# Answers - Mixed Exercise - 2

1.

| Answer | Mark | Comments |
|---|---|---|
| $(5n - 3)^2 + 1$ | M1 | |
| $25n^2 - 15n - 15n + 9 + 1$ | M1 | Allow 1 error<br><br>Must have an $n^2$ term |
| $25n^2 - 30n + 10$ | A1 | |
| $5(5n^2 - 6n + 2)$ | B1 ft | oe<br><br>eg, shows that all terms divide by 5 or explains why the expression is a multiple of 5 |

2.

| Answer | Mark | Comments |
|---|---|---|
| $(x + 6)(x - 2)$ | B1 | |
| $(x + 5)(x - 5)$ | B1 | |
| $x(x - 5)$ | B1 | |
| $\dfrac{\text{their } (x + 6)(x - 2)}{\text{their } (x + 5)(x - 5)} \times \dfrac{\text{their } x(x - 5)}{x + 6}$ | M1 | Must have attempted to factorise at least two of the above |
| $\dfrac{x(x - 2)}{x + 5}$ or $\dfrac{x^2 - 2x}{x + 5}$ | A1 | A0 if incorrect further work seen |

3.

| Answer | Mark | Comments |
|---|---|---|
| $x = 8^{\frac{2}{3}}$ or $x = \sqrt[3]{64}$ or $x^3 = 64$ or $\sqrt{x} = 2$ or $x = 2^2$ | M1 | |
| $x = 4$ | A1 | |
| $y^2 = \frac{4}{25}$ or $\frac{1}{y^2} = \frac{25}{4}$ or $y^{-1} = \sqrt{\frac{25}{4}}$ or $\frac{1}{y} = \sqrt{\frac{25}{4}}$ | M1 | |
| $y = \frac{2}{5}$ or $y^{-1} = \frac{5}{2}$ or $\frac{1}{y} = \frac{5}{2}$ | A1 | Accept $y = \pm\frac{2}{5}$ or $y^{-1} = \pm\frac{5}{2}$ or $\frac{1}{y} = \pm\frac{5}{2}$ |
| 10 | A1 | |

4.

| | Answer | Mark | Comments |
|---|---|---|---|
| **(a)** | Angle $ACP = x$ or angle $PAC$ (base angles of) isosceles triangle (are equal) | M1 | |
| | Angle $APC = 180 - 2x$ angle sum of triangle (= 180°) **and** angle $BPC = 2x$ angles on straight line (add to 180°) | M1 Dep | $BPC = 2x$ external angle of triangle (= sum of interior opposite angles) |
| | Angle $ABC = 2x$ or angle $BPC$ (base angles of) isosceles triangle (are equal) | A1 | SC2 'Correct' response but has reason(s) missing or incorrect |
| **(b)** | Angle $ACB = 2x$ | M1 | May be implied by working |
| | $x + 2x + 2x = 180$ | M1 | oe eg 1 $5x = 180$ eg 2 $90 - \frac{1}{2}x = 2x$ |
| | 36 | A1 | |

5.

| | Answer | Mark | Comments |
|---|---|---|---|
| **(a)** | $-8 \leq m + n \leq 7$ | B2 | B1 $-8$ or 7 in correct position |
| **(b)** | $0 \leq (m+n)^2 \leq 64$ | B2 ft | **If (a) is fully correct ft does not apply**<br>B1 For 0 or 64 in correct position<br>**If (a) is not fully correct apply ft**<br>Can only award B2 ft if their (a) has one negative value and one positive value<br>B1ft for one value in correct position<br>Can award a maximum of B1 ft if in (a) both values have the same sign or one value is zero |

6.

| Answer | Mark | Comments |
|---|---|---|
| $\dfrac{4}{3}\pi x^3 \ (=) \ \dfrac{2}{3}\pi y^3$ | M1 | oe eg 1 $\dfrac{4}{3}\pi \times x^3 \ (=)\dfrac{1}{2} \times \dfrac{4}{3}\pi \times y^3$<br><br>eg 2 $y^3 = 2x^3$ |
| $\left(\dfrac{y^3}{x^3} =\right) \dfrac{\frac{4}{3}\pi}{\frac{2}{3}\pi}$ or $y = \sqrt[3]{2}\,x$ | M1 Dep | oe eg $\dfrac{y^3}{x^3} = 2$ |
| $2^{\frac{1}{3}}$ | A1 | $\sqrt[3]{2}$ scores M2 A0 |

7.

| | Answer | Mark | Comments |
|---|---|---|---|
| (a) | Gradient $AC = \dfrac{4-0}{0-12}$ or $-\dfrac{1}{3}$ | M1 | oe |
| | $y = -\dfrac{1}{3}x + 4$ | A1 | oe   eg $x + 3y = 4$<br>Must be an equation |
| (b) | Gradient $OB = 3$ | B1 ft | ft Their gradient in (a) using $m_1 \times m_2 = -1$ |
| | Equation of $OB$: $y = 3x$ | M1 | ft Their gradient $OB$ |
| | $3x = -\dfrac{1}{3}x + 4$ | M1 | ft Their equations |
| | $x = \dfrac{6}{5}$ or 1.2 | A1 ft | oe ($x$ coordinate of midpoint of $OB$)<br>ft From their linear equations |
| | $y = \dfrac{18}{5}$ or 3.6 | A1 | oe ($y$ coordinate of midpoint of $OB$) |
| | $\left(\dfrac{12}{5}, \dfrac{36}{5}\right)$ or (2.4, 7.2) | B1 ft | oe<br>ft Their $x$ and $y$ values for the midpoint |

8.

| | Answer | Mark | Comments |
|---|---|---|---|
| (a) | Positive | B1 | Do not allow if more than one answer selected |
| (b) | Negative | B1 | Do not allow if more than one answer selected |
| (c) | One positive and one negative | B1 | Do not allow if more than one answer selected |
| (d) | 0 | B1 | Do not allow if more than one answer selected |
| (e) | $y = -3$ | B1 | Do not allow if more than one answer selected |

9.

| Answer | Mark | Comments |
|---|---|---|
| $(4 - x)^2 = 4x + 5$ | M1 | |
| $16 - 4x - 4x + x^2 = 4x + 5$ | M1 Dep | Allow one error but must be a quadratic in $x$ |
| $x^2 - 12x + 11 \ (= 0)$ | A1 | oe  Must be 3 terms |
| $(x - 11)(x - 1) \ (= 0)$ | M1 | $\dfrac{--12 \pm \sqrt{(-12)^2 - 4(1)(11)}}{2}$ **or**<br><br>$(x - 6)^2 - 36 + 11 = 0$  oe |
| $x = 11$ and $x = 1$ | A1 ft | Must have M3 to ft<br>$x = 11$ and $y = -7$ **or** $x = 1$ and $y = 3$ |
| $x = 11$ and $y = -7$ **and**<br>$x = 1$ and $y = 3$ | A1 | |

10.

| Answer | Mark | Comments |
|---|---|---|
| Fully correct method to eliminate a letter from $OB$ and $AB$<br><br>$2(2x) = 11x - 7$ | M1 | oe eg 1 $2y = 11(\frac{y}{2}) - 7$<br><br>eg 2 $2y - 4x = 0$<br>$2y - 11x = -7$<br>**and** $7x = 7$ |
| Coordinates of $B = (1, 2)$ | A1 | Implied by $x = 1$ and $y = 2$ |
| Fully correct method to eliminate a letter from $OA$ and $AB$<br><br>$2y = 11(-3y) - 7$ | M1 | oe eg 1 $x + 3(\frac{11x - 7}{2}) = 0$<br><br>eg 2 $2x + 6y = 0$<br>$33x - 6y = 21$<br>**and** $35x = 21$ |
| Coordinates of $A = (0.6, -0.2)$ | A1 | oe  Implied by $x = 0.6$ and $y = -0.2$ |
| $OB^2 = $ their $1^2 + $ their $2^2$<br>**or**<br>$AB^2 = ($their $1 - $ their $0.6)^2 +$<br>$($their $2 - $ their $-0.2)^2$ | M1 | oe<br>eg correct attempt at $OB$ **or** $AB$<br>ft Their $B$ and/or their $A$ |
| $OB = \sqrt{5}$ **and** $AB = \sqrt{5}$ | A1 | oe<br>eg $OB^2 = 5$ **and** $AB^2 = 5$ |