1. $3x^2 - 5 = 2x$ o.e M1

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

$x = \begin{cases} -1 \\ \frac{5}{3} \end{cases}$ A1 A1

---

2. $\sqrt{3}x - 3 = x + \sqrt{3}$ "MULTIPLIG" M1

$\sqrt{3}x - x = 3 + \sqrt{3}$ "ATTEMPTS TO ISOLATE x" M1

$\frac{3+\sqrt{3}}{\sqrt{3}-1}$ o.e. A1

$\frac{(3+\sqrt{3})(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)}$ OR "ATTEMPTS TO RATIONALIZE" M1 ft.

$\frac{3\sqrt{3}+3+3+\sqrt{3}}{3+\sqrt{3}-\sqrt{3}-1}$ ← CORRECT EITHER OF THESE LINES M1 ft

$3 + 2\sqrt{3}$ A1 c.a.o

---

a) • $38 = a + 4d$ B1

• $158 = a + 19d$ B1

GOOD ATTEMPT AT SIMULTANEOUS EQUATIONS M1

$d = 8$ A1 c.a.o

$a = 6$ A1 c.a.o

b) $\frac{20}{2}(\text{"6"} + 158)$ M1 ft

1640 A1 c.a.o

OR

$\frac{20}{2}[2 \times \text{"6"} + 19 \times \text{"8"}]$ M1 ft

1640 A1 c.a.o

4.

SUBSTITUTION OR ELIMINATION ATTEMPTED (GOOD ATTEMPT) M1

$y^2 - 10y + 9$ or $3x^2 - 10x + 3$ M1

$(y-9)(y-1)$ or $(3x-1)(x-3)$ M1

$y = \begin{cases} 1 \\ 9 \end{cases}$ BOTH OR $x = \begin{cases} 3 \\ \frac{1}{3} \end{cases}$ BOTH A1

$x = \begin{cases} 3 \\ \frac{1}{3} \end{cases}$ OR $y = \begin{cases} 1 \\ 9 \end{cases}$ A1 A1

5.

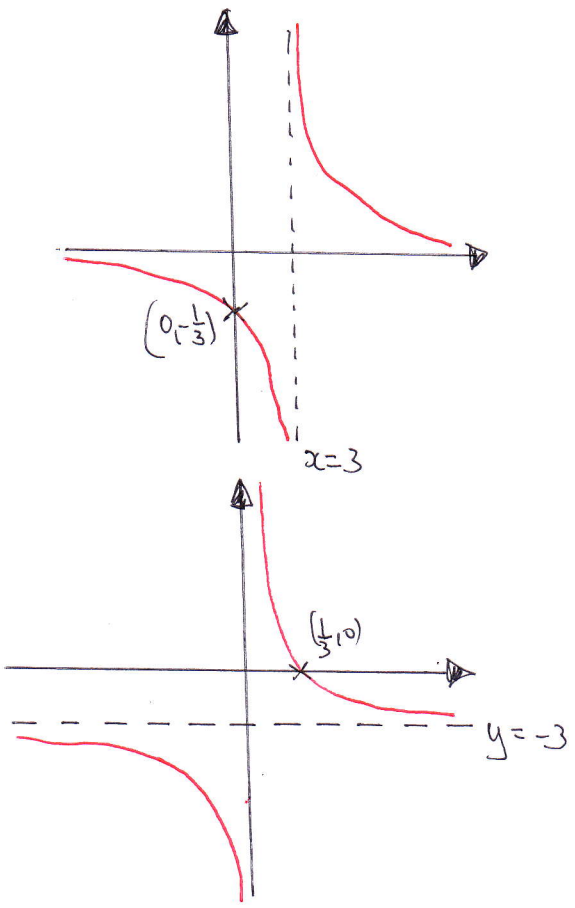
SUBS $(2,k)$ INTO $y = 2x + 7$ E.G. $k = 2 \times 2 + 7$ M1

$k = 11$ A1

SUBS $(2,11)$ INTO $y = 3x + C$ E.G. $11 = 3 \times 2 + C$ M1

$C = 5$ A1

6.



- CORRECT RELATIVE SHAPE ASYMPTOTIC TO THE x AXIS M1
- $x=3$ MARKED/LABELLED AS ASYMPTOTE B1
- $(0,-\frac{1}{3})$ B1

- CORRECT RELATIVE SHAPE ASYMPTOTIC TO THE y AXIS M1
- $y=-3$ MARKED/LABELLED AS ASYMPTOTE B1
- $(\frac{1}{3},0)$ B1

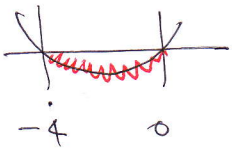
7. $x^2 + mx - m = 0$ M1

$b^2 - 4ac < 0$ SEEN OR $m^2 - 4\times1\times(-m) < 0$ B1

$m^2 + 4m < 0$ A1

$m(m+4) < 0$ M1

SIGHT OF $m \lessgtr \begin{matrix} 0 \\ -4 \end{matrix}$ (BOTH) A1



OR SIMILAR METHOD M1

dep.

$-4 < m < 0$ C.a.o (MUST BE IN m) A1

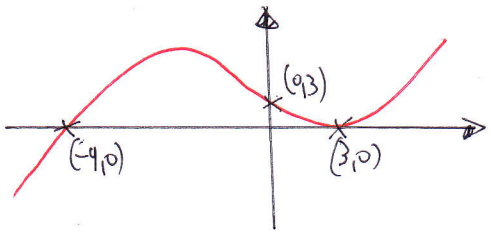
---

8. a) $a=1$, $b=-5$, $c=3$ B3

[OR $x^3 + x^2 - 5x + 3$]

[OR $(x+3)(x-1)^2$ FOR 1 MARK]

b)



CORRECT SHAPE TOUCHES THE x AXIS AT $x>0$ CROSSING THE x AXIS AT $x<0$ M1

$(3,0), (-3,0)$ (BOTH) B1

$(0,3)$ B1

c) $[(x+1)+3][(x+1)-1]^2$ OR $(x+4)x^2$ OR $(x+1)^3 + a(x+1)^2 + b(x+1) + c$

M1

MULTIPLIES CORRECTLY & CONVINCINGLY TO THE ANSWER GIVEN A1

9. a) ATTEMPT AT GRADIENT, EG $\frac{7-5}{4-0}$ M1

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

$y = \frac{1}{2}x + 5$ O.E A1

b) ATTEMPTS TO FIND GRAD OF CD E.G $\frac{1-0}{3-1}$ M1

OBTAINS $\frac{1}{2}$ + COMMENT A1

c) ATTEMPTS TO FIND $|AB|$ OR $|CD|$

E.g $\sqrt{(7-5)^2+(4-0)^2}$ OR $\sqrt{(1-0)^2+(3-1)^2}$) M1

SIGHT OF $\sqrt{5}$ OR $\sqrt{20}$ OR $2\sqrt{5}$ A1

DIVIDES $\frac{\sqrt{20}}{\sqrt{5}}$ OR $\frac{2\sqrt{5}}{\sqrt{5}}$ OR STATES S.F = 2 M1

SIGHT OF 4 : 1 A1

---

10. a) IMPLIES $4^{\frac{5}{2}} = 32$ B1

IMPLIES GRAD $= \frac{7}{2}$ B1

$y - \frac{1}{3} = \frac{7}{2}(x-4)$ O.E E.g $6y = 21x - 82$ A1

b) $x^{\frac{1}{2}} + 24x^{-2}$ B1

$\int "x^{\frac{1}{2}} + 24x^{-2}"\, dx$ B1

$\frac{2}{3}x^{\frac{3}{2}} - 24x^{-1} + C$ A2 (-1 if no +C)

USES $(4, \frac{1}{3})$ IN THEIR INTEGRATED ANSWER M1 ft

$C = 1$ OR $y = \frac{2}{3}x^{\frac{3}{2}} - \frac{24}{x} + 1$ O.E A1

11. $\left(\frac{dy}{dx} =\right) \; 6x^2 - 8x + 2$ M1

STATES OR IMPLIES TANGENT HAS GRAD $-\frac{1}{2}$ B1

$6x^2 - 8x + 2 = -\frac{1}{2}$ M1.

$12x^2 - 16x + 5$ OR $12p^2 - 16p + 5$ M1

$(6x - 5)(2x - 1)$ OR $(6p - 5)(2p - 1)$ M1

p OR $x = < \frac{1}{2}, \frac{5}{6}$ BOTH A1

q OR $y = < -\frac{3}{4}, -\frac{11}{2}$ EITHER A1

IF THEY OBTAINED THEIR y VIA UNIT, "IT CHECKS" WITH CUBIC
IF THEY OBTAINED THEIR y VIA CUBIC, "IT CHECKS" WITH UNIT) M1

STATES $\left(\frac{1}{2}, -\frac{3}{4}\right)$ A1 → d to p