Mark scheme

Calculator Crossover Paper 3

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 N15	$375 \leq n < 385$	**B1** **B1**	for 375 or 385 in the correct position in an inequality for $375 \leq n < 385$ As the number of people is a whole number, accept $375 \leq n \leq 384$ for B2.
			Total for Question 1: 2 marks
2(a) A4	m^8	**B1**	cao
2(b)	$3a^5$	**B1**	cao
2(c)	$27x^6y^3$	**M1** **A1**	for two of 27, x^6, y^3 in a product for $27x^6y^3$ $9x^6y^3$ or $27x^5y^3$ scores M1 A0.
			Total for Question 2: 4 marks
3(a) N9	73 500 000 000 000 000 000 000	**B1**	cao (735 followed by 20 zeros)
3(b)	81.2 (81.224...)	**M1** **A1**	for $(5.97 \times 10^{24}) \div (7.35 \times 10^{22})$ for 81.2 (accept 81.22 to 81.23) 0.0123 (Moon ÷ Earth) scores M0 A0.
			Total for Question 3: 3 marks
4 A17	9	**M1** **M1** **A1**	for multiplying both sides by 4, e.g. $5x + 3 = 4(2x - 6)$ or $5x + 3 = 8x - 24$ for collecting terms correctly, e.g. $27 = 3x$ (ft their expansion) for 9 $5x + 3 = 8x - 6$ (bracket not expanded fully) scores M0 unless recovered.
			Total for Question 4: 3 marks

Q	Answer	Mark	Guidance
5 R9	£29 200	**M1** **M1** **A1**	for 103.5% = 30 222 or 1.035 seen for 30 222 ÷ 1.035 or $\frac{30\,222}{103.5} \times 100$ for 29 200 30 222 × 0.965 = £29 164.23 scores M0 M0 A0.
			Total for Question 5: 3 marks
6(a) A25	$7n - 3$	**M1** **A1**	for $7n + k$ where $k \neq -3$, or for $7n$ seen for $7n - 3$ oe
6(b)	207	**M1** **A1**	for $7n - 3 > 200$ oe, or $n > 29$, or 200 found to be between the 29th term (200) and 30th term (207) – ft their nth term for 207 The 29th term is exactly 200, which is not greater than 200. An answer of 200 scores M1 A0.
			Total for Question 6: 4 marks
7(a) P6	A only: 9, 12; $A \cap B$: 3, 6, 15; B only: 1, 2, 5, 10; outside: 4, 7, 8, 11, 13, 14	**B1** **B1**	for 3, 6, 15 in the intersection and at least 3 other numbers correctly placed for a fully correct Venn diagram with all 15 numbers
7(b)	$\frac{9}{15}$ oe, e.g. $\frac{3}{5}$ or 0.6	**B1**	for $\frac{9}{15}$ oe (ft their Venn diagram)
			Total for Question 7: 3 marks
8(a) S2 S3	Points plotted at (1, 4), (3, 11), (5, 15), (7, 7), (9, 3) joined with straight lines	**B1** **B1**	for at least 4 points plotted correctly at the midpoints of the intervals, or all 5 points plotted at a consistent other position within each interval (e.g. upper bounds) for a fully correct frequency polygon (ignore any line from (1, 4) to the axis or from (9, 3) to the axis) Bars drawn (a histogram/bar chart) score B0 unless midpoints are also joined. Do not award the second B1 if the first and last points are joined.
8(b)	$4 < m \leq 6$	**B1**	for $4 < m \leq 6$ oe, e.g. 4 – 6
8(c)	25%	**B1**	for 25 (from $\frac{10}{40} \times 100$)
			Total for Question 8: 4 marks

Q	Answer	Mark	Guidance
9 R11	1290 N/m^2 (1285.714...)	**M1** **M1** **A1**	for area = 0.4 × 0.35 (= 0.14) for 180 ÷ their area for 1290 (accept 1285.7 to 1286 if not rounded) 0.14 ÷ 180 or 180 × 0.14 scores M1 M0 A0. Using a perimeter (1.5 m) scores M0.
			Total for Question 9: 3 marks
10(a) A4 A18	$(x + 7)(x - 4)$	**M1** **A1**	for $(x \pm 7)(x \pm 4)$ for $(x + 7)(x - 4)$
10(b)	$x = -7, x = 4$	**B1**	for −7 and 4 (ft their factorisation from (a))
			Total for Question 10: 3 marks
11 G20	34.4 cm^2 (34.369...)	**M1** **M1** **M1** **A1**	for halving the base, e.g. 5 cm used as one side of a right-angled triangle for $8.5^2 - 5^2$ (= 47.25) (dep on M2) for $\frac{1}{2} \times 10 \times \sqrt{47.25}$ (height = 6.873...) for 34.4 (accept 34.36 to 34.37) ½ × 10 × 8.5 = 42.5 scores M0. Using $8.5^2 - 10^2$ scores M0.
			Total for Question 11: 4 marks
12(a) G19	14.95 cm	**M1** **A1**	for a correct scale factor, e.g. $\frac{10.4}{6.4}$ (= 1.625), or 9.2 × $\frac{10.4}{6.4}$ for 14.95 (accept 14.9 or 15.0)
12(b)	7.2 cm	**M1** **A1**	for 11.7 ÷ their scale factor, or 11.7 × $\frac{6.4}{10.4}$ for 7.2 cao Adding 4 (10.4 − 6.4) to lengths scores M0.
			Total for Question 12: 4 marks