1. $x^3 \quad -4x^{\frac{3}{2}} \quad + x^{-1}$ $+ \frac{1}{x}$ $\quad + 4x \quad (+ C)$ A4

ALLOW IF MISSING

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2. (a) $\sqrt{7} + 7 + 2 + 2\sqrt{7}$ M1 (ALLOW ONE ERROR)

$9 + 3\sqrt{7}$ A1 c.a.o

(b) $\frac{5\sqrt{2} + 3\sqrt{2}}{2\sqrt{2}}$ OR $\frac{\sqrt{400} + \sqrt{144}}{8}$ M1

4 A1 c.a.o

---

3. $\frac{20}{2}[17 + 264]$ OR $\frac{20}{2}[2\times17 + 19\times13]$ M3 DEPENDENT ON STRUCTURE

2810 A1 c.a.o

IF NO MARKS ARE SCORED ALLOW 1 MARK FOR $17 + 30 + 43$

OR $17, 30, 43,$

---

4. $\int 6x^2 - 4x \, dx$ B1

$2x^3 - 2x^2 + C$ A2 −1 eeoo

$x=1 \quad y=1$ — OR $3 = 2\times1^3 - 2\times1^2 + C$ OR SIMILAR M1 ft

$C=3$ OR $f(x) = 2x^3 - 2x^2 + 3$ A1 c.a.o

5. (a) ATTEMPTS SUBSTITUTION M1

SIMPLIFIES TO $x^2-6x-16=0$ OR $y^2-11y-26=0$ M1

FACTORIZES $(x+2)(x-8)$ OR $(y-13)(y+2)$ M1

$x=-2, 8$ OR $y=-2, 13$ A1

$P(-2,-2)$ $Q(8,13)$ A1 c.a.o

(ALLOW MISSING LABELS)

b) GRAD $\dfrac{-2+3}{-2-0}$ OE OR $\dfrac{13+3}{8-0}$ O.E M1

GRAD $= -\frac{1}{2}$ OR -2 A1

EVALUATES THE GRADIENT OF THE SEGMENT "HE" DID NOT USE + COMMENT E1

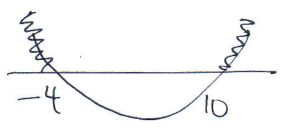
6.

$\boxed{x = \text{LENGTH}}$

$x(x-6)>40$ M1

$x^2-6x-40>0$ M1

$(x+4)(x-10)>0$ A1



OR SIMILAR M1

$x<-4$ OR $x>10$ A1 dep

$x>10$ CLEARLY STATED A1 dep

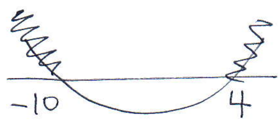
OR LENGTH >10

$\boxed{x = \text{WIDTH}}$

$x(x+6)>40$ M1

$x^2+6x-40>0$ M1

$(x+10)(x-4)>0$ M1



OR SIMILAR M1

$x<-10$ OR $x>4$ A1 dep

CLEARLY IMPLIES LENGTH >10 A1 dep

- ALLOW $\geq$ THROUGHOUT
- DO NOT ALLOW BAD NOTATION e.g $10>x>-4$
- ALLOW $x<-4$ AND $x>10$

7. a) $300 + 11 \times 5$ M1

355 A1

b) $\frac{48}{2}\left[2\times 300 + 47\times 5\right]$ M1

20040 A1

c) $"20040" = \frac{48}{2}\left[2a + 47\times 15\right]$ M1 ft structure

M1

ATTEMPTS SENSIBLE SOLUTION WITH AT LEAST ONE "SIGNIFICANT" STEP M1 ft

$a = 65$ A1 c.a.o

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8. a) $b^2 - 4ac = 0$ OR $(2m)^2 - 4\times 1\times(3m+4) = 0$ M1

$4m^2 - 12m - 16$ OR $m^2 - 3m - 4 = 0$ M1

$(m+1)(m-4)$ A1

$m = \begin{cases} -1 \\ 4 \end{cases}$ (BOTH) A1

b) $x^2 - 2x + 1$ M1

$(1,0)$ A1 dep

$(-4,0)$ A1

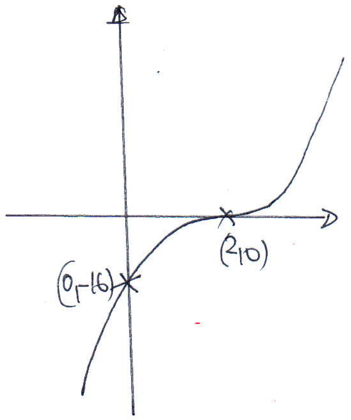
OR

$x^2 + 8x + 16$ M1

$(-4,0)$ A1 dep

$(1,0)$ A1 dep

9. (a)



B1 CORRECT SHAPE

B1 (2,0) (0,-16) BOTH

(b) ATTEMPTS TO MULTIPLY "TWO" BRACKETS FOLLOWED BY A "THIRD" M1

$2x^3-12x^2+24x-16$ A1

$(f'(x)) = 6x^2-24x+24$ A1 ft

c) "SUBSTITUTES" $x=3$ INTO "THEIR" $f'(x)$ M1

GETS GRADIENT "6" A1 ft

$y+2 = "6"(x-1)$

A1 ft

d) $"6x^2-24x+24" = "6"$ M1 ft

$x^2-4x+3=0$ A1 c.a.o

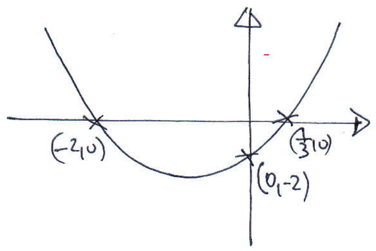
$(x-3)(x-1)$ OR $x = 3, 1$ A1

$Q(1,-2)$ A1

$y+2 = 6(x-1)$ & SIMPLIFIES TO $y=6x-8$ A1

10. a) $(3x-1)(x+2)$ M1

$x = \frac{1}{3}, -2$ BOTH A1

b) 

CORRECT SHAPE IN CORRECT RELATIVE POSITION IN THE 4 QUADRANTS } M1

$(\frac{1}{3},0)$, $(-2,0)$, $(0,-2)$ ALL 3 } M1

c) $(-6,0)$ & $(1,0)$ BOTH B1

$(0,-2)$ B1

d) $3(x+1)^2 + 5(x+1) - 2$ M1

$y = 3x^2 + 11x + 6$ A1

OR

$(x+3)(3x+2)$ M1

$y = 3x^2 + 11x + 6$ A1

ALLOW ONE MISTAKE IN ONE OF THE COEFFICIENTS OF THE LAST A1 SO LONG AS M1 HAS BEEN SCORED

---

11 a) 2×2^x OR B1

$2^3 \times 2^{-x}$ OR 8×2^{-x} OR $\frac{8}{2^x}$ B1

$2y + \frac{8}{y} = 17$ M1

$2y^2 + 8 = 17y$ & WRITES FINAL SHOW A1

b) $(2y-1)(y-8)$ M1

$y = \frac{1}{2}, 8$ BOTH A1

$x = -1$ A1 dep on $y = \frac{1}{2}$

$x = 3$ A1 dep on $y = 3$