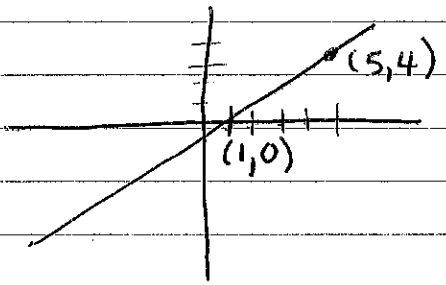
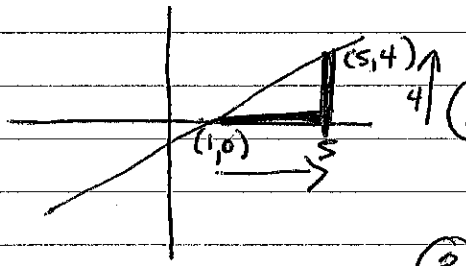
6.1 Math 11AW – notes (x, y)

Slope – $\frac{\text{rise}}{\text{run}}$ or $\frac{\text{change in } y}{\text{change in } x}$ or $\frac{y_2 - y_1}{x_2 - x_1}$

To find the slope on a graph:



① connect 2 points as a triangle (go over → until below next point; then go up to meet the point.



② ask – how much does it go up ⇒ rise = 4

③ ask – how much does it go over ⇒ run = 4 (5 − 1)

④ $\frac{\text{rise}}{\text{run}} = \frac{4}{4} = 1$

To find a slope using points:

(2, 4) (6, 3)
(x_1, y_1) (x_2, y_2)

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

$= \frac{3-4}{6-2} = \frac{-1}{4} = -\frac{1}{4}$

grade - slope over 100

ex 7% grade $= \frac{7}{100} = \frac{\text{rise}}{\text{run}}$

To find grade using slope as a fraction

ex $\frac{3}{7} \Rightarrow (\text{rise} \div \text{run}) \times 100$

$= (0.4286) \times 100$

$= 42.9\%$ grade.

To find rise or run given grade:

→ run is 200; what is rise?

→ given 5% grade which means:

$$\frac{\text{rise}}{\text{run}} = \frac{5}{100}$$

* put into an equivalent ratio

$\frac{\text{rise}}{\text{run}} \Rightarrow \frac{5}{100} = \frac{x}{200}$ cross multiply & divide by other number

$\frac{5}{100} \nearrow \searrow \frac{x}{200}$ $\frac{200 \times 5}{100} = 10$

∴ if the run is 200; the rise is 10.

6.2 Math 11 AW - notes

Comparing Slopes - a steeper slope has a bigger number - it doesn't matter if it is positive or negative

ex 1

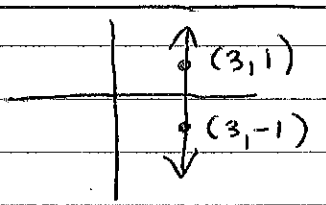
Slope $= -2$ (↑ steeper slope!) Slope $= \frac{1}{4}$

ex 2

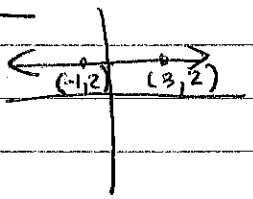
Slope -5 (↑ steeper slope.) Slope -3

6.3 Vertical & Horizontal lines

Vertical



Horizontal



a vertical line's slope is undefined so the equation of the line is $x =$ ____

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

$= \frac{-1-1}{3-3}$

$= \frac{-2}{0}$ ← not allowed.

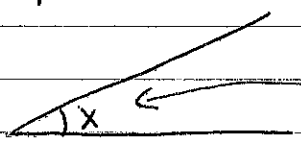
a horizonal line has a slope of zero

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

$= \frac{2-2}{3--1} = \frac{0}{4} = 0$

6.5 Math 11 AW - notes

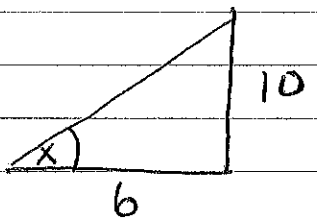
Angle of Elevation - to elevate means to go up.



angle of elevation
- goes up from horizontal line.

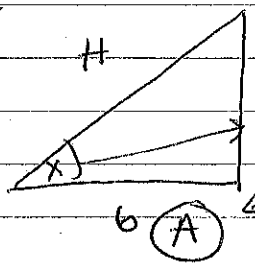
To find the angle of elevation remember Trig

SOH CAH TOA * see additional attached pages from gr 10 AW.



① label sides
② choose trig operation
③ divide; 2nd F tan

ex →



① ② $\tan x = \frac{O}{A}$

$\tan x = \frac{10}{6}$

③ $10 \div 6 =$ 2nd F tan =

$= 59°$ angle of elevation

6.6 Rate of Change

rate of change = slope

6.7 Math 11 AW – notes

Rate of change & unit analysis

- use the rate of change to decide the better price.
- use the answer to find the question

ex1 want: km/h ⇒ take km ÷ # hours

want: gal/m ⇒ take gal ÷ # of minutes

ex2 if you have rate & want to find how much → 14 songs/h → how many in 4 hours

take rate x time

$14 \times 4 = 56$ songs

6.8 Converting decimal hours to hours and minutes

ex 1.5 hours = 1 hour and $0.5 \times 60 = 30$ min

6.32 hours = 6 hours and $0.32 \times 60 = 19$ min

* remember → 1 yd = 3 feet
1 ft = 12 inches

} all measurements have to be the same unit (ft, in, yd) so you can compare!

6.8 Math 11 AW – notes

Conversion Between systems

* do only one side at a time

1116 ft/s = km/h

① convert ft → m (1 ft = 0.30 m)
then m → km (1 m = $\frac{1}{1000}$ km)

ft → m 1116 × 0.30 = 334.8 m
m → km 334.8 × $\frac{1}{1000}$ = 0.3348 km

② convert s → h 1 s = $\frac{1}{60}$ m & 1 m = $\frac{1}{60}$ h
s → m = 1 ÷ 60 = 0.017 m
m → h = 0.017 ÷ 60 = 0.0003

③ put together and divide

$\frac{①}{②} = \frac{0.3348}{0.0003}$ = 1116 km/h