=\frac{4-1}{5-1}=\frac{3}{4}$

$m_{JL}=\frac{y_2-y_1}{x_2-x_1}=\frac{4-(-11)}{5-(-15)}=\frac{15}{20}=\frac{3}{4}$

The slopes between JK and JL are the same, and so the three points **are** collinear.

8. Find another point that is collinear with M(10, 4) and N(-12, 6).

This might be a challenge for Grade 9. The easiest way to understand is to find the slope:

$$m_{MN}=\frac{y_2-y_1}{x_2-x_1}=\frac{4-6}{10-(-12)}=\frac{-2}{22}=\frac{-1}{11}$$

and then use the "down 1, right 11" information to create a new point.
"down 1, right 11" from (10,4) is **(21,3)**
"down 1, right 11" from (-12,6) is **(-1,5)**
^^ Both of these are valid answers.

**Fill In The Blanks**

9.

a) The slope of a horizontal line is _____zero_____.

b) If a line goes downward to the right, its slope must be _____negative_____.

c) A line that passes through (0,0) is an example of _____direct_____ variation.

d) The formula for slope is _____ $slope=\frac{rise}{run}$ _____

e) The slopes of _____parallel_____ lines are the same.

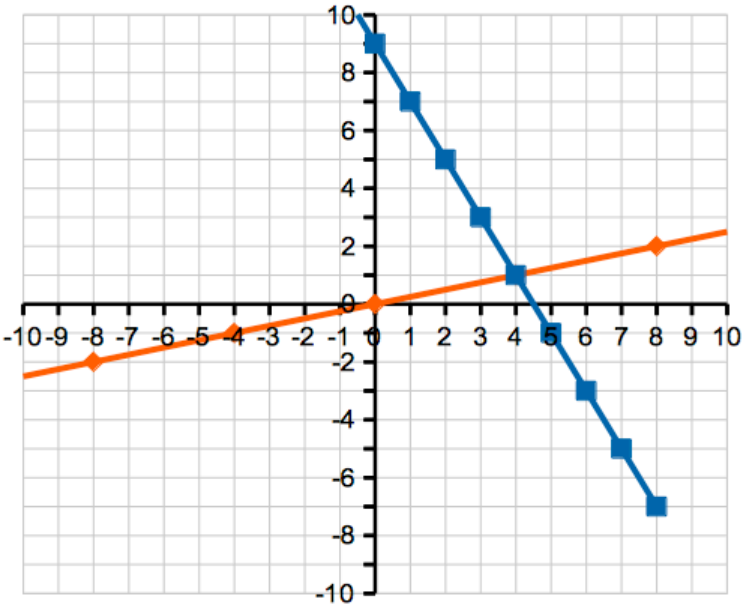
f) The slopes of _____perpendicular_____ lines are negative reciprocals.

g) The negative reciprocal of $\frac{4}{7}$ is _____ $-\frac{7}{4}$ _____

10. Graph each set of lines using the slope/y-intercept method. Solve the system.
"Solve the system" means find the point where the two lines meet.

a) $y=-2x+9$

b) $y=\frac{1}{4}x$




They meet at (4,1)

11. Graph each set of lines by finding the x- and y-intercepts. Solve the system.

a) $0=2x-3y-12$

x-int, plug in y=0:

$0=2x-3(0)-12$

$12=2x$

$x=6$

y-int: plug in x=0:

$0=2(0)-3y-12$

$3y=-12$

$y=-4$

b) $x+3y=-6$

x-int, plug in y=0:

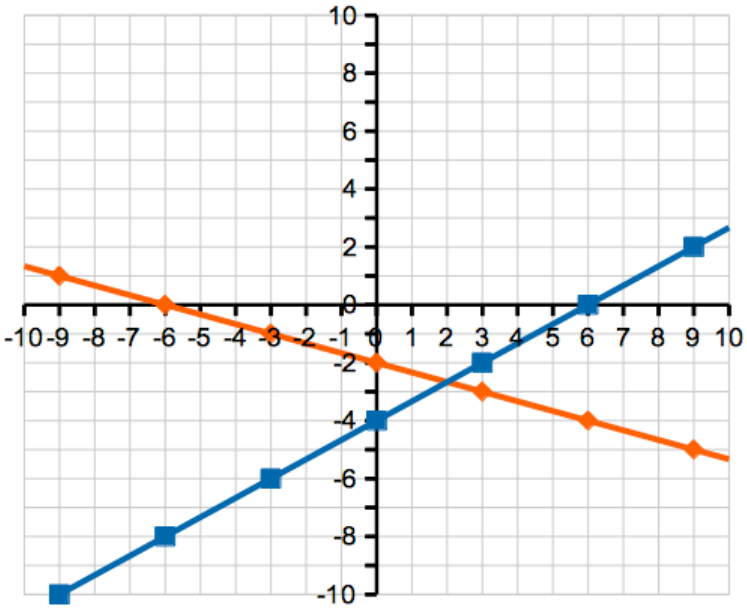
$x+3(0)=-6$

$x=-6$

y-int, plug in x=0:

$(0)+3y=-6$

$y=\frac{-6}{3}=-2$



They meet at approximately (2, -2.8)

12. Create the equation for each of these lines, in *any* form.

Orange Line:

Slope is "down 6, right 1" = -6

y-intercept is 8

$y=-6x+8$

(also acceptable: $6x+y-8=0$ )

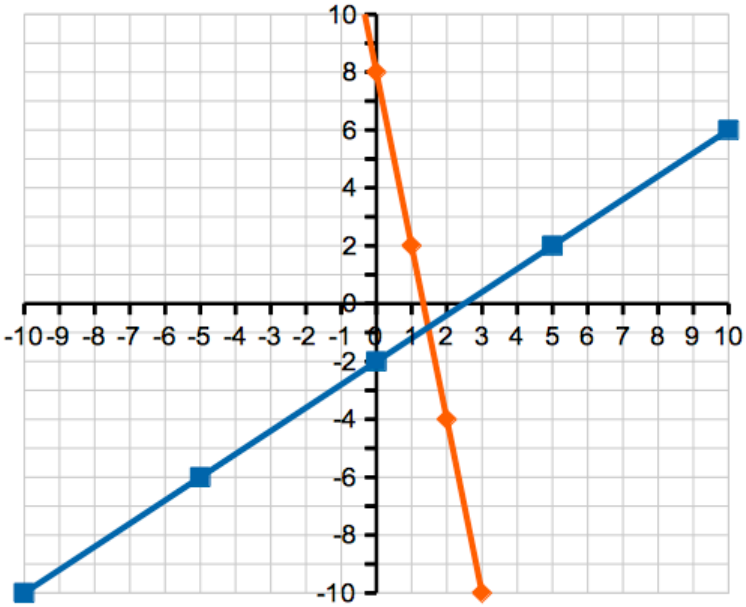
Blue line:

Slope is "up 4, right 5" = 4/5

y-intercept is -2

$y=\frac{4}{5}x-2$

(also acceptable: $4x-5y-2=0$ )



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| Time Elapsed (hours) | Distance Walked (km) |
|---|---|
| 0 | 0 |
| 1 | 4 |
| 2 | 8 |
| 3 | 12 |
| 4 | 16 |
| 5 | 20 |
| 6 | 22 |
| 7 | 24 |
| 8 | 26 |

a) Fill in the table up to 5 hours. Assume you kept up the same speed.

b) What property of a distance-time graph would your **speed** represent?

$$slope = \frac{\Delta y}{\Delta x} = \frac{\Delta d}{\Delta t} = \frac{rise}{run} = \frac{distance}{time}$$

c) After 5 hours, you slow down to a speed of 2 km/hour. Fill in the table for hours 6, 7 and 8.

d) Sketch this on a graph.

Look at how the slope is STEEPER when you are walking FASTER.

What would the slope be like if you were walking backwards? The slope would be negative.