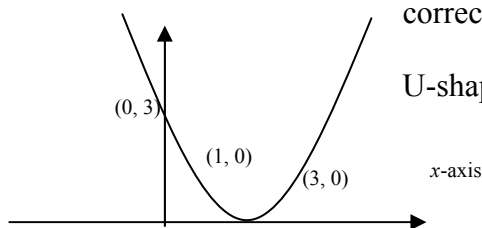


Curve Sketching – Test 5 Answers MEI – 2004 – C1

1. a) correct values for crossing axes **A1A1A1**



U-shaped parabola

A1

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

A1A1

c) Minimum when $(x - 2)^2 - 1$ is the smallest possible value

i.e. when $(x - 2)^2$ is smallest

$x = 2, y = -1$

A1A1 8

2. a) i) $x^2 + 4x + 1 = (x + 2)^2 - 4 + 1 = (x + 2)^2 - 3$

A1A1

ii) $2x^2 + x + 2 = 2[x^2 + \frac{1}{2}x + 1]$

$= 2[(x + \frac{1}{4})^2 - (\frac{1}{4})^2 + 1] = 2[(x + \frac{1}{4})^2 + \frac{15}{16}]$

$= 2(x + \frac{1}{4})^2 + \frac{30}{16}$

A1A1

b) i) $(-2, -3)$

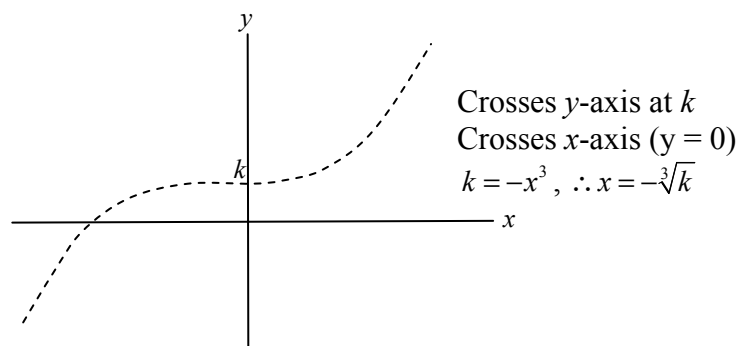
A1

ii) $(-\frac{1}{4}, \frac{30}{16})$

A1 6

3. a) $y = x^3 + k$, k a positive constant.

A1 for correct sketch

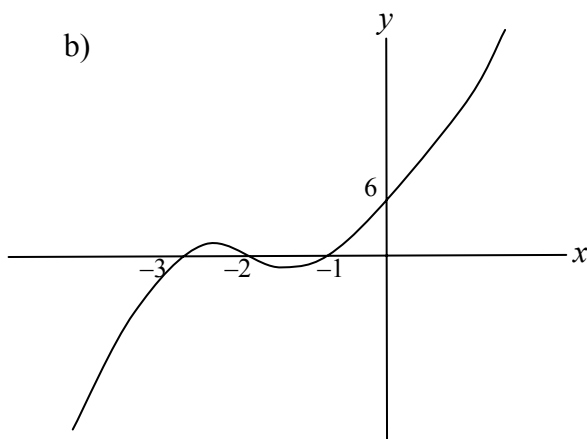


Crosses y-axis at k
Crosses x-axis ($y = 0$)
 $k = -x^3, \therefore x = -\sqrt[3]{k}$

A1

A1

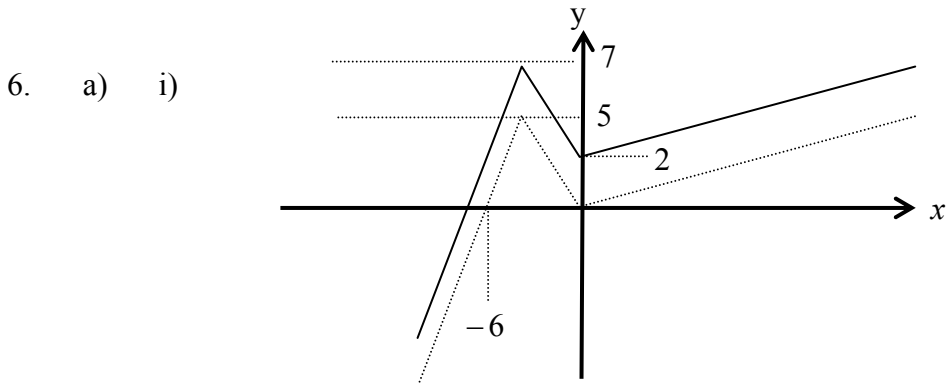
b)



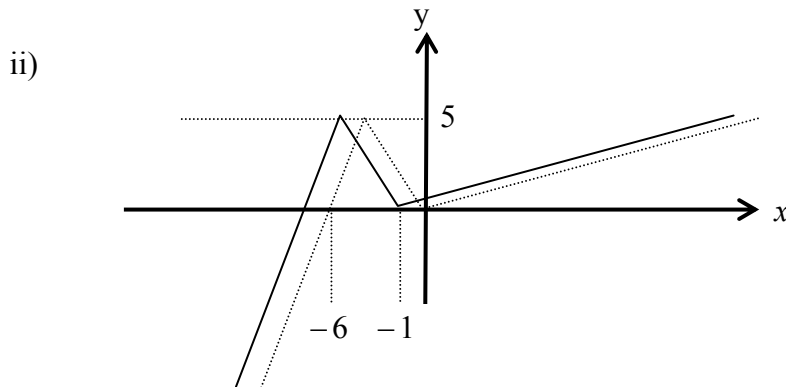
A1 for correct sketch

A1 for correct values **5**

4. a) At $x = b$ **A1**
 b) A False **A1** B True **A1** C False **A1** D True **A1** **5**
5. a) Intersection corresponds to solution of $x^2 = 2x + n$, **M1** $x^2 - 2x - n = 0$ **A1**
 Look at discriminant **M1** $a = 1, b = -2, c = -n$
 $b^2 - 4ac > 0$ **M1** $n > -1$ **A1**
 b) $b^2 - 4ac = 0$ **M1** $n = -1$ **A1**
 c) $b^2 - 4ac < 0$ **M1** $n < -1$ **A1** **9**



y-axis 2 **A1**
 local max 7 **A1**



x-axis -1 (and/or -7) **A1**
 local max *same height* (5) **A1**

- b) i) shift (or translated) **2 up** **A1**
 ii) shift (or translated) **1 left** **A1**

8

{41}