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.a.o

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

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

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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 eeoo

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

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

$f(x)=3x^3-3x^2+x+C$ A2 −1 eeoo

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

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

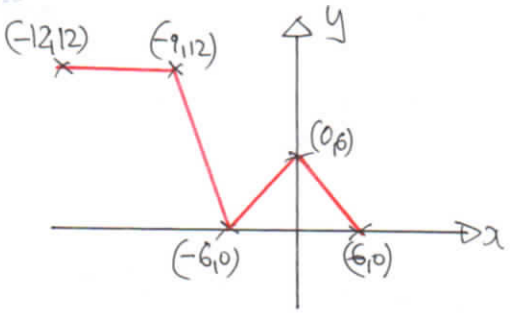
4. a) I DRAWS OR MENTIONS NO OF INTERSECTIONS WITH $y=2$ M1

3 (ROOTS) A1 dep

(II) DRAWS OR MENTIONS THE NUMBER OF INTERSECTIONS WITH $y=x$ M1

3 (ROOTS) A1 dep

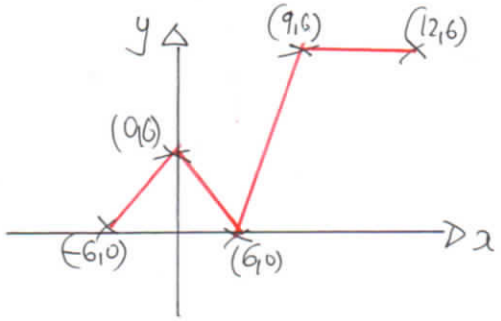
b) (I)



CORRECT REFLEXION M1

CORRECT CO-ORDINATES (5) A1 dep.

(ALLOW ONE ERROR OR OMISSION)



CORRECT SHAPE IN THE CORRECT QUADRANT

CORRECT 5 SETS OF CO-ORDINATES M3 dep

-1 eeoo

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5. a) (4,0) B1 MUST BE WRITTEN AS CO-ORDINATES

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

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

c) $|AB| = \sqrt{160}$ 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. $\frac{40}{2}(2\times1500+39(-7))$ M3

MUST APPEAR IN THIS STRUCTURE ONLY TO SCORE

54540 A1 c.a.o

ALT 1

1227 B1

$\frac{40}{2}(1227+1500)$ M2

54540 A1 c.a.o

ALT 2

$\frac{200}{2}(2\times107+199\times7)$ OR $\frac{160}{2}(2\times107+159\times7)$ M1

160 700 , 106 160 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 eeoo

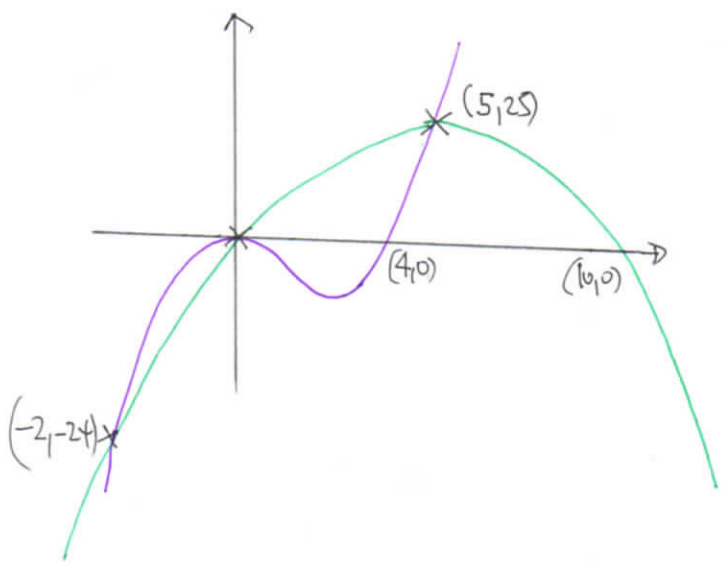
b)

CORRECT SHAPE OF CUBIC TOUCHING AT O B1

CORRECT SHAPE OF QUADRATIC THROUGH O B1

$(1,0)$, $(4,0)$, $(5,25)$, $(-2,-24)$ A2 −1 eeoo dep

CORRECT RELATIVE POSITION BETWEEN GRAPHS M1 dep



8. $x^2-4x+5 = m+2x-x^2$ M1

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

$(-6)^2-4\times2(5-m)=0$ OR STATES $b^2-4ac=0$ M1

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

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

OR

$4x^2-12x+9=0$ M1

OR

$(2x-3)^2=0$

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

9. a) $\frac{dy}{dx} = 2-x^{-2}$ OR $2-\frac{1}{x^2}$ M1

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

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

NORMAL GRADIENT $\frac{1}{2}$ M1 ft

$4y-2x=11$ O.E A1 ft

b) ATTEMPT TO SOLVE SIMULTANEOUS EQUATIONS M1

$6x^2-11x+4=0$ OR $12y^2-77y+123=0$ A1

$(2x-1)(3x-4)=0$ OR $(y-3)(12y-41)$ M1

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

10 a) SIGHT OF 3:4:5 OR USE OF PYTHAGORAS M1

SIGHT OF $5x$ (AWARD 2 MARKS IF NO METHOD) A1

$3x + (3x+1) + (7x+1) + 5x$ M1

$18x + 2$ A1

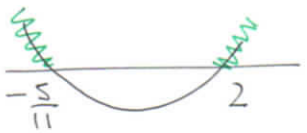
b) $\frac{(3x+1)+(7x+1)}{2} \times 3x$ OR $\frac{18x+2}{2} \times 3x$

CORRECT CONVINCING SIMPLIFICATION

c) $x < 5$ dep 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)

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

A1 dep

$2 < x < 5$ A1