Mark scheme

Calculator Crossover Paper 9

40 marks · 45 minutes · Calculator

M = method mark A = accuracy mark (depends on M marks) B = independent mark C = communication
ft = follow through cao = correct answer only oe = or equivalent isw = ignore subsequent working

Q	Answer	Mark	Guidance
1(a) N3 N15	2.450390658...	M1 A1	for 6.456... or 41.69 or 2.635 seen for 2.450390... (at least 5 decimal places)
1(b)	2.5	B1	for 2.5 (ft their answer to (a) if it has more than 2 significant figures)
			Total for Question 1: 3 marks
2 N15	$7.35 \leq m < 7.45$	B1 B1	for 7.35 in the correct position for 7.45 in the correct position 7.35 and 7.45 the wrong way round scores B0 B0. Do not accept 7.449... for 7.45.
			Total for Question 2: 2 marks
3 N4	7 minutes 30 seconds past 9 pm (9:07:30 pm)	M1 A1	for listing multiples of 75 and 90 (at least 3 of each), or prime factors $75 = 3 \times 5^2$ and $90 = 2 \times 3^2 \times 5$, or 450 seen for 9:07:30 pm oe, e.g. 21:07:30 or 7 minutes 30 seconds after 9 pm 450 seconds after 9 pm (not converted) scores M1 A1. 9:45 or 9:07.5 scores M1 A0.
			Total for Question 3: 2 marks
4 G13	Plan: 4 cm by 2 cm rectangle with a line across it 2 cm from one end. Side elevation: 2 cm by 3 cm rectangle (2 wide, 3 high) with a horizontal line 1 cm from the bottom.	B1 B1 B1	for a 4 by 2 rectangle drawn (any orientation) for a fully correct plan including the internal line dividing it into two 2 by 2 squares for a fully correct side elevation, 2 wide and 3 high, with a line at height 1 Ignore labels. Accept drawings that are not joined to grid points if lengths are correct to within 2 mm. A front elevation drawn instead of the side elevation does not score the third mark.
			Total for Question 4: 3 marks

Q	Answer	Mark	Guidance
5 R11	5471.0	**M1** **A1**	for 2750 ÷ (π × 0.4^2) or 2750 ÷ 0.5026... for 5471.0 (from 5470.951...; accept 5470.9 to 5471.0) Using 2πr for the area (2750 ÷ 2.513... = 1094.2...) or π × 0.4 scores M0 A0.
			Total for Question 5: 2 marks
6 R16	5 years	**M1** **M1** **A1**	for 0.85 seen, or 42 000 × 0.15 (= 6300) and 42 000 – 6300 (= 35 700) for trials at n = 4 (42 000 × 0.85^4 = 21 924.26...) and n = 5 (42 000 × 0.85^5 = 18 635.62...), or a complete year-by-year method to year 5 for 5 with supporting working (compared with 21 000) Using simple depreciation (6300 per year, giving 4 years) scores M1 M0 A0.
			Total for Question 6: 3 marks
7 R10	26 minutes 15 seconds	**M1** **M1** **A1**	for 4320 ÷ 6 ÷ 15 (= 48 bottles per machine per minute) or another correct first step, e.g. 4320 ÷ 15 (= 288) or 4320 ÷ 6 (= 720) for 5040 ÷ (4 × 48) or 5040 ÷ 192 (= 26.25) for 26 minutes 15 seconds 26.25 minutes scores M1 M1 A0. 26 minutes 25 seconds scores M1 M1 A0.
			Total for Question 7: 3 marks
8(a) P6	Year 10: Theatre 17. Year 11: Museum 15, Zoo 13, Total 42. Theatre total 31.	**B1** **B1**	for at least 3 correct entries for a fully correct table
8(b)	$\frac{13}{22}$	**B1**	for $\frac{13}{22}$ oe (ft their table)
8(c)	$\frac{17}{38}$	**B1**	for $\frac{17}{38}$ oe (ft their table)
			Total for Question 8: 4 marks
9(a) S6	As the height above sea level increases, the temperature decreases	**B1**	for a correct relationship in context, or negative correlation
9(b)	12.2 (accept 11.2 to 13.2)	**M1** **A1**	for a single straight line of best fit with negative gradient passing between (200, 16.5) & (200, 18.5) and (1700, 6.6) & (1700, 8.6), or a vertical line from 1000 m for an answer in the range 11.2 to 13.2

Q	Answer	Mark	Guidance
9(c)	3000 m is outside the range of the data (extrapolation)	**C1**	for a correct explanation, e.g. 3000 m is outside the range of heights recorded, or the pattern may not continue beyond 1700 m
			Total for Question 9: 4 marks
10 G16 N2	£150	**M1** **A1** **M1** **A1**	for $\frac{1}{2} \times (46.5 + 72.8) \times 31.4$ for 1873.01 for their area ÷ 250 (= 7.49...) and rounded up to 8 for 150 cao 7.49... × 18.75 = 140.48 scores M1 A1 M0 A0. Using 72.8 × 31.4 or 46.5 × 31.4 for the area scores M0.
			Total for Question 10: 4 marks
11 A17 A21	20.8 cm	**M1** **M1** **A1** **A1**	for $x + 3.2 + 2x + 3x - 1.4 = 46.2$ oe for $6x + 1.8 = 46.2$ or $6x = 44.4$ for $x = 7.4$ for 20.8 An answer of 7.4 only scores M1 M1 A1 A0.
			Total for Question 11: 4 marks
12 G20	44.4 cm	**M1** **M1** **A1**	for $15.8^2 - 12.3^2$ (= 98.35) for $\sqrt{15.8^2 - 12.3^2}$ (= 9.917...) for 44.4 (from 44.434...; accept 44.43 to 44.44) Adding the squares ($\sqrt{15.8^2 + 12.3^2}$ = 20.02...) scores M0 M0 A0.
			Total for Question 12: 3 marks
13(a) A11 A12	0.8 and 5.2 (0.763..., 5.236...)	**B1** **B1**	for one solution in the range 0.7 to 0.8 or 5.2 to 5.3 for both solutions in the ranges 0.7 to 0.8 and 5.2 to 5.3
13(b)	(3, –5)	**B1**	cao
			Total for Question 13: 3 marks