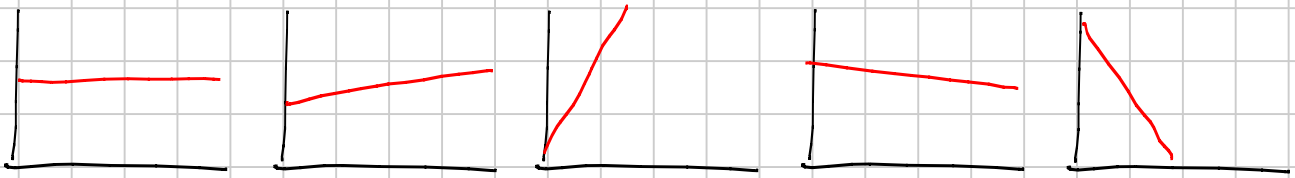
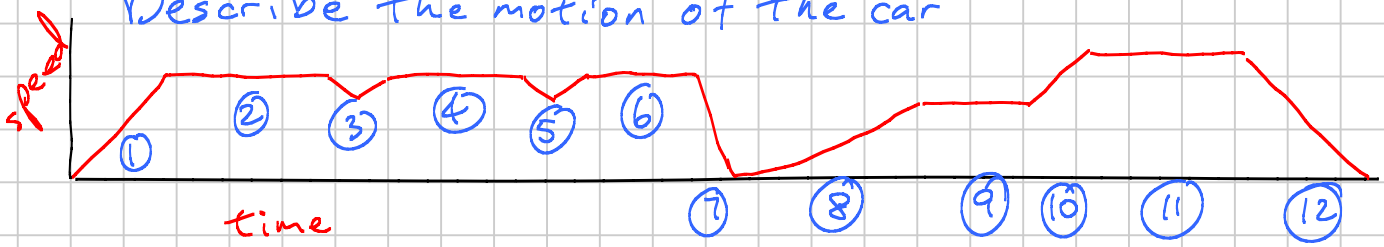
Math 10 Chp 6.1

Note Title 2016-07-18

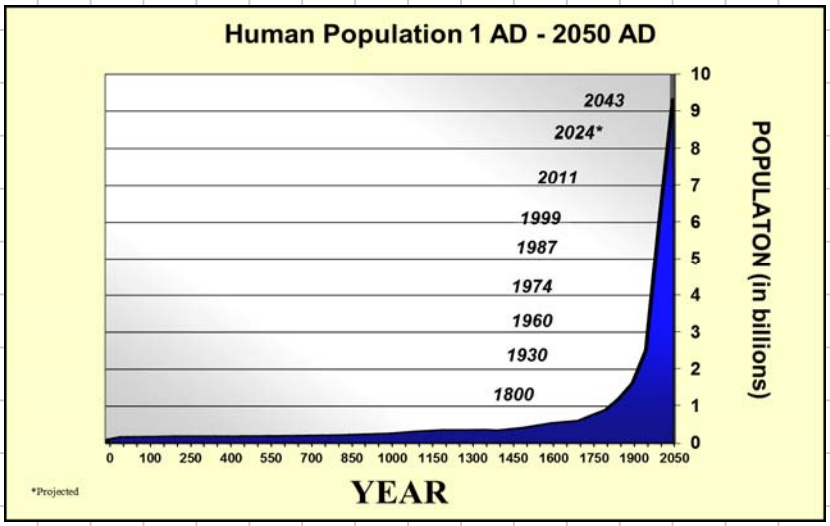
Graphs of Relations – Graphs generally do not provide a great detail of precision, a table of values does. However, graphs very quickly convey how a quantity changes.

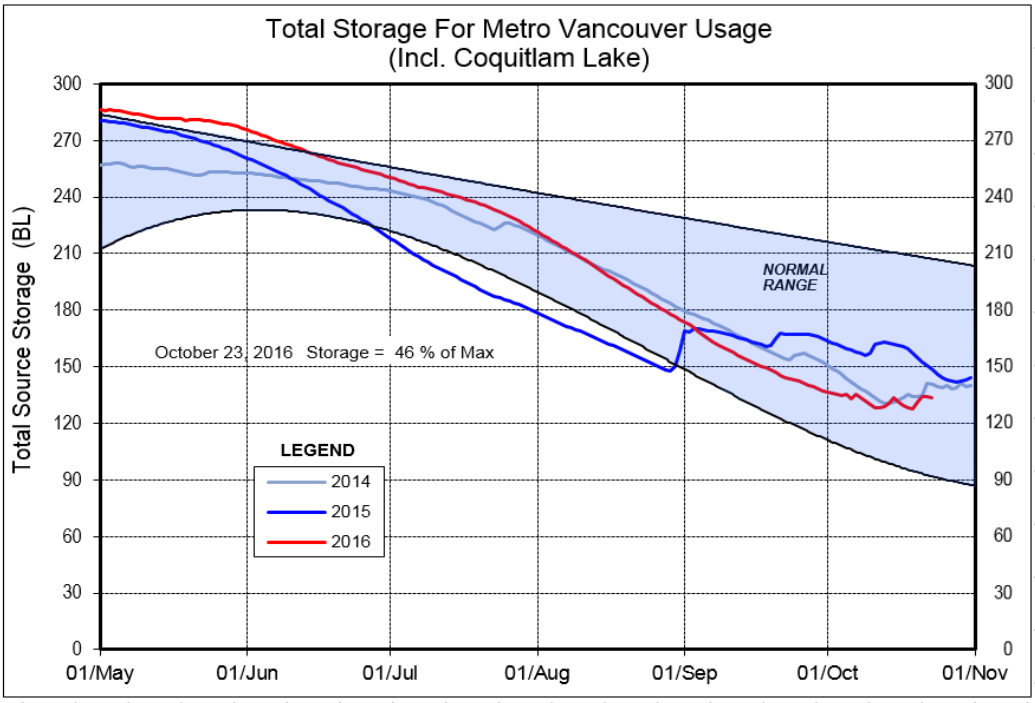


Describe the motion of the car



The vertical axis is called the dependent variable. The horizontal axis is called the independent variable (or control).





Assigned Work: pp. 274-278: 1, 2, 4, 6, 7, 11, 16

Challenge: 9, 12, 14

Math 10 Chp 6.2

Note Title 2016-07-18

Linear Relations - linear relations are relatively easy to analyze. In the next 2 years, you will learn to analyze many non-linear relations. However, many concepts from linear transfer to non-linear.

Regardless of the variable name, the horizontal is the independent variable and the vertical is the dependent variable. Usually, we write the relation explicitly for the dependent variable.

$y = -\frac{2}{3}x + 1$ $\quad v = -(u+1)^2 + 3$ $\quad k = -(j+5)(j+2)(j-3)(j-7)$

$s = t$ Example of implicit equation: $2x + 3y = 7$

Do the linear relations look easier?

eg) Determine the dependent and independent variables.

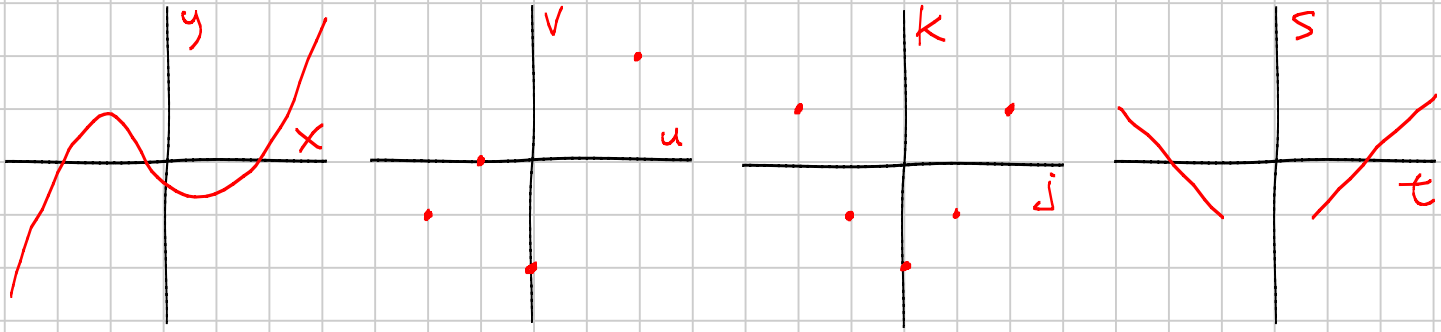
1) A car travels along a highway. The variables are time and distance.

2) An experiment measures the growth of 10 bean plants. The variables are height and plant number

3) A teacher records grades for a test. The variables are grade and student number

4) A statistician is recording shots in a hockey game. The variables are shot number and position.

The next concept for relations is continuity.
If the relation is made up of points, it is
If the relation is made up of curves, it is



Algebraically showing a linear relation - if we have an equation, there will be one or two variables and each term will be degree 0 or 1. The degree is the sum of the exponents for the variables in a term.

eg) Determine if linear or not.

1) $y = 2x + 1$
2) $y = x^2 + 2$
3) $y = -x + 3$
4) $xy = 4$

Another algebraic way is to determine the slope between points. If any of the slopes are different, then it is non-linear. To show linear, you must do the slope between points.

Recall the slope can be calculated from $m = \frac{y_2 - y_1}{x_2 - x_1}$

eg) Determine if the relation is linear.

1) $\{(2,-5), (1,-7), (4,-1), (7,3)\}$

2) $\{(0,9), (-1,12), (3,0), (5,-6)\}$

Alternatively, you can plot all the points to see if they form a line.

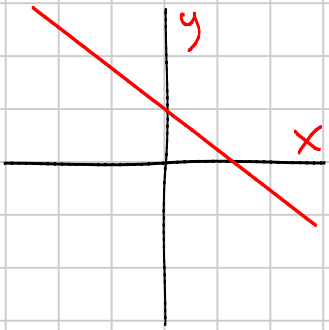
Assigned Work: pp. 281-291: 2, 4, 6, 7, 8

Challenge: 10, 11, 12

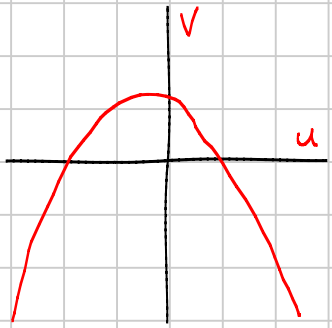
Math 10 Chp 6.3

Note Title 2016-11-11

Domain and Range - is another concept that applies to relations. Domain is simply the acceptable values for the independent variable. Range is all the calcalated or measured values of the dependent variable.



D:
R:



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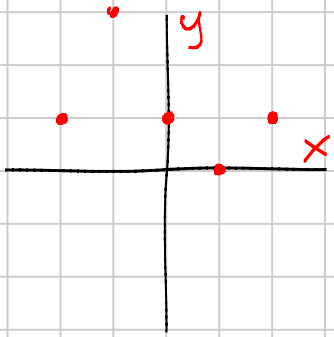
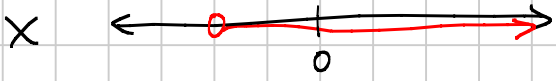
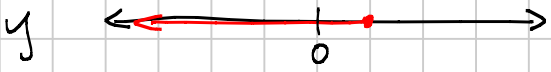
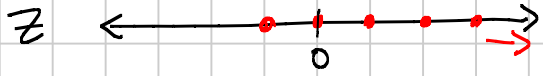


D:
R:

Notation:

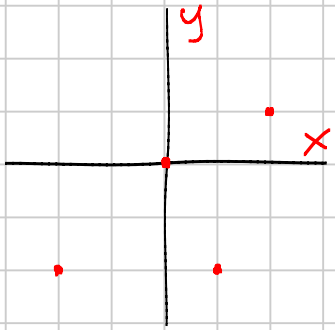






At this point, it's not important to use all of these. But you should be able to know what they mean.

eg) Determine the domain & range (any notation)



D:
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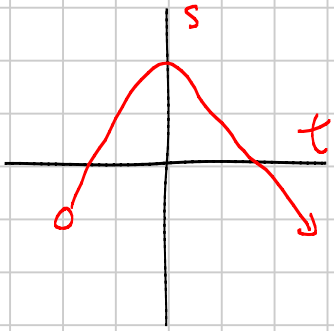

D:
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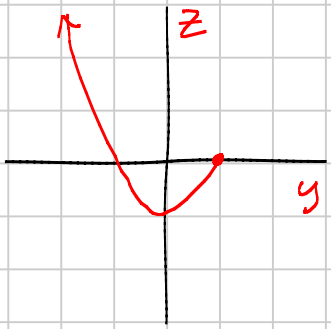


D:
R:

eg) Determining domain and range from a problem.

1) Many places on Earth experience diurnal tides - one high and low tide per day that corresponds to the Moon revolving around the Earth. On a particular day, the average tide height is 2.3 m; the high tide of 3.4 m occurs at midnight.

2) The wind turbine on Grouse was activated from 3:30 pm to 5:00 pm. A sensor was attached to one blade tip. The hub is 65 m high and the blades cover a diameter of 76.8 m.

Assigned Work: pg. 301 - 304: 2, 3, 5, 7, 8

Challenge: 9, 11, 13

Math 10 Chp 6.4

Note Title 2016-11-11

Functions - a function is a relation, but a relation is not necessarily a function. An analogy: a car is a vehicle, but a vehicle is not necessarily a car, such as a truck. The property that makes a function different from a relation is a function gives only one dependent value for each independent value. It is easily seen when graphed. Function is abbreviated fn.

When we say 'relation', it is generally implying that it is not a function. When looking at a graph, we use the vertical line test: If on the relation, a vertical line passes through 2 or more points, the relation is not a function. It's easy to show when a relation is not a function, but it's not easy to show that a relation is a function.

Function Notation - looks strange, but understanding why we use it will make it sensible. $y = 3x + 4$ in fn notation: Because we use x and y so frequently, we just write it as an equation. Fn notation simply makes it clear what are the independent variables and what is the dependent variable as well as the equation is a function not a relation.

eg) Taxes:
MLS points:
NBA points:

We can use a function simply by substituting values.

$T(10) =$

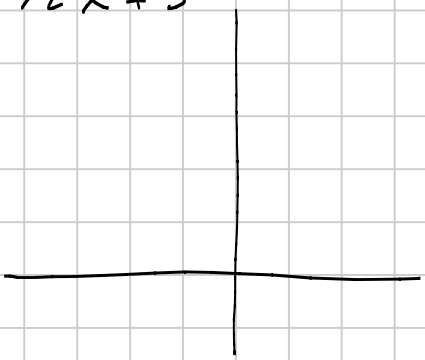
$P_1(4, 6) =$

$P_2(9, 2, 4) =$

Recall graphing and solving linear relations from last year.

1. Graphing from table of values. $y = \frac{1}{2}x + 3$

x	y



2. Graphing from slope-intercept form.

Recall finding solutions

1. From graph. $3.5 = \frac{1}{2}x + 3$

2. Algebraically: $3.5 = \frac{1}{2}x + 3$

Assigned Work: pp. 311 - 314: 1, 2, 3, 4, 8, 9, 10

Challenge: 11, 14, 15

Math 10 Chp 6.5

Note Title 2017-01-05

Slope - simply means change. It is the ratio of the change in dependent variable vs. the change in independent variable. $m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

If the |slope| is large it means it is steep and the change is large. If the |slope| is small then it is not steep and the change is small. If the slope is , then there is no change.

If the slope > 0 (positive), then the dependent variable is increasing. Conversely, if the slope < 0 (negative), then the dependent variable is decreasing.

By convention, the sign of the slope goes with the ; the run is considered and goes to the .

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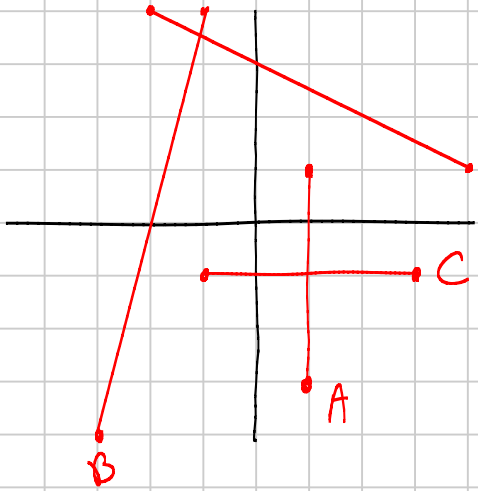
eg) Determine the slope from the graphs:



$m_A =$

$m_B =$

$m_C =$

$m_D =$

eg) Determine the slopes from the points.

A(0, 0), B(3, 6), C(-2, -1), D(0, -1)

$m_{AB} =$

$m_{AD} =$

$m_{CD} =$

$m_{BC} =$

There are many things that represent change and therefore they represent slopes. For instance, speed, acceleration, rate, increase, decrease, derivative, rise, ... Change can happen with money, light, position, sound, pressure, force, etc. When working on word problems, you must recognize that you are being given the slope or a means to calculate the slope.

eg) On Dec 20, 2016, there was 50 mm of snow at my house. On Dec 24, 2016, there was 30 mm of snow at my house. It snowed on Dec 17, 2016. Create an equation. If it didn't snow any more, when would the snow have disappeared? How much snow originally fell on Dec 17? What are the domain and range?

Assigned Work: pp. 325 - 329: 1, 2, 3 cf, 4 cef, 6, 8, 10

Challenge: 9, 11, 13