PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI
Week 9
LESSON NOTES

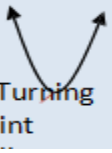
Year/Level: 12 **Subject:** Mathematics

Strand	3
Sub Strand	3.1.1
Content Learning Outcome	Students should be able to: • Draw Quadratic graphs

Lesson Notes

Topic: Quadratic Graphs

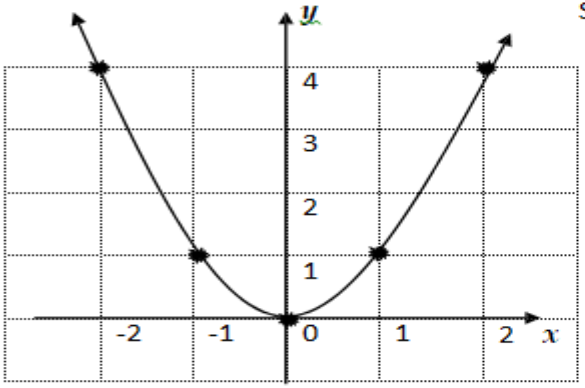
- **Quadratic Graphs** have a degree of 2, eg, $y = x^2, y = x^2 + 2 \; and \; y = (x-2)^2$
- The graph will be **symmetrical** about the **turning point (Vertex)**.
- **Symmetrical** objects will have one half as the reflection of the other half. Line of Symmetry – the line that divides the object into two equal halves.
- When drawn the graph has a parabola summarised in the table below

GRAPH $y = \pm a\,x^2$	POSITIVE SHAPE ($y = +a\,x^2$)	NEGATIVE SHAPE ($y = -a\,x^2$)
$y = x^2$, $y = -x^2 + 2$, $y = (x+1)^2$		Turning point

To sketch the quadratic graphs there are three methods:

EXAMPLE 1: Sketch graph of $y = x^2$
Using tables

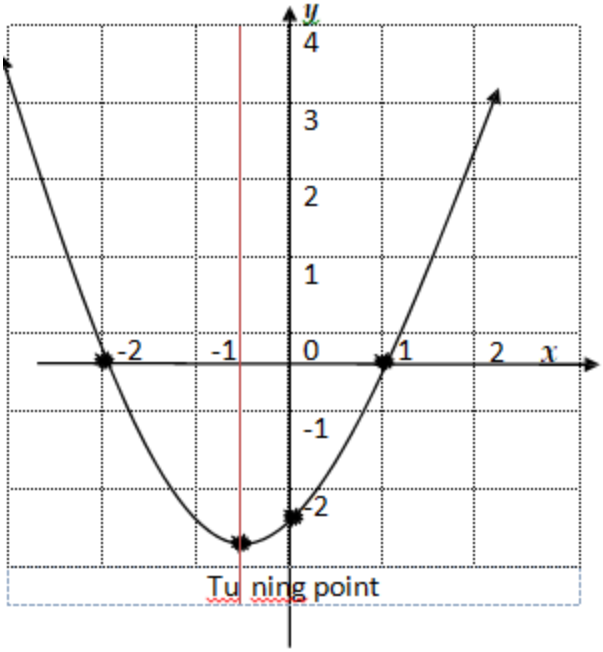
Take some x – values, i.e, positive and negative numbers.
Substitute those x values to find y



x	$y = x^2$	(x,y)
-2	$(-2)^2 = 4$	(-2,4)
-1	$(-1)^2 = 1$	(-1,1)
0	$(0)^2 = 0$	(0,0)
1	$(1)^2 = 1$	(1,1)
2	$(-2)^2 = 4$	(2,4)

EXAMPLE 2: Draw the graph of $y = x^2 + x - 2$

Using Intercepts



To find x – int, let y = 0:
Substitute 0 in place of y & solve
$0 = x^2 + x - 2$ ⟲ *Factorize*

x 2
x -1 →

$0 = (x + 2)(x - 1)$ *Solve*
$x + 2 = 0, \quad x - 1 = 0$
$x = -2, 1$ *[2 roots]*

To find y – int, let x = 0:
Substitute 0 in place of x & solve
$y = x^2 + x - 2$
$= 0^2 + 0 - 2$
$= -2$

Shape: $y = +x^2$
Turning point: Since symmetric, it should be at the midpoint of x – coordinates, thus

$$x_m = \frac{-2+1}{2} = \frac{-1}{2}$$

$$y = (-0.5)^2 + -0.5 - 2$$
$$= -2.25$$

Turning point= (-0.5, -2.25)

Activity

Sketch the following graphs

a) $y = x^2 - 25$
b) $y = -x^2 - 2x + 3$
c) $y = 3x - x^2$
d) $f(x) = x^2 - 2x$

Please note the third method is using **transformation of quadratic graphs** which will be covered in the **next** worksheets.