

1. a)  $\frac{(3-\sqrt{3})(3-\sqrt{3})}{(3+\sqrt{3})(3-\sqrt{3})}$  M1

$\frac{9-3\sqrt{3}-3\sqrt{3}+3}{9-3\sqrt{3}+3\sqrt{3}-3}$  (O.E) M1

$2-\sqrt{3}$  A1 c.u.o

b)  $\frac{1}{x} = \frac{x}{16}$  OR  $x^2 = 16$  M1

$x = \pm 4$  A1 c.a.o

2  $2x^3 + x^{\frac{1}{2}} + 1 + 2x^{-1}$  (O.E) B1 B1

$6x^2 + \frac{1}{2}x^{-\frac{1}{2}} - 2x^{-2}$  (O.E) -A3 -1 eeo

3.  $\int (3x-1)^2 dx$  OR  $\int \dots$  M1

$9x^2 - 6x + 1$  B1

$f(x) = 3x^3 - 3x^2 + x + C$  A2 -1 eeo

$x=3$   $y=56$  used M1

$C = -1$  OR  $(f(x) =) 3x^3 - 3x^2 + x - 1$  A1

4. a) I DRAMS OR MNOTIONS  
NO OF INTERSECTIONS WITH  
 $y=2$

3 (ROOTS)

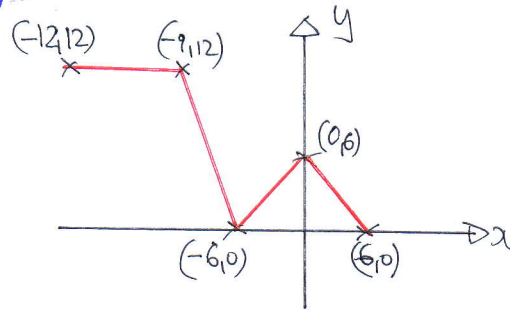
M1  
A1 dtp

(II) DRAMS OR MNOTIONS  
NUMBER OF INTERSECTIONS  
WITH  $y=x$

3 (ROOTS)

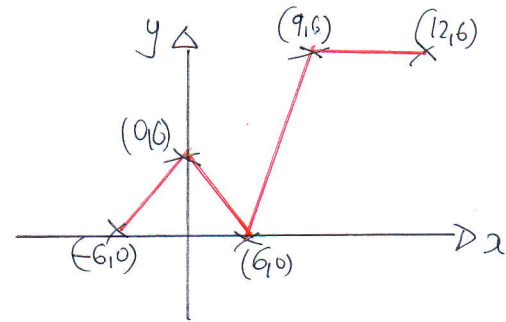
M1  
A1 dtp

b) (I)



CORRECT REFLEXION  
CORRECT CO-ORDINATES (5)  
(ALLOW ONE ADD OR OMISSION)

M1  
A1 dtp



CORRECT SHAPE IN THE  
CORRECT QUADRANT  
CORRECT 5 SETS OF  
CO-ORDINATES

M3 dtp  
-1 eeo

5. a) (5, 0)

B1

MUST BE WRITTEN AS CO-ORDINATE

b)  $\sqrt{(2-0)^2 + (10-4)^2}$  O.E. M1

$\sqrt{40}$  OR  $2\sqrt{10}$  -A1

c)  $|AB| = \sqrt{16}$  OR  $4\sqrt{10}$  B1

$\frac{1}{2} \times 4\sqrt{10} \times 2\sqrt{10}$  O.E. M1 ft

40 A1 c.a.o

d) SCALE FACTOR  $\frac{1}{2}$  OR 2 B1

30 A1 c.a.o

6.  $\frac{40}{2}(2 \times 1500 + 39(-7))$   
54540 A1 c.a.o

M3

MUST APPEAR IN THIS STRUCTURE TO SCORE

ALT 1  
1227 B1  
 $\frac{40}{2}(1227 + 1500)$  M2  
54540 A1 c.a.o

ALT 2  
 $\frac{200}{2}(2 \times 107 + 199 \times 7)$  OR  $\frac{160}{2}(2 \times 107 + 159 \times 7)$  M  
160700 A2  
54150 A1 c.a.o

7. a)  $x^2(x-4) = x(10-x)$  M1

$x^2 - 3x - 10 = 0$  A1

$(x-5)(x+2)$  M1

$(0,0)$   $(5,25)$   $(-2,-24)$  A2 -1 eeo

b)

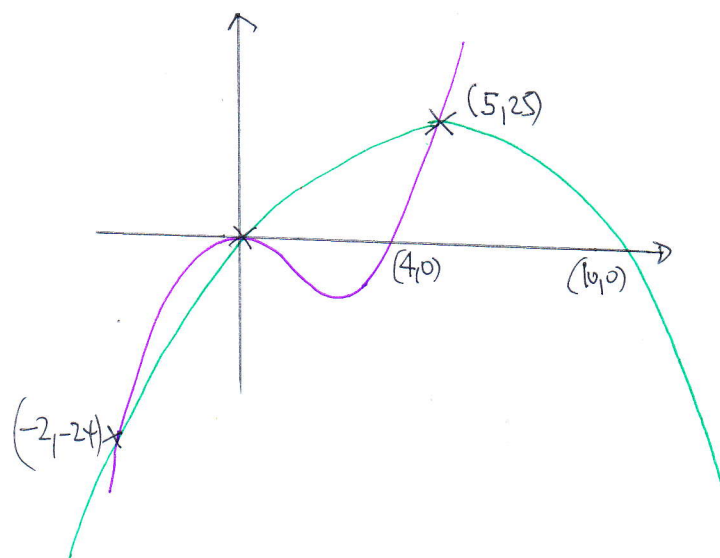
CORRECT SHAPE OF CUBIC TOUCHING AT 0

CORRECT SHAPE OF QUADRATIC THROUGH 0

$(1,0)$ ,  $(4,0)$ ,  $(5,25)$ ,  $(-2,-24)$  A2 -1 eeo

CORRECT RELATIVE POSITION BETWEEN GRAPHS M1

B1  
B1  
dtp  
dtp



8.

$$x^2 - 4x + 5 = m + 2 - x^2 \quad M1$$

$$2x^2 - 6x + 5 - m = 0 \quad M1$$

$$(-6)^2 - 4 \times 2(5 - m) = 0 \quad \underline{\text{OR}} \quad \text{STATES } b^2 - 4ac = 0 \quad M1$$

$$m = \frac{1}{2} \quad A1$$

$$2x^2 - 6x + (5 - \frac{1}{2}) \quad M1$$

$$4x^2 - 12x + 9 = 0 \quad \underline{\text{OR}} \quad M1$$

$$(2x - 3)^2 = 0 \quad \underline{\text{OR}} \quad M1$$

$$x = \frac{3}{2} \quad A1 \text{ c.o.o}$$

9.

a)  $\frac{dy}{dx} = 2 - x^{-2} \quad \underline{\text{OR}} \quad 2 - \frac{1}{x^2} \quad M1$

$$A(\frac{1}{2}, 3) \quad \underline{\text{OR}} \quad y = 3 \quad A1$$

$$\frac{dy}{dx} = -2 \quad A1$$

NORMAL GRADIENT  $\frac{1}{2} \quad M1 \quad \cancel{A1}$

$$4y - 2x = 11 \quad \text{o.e.} \quad A1 \quad \cancel{A1}$$

b) ATTEMPT TO SOLVE SIMULTANEOUS EQUATIONS M1

$$6x^2 - 11x + 4 = 0 \quad \underline{\text{OR}} \quad 12y^2 - 77y + 123 = 0 \quad A1$$

$$(2x - 1)(3x - 4) = 0 \quad \underline{\text{OR}} \quad (y - 3)(12y - 41) \quad M1$$

$$B(\frac{4}{3}, \frac{41}{12}) \quad A2$$

10 a) SIGHT OR USE OF PYTHAGORAS  
 SIGHT OF  $5x$  (AWARD 2 MARKS IF NO METHOD)  
 $3x + (3x+1) + (7x+1) + 5x$   
 $18x + 2$

M  
A1  
M  
A1

b)  $\frac{(3x+1) + (7x+1)}{2} \times 3x$  OR  $\frac{10x+2}{2} \times 3x$

CORRECT CONVINCING SIMPLIFICATION

c)  $x < 5$  dfp ON  $18x+2 < 92$  A1

$5x^2 + x - 22 > 0$  O.E. M1

$(5x+11)(x-2) > 0$  OR  $-\frac{11}{5}$  &  $2$  M1



M1 (OR SIMILAR METHOD)  
 A1 dfp

$x < -\frac{11}{5}$  OR  $x > 2$

$2 < x < 5$

A1