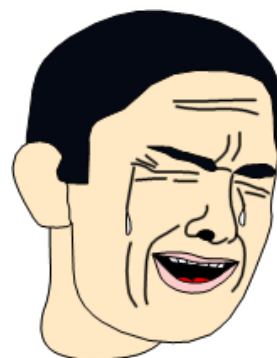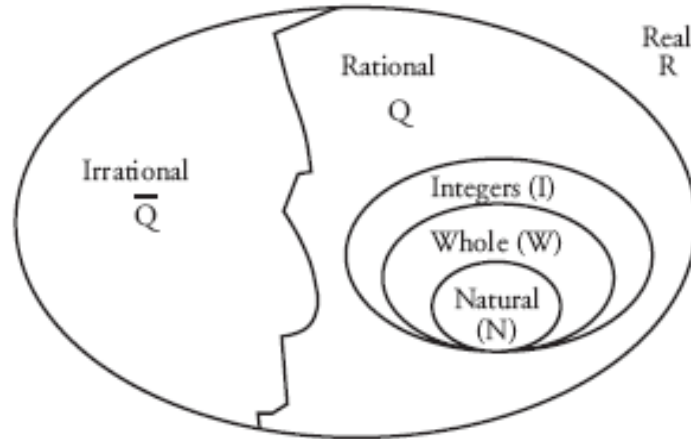# Number Relations Functions 10 Exam Review

27 Multiple Choice

65 Open Response

Review of Types of Number Systems

Natural Numbers - either a positive or a non-negative integer. Ex. 1, 2, 3 etc

Whole Numbers - couting numbers including zero. Ex. 0, 1, 2, 3, etc

Integers - all positive whole numbers greater then 0 and all negative numbers less then 0. Zero is not an integer.

Rational Numbers - all whole numbers, fractions, mixed numbers, decimals and their negatives are rational numbers. The decimal must repeant of terminate also.

Irrational Numbers - decimals that never terminate or repeat.

Real Numbers - all rational and irrational numbers are real numbers

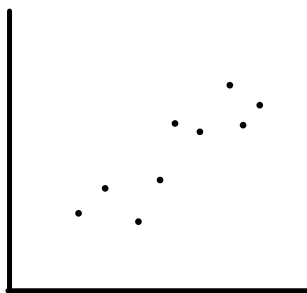## Exercise

Complete the table

	N	W	I	Q	$\overline{Q}$	R
5						
-2						
$\frac{3}{4}$						
-1.3						
$\sqrt{7}$						
$\sqrt{9.5}$						

Discrete and Continuous Data
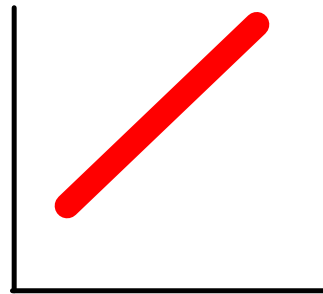
Discrete Data - points are not joined together with a line on the graph

Continuous Data - points are joined together
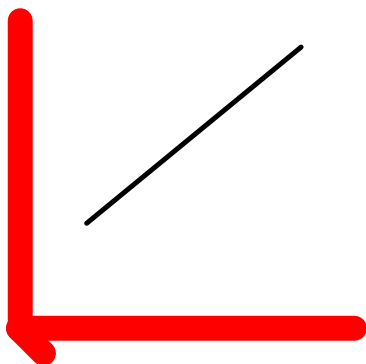
Examples:

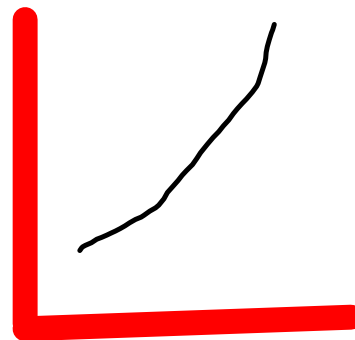Discrete   Continuous

Linear graphs - the data is in a straight line

Non-Linear Graphs - the data is not in a line. It can be curved or spread out with no real pattern

Linear   Non-linear

Write an equation and use it to solve the following:

A rental car company charges a base rate of $45 for a compact car and an additional $2 for every 10 kilometers driven.

a) How much would it cost you if you plan to drive 100 kms?
b) How much would it cost you if you plan to drive 500 kms?
c) If your bill was $225, how many kms did you drive?

Adam is going to the mall. Foran's Taxi has a flat rate of $3.50 plus $0.25 for every kilometre driven. Discount charges $0.35/km

a) Write an equation that represents the problem.
b) How much will it cost him at each company to travel 25 km?
c) How much will it cost him to travel 37 km?
d) When will both companies take you the same distance and cost the same?

Key words

per
for every
for each   } go with variable

An electrician charges $32 per hour plus a base charge of $55.

a) What equation would indicate how he charges his customers?

equ→ $C = 32h + 55$ $y = mx + b$

functi→ Notation $C(h) = 32h + 55$ $f(x) = mx + b$

b) On a recent job, he was paid $345. How many hours did the electrician work?

$$345^{-55} = 32h + 55^{-55}$$

$$\frac{290}{32} = \frac{32h}{32}$$

$$\boxed{9 = h}$$

→ He had to work 9 hrs

c) Suppose the electrician worked 12 hours. How much would he get paid?

$$C = 32(12) + 55$$

$$= 384 + 55$$

$$= \$439$$

He got paid $439

15% final   5 days $<$ $\left(\begin{array}{c}85\% \\ \text{Class}\end{array}\right)$

Mark $\times 0.85$

$77 \times 0.85 = 65.45\%$

Class

$63\% \times 0.85 = 53.55$

$\begin{array}{r} 60.00 \\ -55.55 \\ \hline 6.45 \end{array}$

$\dfrac{53.55}{85} + \dfrac{}{15} = \dfrac{\text{Report}}{100}$

$\dfrac{6.45}{15} = 43\%$ on Exam

$> 5\,days$　　$(class\ 70\%)$

Mark $\times 0.75 =$

75

$$\frac{52.5}{70} + \frac{275}{30} = \frac{80}{100}\ \text{Final on Report}$$

92%

on Exam

Solve the following:

a) $4(x - 2) - 3(x + 1) = 1$

$4x - 8 - 3x - 3 = 1$

$x - 11 = 1$ $+11$

$\boxed{x = 12}$

b) $3 - 6x + 6 = 2x - 7$

c) $(x+1) - 2(x + 3) - 3(x + 1) = 1 - 3x$

$x + 1 - 2x - 6 - 3x - 3 = 1 - 3x$

$-4x - 8 = 1 - 3x$ or $-4x - 8 = 1 - 3x$

$-8 = 1 + x$ $-x = 9$

$\boxed{-9 = x}$ $\dfrac{-x}{-1} = \dfrac{9}{-1}$

$x = -9$

d) $4(x + 1) = 10 - (2x + 6)$

Review from grade 9

The Coordinate Plane

(0,0) orgin
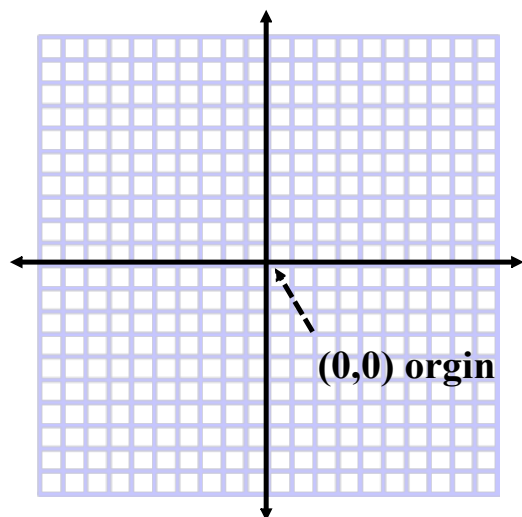
Each point has an x and y value

$$(x,y)$$

This is called an ordered pair

SLOPE

$$\text{Slope} \; = \; m \; = \; \frac{rise}{run} \; = \; \frac{\Delta y}{\Delta x} \; = \; \frac{y_2 - y_1}{x_2 - x_1}$$

Find the slope of the line that passes through the points (0, 5) and (4, 10)

$x_1, y_1 \qquad x_2, y_2$

$$m = \frac{10 - 5}{4 - 0}$$

$$= \frac{5}{4}$$

Using the points below, find the slope of each line

a) (7,6) (3,0)

b) (3,5) (-3,-5)

c) (-4,5) (1,0)

d) (0,2) (3,-4)

e) (-1,-1) (4,5)

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$x_1 \; y_1 \quad x_2 \; y_2$$

$$\frac{5 \;\overset{\text{add op}}{-} \; 1}{4 \;-\; -1} = \frac{5 + {}^{+}1}{4 + {}^{+}1}$$

$$= \frac{6}{5}$$

Finding Intercepts

X - Intercept - is where the graph crosses the x-axis (y = 0)

Y- Intercept - is where the graph crosses the y-axis (x = 0)

Example: What are the x and y intercepts for 2x + 3y = 12

X-intercept (let y=0)

$$2x + 3y = 12$$

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

$$\frac{2x}{2} = \frac{12}{2}$$

$$x = 6$$
$$(6, 0)$$

$$2x + 3y = 12$$

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

$$\frac{3y}{3} = \frac{12}{3}$$

$$y = 4$$
$$(0, 4)$$

$$\frac{3y}{3} = \frac{-2x}{3} + \frac{12}{3}$$

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

$$b = 4$$

$$m = \frac{-2}{3} \qquad (0, 4)$$

Find the x and y intercepts for the following lines.

a) $x + y = 7$

b) $2x - 3y = 18$

c) $4x + 3y = 24$

d) $x - 3y = 9$

Finding the Equation of a Line

Using slope y-intercept form to find the equation of a line

Slope y - intercept form $\longrightarrow$ $y = mx + b$

Slope   Y-Intercept

Slope - the steepness of a line

y - intercept - the point where a graph crosses the y-axis; the point where x = 0

Example:

Given that a line has a slope of 3 and a y intercept of -2, what is the equation of the line?

A line passes through the points (4, 5) and (1, 3). The same line has a y intercept of 4. What is the equation of the line?

Point - Slope Form

You can also find the equation of a line if you are given a point and the slope of the line. In order to do this you use the formula:

slope

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

The x and y values from the given point

Example 1: Find the equation of a line that passes through (-3,4) and has the same slope as y = 3x + 2.

$m = 3$ $(-3, 4)$ $y - y_1 = m(x - x_1)$

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

Point-slope $y - 4 = 3(x + 3)$

$y - 4^{+4} = 3x + 9 + 4$

Slope-intercept $y = 3x + 13$

$y = 3x + 13$

General Form $0 = 3x - y + 13$

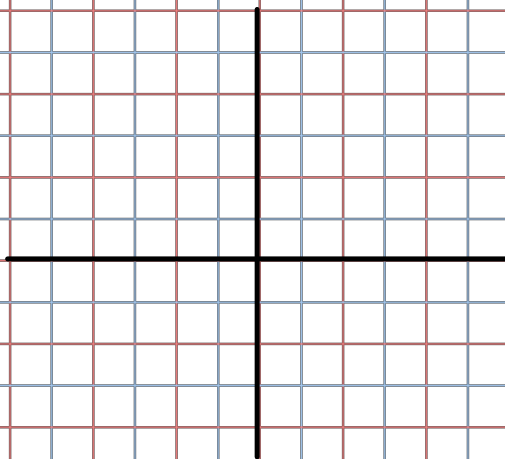**Find the equation of a line that passes through the points (0,5) and (-2,1)**

More on Slope...

Lines that are parallel will have the same slope.

Remember $y = mx + b$ $m = slope$

The lines $y = 3x + 1$ and $y = 3x - 2$ are parallel
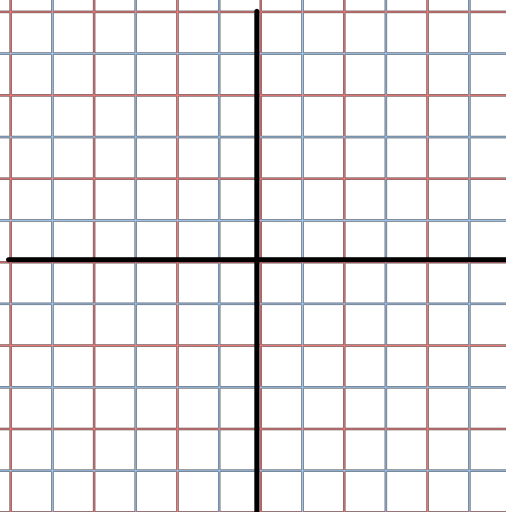
You can see this when you graph it...

When two lines are perpendicular, their slopes are the negative reciprocal of one another.

Example...

The lines $y = 2x + 1$ and $y = -1/2x + 1$ are perpendicular.

Again, you can see this when you graph the two lines on a coordinate plane.

What is the slope of each pair of lines? Are they parallel or perendicular?

a) $y = 2x - 4$
$y = 2x - 8$

b) $y = 4$
$y = 9$

c) $y = 4x$
$y = -1/4\ x$

d) $x = 4$
$y = 4$

Find the x and y intercepts of each line.

a) $2x - 4y = 0$

b) $y = 3x - 2$

c) $3x + 3y = 9$

Write the equation of each line in the form y = mx + b

a) m = 4
    y-int = -2

b) m = 1/2
    y-int = 3

c) m = 2
    y-int = 0

d) (4,0) (6,4)
    y-int = 3

e) (5,1) (-2,6)
    same y-int as y = 3x + 2

Rearranging Equations

Anytime we have looked at equations of lines that have all been in the form $y = mx + b$. However, there are some cases in which an equation is written in a different form and we have to rearrange it in order to put it in $y = mx + b$ form.

For example: Write $3x + y = 7$ in the form $y = mx + b$

Rearrange the following equations in the form $y = mx + b$

a) $2x + y = 4$ b) $3x - 3y = 9$

c) $x + 2y - 12 = 0$ d) $y + 4 = 10x$

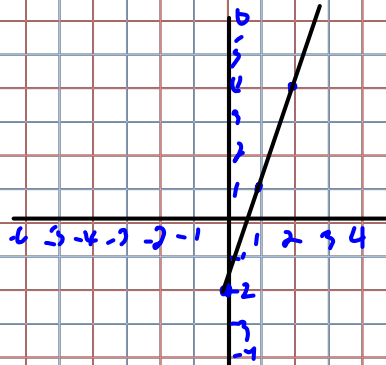e) $2y = 50x - 100$ f) $2x = -y + 13$

Graphing

1. Using a Table of Values   2. Using y = mx + b   3. Using intercepts

Example,

$$y = 3x - 2$$
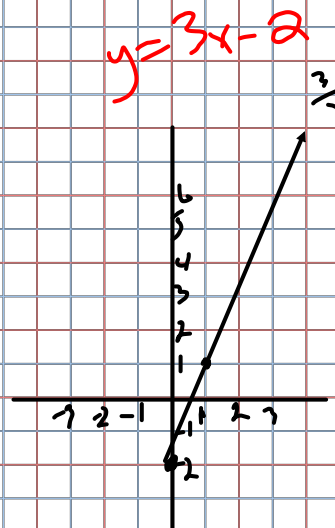
method 1 -
using a table of values

x	y
0	-2
1	1
2	4
3	7

method 2- using y=mx+b

Shortcut way of graphing linear equations.

1. put the equation in the form y = mx + b

2. put a point on the y-intercept. (that is your starting point)

3. Use slope (rise/run) to get your next point.

$y=3x-2$

Method 3 - Using the Intercepts

$$y = 3x - 2$$

x int
$0 = 3x - 2$
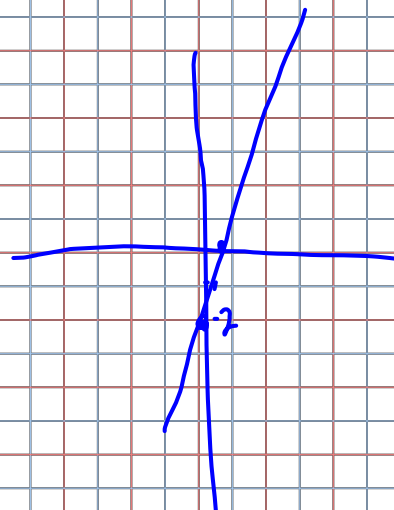$2 = 3x$
$\frac{2}{3} = x$ $\left(\frac{2}{3}, 0\right)$

y int
$y = 3x - 2$
$y = 3(0) - 2$
$y = -2$
$(0, -2)$

Copy First, then complete.

1. Find the slope of the following:
   a. (4,5) and (3, -2)
   b. (-3,1) and y-intercept of 5
   c. 2x - y -3 = 0

2. Rearrange for Y and state the slope and y-intercept
   a. 2x - 3y = 6
   b. x = y - 5
   c. 7y + 2x - 14 = 0

3. Find the x and y intercept
   a. 2x - 3y = 6
   b. x = y - 5
   c. 7y + 2x - 14 = 0

4. Write the equation of the line given:
   a. m=3   b = -1
   b. m = 1/2 b = 0
   c. (2,3) and (-4, 1) are on the line
   d. (-5, 3) and (6,2) are one the line

5. Write the following equations in Standard Form
   a. 2x - 3y = 6
   b. x = y - 5
   c. 7y + 2x - 14 = 0

6. On graph paper, graph the following:

   a. y = 2/3 x + 1
   b. y = -3x + 4
   c. 4x - 2y + 6 = 0
   d. y = 3
   e. x = -2
   f. y = x

Finding the Intersection Points of Lines

Intersection Point - the point where the graphs of two equations cross

How do we find the Intersection Point of 2 graphs?

Example:

Draw the graphs of and find the point of intersection

$x + y = 8$ $x - y = 12$

There are 2 different ways that we can write our equation.

Method 1:   Slope Y-Intercept Form $Y = mx + B$

Method 2: Standard Form $Ax + By + C = 0$

$A > 0$ $B \neq 0$

Write the following in Standard Form

a) $y = 3x + 4$

b) $y = -2x - 6$

Write the following in Slope Y-Intercept form

a) $10x + 5y - 45 = 0$

b) $2x - y + 10 = 0$