1.

$2\sqrt{2}$, $5\sqrt{2}$, $2\sqrt{6}$, $3\sqrt{6}$ A1 (AT LEAST 3 CORRECT OUT 4)

$35\sqrt{12}$ OR $7\sqrt{2} \times 5\sqrt{6}$ A1

$70\sqrt{3}$ c.a.o A1

2.

$36^{\frac{1}{2}} = 6$ OR $16^{\frac{1}{4}} = 2$ IS IMPLIED M1

$\frac{1}{8^{\frac{2}{3}}}$ OR $\frac{1}{(\sqrt[3]{8})^2}$ A1

$\frac{1}{4}$ c.a.o A1

3.

(a) $3(x+2)^2 - 4$ B1, B1, B1

(b) THE MINIMUM VALUE IS "-4" A1 ft

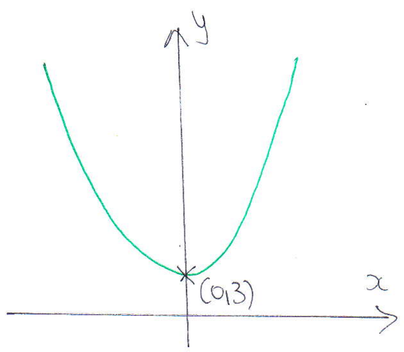
PENALISE "$(-2,-4)$" AS ANSWER

(c) "$3(x+2)^2 = 4$" M1 ft

"$x+2 = \pm\sqrt{\frac{4}{3}}$" M1 ft

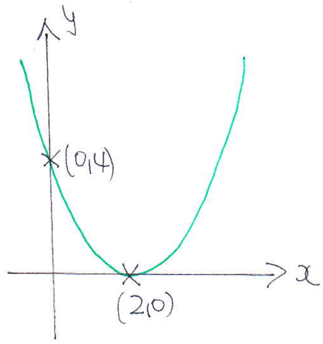
$x = -2 \pm \frac{2}{\sqrt{3}}$ OR $x = -2 \pm \frac{2}{3}\sqrt{3}$ o.e A1 c.a.o

4.



"SHAPE SYMMETRICAL IN y" B1

(0,3) B1

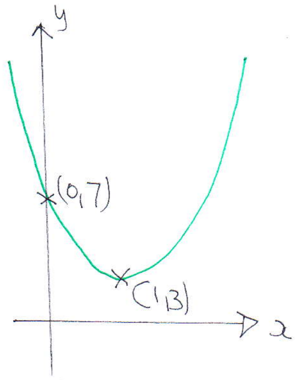


"SHAPE IN CORRECT POSITION"

AND

(2,0) B1

(0,4) B1

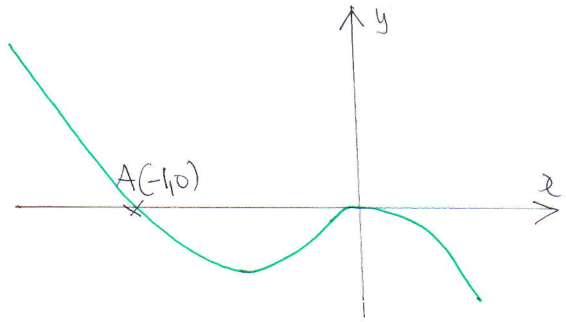


SHAPE IN CORRECT POSITION

(1,3) A1 dep

(0,7) A1 dep

5. (a)



$\smile\!\!\frown$ B1

TOUCHES AT O M1 dep

(-1,0) B1

(b) $\left(\frac{dy}{dx}=\right) -3x^2-2x$ M1

IMPLIES GRADIENT IS -1 (NOTE THAT POINT IS ALSO (-1,0)) A1

CORRECT USE OF $y-y_0=m(x-x_0)$

$y-0=-1(x+1)$ M1

SIMPLIFIES CONVINCINGLY TO $x+y+1=0$ A1

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6. (a) $(u_2=)\ a+260$ A1

$(u_3=)\ \frac{3}{2}a+130$ A1

$(u_4=)\ \frac{7}{4}a+65$ A1

follow through for a maximum of 1 "step"

"$\frac{7}{4}a+65=72$" M1

$a=4$ c.a.o A1

(b) "$9=4+\frac{1}{2}u_9$" M1

$u_9=10$ A1

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7. $96=28+(n-1)\times4$ B1, B1, B1 MUST BE IN THE CORRECT POSITION IN THE FORMULA

$n=18$ A1

$\frac{18}{2}(28+96)$ OR $9\times(28+96)$ OR $\frac{18}{2}[2\times28+17\times4]$ M1

9×124 M1

CALCULATION MUST BE SEEN, THEN EQUAL 1116 A1

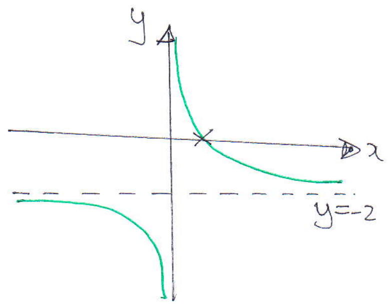
8. a) $\left(f(x)=\right)\int -\frac{4}{x^2}\,dx$ OR $\int -4x^{-2}\,dx$ M1

$\left(f(x)=\right)\ \frac{4}{x}+c$ OR $4x^{-1}+c$ A1 A1

$2 = 4 + c$ M1

$c=-2$ OR $f(x)=\frac{4}{x}-2$ A1

b)



RECIPROCAL SHAPE (CAREFULLY DRAWN) B1

TRANSLATION TO $y=-2$ MUST BE STATED A1 dep

(2,0) B1

9. $k(2x^2+1)=x^2-2x$ M1

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

$b^2-4ac=0$ OR $2^2-4(2k-1)k=0$ M1

$2k^2-k-1=0$ OR $8k^2-4k-4=0$ A1

$(2k\pm1)(k\pm1)$ M1

$k=1$ A1

$k=-\frac{1}{2}$ A1

10. a) $2(2x+4)+2(3x+2)$ OR $10x+12$ M1

$27 < \text{"}10x+12\text{"} < 52$ A1 ft

$27-\text{"}12\text{"} < \text{"}10x\text{"} < 52-\text{"}12\text{"}$ M1 ft.

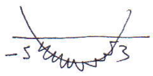
$1.5 < x < 4$ O.E A1

b) $(2x+4)(3x+2)-4x < 98$ M1

$6x^2+12x-90<0$ OR $x^2+2x-15<0$ A1

$(x-3)(x+5)$ M1

C.V ARE IMPLIED AS 3 & -5 (BOTH) A1



OR SIMILAR METHOD M1

$1.5 < x < 4$ O.E A1 dep

$1.5 < x < 3$ O.E A1 c.a.o

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11. a) $y-4=\frac{1}{2}(x-3)$ O.E

$y=\frac{1}{2}x+\frac{5}{2}$

b) SUBSTITUTES CONVINCINGLY $x=3$ TO OBTAIN $y=4$

c) $\sqrt{(1-4)^2+(-3-3)^2}$ O.E

$\sqrt{45}$ OR $3\sqrt{5}$

d) $\frac{1}{2}p+\frac{5}{2}p$ B1

$\sqrt{125}=\sqrt{(\frac{1}{2}p-\frac{3}{2})^2+(p-3)^2}$ O.E (SQUARE ROOTS MAY BE MISSING) M1

$500=5p^2-30p+45$ O.E.

E.g $p^2-6p-91=0$ A1

$(p\pm7)(p\pm13)$ M1

$p = -7, 13$ (BOTH) A1