

AREA, PYTHAGORAS THEOREM AND SOHCAHTOA GCSE MATHS
EDEXCEL PASTPAPER ANSWERS

1.

1	$5 \times 6 \div 2$	15cm^2	3	M1 $5 \times 6 \div 2$ oe seen A1 15 B1 cm^2
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2.

Question	Working	Answer	Mark	Notes
	Triangular ends $\frac{1}{2} \times 5 \times 12 = 30$ $\frac{1}{2} \times 5 \times 12 = 30$ Base $20 \times 5 = 100$ Vertical face $20 \times 12 = 240$ Slant face $20 \times 13 = 260$ Total area $= 30 + 30 + 100 + 240 + 260$ OR $(5 + 12 + 13) \times 20 + 2 \times \frac{1}{2} \times 5 \times 12$	660	3	M1 for $\frac{1}{2} \times 5 \times 12 (= 30)$ or $20 \times 5 (= 100)$ or $20 \times 12 (= 240)$ or $20 \times 13 (= 260)$ M1 (dep) for adding at least 3 areas found from correct methods (of no more than 5 faces) A1 cao OR M1 for $(5 + 12 + 13) \times 20$ or $\frac{1}{2} \times 5 \times 12 (= 30)$ M1 (dep) for adding “ $(5 + 12 + 13) \times 20$ ” to at least “ $\frac{1}{2} \times 5 \times 12$ ” A1 cao Note: Sight of $\frac{1}{2} \times 5 \times 12 \times 20$ or 600 (ie a volume calculation) scores no marks

3.

Question	Working	Answer	Mark	Notes
	Front or Back: $\frac{1}{2} \times 3x(13x - 3 + 5x - 3)$ $= 27x^2 - 9x$ or $\frac{1}{2} (4x)(3x) + 3x(5x - 3)$ Top: $(5x - 3)(x + 2)$ $= 5x^2 + 7x - 6$ Bottom: $(13x - 3)(x + 2)$ $= 13x^2 + 23x - 6$ Each Side: $5x(x + 2)$ $= 5x^2 + 10x$ Total SA = $2(27x^2 - 9x) + 2(5x^2 + 10x) + (5x^2 + 7x - 6) + (13x^2 + 23x - 6)$ $= (54 + 10 + 5 + 13)x^2 + (-18 + 20 + 7 + 23)x + (-6 - 6)$	$82x^2 + 32x - 12$	4	M1 finds the area of at least 2 faces (condone omission of brackets) M1 writes a correct algebraic expression for the area of at least 3 different faces M1 correct expressions for all 6 faces and adds C1 (dep on M3) for correct algebraic expression as a correct summary

4.

Question	Working	Answer	Mark	Notes
3		$x^2+10x+22$	4	M1 for $(x+8) - (x+5) (=3)$ or $(x+4) - (x+2) (=2)$ M1 for area of one rectangle eg $(x+2)(x+5) (=x^2+7x+10)$ M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4) (=x^2+7x+10 + 3x+12)$ A1 cao

5.

		$A = 13x + 8$	3	M1 for $5(2x + 1)$ or $3(x + 1)$ or $5 \times 2x + 1 + 3 \times x + 1$ M1 for $5(2x + 1) + 3(x + 1)$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe OR M1 for $8(x + 1)$ or $5x$ or $8 \times x + 1 + 5x$ M1 for $8(x + 1) + 5x$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe OR M1 for $8(2x + 1)$ or $3x$ or $8 \times 2x + 1 - 3x$ M1 for $8(2x + 1) - 3x$ or $13x + 8$ oe A1 for $A = 13x + 8$ oe
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6.

$(2x - 2)(2x + 1)$ $+ \frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$ $4x^2 - 2x - 2$ $+ x^2 + 4x - x - 4$ $= 5x^2 + x - 6$ <p>Or</p> $(2x - 2)(3x + 5)$ $- \frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$ $= 6x^2 - 6x + 10x - 10$ $- x^2 - 4x + x + 4$ $= 5x^2 + x - 6$	Show	4	<p>M1 for correct expression for a single rectangle area $(2x - 2)(2x + 1)$ or $(2x - 2)(3x + 5)$</p> <p>M1 for correct expression for triangle area $\frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$</p> <p>M1 for all 4 terms correct with or without signs or 3 out of no more than four terms correct with signs in expansion of any two linear expressions.</p> <p>C1 for $5x^2 + x - 6$ and all steps clearly shown in a logical progression</p> <p>QWC: All steps need to be clearly laid out showing a logical progression</p>
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7.

Question	Working	Answer	Mark	Notes
	Big area = 144 Small area = 64 Area frame = $144 - 64 = 80$ $80 \div 4$ Or Area one piece is a trapezium $\frac{1}{2}(12+8) \times (12-8) \div 2$ $\frac{1}{2} \times 20 \times 2 = 20$ Or Area of rectangle and 2 triangles $8 \times 2 + 2 \times (\frac{1}{2} \times 2 \times 2)$ $16 + 4$ Or Area of rectangle - 2 triangles $12 \times 2 - 2 \times (\frac{1}{2} \times 2 \times 2)$ $24 - 4$	20	4	M1 for 12×12 or 8×8 or 144 seen or 64 seen as areas M1 for $12 \times 12 - 8 \times 8$ or '144' - '64' or 80 seen as areas M1 for $(12 \times 12 - 8 \times 8) \div 4$ or '(144 - 64)' $\div 4$ or '80' $\div 4$ seen as areas A1 for 20 cao Or M1 for $12 - 8$ or 4 seen as difference in lengths M1 for height of trapezium = $(12 - 8) \div 2$ or '4' $\div 2$ or 2 M1 for area trapezium = $\frac{1}{2}(12 + 8) \times '2'$ oe A1 for 20 cao Or M1 for $\frac{1}{2} \times (12 - 8)$ or 2 for width of frame M1 for $8 \times 2 = 16$ for rectangle M1 for $2 \times (\frac{1}{2} \times 2 \times 2)$ or 4 for 2 triangles A1 for 20 cao Or M1 for $\frac{1}{2} \times (12 - 8)$ or 2 for width of frame M1 for $12 \times 2 = 24$ for rectangle M1 for $2 \times (\frac{1}{2} \times 2 \times 2)$ or 4 for 2 triangles A1 for 20 cao NB Marks can be awarded for correct measurements indicated on the diagram Note If 80 is seen on the answer line following a correct calculation of one piece of card, full marks can be earned.

8.

Question	Working	Answer	Mark	Notes
(a)	$(x+2)(x+1) + x(2x+2)$ $= x^2 + 3x + 2 + 2x^2 + 2x$ Or $(x+2)(x+1) + x[2x+2 - (x+2)] + (x+2)(x)$ $= x^2 + x + 2x + 2 + x^2 + x^2 + 2x$ Or $(2x+2)(x+x+1) - (x+1)[2x+2 - (x+2)]$ $= (2x+2)(2x+1) - (x+1)x$ $= 4x^2 + 6x + 2 - x^2 - x$ Or $(x+2)(2x+1) + x = 2x^2 + x + 4x + 2 + x^2$	$3x^2 + 5x + 2$	4	M1 for area of 1 rectangle Eg $(x+2) \times (x+1)$ oe or $x \times (2x+2)$ oe or $(2x+2)(x+x+1)$ oe or $x \times (x+1)$ oe or $(x+2)(2x+1)$ oe or x oe A1 for correct simplification of this area Eg $x^2 + x + 2x + 2$ (or better) or $2x^2 + 2x$ (or better) or $4x^2 + 4x + 2x + 2$ (or better) or $x^2 + x$ (or better) or $2x^2 + x + 4x + 2$ (or better) or x^2 M1 (dep on M1) for a complete method to find the area using at least two quadratic expressions Eg '(x+2)(x+1)' + 'x(2x+2)' A1 cao for $3x^2 + 5x + 2$
(b)	$3x^2 + 5x + 2$ $= (3x+2)(x+1)$		1	B1 cao (x+1)

9.

		108	5	M1 for a method for finding the dimensions eg length & width = 12 or $2 \times \text{length} + \text{width} = 21$ A1 for length = 9 (could be shown on diagram) A1 for width = 3 (could be shown on diagram) M1 for area = "9" \times "3" \times 4 A1 cao
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10.

		$A = 9x^2 + 19x - 6$	4	B1 for one of $5x - 2$ or x found M1 for correct method to find area of one relevant rectangle. M1 for complete method to find whole area or simplified expression $9x^2 + 19x - 6$ or correct but not simplified formula A1 for correct, simplified formula $A = 9x^2 + 19x - 6$
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11.

	$10 \times 4^2 - 4 - 21 = 135$ $2 \times 4 - 3 = 5$ $135 \div 5 = 27$ $10x^2 - x - 21$ $= (2x - 3)(5x + 7)$ $5 \times 4 + 7$	27	3	M1 for $10 \times 4^2 - 4 - 21 (= 135)$ M1 for $135 \div (2 \times 4 - 3)$ A1 cao OR M1 for factorising to give $5x + 7$ or $5x + n$, $n \neq 7$ or $mx + 7$, $m \neq 5$ M1 (dep) for substitution of $x = 4$ into expression for length of rectangle A1 cao	E
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12.

Question	Working	Answer	Mark	Additional Guidance
	$A = 3(x + 1)(2x + 7) - (x - 4)(x + 1)$ $= 3(2x^2 + 9x + 7) - (x^2 - 3x - 4)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$ OR Splitting shape A into rectangles, area to be added: e.g. $3(x + 1)(x + 11) + (x - 4)(2x + 2)$ $= 3(x^2 + 12x + 11) +$ $(2x^2 - 6x - 8)$ $= 5x^2 + 30x + 25$ Factorising gives $5(x + 1)(x + 5)$	$5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$	6	M1 for attempting to subtract the area of small rectangle from area of large rectangle in A M1 for $3(x + 1)(2x + 7) - (x - 4)(x + 1)$ A1 for $3(2x^2 + 9x + 7)$ and $(x^2 - 3x - 4)$ A1 for $5x^2 + 30x + 25$ M1 for attempting to factorise " $5x^2 + 30x + 25$ " to get dimensions of B A1 for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$ OR M1 for attempting to add the area of two (or more) rectangles that make up the shape A M1 for $3(x + 1)(x + 11) + (x - 4)(2x + 2)$ or equivalent A1 for $3(x^2 + 12x + 11)$ and $(2x^2 - 6x - 8)$ A1 for $5x^2 + 30x + 25$ M1 for attempting to factorise " $5x^2 + 30x + 25$ " to get dimensions of B A1 for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$
Total for Question: 6 marks				