GCSE MATHEMATICS · HIGHER

Targeting Grade 9

Paper 7 · Mark scheme · Non-calculator · 40 marks

M method mark **P** process mark **A** accuracy mark (depends on the M or P marks before it)
B independent mark **C** communication mark **ft** follow through **oe** or equivalent

Q	Working	Answer	Mark	Notes
1	$25 - 10\sqrt{x} + x = y - 20\sqrt{2}$ $10\sqrt{x} = 20\sqrt{2} \Rightarrow \sqrt{x} = 2\sqrt{2} = \sqrt{8}$	 $x = 8,\ y = 33$	M1 M1 A1	Expands correctly Equates the surd parts

Q	Working	Answer	Mark	Notes
2	Odd number $2n + 1$: $(2n + 1)^2 = 4n^2 + 4n + 1$ $= 4n(n + 1) + 1$ $n(n + 1)$ is the product of two consecutive integers, so it is even		M1 M1 M1 C1	 So $4n(n + 1)$ is a multiple of 8 and $(2n + 1)^2$ is one more than a multiple of 8

Q	Working	Answer	Mark	Notes
3	$x^2 - 9 = (x + 3)(x - 3)$ $\frac{2(x - 3) - (x - 9)}{(x + 3)(x - 3)}$ $= \frac{x + 3}{(x + 3)(x - 3)}$	 $\frac{1}{x - 3}$	M1 M1 M1 A1	

Q	Working	Answer	Mark	Notes
4(a)	$0.3 \times 0.4 + 0.7 \times 0.1$	0.19	M1 A1	
4(b)	$P(\text{rain and late}) = 0.12$ $\frac{0.12}{0.19}$	$\frac{12}{19}$	M1 M1 A1	ft their (a)

Q	Working	Answer	Mark	Notes
5(a)	$\frac{x}{2x+3} = \frac{6}{15}$ $15x = 12x + 18$	6	M1 M1 A1	Similar triangles ADE and ABC
5(b)	Length scale factor $\frac{15}{6} = \frac{5}{2}$ Area scale factor $\frac{25}{4}$, so trapezium $= \frac{25}{4} - 1 = \frac{21}{4}$ of triangle ADE	$4 : 21$	M1 M1 A1	

Q	Working	Answer	Mark	Notes
6	$x^2 - 4x + 5 = 2x - 3$		P1	
	$x^2 - 6x + 8 = 0 \Rightarrow$ $(x - 2)(x - 4) = 0$		P1	
	$A(2,\ 1),\ B(4,\ 5)$		P1	
	Area = triangle $(O, A, (2, 0))+$ trapezium $(A, B, (4, 0), (2, 0))-$ triangle $(O, B, (4, 0))$		P1	Or enclosing rectangle, or $\frac{1}{2}\lvert x_1y_2 - x_2y_1\rvert$
	$= 1 + 6 - 10$ in size		P1	
		3	A1	

Q	Working	Answer	Mark	Notes
7(a)	Radius OP is perpendicular to the tangent, so gradient of $OP = -\frac{1}{2}$		M1	
	P lies on $y = -\frac{1}{2}x$: $x^2 + \frac{1}{4}x^2 = 20$		M1	
	$x^2 = 16 \Rightarrow x = \pm 4$		A1	
		$(4,\ -2)$ and $(-4,\ 2)$	A1	
7(b)	$y + 2 = 2(x - 4)$ or $y - 2 = 2(x + 4)$		M1	ft their (a)
		$y = 2x - 10$, $y = 2x + 10$	A1	

Q	Working	Answer	Mark	Notes
8(a)	Reflection in the x-axis: $y = -(x^2 - 4) = -x^2 + 4$ Translation: replace x with $x - 3$: $y = -(x - 3)^2 + 4$ $= -(x^2 - 6x + 9) + 4 =$ $-x^2 + 6x - 5$		M1 M1 A1	 Shown
8(b)	$x^2 - 4 = -x^2 + 6x - 5$ $2x^2 - 6x + 1 = 0 \Rightarrow x =$ $\frac{6 \pm \sqrt{36 - 8}}{4}$	$\frac{3 \pm \sqrt{7}}{2}$	M1 M1 A1	 Accept $\frac{6 \pm \sqrt{28}}{4}$
		Total	**40**	