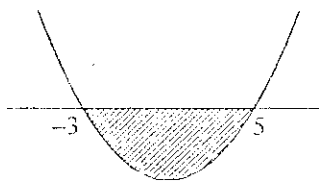


MARK SCHEME FINAL YEAR EXAM FORM 4 – PAPER 1

1. (a) $\{-1, 3\}$ [1]
 (b) many to one. [1]
2. $x = -4$ [2]
 $3 - 2x = 11$ B1
3. $p = -5, 7$ [3]
 $(p + 5)(p - 7) = 0$ B2
 $p^2 - 2p - 35 = 0$
 $(p - 1)^2 - 4(1)(9) = 0$ B1
4. (a) $\frac{x+1}{3}$ [2]
 $3y = x + 1$ or $3x = y + 1$ B1
- (b) 0 [2]
 2 or $\left(\frac{x+1}{3}\right)^2 - 7\left(\frac{x+1}{3}\right) + 10$ B1
5. $4x^2 + 11x - 3 = 0$ [2]
 $(x + 3)(4x - 1)$ B1 (accept $(x + 3)\left(x - \frac{1}{4}\right)$ for B1)

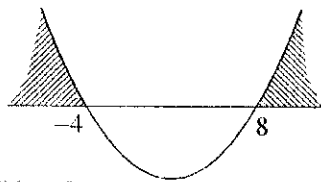
6. $-3 < x < 5$ [3]



B2 for graph + values + shading correctly

$(x + 3)(x - 5)$ or $x \in (-3, 5)$ B1

7. $m < -4, m > 8$ [4] Give **B3** for the final answer $x < -4, x > 8$



B3 for graph + values + shading correctly

$$(m + 4)(m - 8) < 0 \quad \text{or} \quad m = -4, 8 \quad \text{B2}$$

$$m^2 - 4m - 32 > 0$$

$$(2 - m)^2 - 4(1)(9) > 0 \quad \text{B1}$$

8. $3x^2 + 12x + 8 = 0$ [4] (accept $x^2 + 4x + \frac{8}{3} = 0$)

$$x^2 - (-4)x + \frac{8}{3} \quad \text{B3}$$

$$SOR = 2\alpha + 2\beta = -4 \quad \text{or} \quad SOR = 2\alpha \times 2\beta = \frac{8}{3} \quad \text{B2 (for } -4 \text{ or } \frac{8}{3})$$

$$SOR = \alpha + \beta = -2 \text{ (accept } -\frac{6}{3}) \text{ and } POR = \alpha\beta = \frac{2}{3} \text{ (both)} \quad \text{B1}$$

9. (a) $p = 5$ **and** $q = 1$ [2]

$$p = 5 \quad \text{or} \quad q = 1 \quad \text{B1}$$

(b) $x = 5$ [1]

10. $p = -1, q = -2$ (both) [3]

$$\frac{p+1}{2} = 0, \quad \frac{q+3}{2} = \frac{1}{2} \quad \text{B2 (both)}$$

$$\text{midpoint of } AC = \left(0, \frac{1}{2}\right) \quad \text{or} \quad \text{midpoint of } BD = \left(\frac{p+1}{2}, \frac{q+3}{2}\right) \quad \text{B1}$$

11. 1, 21 (both) [3]

$$\frac{1}{2}(22 - 2k) = 10 \quad \text{or} \quad \frac{1}{2}(22 - 2k) = -10 \quad \text{B2}$$

$$\frac{1}{2} \left| [3(3) + (-1)(-1) + (-1)(k)] - [-1(k) + (-1)(3) + 3(-1)] \right| \quad \text{B1}$$

12. 23.47 cm² or 23.46 cm² [3]

$$A = \frac{1}{2}(8)^2(0.7333) \quad \text{B2} \quad \text{follow through at this level, accept value which is not in 4 sig. fig.}$$

$$0.7333 \text{ rad. or } 0.7332 \text{ rad. or } 0.7331 \text{ rad.} \quad \text{B1}$$

13. (a) 4.5 cm [2]

$$5.4 = 1.2r \quad \text{[1]}$$

(b) 15.6 cm [2]

$$5.4 + 7.2 + 1.5 + 1.5 \quad \text{[B1]}$$

14. $\frac{4}{3}$ rad. or 1.333 rad. [3]

$$12 = 9\theta \quad \text{B2}$$

$$2r + 12 = 30 \quad \text{OR} \quad OP = 9 \text{ cm, } OQ = 9 \text{ cm, } PQ = 12 \text{ cm (all)} \quad \text{B1}$$

15. $3x^2 + 3y^2 + 12x - 4y - 36 = 0$ [4]

$$4[(x-0)^2 + (y-1)^2] = (x-6)^2 + (y-2)^2 \quad \text{B3}$$

$$2\sqrt{(x-0)^2 + (y-1)^2} = \sqrt{(x-6)^2 + (y-2)^2} \quad \text{B2}$$

$$\sqrt{(x-0)^2 + (y-1)^2} \quad \text{or} \quad \sqrt{(x-6)^2 + (y-2)^2} \quad \text{B1}$$

16. $x = \frac{8}{5}$ [3]

$$2(x+2) = -3(x-4) \quad \text{or} \quad \text{bequivalent} \quad \text{B2}$$

$$2^{2(x+2)} \quad \text{and} \quad 2^{3(x-4)} \quad \text{B1}$$

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17. $p = 2$ [3]
 $4p = 2^3$ **or** $\log_2 4p = \log_2 8$ **or** $\log_2 4p = \log_2 2^3$ **B2**
 $\log_2 4p = 3$ **B1**
18. 3^{3n+4} [4]
 $3n + 4$ **B3**
 $2n + 2n + 1 - 3\left(\frac{n}{3} - 1\right)$ **B2**
 3^{2n} **and** $3^{\left(\frac{n}{3} - 1\right)}$ **B1**
19. $x = \frac{y^2}{4}$ [4]
 $\frac{y^2}{x} = 2^2$ **or** $\log_2 \frac{y^2}{x} = \log_2 2^2$ **B3**
 $\log_2 \frac{y^2}{x} = 2$ **B2**
 $\log_2 y^2 - \log_2 x = 2$
 $\frac{\log_2 x}{\log_2 4}$ **B1**
20. $y = 38$ [3]
 $\frac{160 + y}{11} = 18$ **B2**
 $\frac{\Sigma x}{10} = 16$ **B1**
21. 23 [2]
 $6x + 11$ **B1**

22. $3(12x - 1)(2x - 1)^4$ [3]

$$3(2x - 1)^4[10x + (2x - 1)]$$

$$3x(5)(2x - 1)^4(2) + (2x - 1)^5(3)$$
 B2

$$3 \text{ and } 5(2x - 1)^4$$
 B1

23. 21.85 [4]

$$15.5 + \left(\frac{\frac{1}{2}(100) - 28}{52} \right) (15)$$
 B3 all correct

$$L = 15.5, F = 28, f_m = 52, C = 15$$
 B2 all correct

$$15.5$$
 B1

24. 1.915 [4]

$$\sigma = \sqrt{\frac{118}{6} - 4^2}$$
 B3

$$\sigma^2 = \frac{118}{6} - 4^2$$
 B2

$$4 \text{ or } 118$$
 B1

25. (a) 0.12 [2]

$$\delta y = 4x \times 0.01$$
 B1 (for $4x$ and 0.01)

(b) 23.12 [2]

$$23 + 0.12$$

$$y = 2(3)^2 + 5 \text{ or } 23$$
 B1

END OF MARK SCHEME