Edexcel

A Level

A Level Maths

Edexcel Core Maths C1 June 2010 Model Solutions

Name:

M M E

Mathsmadeeasy.co.uk

Total Marks:

Edexcel June 10 C1

1. $\sqrt{75} - \sqrt{27}$

$\sqrt{25 \times 3} - \sqrt{9 \times 3}$

$\sqrt{25} \times \sqrt{3} - \sqrt{9} \times \sqrt{3}$

$5\sqrt{3} - 3\sqrt{3} = 2\sqrt{3}$

2. $\int 8x^3 + 6x^{1/2} - 5 \, dx$

$= 4x^4 + 4x^{3/2} - 5x + c$

3a. $3(x-2) < 8 - 2x$

$3x - 6 < 8 - 2x$

$5x < 14$

$x < 14/5$

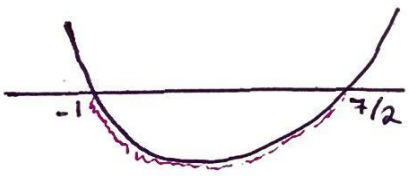
3b. $(2x-7)(1+x) < 0$

$2x + 2x^2 - 7 - 7x < 0$

$2x^2 - 5x - 7 < 0$

$(2x - 7)(x+1) < 0$

C.V.'s $x = 7/2$, $x = -1$



$-1 < x < 7/2$

3c. $x < 2.8$ and $-1 < x < 3.5$

$\therefore \quad -1 < x < 2.8$

4a. $x^2 + 6x + 11$

$(x+3)^2 - 9 + 11$

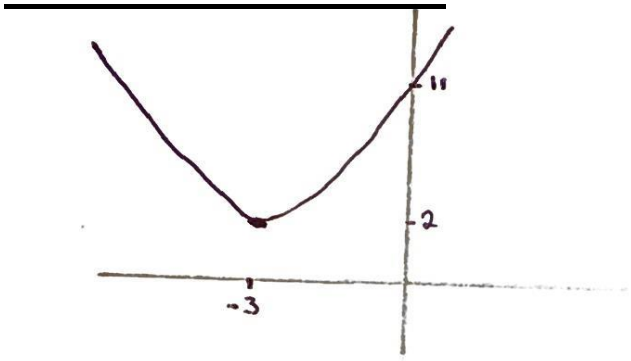
$(x+3)^2 + 2$

4b. $y = x^2 + 6x + 11$

from (a) minimum at $(-3, 2)$

when $x = 0$, $y = 0^2 + 6(0) + 11$

$= 11$



4c. $b^2 - 4ac$

$= 6^2 - 4(1)(11)$

$= 36 - 44$

$= -8$

5a. $a_{n+1} = \sqrt{a_n^2 + 3}$

$a_1 = 2$

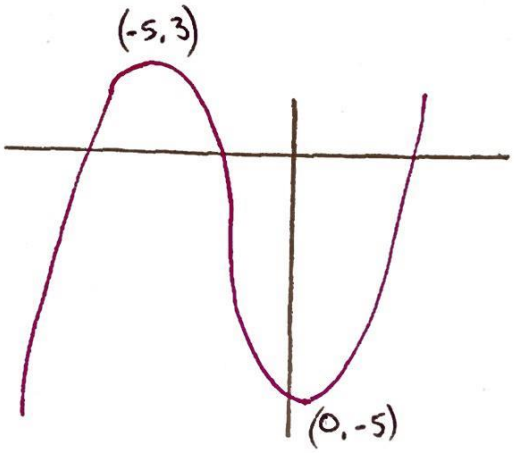
$a_2 = \sqrt{a_1^2 + 3} = \sqrt{2^2 + 3} = \sqrt{7}$

$a_3 = \sqrt{a_2^2 + 3} = \sqrt{(\sqrt{7})^2 + 3} = \sqrt{10}$

5b. $a_4 = \sqrt{a_3^2 + 3} = \sqrt{(\sqrt{10})^2 + 3} = \sqrt{13}$

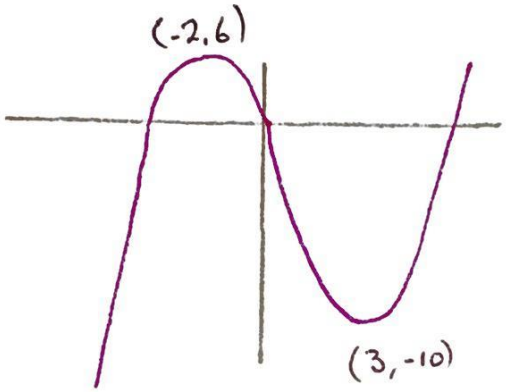
$a_5 = \sqrt{a_4^2 + 3} = \sqrt{(\sqrt{13})^2 + 3} = \sqrt{16} = 4$

6a.



Translation -3 units in positive x direction

6b.



Stretch s.f. 2 in y direction

6c. min. at $(3,0)$ $\Rightarrow$ graph has moved up 5

$\therefore \quad a = 5$

7. $y = 8x^3 - 4\sqrt{x} + \dfrac{3x^2 + 2}{x}$

$y = 8x^3 - 4x^{1/2} + \dfrac{3x^2}{x} + \dfrac{2}{x}$

$y = 8x^3 - 4x^{1/2} + 3x + 2x^{-1}$

$\dfrac{dy}{dx} = 24x^2 - 2x^{-1/2} + 3 - 2x^{-2}$

8a. $A(7,4)$ $B(2,0)$

$\text{grad} = \frac{4-0}{7-2} = \frac{4}{5}$

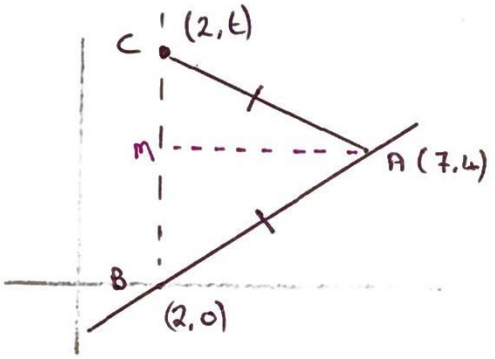
$y-0 = \frac{4}{5}(x-2)$ $\times 5$

$5y = 4x - 8$

$4x - 5y - 8 = 0$

8b. $|AB| = \sqrt{(7-2)^2+(4-0)^2} = \sqrt{25+16} = \sqrt{41}$

8c.



Isosceles $\Delta \Rightarrow t = 8$

8d. Area of Δ; base = BC = 8

height = AM = 5

$\therefore$ Area $= \frac{1}{2}(8 \times 5) = 20$

9a. $u_{30} = a + (30-1)d$

$= a + 29d = 40.75$

9b $S_n = \frac{1}{2}n(a+l)$ $(u_{30} = 40.75 = l)$

$S_{30} = \frac{1}{2}(30)(a + 40.75)$

$1005 = 15(a + 40.75)$

9c. $1005 = 15(a + 40.75)$ ①

$67 = a + 40.75$

$15\overline{)1005}$ → 67

$a = 26.25$

$a + 29d = 40.75$ ②

$26.25 + 29d = 40.75$

$29d = 14.5$

$d = 1/2$

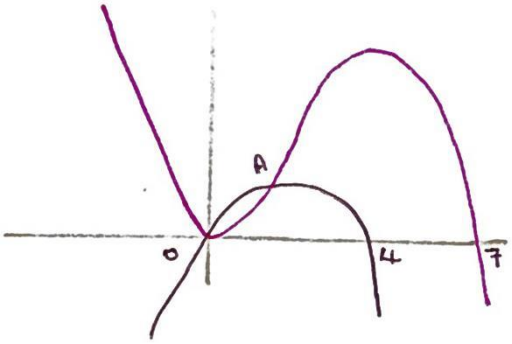
10a. $y = x(4-x)$ ⇒ roots at 0 and 4

$-x^2$ ∴ ∩ shaped

$y = x^2(7-x)$ ⇒ double root at 0

root at 7

$-x^3$ ∴  shaped



10b. $x(4-x) = x^2(7-x)$

$4x - x^2 = 7x^2 - x^3$

$x^3 - 8x^2 + 4x = 0$

$x(x^2 - 8x + 4) = 0$

10c. $x = 0$ or $x^2 - 8x + 4 = 0$

$(x-4)^2 - 16 + 4 = 0$

$(x-4)^2 = 12$

$x = 4 \pm \sqrt{12}$

$x = 4 \pm 2\sqrt{3}$

from sketch x co-ord of A $= 4 - 2\sqrt{3}$

10c. y coord: sub $x = 4-2\sqrt{3}$ into $y = x(4-x)$

$y = (4-2\sqrt{3})(4-(4-2\sqrt{3}))$

$= 2\sqrt{3}(4-2\sqrt{3})$

$= 8\sqrt{3} - 12$

$\therefore$ A $(4-2\sqrt{3}, -12+8\sqrt{3})$

11a. $\frac{dy}{dx} = 3x - \frac{5}{\sqrt{x}} - 2$

$= 3x - 5x^{-1/2} - 2$

$y = \int 3x - 5x^{-1/2} - 2 \, dx$

$= \frac{3}{2}x^2 - 10x^{1/2} - 2x + c$

when $y=5$, $x=4$, : $5 = \frac{3}{2}(4)^2 - 10.\sqrt{4} - 2(4) + c$

$5 = 24 - 20 - 8 + c$

$c = 9$

$f(x) = \frac{3}{2}x^2 - 10x^{1/2} - 2x + 9$

11b. at P $x = 4$, $\frac{dy}{dx} = 3(4) - \frac{5}{\sqrt{4}} - 2$

$= 10 - \frac{5}{2}$

$= \frac{15}{2}$

$y - 5 = \frac{15}{2}(x-4)$ $\times 2$

$2y - 10 = 15x - 60$

$15x - 2y - 50 = 0$