1. (a) $\frac{\sqrt{49}}{\sqrt{2}}$ OR $\frac{7}{\sqrt{2}}$ OR $\frac{\sqrt{25}}{\sqrt{2}}$ OR $\frac{5}{\sqrt{2}}$ M1

$\frac{2}{\sqrt{2}}$ M1

$\sqrt{2}$ c.a.o A1

(b) $\frac{\sqrt{2}(1-\sqrt{2})}{(1+\sqrt{2})(1-\sqrt{2})}$ B1

$\sqrt{2}-2$ OR -1 A1

$2-\sqrt{2}$ OR $-\sqrt{2}+2$ A1

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2. (a) $8+3x > 4x+10$ OR $4x+10 < 3x+8$ M1

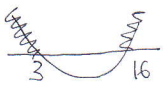
$x < 18$ A1

DON'T ACCEPT $18 > x$

(b) $x^2-14x+40 \geqslant 5x-8$ OR $x^2-19x+48 \geqslant 0$ M1

$(x-16)(x-3)$ A1

SIGHT OF 16, 3 (BOTH) MAY BE IN A DIAGRAM A1



← Dep (or similar)

$x \leqslant 3$ OR $x \geqslant 16$ A1

ACCEPT "AND"
MUST HAVE $\leqslant$ $\geqslant$
DO NOT ACCEPT $16 \leqslant x \leqslant 3$

(c) $x \leqslant 3$ OR $16 \leqslant x < 18$

A1 c.a.o A1 c.a.o

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3. $b^2-4ac=0$ OR $(2m)^2-4\times1\times(3m+4)=0$ M1

$4m^2-12m-16=0$ OR m^2-3m-4 A1

$(m-4)(m+1)$ M1

$m=4$ A1

$m=-1$ A1

MUST HAVE $m=\ldots$
DO NOT ACCEPT $x=\ldots$

4.

$x = 9 - y$ B1

$(9-y)^2 - 3(9-y)y + 2y^2 = 0$ M1

OR $6y^2 - 45y + 81 = 0$ / $2y^2 - 15y + 27 = 0$ M1

$(2y-9)(y-3)$ M1

$y = \frac{9}{2}, 3$ A1 BOTH

$x = 6, \frac{9}{2}$ A1 BOTH

$y = 9 - x$ B1

$x^2 - 3x(9-x) + 2(9-x)^2$ M1

$6x^2 - 63x + 162 = 0$ / OR $2x^2 - 21x + 54 = 0$ M1

$(2x-9)(x-6)$ M1

$x = 6, \frac{9}{2}$ A1 BOTH

$y = 3, \frac{9}{2}$ A1 BOTH

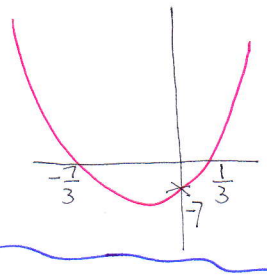
5. (a) $(3x \pm 1)(3x \pm 7)$ M1

$x = \frac{1}{3}, \frac{7}{3}$ A1 BOTH

(b) $9(x+1)^2 - 16$ OR $A = 1,\ B = -16$ B1 B1

(c) (MINIMUM VALUE IS) -16 B1 DO NOT ACCEPT $(-1, -16)$

(d)

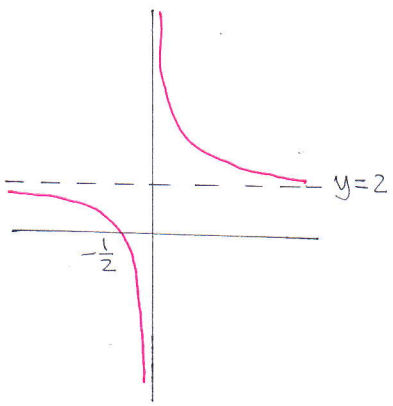


B1 SHAPE

B1 $-\frac{7}{3}, \frac{1}{3}$ BOTH CORRECTLY MARKED

B1 -7 CORRECTLY MARKED

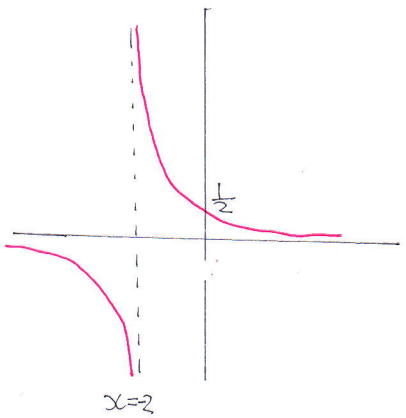
6.



B1 CORRECT SHAPE IN THE CORRECT QUADRANT

B1 $y = 2$ (ASYMPTOTE)

B1 $-\frac{1}{2}$ (CORRECT x INTERCEPT)



B1 CORRECT SHAPE IN THE CORRECT QUADRANT

B1 $x = -2$ (ASYMPTOTE)

B1 $\frac{1}{2}$ (CORRECT y INTERCEPT)

7. (a) $y = -\frac{5}{4}x + \frac{7}{4}$ OR SIGHT OF $-\frac{5}{4}$ B1

$y - 7 = -\frac{5}{4}(x - 4)$ M1

$5x + 4y = 48$ ⊛ A1

(b) SIGHT OF $\frac{4}{5}$ B1

$y - 7 = \frac{4}{5}(x - 4)$ M1

$5y = 4x + 19$ O.E A1

(c) CORRECT APPROACH — SUBSTITUTION OR ELIMINATION ATTEMPT M1

$y = -3$ OR $x = 12$ WITH CORRECT WORKINGS A1

$x = 12$ OR $y = -3$ WITH CORRECT WORKINGS A1

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8 (a) $15360 = \frac{12}{2}[2 \times 1500 + 11 "d"]$ O.E. M1

ATTEMPT TO SOLVE AT LEAST "TWO STEPS" FROM THREE M1

$x = +40$
(ACCEPT -40) A1

(b) $T_n = \frac{n}{2}[2 \times 1500 + (n-1)(-40)]$ O.E M1

$T_n = 20n(76 - n)$

SIMPLIFIES TO THE ANSWER GIVEN IN A CONVINCING WAY A1

(c) ATTEMPTS SOLUTION BY TRIALS OR $n^2 - 76n + 1300$ M1

26 A1

50 A1

(d) ATTEMPTS TO FIND $U_{26} = 500$ OR $U_{50} = -460$ OR < 0 M1

$\therefore n = 26$ A1 dep

9. (a) $\left(\frac{dy}{dx} =\right) 3x^2 - 10$ A1

GRADIENT = 2 ← SIGHT A1

VALID METHOD $y - y_0 = m(x - x_0)$ M1

$y = 2x - 14$ O.E. A1

$x + 2y + 18 = 0$ O.E. A1

(b) $x = 7$, $A(7, 0)$ EITHER A1

$y = -9$, $B(0, -9)$ EITHER A1

AREA = 31.5 O.E A1 ft

10. (a) $12x^{\frac{1}{2}}$, $-x^{-\frac{1}{2}}$ A2

$f(x) = 8x^{\frac{3}{2}} - 2x^{\frac{1}{2}} + C$ A3 ← IF A0 OR A1 AWARD M1 FOR $\int$

USES $(0, 0)$ OR EXPLICITLY STATES $C = 0$ M1

$f(x) = 8x^{\frac{3}{2}} - 2x^{\frac{1}{2}}$ A1 dep

(b) $2x^{\frac{1}{2}}(4x - 1)$ OR SIGHT OF $4x - 1$ M1

$P(\frac{1}{4}, 0)$ OR $\frac{1}{4}$ A1