

LESSON NOTES

Year/Level: 12



Subject: Mathematics

Strand	3
Sub Strand	3.1.1
Content Learning Outcome	Students should be able to: <ul style="list-style-type: none"> <li>Find the x and y intercepts.</li> <li>Draw cubic graphs that can be factorised.</li> </ul>

**Lesson Notes**

**Topic: Cubic equations that can be factorized.**

**Note:** Cubic is derived from the word 'cube' which means power of 3 in algebra, i.e. the highest power of 3.


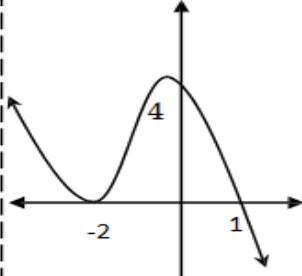
GRAPH	POSITIVE SHAPE $y = + a x^3$	NEGATIVE SHAPE $y = - a x^3$
Cubic function / graph		

To sketch the graph, follow **intercept** method from the linear and quadratics graph. Only new feature is that you will expect three  $x$  – intercepts [roots].

Also, if you see **square** then the point would be the vertex.

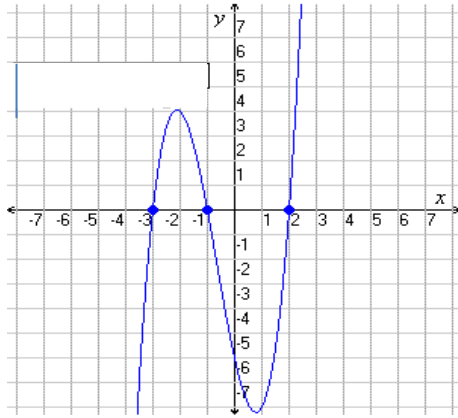
**Examples**

Example 1: Sketch the graph of  $y = (x + 2)^2(1 - x)$ , show all the intercepts clearly.

Shape	x-int, let $y = 0$ and solve and draw smooth curve	y-int, let $x = 0$ and solve	plot
$y = -x^3$ 	$y = (x + 2)^2(1 - x)$ $0 = (x + 2)^2 \cdot 0 = 1 - x$ $x = -2, x = 1$	$y$ $y = (0 + 2)^2(1 - 0)$ $= 4 \times 1$ $y = 4$	

The repeated factor in  $y = (x + 2)^2(1 - x)$  that is  $(x + 2)^2$  means the graph turns at  $x = -2$  as shown above

Example2: Find the equation of the graph below



The x- intercepts are given as  $x = -3, x = -1$  and  $x = 2$

Take it on the left side with the x

$x = -3, x = -1$  and  $x = 2$

$(x + 3)(x + 1)(x - 2)$  the shape is of positive coefficient so the equation is  $y = (x + 3)(x + 1)(x - 2)$

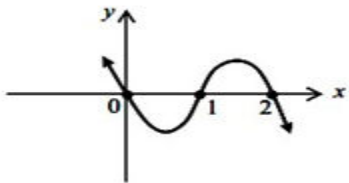
### Exercise

#### [Multiple Choice Questions]

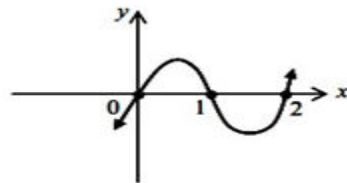
1. Which of the following has the equation

$$x(x - 1)(x - 2)?$$

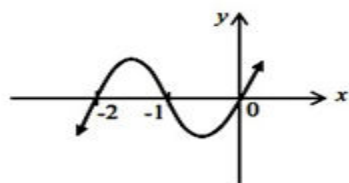
A.



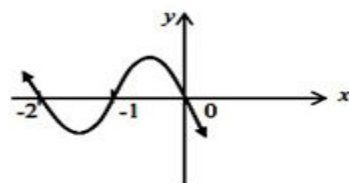
B.



C.



D.



#### [Questions requiring working]

2. Sketch the following graphs:

a)  $y = x(x^2 - 1)$

b)  $y = (x + 1)(x - 3)^2$

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

d)  $y = x^2(x + 2)$

3. Write the equation of the following graphs

