1. (a) $3 + 2\sqrt{2}$ A1 A1

(b) $\sqrt{25}\sqrt{3}$ , $\dfrac{(3+\sqrt{3})(3+\sqrt{3})}{(3-\sqrt{3})(3+\sqrt{3})}$ , $-2$ M1 M1 M1

$10\sqrt{3}$ , $\dfrac{12+6\sqrt{3}}{6}$ OR $2+\sqrt{3}$ A1 A1

$11\sqrt{3}$ A1

2. (a) $(u_2 =) -1$ A1

$(u_3 =) = \frac{1}{2}$ A1

$(u_4 =) = 2$ A1

(b) $(u_{12} =) \frac{1}{2}$ A1

(c) $u_1 + u_2 + u_3 + \cdots + u_{12}$ (MAY BE IMPLIED) M1

$4(u_1+u_2+u_3)$ OR $4\times(2-1+\frac{1}{2})$ OR $4\times 1.5$ M1

6 A1

3. (a) $(x+3)^2 + 1$ A1 A1

(b) TRANSLATION B1

3 UNITS/STEPS B1

"LEFT", NEGATIVE $x$ DIRECTION A1 dep

TRANSLATION, 1 UNIT, "UPWARDS" o.e B1

OR

TRANSLATION B1

1 UNIT B1

"UPWARDS", IN THE POSITIVE $y$ DIRECTION A1 dep

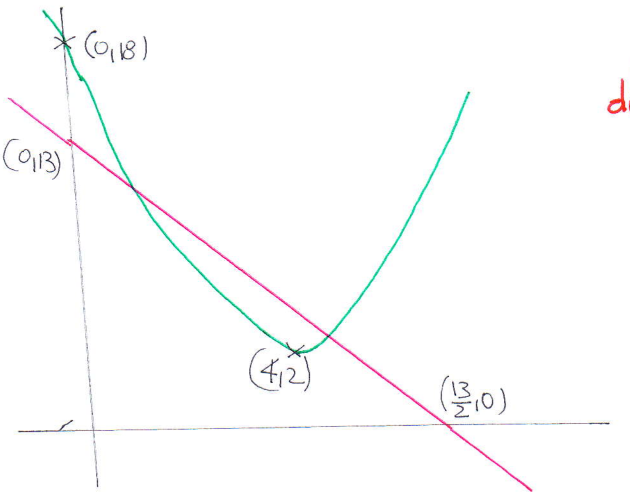
TRANSLATION, 3 UNITS, TO THE "LEFT", o.e B1

OR

TRANSLATION, $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$ , BOTH INSIDE VECTOR

B1 B1 A1 A1

4. (a)




DO NOT PENALISE IF L & C DO NOT INTERSECT

B1 CORRECT SHAPE

dep B1 MINIMUM AT 1st QUADRANT

B1 (0,18)

B1 (0,13) + STRAIGHT LINE WITH NEGATIVE GRADIENT

B1 $(\frac{13}{2},0)$ + STRAIGHT LINE WITH NEGATIVE GRADIENT

(b)

$x^2-8x+16+2 = 13-2x$

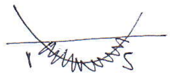
$(x^2-8x+18 = 13-2x)$ M1

$x^2-6x+5=0$ A1

$(x-1)(x-5)=0$ M1

$x = 1, 5$ (BOTH) A1

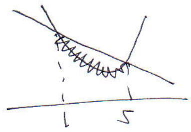
(c)




OR EQUIVALENT METHOD M1

$1<x<5$ c.a.o A1 dep

OR




M1

$1<x<5$ c.a.o A1 dep

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5.

$8x^2-(k-1)x+2=0$ M1

OR $-8x^2+(k-1)x-2=0$

$b^2-4ac=0$

OR $[-(k-1)]^2-4\times8\times2=0$ B1

DO NOT PENALIZE IF MISSING

$(k-1)^2=64$ A1

$k-1=\pm8$ M1

$k = 9$ A1

$k = -7$ A1

ALTERNATIVE LAST 4 MARKS

$k^2-2k-63=0$ A1

$(k-9)(k+7)=0$ M1

$k = 9$ A1

$k = -7$ A1

6. $(y=)\ 4x^{\frac{5}{2}}-1$ B1

$\left(\frac{dy}{dx}=\right)\ 10x^{\frac{3}{2}}$ B1

$\left(\frac{d^2y}{dx^2}=\right)\ 15x^{\frac{1}{2}}$ B1

$4x^2(15x^{\frac{1}{2}})-15(4x^{\frac{5}{2}}-1)$ o.e. M1

$60x^{\frac{5}{2}}-60x^{\frac{5}{2}}+15$ A1

$15$ A1

---

7. $(f(x)=)\int 3-4x\ dx$ B1

$(f(x)=)\ 3x-2x^2+C$ A2 (−1 eeoo)

$3-2+C=2(6-8+C)$ o.e M1

$C=5$ OR $(f(x)=)\ 5+3x-2x^2$ A1

$R(0,5)$ $P(-1,0)$ $Q(\frac{5}{2},0)$ A1 A1 A1 (IGNORE LABELS

---

8. (a) $\frac{9}{2}(2X+8(2Y))$ o.E M1

SIMPLIFY CONVINCINGLY TO $9(X+8Y) \leftarrow (\mathrm{I})$ A1

(b) $\frac{9}{2}[2(X+2000)+8Y]$ M1

$9[2000+X+4Y]$ OR $9X+36Y+18000 \leftarrow (\mathrm{II})$ A1

$\mathrm{I}=\mathrm{II}+3600$ OR $\mathrm{I}-\mathrm{II}=3600$ M1

SIMPLIFICATION OF PREVIOUS LINE (AT LEAST ONE SIGNIFICANT STEP) M1

CONVINCINGLY ARRIVES TO $Y=600$ A1

(c) $36000=X+10(2Y)$ OR $36000=X+10(1200)$ M1

SIMPLIFICATION OF EQUATION IN ONE VARIABLE M1

$X=24000$ c.a.o A1

10. a) GRAD AB $= \frac{1}{5}$ B1

CORRECT USE OF $y - y_0 = m(x - x_0)$ M1

$x - 5y + 16 = 0$

OR $5y - x - 16 = 0$ A1

b) PERPENDICULAR GRADIENT $-5$ (MAY BE IMPLIED IN EQUATION BELOW) B1

$y = 24 - 5x$ OE OR $y = -5x - 2$ o.E A1

SOLVES "THEIR EQUATION" FROM ABOVE WITH $5y - x + 10 = 0$
(INDICATION IS SUFFICIENT) M1 ft

DECENT ATTEMPT TO SOLVE EQUATIONS M1 ft

$(5, -1)$ OR $(0, -2)$ A1 A1 (ONE MARK PER CO-ORDINATE)

ATTEMPTS TO FIND DISTANCE FROM $(4,4)$ TO "$(5,-1)$"
OR FROM $(-1,3)$ TO "$(0,-2)$" M1 ft

$\sqrt{26}$ c.a.o A1

c) INDICATES $|AB| = \sqrt{26}$ M1

$\sqrt{26} \times \sqrt{26} = 26$ A1 dep