1. $x^2 - 4x + 2 = -x^2 - 8x$ M1

$x^2 + 2x + 1 = 0$ OR $(x+1)^2 = 0$ OR $2(x+1)^2 = 0$ M1

$(-1, 7)$ A2

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2. $u_2 = 1$ A1

$u_3 = 4$ A1

$u_4 = 1$ A1

$u_{10} = 1$ A1 dep on first 3 marks

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3. $2 + y = \sqrt{2}y$ M1

$2 = \sqrt{2}y - y$ OR $2 = y(\sqrt{2} - 1)$ M1

$y = \frac{2}{\sqrt{2} - 1}$ A1

$y = \frac{2(\sqrt{2}+1)}{(\sqrt{2}-1)(\sqrt{2}+1)}$ M1 ft

$y = 2 + 2\sqrt{2}$ A1 c.a.o

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4. a) $(x+2)^2 + 8$ A1 A1

b) 8 A1 dep

5. a) $16 - 8x < 30$ OR $4 - 2x < \frac{7}{2}$ M1

$-8x < 14$ OR $-4x < 7$ OE M1

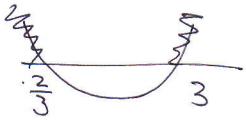
$x > -\frac{7}{4}$ A1

DO NOT ACCEPT $-\frac{7}{4} < x$

b) $x + 3x^2 - 12x + 6 > 0$ M1

$(3x - 2)(x - 3)$ M1

C.V IMPLIED OR STATED AS $\frac{2}{3}$, 3 A1



OR EQUIVALENT METHOD M1

$x < \frac{2}{3}$ OR $x > 3$ A1 dep

- IF $x + 3(x^2 - 4x + 2)$ IS TREATED AS $(x+3)(x^2 - 4x + 2)$ WHOLE QUESTION SCORES 0
- DO NOT ACCEPT $3 < x < \frac{2}{3}$
- ACCEPT AND INSTEAD OF OR

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6. $\frac{20}{2}[13 + 70]$ M3

830 A1

$\frac{20}{2}[2 \times 13 + 19 \times 3]$ M3

830 A1

IF NO MARKS ARE SCORED THEN AWARD ONE MARK FOR $13 + 16 + 19 + \ldots$

ALL MARKS ARE DEPENDENT ON QUANTITIES BEING PART OF THE CORRECT FORMULA

7. (a) $\frac{-2-2}{7-1}$ OR $\frac{2-(-2)}{1-7}$ M1

$-\frac{2}{3}$ A1

$y-2 = -\frac{2}{3}(x-1)$ OR $y+2 = -\frac{2}{3}(x-7)$ M1 ft

$2x+3y=8$ A1 c.a.o

(b) GRADIENT OF $\frac{3}{2}$ IS IMPLIED OR USED B1 ft

$y+2 = \frac{3}{2}(x+7)$ M1 ft

e.g. $2y = 3x-25$ OR $y = \frac{3}{2}x - \frac{25}{2}$ A1

(c) SUBSTITUTES $x=1$ INTO EITHER "l_2" M1 ft

$C(1, -11)$ OR "$y=-11$" A1 ft

$\frac{1}{2} \times 13 \times 6$ M1

39 A1 c.a.o

ALTERNATIVE $|AB| = \sqrt{52}$ OR $|BC| = \sqrt{117}$

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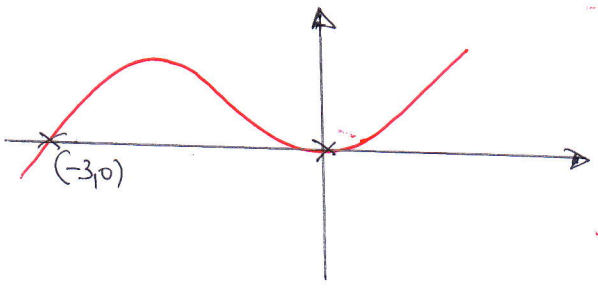
8. a)

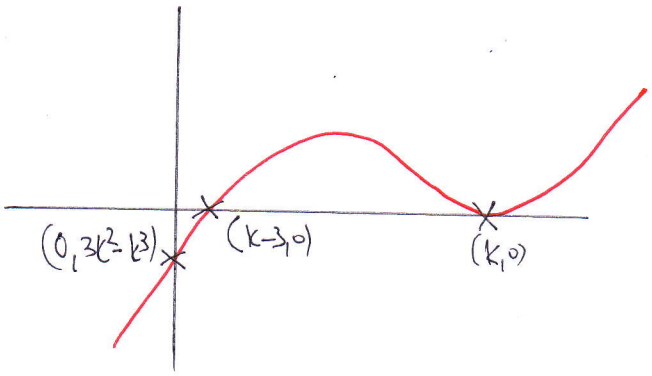


SHAPE ~ G1

TOUCHING AT ORIGIN G1

CROSSING AT (-3,0) G1

b)



TRANSLATION INTO CORRECT POSITION G1

CORRECT x INTERCEPTS BOTH A1

CORRECT y INTERCEPT A1

9. a) $500 = 77 + (n-1)\times 3$ OR PRACTICAL METHOD — M1

$n = 142$ — A1

"142" $\left[77 + 500\right]$ OR "142" $\left[2\times 77 + 141\times 3\right]$ — M2

40967 — A1 c.a.o

b) $\frac{71}{2}\left[80 + 500\right]$ OR $\frac{71}{2}\left[2\times 80 + 70\times 6\right]$ — M1

20590 — A1 c.a.o

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10 a) $\frac{4x^2 + 4x + 1}{9x^4}$ — M1

$\frac{4}{9}x^{-2} + \frac{4}{9}x^{-3} + \frac{1}{9}x^{-4}$ — A3

b) $-\frac{8}{9}x^{-3} - \frac{4}{3}x^{-4} - \frac{4}{9}x^{-5}$ — A2 −1 eeoo

ALLOW NON SIMPLIFIED FRACTIONS

c) $-\frac{4}{9}x^{-1} - \frac{2}{9}x^{-2} - \frac{1}{27}x^{-3} + C$ — A3

ALLOW NON SIMPLIFIED FRACTIONS BUT NO DOUBLE FRACTIONS

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11 $x^2 + (2m+3)x + m^2 = 0$ — B1

$b^2 - 4ac = 0$ OR $(2m+3)^2 - 4\times 1\times m^2 = 0$ — M1

$4m^2 + 12m + 9 - 4m^2$ — M1

$12m = -9$ — M1

$m = -\frac{3}{4}$ — A1

12. (a) $\frac{dy}{dx} = 12x^2 - 7$ M1

GRADIENT IMPLIED OR STATED AS 5 A1

$y = -4$ OR $(1, -4)$ B1

$y + 4 = 5(x - 1)$ OR A1

E.G. $y = 5x - 9$

(b) $4x^3 - 7x - 1 = 5x - 9$ M1

$x^3 - 3x + 2 = 0$ M1

$(x-1)^2(x+2) = 0$ A1

$x = -2$, $y = -19$ OR $(-2, -19)$ A2