Stage 9: Got It?

Markscheme

Abbreviations

A: Answer mark
M: Method mark
oe: or equivalent
eeoo: each error or omission
awrt: answer which rounds to

Unless stated otherwise a correct answer with no working gains all marks
A correct answer with alternative correct working gains all marks
A correct answer with incorrect working does not gain the relevant M mark(s)

Q			Answers	M	Notes and alternatives
1	**a**	**i**	5	A1	
		ii	3	A1	
		iii	0	A1	
		iv	4	A1	
		v	3	A1	
		vi	-3	A1	
2			Evidence of '$\pi(64- 9)$' oe	M1	
			$55\ \pi$	A1	
3	**a**		3.2 10^9 3.2×10^9	M1 M1 A1	
	b		1.2 10^8 1.2×10^8	M1 M1 A1	
	c		18 10^{-9} 1.8×10^{-8}	M1 M1 A1	
	d		0.5 oe 10^{-4} 5×10^{-5}	M1 M1 A1	
4	**a**	**i**	3.15 3.25	A1 A1	
		ii	$1.635 \leq x < 1.645$	A2	Award A1 for evidence of '1.635' and '1.645'
		iii	$150 \leq y < 250$	A2	Award A1 for evidence of '150' and '250'
		iv	$15 \leq t < 25$	A2	Award A1 for evidence of '15' and '25'
		v	$3.2 \leq s < 3.3$	A2	Award A1 for evidence of '3.2' and '3.3'
		vi	$1.64 \leq p < 1.65$	A2	Award A1 for evidence of '1.64' and '1.65'
5	**a**		9.575s	A1	

	b		79.5	A1	
6	**a**	**i**	2(a+b) = 2a + 2b n+n+n=3n	A1 A1	
		ii	A = l × w y = 6x + 2	A1 A1	
7	**a**	**i**	Any three of the four terms: $x^2 + 2x + 4x + 8$ $x^2 + 6x + 8$	M1 A1	
		ii	Any three of the four terms: $x^2 + 2x – 4x – 8$ $x^2 – 2x – 8$	M1 A1	
		iii	Any three of the four terms: $a^2 – ab + 3ab – 3b^2$ $a^2 + 2ab – 3b^2$	M1 A1	
		iv	Any three of the four terms: $x^2 – xy – 2xy + 2y^2$ $x^2 – 3xy + 2y^2$	M1 A1	
		v	Any three of the four terms: $x^2 + 2x + 2x + 4$ $x^2 + 4x + 4$	M1 A1	
		vi	Any three of the four terms: $x^2 – 3x – 3x + 9$ $x^2 – 6x + 9$	M1 A1	
	b	**i**	(x + 4)(x + 3) oe	A2	Award M1A0 for one correct bracket
		ii	(x + 10)(x + 1) oe	A2	Award M1A0 for one correct bracket
		iii	Any one of (x + 6) and (x – 2) OR (x – 6)(x + 2) (x + 6)(x – 2) oe	M1 A1	
		iv	Any one of (p + 4) and (p – 5) OR (p – 4)(p + 5) (p – 5)(p + 4) oe	M1 A1	
		v	(x + 4)(x – 4) oe	A2	Award M1A0 for one correct bracket
		vi	(y + 5)(y – 5) oe	A2	Award M1A0 for one correct bracket
8	**a**	**i**	Equation	A1	
		ii	Equation	A1	
		iii	Identity	A1	
		iv	Identity	A1	
		v	Equation	A1	
		vi	Identity	A1	
9	**a**		Evidence of 4x + 8 or 3x + 18 4x + 8 – 3x – 18 OR 4x + 8 – (3x + 18) x – 10	M1 M1 A1	
	b		$(x + 3)^2 = x^2 + 6x + 9$ oe	M1	
			‘n’ → ‘2n’ → ‘2n + 12’ → ‘n + 6’ → 6	M1 M1	
10	**a**	**i**	x > 5	A1 A1	Correct inequality ‘5’
		ii	x ≤ -2	A1 A1	Correct inequality ‘-2’
		iii	6 < x < 8.5	A1 A1	Correct inequalities ‘6’ and ‘8.5’

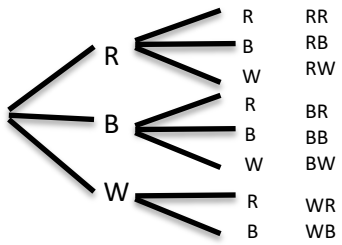
		iv	$4.25 < x < 6$	A1 A1	Correct inequalities '4.25' and '6'
		v	$x \geq 6$	A1 A1	Correct inequality '6'
		vi	$2 \leq x < 5$	A1 A1	Correct inequalities '2' and '5'
11	**A**		$y = x - 5$ oe	A1 A1	'y = x' '-5'
	B		$y = x + 2$ oe	A1 A1	'y = x' '+2'
	C		$y = 2x - 2$ oe	A1 A1	'y = 2x' '-2'
	D		$y = 2x + 4$ oe	A1 A1	'y = 2x' '+4'
	E		$y = ½x + 6$ oe	A1 A1	'y = ½x' '+6'
	F		$y = -4$	A1 A1	'y=' '-4'
12			$y = 3x - 5$ $3x - 2 = y$ $y = 10 + 3x$ $2y - 6x = 4$	A3	-1 eeoo
13	**a**		Gradient = $(10 - 2)/(3 - -1) = 2$ $y = 2x + c$ oe $y = 2x + 4$ oe	M1 A1 A1	
	b		$y = 5x + c$ oe $y = 5x - 13$ oe	A1 A1	
14	**a**	**i**	1, 2, 4, 5	A2	-1 eeoo
		ii	6	A1	-1 eeoo
		iii	3	A1	-1 eeoo
	b	**i**	Smooth 'positive' parabola crossing the y-axis at 3	A1	
		ii	Smooth positive cubic graph passing through the origin	A1	
		iii	Reciprocal graph drawn in the first **and** fourth quadrant	A1	
		iv	Smooth 'positive' parabola crossing the y-axis at -4	A1	
15	**a**		Between six and eight of the following points generated (ignoring x = 0) x = 0 dealt with correctly Their points plotted correctly Smooth curve through points creating correct graph	M1 M1 M1 A1	
	b	**i**	70 140	M1 A1	
		ii	e.g. the drone is hovering at the same height	A1	

x	-4	-3	-2	-1	0	1	2	3	4
y	-0.5	-0.6(6...)	-1	-2	---	2	1	0.6(6...)	0.5

		iii	20 ÷ 20 oe 1	M1 A1	
		iv	70 ÷ 50 oe 1.4	A1 A1	
		v	e.g. the drone is accelerating	A1	
16	**a**		Eliminating y ⇒ 2x = 20 ⇒ x = 5 Substituting x = 5 ⇒ y = 7	M1 A1 A1	
	b		2x + 2(x + 9) = 30 oe x = 3 y = 12	M1 A1 A1	
	c		Eliminating a ⇒ 4b = 36 ⇒ b = 9 Substituting b = 9 ⇒ a = 4	M1 A1 A1	
	d		2(2a + 13) + 3a = 40 oe a = 2 b = 17	M1 A1 A1	
17			x = 0.3 (±0.1) y = -1.8 (±0.1)	A1 A1	
18	**a**		k + 3	A1	
	b		4k + 6k oe	A1	
	c		k(k + 3) oe	A1	Do not accept k × k + 3
19	**a**	**i**	4x – 4 oe 4x – 4 = 10 oe	M1 A1	
		ii	4x = 14 x = 3.5	M1 A1	
	b	**i**	3t + 2c = 6.6 and 5t + c = 7.5 oe	A1	
		ii	Evidence of eliminating one variable t = £1.20 c = £1.50	M1 A1 A1	Penalise one mark for no £ symbol
20	**a**	**i**	x < 9	A1 A1	'<' '9'
		ii	Empty circle at '9' and line on the left	A1	
	b	**i**	x ≥ 12	A1 A1	'≥' '12'
		ii	Solid circle at '12' Line on the right	A1 A1	
	c	**i**	x < 3 oe	A1 A1	'<' '3'
		ii	Empty circle at '3' and line on the left	A1	
	d	**i**	x ≤ 9 oe	A1 A1	'≤' '1.5'
		ii	Solid circle at '9' Line on the left	A1 A1	
21	**a**	**i**	Fibonacci-Type	A1	
		ii	Quadratic	A1	
		iii	Fibonacci-Type	A1	
		iv	Quadratic	A1	
	b	**i**	76	A1	

		ii	144	A1	
22	**a**		F	A1	
	b		T	A1	
	c		T	A1	
	d		F	A1	
23	**a**		Evidence of '19.3 × 650' oe 12545g oe	M1 A1	
	b		Evidence of '65000 ÷ 120' oe 542 (to 3sf) oe	M1 A1	
24	**A**		25	A1	
	B		0	A1	
	C		50	A1	
	E		-50	A1	
25	**a**		47 ÷ 6 = 7.8333… 7.8333… × 9 = £70.50	M1 A1	Alt: 9 ÷ 6 = 1.5 ⇒ 1.5 × 47 = £70.50
	b		5 × 48 = 240 240 ÷ 40 = 6	M1 A1	
26	**a**		Evidence of arcs correctly drawn Perpendicular bisector passing through midpoint of the line	M1 A1	
	b		Evidence of arcs correctly drawn Angle bisector passing through the midpoint of the angle	M1 A1	
	c		Evidence of arcs correctly drawn Perpendicular bisector passing through A	M1 A1	
27			Circle radius 2cm, centre X Parallel line constructed 3 cm from garden wall Area shaded	M1 M1 A1	Award M0M0A0 if no evidence of construction lines
28			PS = RQ PQ = RS QS = QS Triangles congruent because of SSS	M1 M1 A1	Award M0M0A0 if SSS is stated without any reasoning
29			SSS RHS SAS AAS	A1 A1 A1 A1	-1 for each error
30	**a**		Line touching the circle at one point	A1	
	b		Section of the circumference identified	A1	
	c		Area identified bounded by 2 radii and arc	A1	
	d		Area identified bounded by chord and arc	A1	

31	**a**			A1	Penalise one mark maximum if the boundary lines of all cubes are shown; e.g. 
	b			A1	
	c			A1	
32	**a**		A (circle) = $\pi r^2 \Rightarrow$ A = 64π A = ¾ of '64π' 151	M1 M1 A1	Penalise a maximum of one mark for incorrect rounding
	b		A (triangle) = ½ × 6 × 6 = 18(.0)	A1	
	c		A (circle) = $\pi r^2 \Rightarrow$ A = 64π A = 60/360 of '64π' 33.5	M1 M1 A1	
	d		C = $\pi d = 8\pi$ Arc length = 240/360 × 8π = 16.755… P = 24.8	M1 M1 A1 A1	
33	**a**		Evidence of '1/2 × 6 × 8' oe Evidence of '10 × 10', '6 × 10', '10 × 8' oe 288	M1 M1 A1	
	b		Evidence of '$\pi \times 5^2$' oe Evidence of '$\pi \times 10 \times 10$ ' oe 471 (to 3sf)	M1 M1 A1	
34	**a**		4.8 ÷ 1.2 = 4 20 ÷ 4 = 5	M1 A1	Alt: 20 ÷ 4.8 = 4.1666… $\Rightarrow$ 4.1666… × 1.2 = 5
	b		9 ÷ 6 = 3/2 9 × 3/2 = 13.5	M1 A1	
	c		3 ÷ 0.6 = 5 2 × 5 = 10	M1 A1	Alt: 2 ÷ 0.6 = 3.333… $\Rightarrow$ 3.333… × 3 = 10
	d		7.2 ÷ 2.4 = 3 9.3 ÷ 3 = 3.1	M1 A1	Alt: 9.3 ÷ 7.2 = 1.2916… $\Rightarrow$ 1.2916… × 2.4 = 3.1
35	**a**	**i**	Evidence of '$7^2 + 12^2 = x^2$' oe 13.89	M1 A1	
		ii	Evidence of '$8^2 + x^2 = 10^2$' oe 6	M1 A1	
		iii	Evidence of '$11^2 + x^2 = 14^2$' oe 8.66	M1 A1	
		iv	Evidence of '$3^2 + x^2 = 10^2$' oe 9.54	M1 A1	
	b	**i**	No '$6^2 + 7^2 \neq 8^2$' oe	A1 A1	Award A0A0 for 'No' without any justification
		ii	Yes '$5^2 + 12^2 = 13^2$' oe	A1 A1	Award A0A0 for 'No' without any justification
		iii	No '$6^2 + 9^2 \neq 12^2$' oe	A1 A1	Award A0A0 for 'No' without any justification

36			Axes drawn and labelled correctly At least 12 points plotted correctly Complete correct graph	M1 M1 A1	Points may or may not be joined with line segments
37	**a**		Line with negative gradient Line with positive gradient (negative y intercept) Not possible Line with positive gradient (positive y intercept)	A1A1 A1A1	
	b		Line of best fit drawn 55 (± 2)	M1 A1	
38	**a**		Correct statement, e.g. it is beyond the range of the data	A1	
	b		Mentions positive correlation Mentions probability or likelihood No AND conclusion, e.g. you are likely to get a high score due to the positive correlation but it is not certain	M1 M1 A1	
39			Tree diagram completed (RYB at every node) RRR, RRY, RRB, RYR, RYY, RYB, RBR, RBY, RBB YRR, YRY, YRB, YYR, YYY, YYB, YBR, YBY, YBB BRR, BRY, BRB, BYR, BYY, BYB, BBR, BBY, BBB	M1 A1	
40			Yes 'but the results should be more accurate for Hazel' oe	A1 M1	Award A0M0 for 'Yes' with no justification
41	**a**	**i**	Tree diagram completed (RYB at every node) RR, RY, RB, YR, YY, YB, BR, BY, BB	M1 A1	
		ii	Evidence of '½ × ¼' oe 1/8	M1 A1	
		iii	Evidence of '½ × ½, ¼ × ¼ , ¼ × ¼' oe 3/8	M1 A1	
	b	**i**	Two branches from 'W' Correct tree diagram Outcomes listed 	M1 M1 A1	Second method mark can still be awarded if three branches from 'W'
		ii	Evidence of '2/6 × 1/5' oe 2/30 or 1/15	M1 A1	
		iii	Evidence of 'RR: 3/6 × 2/5' oe Evidence of 'BB: 2/6 × 1/5' oe 8/30 or 4/15	M1 M1 A1	
			Total marks	**280**	