Lesson Form 2

Coordinate geometry. time: 6x50 min

Verification of preriquesite

Exercise: Draw the X-Y plane well graduated and plot the following points. $A\binom{2}{2}$ $B\binom{-1}{3}$ $C\binom{0}{4}$ $D\binom{-2}{-3}$ $E\binom{5}{-3}$ $F\binom{5}{0}$ $G\binom{-2}{4}$ $H\binom{3}{-4}$ $I\binom{0}{-3}$ $J\binom{-6}{0}$

Problem situation

John is situated at point A (up here) and want to reach Michel at point B. How long will he works?

1) Distance between two points

Given two points $M\binom{x_1}{y_1}$ and $N\binom{x_2}{y_2}$, the distance between M and N denoted MN is given by:

$\boxed{MN = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}}$ units

Example: $O\binom{-1}{2}$, $P\binom{3}{-2}$

The distance between O and P is

$OP = \sqrt{(3-(-1))^2+(-2-2)^2} = \sqrt{(3+1)^2+(-4)^2} = \sqrt{4^2+(-4)^2}$
$= \sqrt{16+16} = \sqrt{32}$ unit $= 4\sqrt{2}$ units

solution to the problem situation

$AB = \sqrt{(-1-2)^2+(3-2)^2} = \sqrt{(-3)^2+1^2} = \sqrt{9+1} = \sqrt{10}$ units.

Exercise Find the distance between.
a) A( ) and B( ) b) M( ) and N( )

2) Mid points of points

Given two points $E(x_1, y_1)$ and $F(x_2, y_2)$ the mid point of between E and F is denoted by mid(E,F) and given by.

$mid(A,B) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Example: $A(1,2)$ $B(3,4)$

$mid(A,B) = \left(\frac{1+3}{2}, \frac{2+4}{2}\right) = \left(\frac{4}{2}, \frac{6}{2}\right) = (2, 3)$

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b) point between

3) Gradient of a line

The gradient of a line (L) gives the ratio of the increase of y-coordinate to the x-coordinate.
Let (x_1, y_1) and (x_2, y_2) be two points on a straight line (L), then the gradient or the slope (most of time denoted by m) of the line (L) is given by

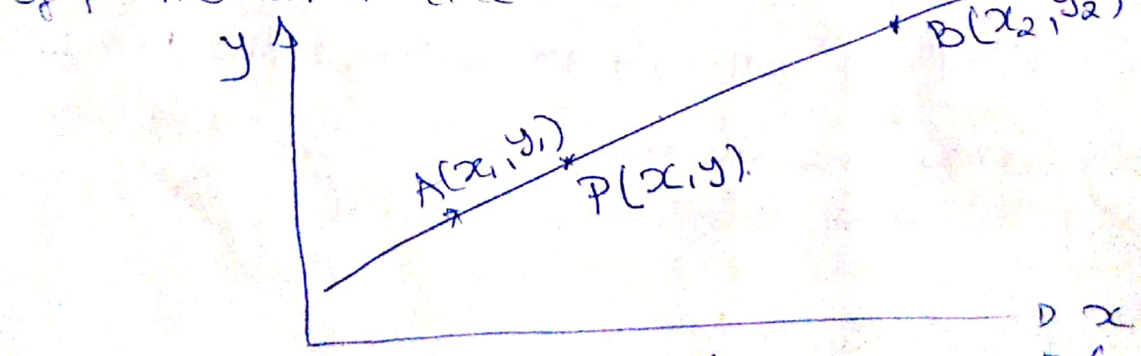
$$\boxed{m = \frac{\text{increase in } y}{\text{increase in } x} = \frac{y_2 - y_1}{x_2 - x_1}}$$

Eg Given two points A(2, 3) B(-1, 2) on a line (L). Compute the gradient of the line.

Exercise

4) Equation of a straigh line

A line is a set of points. Sine a line has an infinite length, it means there are infinite number of points on a line.



Given two points $A(x_1, y_1)$ and $B(x_2, y_2)$; we can find the equations of the line joining the points A and B. To do so, we have to:
- Consider any point P(x, y) on the line (AB).
- Find the gradient of A and P and the gradient of A and B.

$m_{AP} = m_{AP} = \frac{y-y_1}{x-x_1}$ $\qquad m_{AB} = \frac{y_2-y_1}{x_2-x_1} = m$

- Then equate the two gradient

$$\frac{y-y_1}{x-x_1} = m$$

The equation of a line passing throu
A and B is then:

$\boxed{y-y_1 = m(x-x_1)}$ or $\boxed{y = y_1 + m(x-x_1)}$

Write the equation of the line passing by $A\binom{3}{8}$ and
et $P(x, y)$ be another point of the line

$m_{AP} = \frac{y-8}{x-3}$ $\qquad m_{AB} = \frac{12-8}{6-3} = \frac{4}{3}$

The equation is

$$y-8 = \frac{4}{3}(x-3)$$

$$y = 8 + \frac{4}{3}x - \frac{4}{3}\times 3 = 8 + \frac{4}{3}x - 4$$

3) : $\underline{\underline{y = \frac{4}{3}x + 4}}$

ercise Find the equation of the line joining

$E(2,-5)$ & $F(0,3)$

$M(1,2)$ and $N(-2,0)$

-1

A triangle is a three sided Polygon with three angles. There exists many types of triangles.

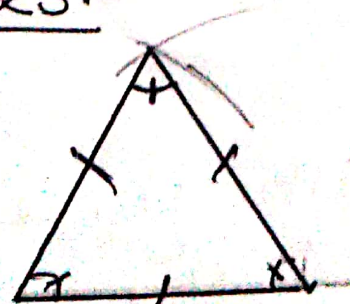
i) Equilateral triangle: All its sides are equal and all it angle are equal. (60°)

ii) isosceles triangle: It has two sides of the same length and two angles of the same measure.

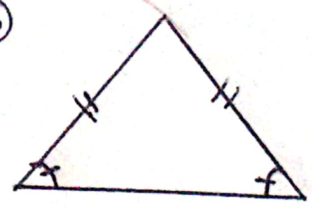
iii) ~~Right~~ angled triangle: It has and angle of 90° (a right angle).

iv) Scalene triangle: All its sides and angles are different.

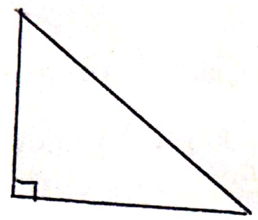
Examples:

a) 

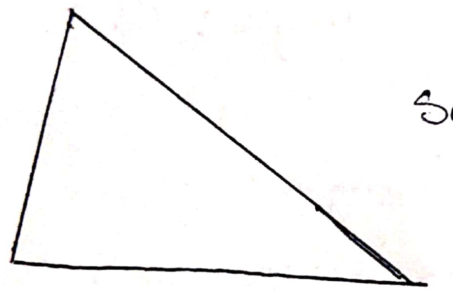
equilateral triangle. The cotation "/" means all the sides are equal.

b) 

Isosceles triangle with cotation on two sides and two angles.

c) 

Right angled triangle with a 90° angle.

d) 

Scalene triangle.

NB: * A triangle with one obtuse angle is called an obtuse angled triangle.

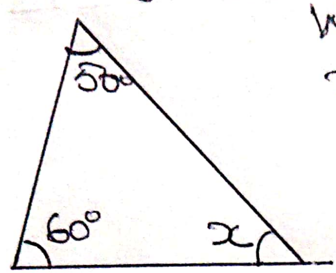
* A triangle with one acute angle is called an acute angled triangle.

* The sum of the three angles of a triangle is 180°.

It is therefore possible to find and angle knowing the other measures.

Examples:

a)



We know that

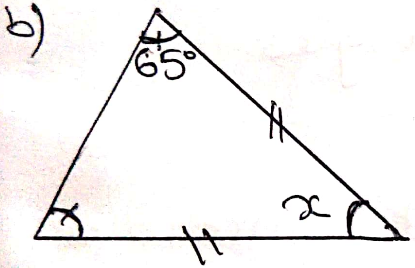
$x + 50° + 60° = 180°$

$x + 110° = 180°$

$x = 180 - 110°$

$\underline{\underline{x = 70°}}$

b)



We know that it is an isosceles triangle then:

$x + 65° + 65° = 180°$

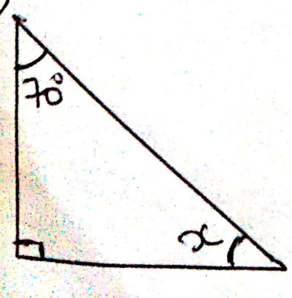
$x + 130° = 180°$

$x = 180° - 130° = 50°$

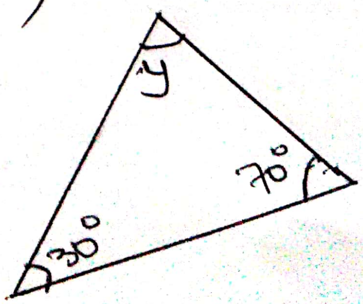
$\underline{\underline{x = 50°}}$

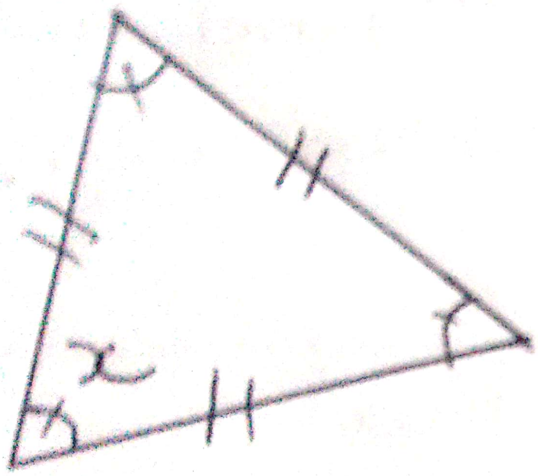
Exercise Find the measure of the missing angle.

a)

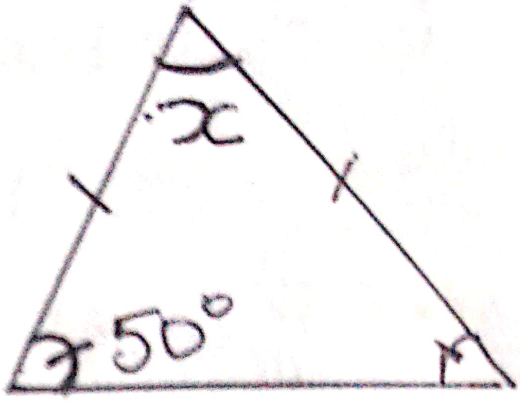


b)





d)



…ssignment

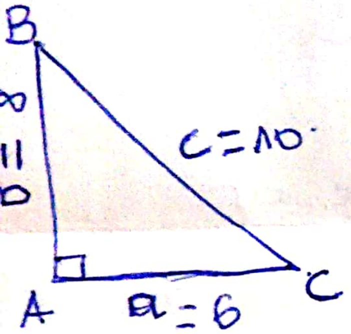
Sub-topic = Lesson : Pythagoras' theorem

NB: students are able to identify a right angle triangle and the hypothenuse.

<u>Life situation</u>:

A farmer decides to support one of his plantain tree with a stick of 5m. If the foot of the tree and the stick are at a distance of 3m apart, what will be the distance from the ground to the point where the plant will be supported? (the heigh of the

<u>Activity</u>: Consider the shape bellow and fill the table AB = b = AC = a = BC = c =



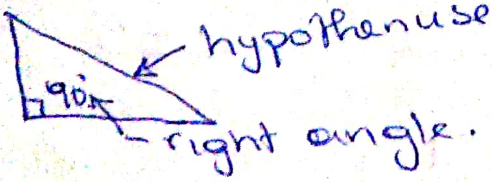
a	b	c	a^2	b^2	a^2+b^2	c^2

What do you remark (or compare a^2+b^2 and c^2).

<u>Definition</u>

* Trigonometry is a greck word which means « Solving for triangles ».

* A right angled triangle is any triangle with one of its angle 90° (called a right angle



<u>Pythagoras' theorem</u>:

« For any right angled triangle, the square of the hypothenuse is equaled to the sum of squares of the two other sides ».

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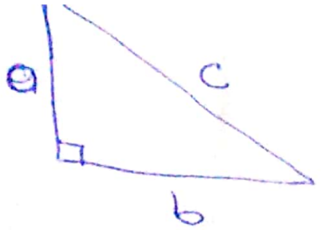


$c^2 = a^2 + b^2$ and from this, we have the following. $* \; c = \sqrt{a^2+b^2}$

$* \; a^2 = c^2 - b^2$ and $* \; b^2 = c^2 - a^2$

$a = \sqrt{c^2 - b^2}$ $\qquad$ $b = \sqrt{c^2 - a^2}$.

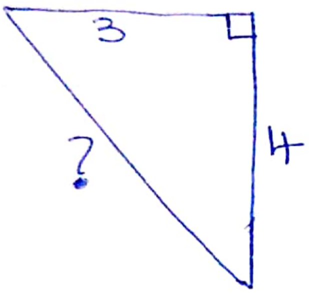
Conversely, if the square of one side of a triangle equal the sum of squares of the two other sides, then the triangle is a right angled triangle.

Exercise

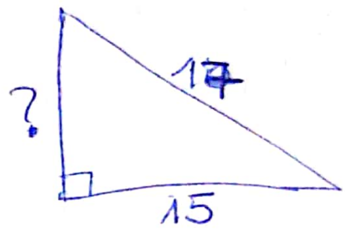
1) Find the missing side.

a)

(5)



b)



2) Say if it is a right angled triangle or not.