Section A

| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Question | | Full marks | | Part marks | |
|--|----------|-----|--|-----|--|--|
| | | | | W2 | | |
| | | () | $\frac{1}{12}$ and $\frac{1}{12}$ in correct places | | ' | |
| (b) $\frac{1}{169}$ W2 M1 for $\frac{1}{13} \times$ their $\frac{1}{13}$ seen (b) $x = \frac{y-6}{4}$ or $x = \frac{y}{4} - \frac{3}{2}$ mark final answer W3 W2 for $x = \frac{\pm y \pm 6}{\pm 4}$ or M1 for 1st correct step e.g $[y =] 4x + 6$ or $\frac{y}{2} = 2x + 3$ M1 for 2nd correct step e.g $y - 6 = 4x$ or $\frac{y}{2} - 3 = 2x$ or ft their 1st step M1 for 3nd correct step ft their 1st/2nd step N.B mark final answer for 3nd M1, Incorrect cancelling loses 3nd M1 3 Area none of these length 4 rotation, 90°[anticlockwise or positive] or rotation entre (1,1) W3 (2nd for rotation 90° anti-clockwise or positive] or rotation entre (1,1) W1 for rotation or 90° anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° anti-clockwise or negative] or centre (1,1) W1 for rotation entre (1,1) W2 for rotation entre (1,1) W3 for rotation entre (1,1) W6 if any second transformation mentioned if W0 awarded then m1 for clear final triangle in correct position W2 W1 for 1 correct M1 for 3° ÷ 3 seen or 3° × 3° or 3⁴ × 3⁴ or 38 seen in working | | | | | | |
| 2 (a) $7n-3$ oe $3n-3$ oe $3n-3$ oe $3n-3$ or $3n-3$ oe $3n-3$ oe $3n-3$ or | | | on three pairs of branches | | | |
| 2 (a) $7n-3$ oe $3n-3$ oe $3n-3$ oe $3n-3$ or $3n-3$ oe $3n-3$ oe $3n-3$ or | | (b) | 1 | W2 | 1 1 | |
| (b) $x = \frac{y-6}{4}$ or $x = \frac{y}{4} - \frac{3}{2}$ mark final answerW3 W2 for $x = \frac{\pm y \pm 6}{\pm 4}$ orW1 for 1^{st} correct step e.g $[y=]4x+6$ or $\frac{y}{2}=2x+3$ M1 for 2^{nd} correct step e.g $y-6=4x$ or $\frac{y}{2}-3=2x$ or ft their 1^{st} step N.B mark final answer for 3^{rd} M1, Incorrect cancelling loses 3^{rd} M13Area none of these lengthW31 for each correct answer4rotation, 90°[anticlockwise or positive] oe e.g 270°clockwise, '4 turn clockwise centre (1,1) condone missing bracketsW3W2 for rotation 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W0 if any second transformation mentioned5199.5, 200.5 Condone order reversedW2W1 for 10° correct6(a) 3° Final AnswerW2M1 for 3° ÷ 3 seen or 3° × 3° or 3° | | (/ | | | M1 for $\frac{1}{12}$ × 'their $\frac{1}{12}$ ' seen | |
| (b) $x = \frac{y-6}{4}$ or $x = \frac{y}{4} - \frac{3}{2}$ mark final answer W2 for $x = \frac{\pm y \pm 6}{\pm 4}$ or M1 for 1st correct step e.g $[y =] 4x + 6$ or $\frac{y}{2} = 2x + 3$ M1 for 2nd correct step e.g $y-6=4x$ or $\frac{y}{2}-3=2x$ or ft their 1st step M1 for 3nd correct step ft their 1st/2nd step N.B mark final answer for 3nd M1, Incorrect cancelling loses 3nd M1 1 for each correct answer W3 for rotation 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1) W1 for clear final triangle in correct position W2 M1 for 3° ÷ 3 seen or 3° × 3° or 3⁴ × 3⁴ or 3° seen in working | 2 | (2) | | W2 | | |
| mark final answer or M1 for 1^{st} correct step e.g $[y =] 4x + 6$ or $\frac{y}{2} = 2x + 3$ M1 for 2^{nd} correct step e.g $y - 6 = 4x$ or $\frac{y}{2} - 3 = 2x$ or fit their 1^{st} step M1 for 3^{rd} correct step fit their $1^{st}/2^{nd}$ step N.B mark final answer for 3^{rd} M1, Incorrect cancelling loses 3^{rd} M1 1 for each correct answer 4 rotation, 90° [anti-clockwise or positive] or rotation 90° [anti-clockwise or positive] or rotation or 90° [anti-clockwise or negative] or centre $(1,1)$ W1 for rotation or 90° [anti-clockwise or negative] or centre $(1,1)$, W0 if any second transformation mentioned 1 f W0 awarded then M1 for clear final triangle in correct position 5 | | | v 6 v 3 | | · | |
| mark final answer or M1 for 1^{st} correct step e.g $[y =] 4x + 6$ or $\frac{y}{2} = 2x + 3$ M1 for 2^{nd} correct step e.g $y - 6 = 4x$ or $\frac{y}{2} - 3 = 2x$ or fit their 1^{st} step M1 for 3^{rd} correct step fit their $1^{st}/2^{nd}$ step N.B mark final answer for 3^{rd} M1, Incorrect cancelling loses 3^{rd} M1 1 for each correct answer 4 rotation, 90° [anti-clockwise or positive] or rotation 90° [anti-clockwise or positive] or rotation or 90° [anti-clockwise or negative] or centre $(1,1)$ W1 for rotation or 90° [anti-clockwise or negative] or centre $(1,1)$, W0 if any second transformation mentioned 1 f W0 awarded then M1 for clear final triangle in correct position 5 | | (6) | $x = \frac{y - 0}{4}$ or $x = \frac{y}{4} - \frac{3}{2}$ | ••• | W2 for $x = \frac{1}{x} \frac{y \pm 0}{x^2}$ | |
| M1 for 1st correct step e.g $[y =] 4x + 6 \text{or} \frac{y}{2} = 2x + 3$ M1 for 2nd correct step e.g $y - 6 = 4x \text{or} \frac{y}{2} - 3 = 2x \text{or ft their } 1^{\text{st}}$ step M1 for 3nd correct step ft their 1st/2nd step N.B mark final answer for 3nd M1, Incorrect cancelling loses 3nd M1 Incorrect answer | | | | | | |
| $[y=] \ 4x+6 \ \ or \ \ \frac{y}{2}=2x+3$ $M1 \ \ for \ 2^{nd} \ \ correct \ \ step e.g$ $y-6=4x \ \ or \ \frac{y}{2}-3=2x \ \ or \ \ ft \ \ their \ 1^{st}$ $step$ $M1 \ \ for \ 3^{rd} \ \ correct \ \ step ft \ \ their \ 1^{st}/2^{nd} \ \ \ step$ $N.B \ \ mark \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$ | | | mark imai answei | | or | |
| M1 for 2^{nd} correct step e.g $y-6=4x$ or $\frac{y}{2}-3=2x$ or ft their 1^{st} step M1 for 3^{rd} correct step ft their $1^{st}/2^{nd}$ step N.B mark final answer for 3^{rd} M1, Incorrect cancelling loses 3^{rd} M1 Incorrect cancelli | | | | | | |
| $y-6=4x \text{ or } \frac{y}{2}-3=2x \text{ or fit their } 1^{\text{st}}$ step $M1 \text{ for } 3^{\text{rd}} \text{ correct step fit their } 1^{\text{st}}/2^{\text{nd}} \text{ step}$ $N.B \text{ mark } \textbf{final answer} \text{ for } 3^{\text{rd}} \text{ M1},$ $\text{Incorrect cancelling loses } 3^{\text{rd}} \text{ M1}$ $1 \text{ for each correct answer}$ $\mathbf{M3}$ $\mathbf{M3}$ $\mathbf{M3}$ $\mathbf{M4}$ $\mathbf{M3}$ $\mathbf{M5}$ $\mathbf{M3}$ $\mathbf{M5}$ $\mathbf{M6}$ $\mathbf{M3}$ $\mathbf{M6}$ $\mathbf{M6}$ $\mathbf{M6}$ $\mathbf{M6}$ $\mathbf{M6}$ $\mathbf{M7}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M8}$ $\mathbf{M9}$ $\mathbf{M8}$ $\mathbf{M9}$ $$ | | | | | [y =] 4x + 6 or $\frac{y}{2} = 2x + 3$ | |
| step M1 for 3 rd correct step ft their 1 st /2 nd step N.B mark final answer for 3 rd M1, Incorrect cancelling loses 3 rd M1 Area none of these length V3 1 for each correct answer rotation, 90°[anti-clockwise or positive] or rotation centre (1,1) or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned If W0 awarded then M1 for clear final triangle in correct position Temporary Step M1 for 3° to 3° to 3° to 3° to 3° to 3° seen in working M1 for 3° to 3° to 3° to 3° to 3° seen in working | | | | | M1 for 2 nd correct step e.g | |
| M1 for 3rd correct step ft their 1st/2nd step N.B mark final answer for 3rd M1, Incorrect cancelling loses 3rd M1 Area none of these length W3 1 for each correct answer Totation, 90°[anticlockwise or positive] oe e.g 270°clockwise, 1/4 turn clockwise centre (1,1) condone missing brackets W2 W2 for rotation 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned If W0 awarded then M1 for clear final triangle in correct position W1 W1 for 1 correct M1 for 3° ÷ 3 seen or 3³ × 3⁵ or 3⁴ × 3⁴ or 38 seen in working M1 W1 | | | | | $y-6=4x$ or $\frac{y}{2}-3=2x$ or ft their 1 st | |
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| Incorrect cancelling loses 3 rd M1 Area none of these length Totation, 90°[anticlockwise or positive] or rotation entre (1,1) w1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w0 if any second transformation mentioned centre (1,1) condone missing brackets Today and the matter of these length M3 w2 for rotation 90° [anti-clockwise or positive] or rotation centre (1,1) w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w0 if any second transformation mentioned lif w0 awarded then m1 for clear final triangle in correct position M4 w2 for rotation 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), w1 for rotatio | | | | | N.B mark final answer for 3 rd M1. | |
| Area none of these length 4 rotation, 90°[anticlockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned centre (1,1) condone missing brackets 5 199.5, 200.5 Condone order reversed 6 (a) 38 Final Answer W2 M1 for 39 ÷ 3 seen or 33 × 35 or 34 × 34 or 38 seen in working | | | | | Incorrect cancelling loses 3 rd M1 | |
| length rotation, 90°[anticlockwise or positive] or rotation 90° [anti-clockwise or positive] or rotation centre (1,1) positive] oe e.g 270°clockwise, 1/4 turn clockwise centre (1,1) condone missing brackets 199.5, 200.5 Condone order reversed 6 (a) 38 Final Answer W2 for rotation 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or positive] or rotation centre (1,1) N0 if any second transformation mentioned W2 w1 for 1 correct W1 for 1 correct W1 for 1 correct W1 for 3° + 3 seen or 3° + 3° or 3° + 3° or | 3 | | Area | W3 | 1 for each correct answer | |
| rotation, 90°[anticlockwise or positive] or rotation entre (1,1) positive] oe e.g 270°clockwise, ½ turn clockwise centre (1,1) condone missing brackets 199.5, 200.5 Condone order reversed (a) 7 W3 W2 for rotation 90° [anti-clockwise or positive] or rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned If W0 awarded then M1 for clear final triangle in correct position W2 W1 for 1 correct W1 W1 for 3° ÷ 3 seen or 3° × 3° or 3° × 3° or 3° × 3° or 3° seen in working | | | | | | |
| 90°[anticlockwise or positive] oe e.g 270°clockwise, 1/4 turn clockwise centre (1,1), 1/4 turn clockwise centre (1,1) condone missing brackets 1 199.5, 200.5 Condone order reversed 6 (a) 38 Final Answer (b) 7 Or rotation centre (1,1) W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned W1 for clear final triangle in correct position W1 for 1 correct W1 for 39 ÷ 3 seen or 33 × 35 or 34 × 34 or 38 seen in working | | | length | | | |
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| positive] oe e.g 270°clockwise, 1/4 turn clockwise centre (1,1) condone missing brackets 199.5, 200.5 Condone order reversed 6 (a) 38 Final Answer W1 for rotation or 90° [anti-clockwise or negative] or centre (1,1), W0 if any second transformation mentioned W1 for clear final triangle in correct position W1 for 1 correct W2 M1 for 39 ÷ 3 seen or 33 × 35 or 34 × 34 or 38 seen in working W1 | 7 | | | *** | | |
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| ¼ turn clockwise centre (1,1) condone missing brackets If W0 awarded then M1 for clear final triangle in correct position 199.5, 200.5 W1 for 1 correct Condone order reversed (a) 3⁸ Final Answer W2 M1 for 3⁹ ÷ 3 seen or 3³ × 3⁵ or 3⁴ × 3⁴ or 3⁸ seen in working (b) 7 | | | | | | |
| missing brackets If W0 awarded then M1 for clear final triangle in correct position V1 199.5, 200.5 Condone order reversed W2 M1 for $3^9 \div 3$ seen or $3^8 \times 3^5$ or $3^4 \times 3^4$ or 3^8 seen in working W1 | | | | | | |
| | | | , , , | | KINO accorded these | |
| | | | missing brackets | | | |
| Condone order reversed 6 (a) 3^8 Final Answer W2 M1 for $3^9 \div 3$ seen or $3^3 \times 3^5$ or $3^4 \times 3^4$ or 3^8 seen in working (b) 7 W1 | 5 | | 199.5. 200.5 | W2 | | |
| 6 (a) 3^8 Final Answer W2 M1 for $3^9 \div 3$ seen or $3^3 \times 3^5$ or $3^4 \times 3^4$ or 3^8 seen in working W1 | | | 1 | *** | THE TOTAL CONTROL | |
| or $3^3 \times 3^5$ or $3^4 \times 3^4$ or 3^8 seen in working | 6 | (a) | | W2 | M1 for 3 ⁹ ÷ 3 seen | |
| (b) 7 W1 | | ` ' | | | | |
| (b) $\frac{7}{15}$ indicated | | | | | | |
| | | (b) | 7 indicated | W1 | - | |
| | | | — Indicated 15 | | | |
| (c) $0.\dot{5}$ Final Answer W1 | | (c) | | W1 | | |

| Question | Full marks | | Part marks | |
|----------|------------|----|---|----|
| 7 | 80π | W4 | M3 for $2 \times \pi 4^2 + 6 \times 8\pi$ or $2 \times 16\pi + 48\pi$ | or |
| | | | M2 for 32π or | |
| | | | M1 each for $[2 \times] \pi \times 4^2$ and $\pi \times 6 \times 8$ oe | |
| | | | eg 16 π or 48 π | |
| | | | or | |
| | | | SC3 Final Answer 240 to 251.4 or 224π | |
| | | | or 64π from $16\pi + 48\pi$ | |
| | | | or | |
| ı | | | SC1 for $2\pi \times 8^2 + \pi \times 16 \times 6$ | |
| | | | SC1 for 96π as answer | |

Section B

| Que | stion | | Full marks | | Part marks |
|-----|-------|------|---|----|--|
| 8 | (a) | | £99.89 | W4 | M3 for 99.891or 899.89 or 99.9[0] or M2 for 800×1.04^2 (or better) soi or 865.28 or $899.9[0]$ or 832×1.04 M1 for 800×1.04 soi or 832 or 896 or 96 |
| 9 | (a) | | 2.5×10^{-7} | W2 | M1 for figs 25 seen |
| | (b) | | 0.32 | W2 | M1 for 1000 mm ³ = 1cm ³ soi |
| 10 | (a) | | $\frac{1}{2} \times x \times (x-2) \times 2x$ condone lack of brackets in above expression or $x \times (x-2) \times 2x$ or $\frac{1}{2} \times x \times (x-2)$ Brackets MUST be used in both these two expressions $x^2(x-2) \text{ or } x\left(x^2-2x\right)$ Condone missing brackets if intention is clear | M1 | |
| | (b) | (i) | $[3^3 - 2 \times 3^2] = 9$ and $[4^3 - 2 \times 4^2] = 32$ or allow any values between 3 and 4 that produce one outcome above and one below 20 | 1 | Allow 3 and 4 with working crossed out and then replaced with a more accurate attempt |
| | (b) | (ii) | trial of 3.5 to give 18.3[75] trial of 3.6 to give 20.7[36] Allow outcomes rounded or truncated to 1 dp or better | 1 | Or 3.5 and 3.6 with outcomes in (b)(i) after 0 SC1 for correct trial with x between 3.1 and 3.9 with outcomes clearly shown |
| | | | ans 3.6 cao independent | 1 | |

| Que | stion | | Full marks | | Part marks |
|-----|-------|------|--|----------|---|
| 11 | (a) | | 5x = 10 or $5x = 7 + 3or complete long methodx = 2$, $y = -3$ | M1 W1 | |
| | (b) | | $x^2 - 2x - 35$ cao | W2 | M1 for 2 correct terms in 3-term final expression or 3 of $x^2 - 7x + 5x - 35$ |
| | (c) | (i) | (x-5)(x+5) ISW if attempt to solve | W1 | · |
| | (c) | (ii) | [+]5, -5 or ±5 | W1 | |
| 12 | | | 31.2 to 31.3 | W3 | M2 for [h =] $200 \times \sin 9$ M1 for $\sin 9$ used with h and 200 A1 for 31 if M2 earned SC3 for $\sin 9 = \frac{h}{200}$ followed by 31 |
| 13 | | | A is better as median is higher average/median A =21 to 22 and or average/median B = 17 to 19 | W1 W1 | Must be median not just average unless readings given Readings may be on the diagram |