

Mark Scheme

Predicted Practice Paper — Summer 2027

GCSE Mathematics 8300/1H

Higher Tier Paper 1 Non-Calculator

This is an original mark scheme written for a predicted practice paper. It is NOT an official AQA mark scheme and is NOT endorsed by or affiliated with AQA. All questions are original.

For use with the Predicted Practice Paper 1 question paper.

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 **Mark positively.**

Award marks for what the candidate gets right. Do not deduct marks for errors elsewhere unless the mark scheme says so.

2 **Types of mark.**

M marks are for a correct method or a correct first step towards the answer. A marks are for accuracy and depend on the relevant M mark being earned. B marks are unconditional accuracy marks — no method is needed.

3 **Follow through (ft).**

If a candidate makes an early error but then works correctly with their wrong value, award the later method marks for the correct process. Follow-through marks involving a single calculation can be awarded from the answer alone; multi-step follow-through needs the working to be seen.

4 **Show that / Prove that.**

The final answer alone scores nothing. Every step of working must be shown and correct, ending in a clear concluding statement.

5 **Answer line only.**

If the correct answer appears on the answer line with no working, award full marks — unless the question requires working to be shown.

6 **Contradictory work.**

If working contradicts the answer on the answer line, mark the working as the candidate's intended method, unless the answer line is clearly the intended final answer.

7 **Crossed out work.**

Mark crossed-out work unless the candidate has replaced it with other work.

8 **Misreads.**

If a candidate misreads a number from the question (e.g. copies 4.5 as 45), award method marks for correct working with the misread value, provided the question has not been made easier.

9 **Probability.**

Answers may be given as a fraction, decimal or percentage. A fraction must be in its simplest form for the final accuracy mark unless the scheme says otherwise.

10 **Units.**

Units are not required for a mark unless the mark scheme states otherwise; wrong units do not lose the mark.

11 **Write down.**

No working is needed; a correct answer alone gets full marks.

12 Multi-step methods.

Where a method involves more than one step, each distinct correct step can earn its method mark even if arithmetic slips later — apply follow-through.

13 Two answers given.

If a candidate gives two different answers, mark the first unless the second is clearly intended as a replacement.

14 Surds.

Surd answers must be in simplest form (e.g. $\sqrt{3}$, not $\sqrt{27}$) for the final accuracy mark.

Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	(a) 4.5×10^6	B1	4.5×10^6	cao; accept 4.5×10^6 in any clear notation
	(b) 0.0072	B1	0.0072	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
2	(a) 5^5	B1	5^5	cao
	(b) 4^2	B1	4^2	cao; accept 16 with 4^2 seen, but not 16 alone

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	1 $\frac{3}{20}$	M1 A1	for a common denominator of 20, eg $\frac{15}{20} + \frac{8}{20} (= \frac{23}{20})$; for 1 $\frac{3}{20}$	cao; accept $\frac{23}{20}$ for the M1 only

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	(a) 8.55	B1	8.55	cao
	(b) 11	B1	11	cao; ft their (a) + 2.45 correctly evaluated

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	(a) 22 kg	B1	22	cao; units not required
	(b) 20 kg	M1 A1	for $34 - 14$; for 20	cao; ft their quartiles read from the diagram

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	£24	M1 M1 A1	for $96 \div (5 + 3) (= 12)$; for $(5 - 3) \times "12"$; for £24	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	$2^3 \times 3 \times 7$	M1 A1	for a complete factor tree or ladder with at most one arithmetic slip, or the prime factors 2, 2, 2, 3, 7; for $2^3 \times 3 \times 7$	cao; accept $2 \times 2 \times 2 \times 3 \times 7$

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	5/11	M1 A1	for $x = 0.454545\dots$, $100x = 45.4545\dots$ and a correct subtraction to remove the recurring part; for 5/11	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	£280	M1 M1 A1	for $238 \div (1 - 0.15)$, ie $238 \div 0.85$; for $23800 \div 85$ evaluated; for £280	cao; accept £280.00

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
10	$x = 10$	M1 M1 A1	for $\frac{1}{2}(x + 2)(8) = 48$ oe; for $4(x + 2) = 48$ or $x + 2 = 12$; for $x = 10$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	$x = 4$, $y = 5$	M1 A1 A1	for a correct process to eliminate one variable, eg substituting $y = 3x - 7$ into $x + 2y = 14$; for $x = 4$; for $y = 5$	cao; both values needed for full marks

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
12	$x = -2$, $x = -4$	M1 A1 A1	for factorising to $(x + 2)(x + 4)$; for $x = -2$; for $x = -4$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	$p = (5r + q)/3$	M1 A1	for $3p = 5r + q$; for $p = (5r + q)/3$	cao; the division must apply to the whole numerator

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	$n^2 + n$	M1 M1 A1	for identifying a second difference of 2 (so an n^2 term); for comparing with n^2 to find the linear part n ; for $n^2 + n$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	(a) F only 10, N only 5, both 9, neither 16	B1	all four regions correct	cao
	(b) $\frac{1}{8}$	B1	$\frac{1}{8}$	cao; accept 0.125 or 12.5%; ft their (a) netball-only $\div 40$

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	(a) 52° , angle at the centre is twice the angle at the circumference	B1 B1	for 52° ; for a correct circle-theorem reason	the reason is required for the second mark
	(b) 62°	M1 A1	for angle in a semicircle = 90° , so angle PRQ = 90° ; for $180 - 90 - 28 = 62^\circ$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
17	$\frac{3}{4}$ with full working	M1 M1 A1	for substituting $\cos 60^\circ = \frac{1}{2}$ and $\sin 45^\circ = \frac{\sqrt{2}}{2}$; for $(\frac{1}{2})^2 = \frac{1}{4}$ and $(\frac{\sqrt{2}}{2})^2 = \frac{1}{2}$; for a complete chain ending $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$	“Show that”: no marks for the answer alone

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
18	(a) $\sqrt{3}$	M1 A1	for $\sqrt{12} = 2\sqrt{3}$ and $\sqrt{27} = 3\sqrt{3}$; for $\sqrt{3}$	cao
	(b) $\sqrt{5}$	M1 A1	for multiplying top and bottom by $\sqrt{5}$, eg $5\sqrt{5}/5$; for $\sqrt{5}$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	(a) 54	M1 A1	for $y = kx$ with $k = 30 \div 5 = 6$; for 54	cao
	(b) 18	M1 A1	for $P = k/Q^2$ with $k = 8 \times 3^2 = 72$; for 18	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	(a) $4/7, 3/7;$ $3/6, 4/6; 4/6,$ $2/6$	B1 B1	for the two first-draw branches correct; for all four second-draw branches correct	accept $1/2$ for $3/6$, $2/3$ for $4/6$, $1/3$ for $2/6$
	(b) $2/7$	B1	$2/7$	cao; ft their tree: (their $4/7$) $\times$ (their $3/6$)

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	(a) $(x + 4)^2 - 4$	M1 A1	for $(x + 4)^2$; for -4	cao
	(b) $(-4, -4)$	B1	$(-4, -4)$	cao; ft their (a): $(-p, q)$

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
22	$(x - 4)/4$	M1 M1 A1	for $(x - 4)(x + 4)$; for $4(x + 4)$; for $(x - 4)/4$	cao; cancelling before factorising loses the M marks

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
23	(a) $x_1 = 2.5, x_2 = 2.45$	B1 B1	for 2.5; for 2.45	cao; accept $5/2$ and $49/20$
	(b) 2.45	B1	2.45	cao; ft their x_2

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
24	(a) $b - a$	B1	$b - a$	cao; accept $-a + b$
	(b) $MN = \frac{1}{2}AB$, so parallel	M1 M1 A1	for $OM = a/2$ or $ON = b/2$; for $MN = b/2 - a/2$; for $MN = \frac{1}{2}(b - a) = \frac{1}{2}AB$ with a concluding statement	the conclusion is required for the final mark

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
25	$8n$ with full working	M1 M1 A1 A1	for $(n + 2)^2 = n^2 + 4n + 4$; for $(n - 2)^2 = n^2 - 4n + 4$; for $8n$; for $8n = 8 \times n$ with a concluding statement	"Prove that": no marks for the answer alone

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
26	(a) 27	M1 A1	for $f(3) = 5$; for $g(5) = 27$	cao
	(b) $(x + 1)/2$	M1 A1	for $x = 2y - 1$ or $y = (x + 1)/2$ seen; for $(x + 1)/2$	cao

Paper: 8300/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
27	$n = 5$	M1 M1 M1 A1 A1	for $4/(n+4) \times 3/(n+3)$; for equating to $1/6$; for $(n+4)(n+3) = 72$; for $n^2 + 7n - 60 = 0$; for $n = 5$ (rejecting $n = -12$)	the final A1 is dep on rejecting the negative root

Worked solutions

- Q1.** (a) $4\,500\,000 = 4.5 \times 10^6$. (b) $7.2 \times 10^{-3} = 0.0072$.
- Q2.** (a) $5^3 \times 5^4 = 5^7$; $5^7 \div 5^2 = 5^5$. (b) $(4^2)^3 = 4^6$; $4^6 \div 4^4 = 4^2$.
- Q3.** Common denominator 20: $\frac{3}{4} = \frac{15}{20}$, $\frac{2}{5} = \frac{8}{20}$. Sum = $\frac{23}{20} = 1 \frac{3}{20}$.
- Q4.** (a) 8.5 cm to 1 d.p. gives an upper bound of 8.55 cm. (b) The upper bound of 2.4 cm is 2.45 cm. Total upper bound = $8.55 + 2.45 = 11$ cm.
- Q5.** (a) The median is the line inside the box: 22 kg. (b) IQR = upper quartile – lower quartile = $34 - 14 = 20$ kg.
- Q6.** $5 + 3 = 8$ parts. $\pounds 96 \div 8 = \pounds 12$ per part. Nadia gets $5 - 3 = 2$ more parts: $2 \times \pounds 12 = \pounds 24$.
- Q7.** $168 = 2 \times 84 = 2 \times 2 \times 42 = 2 \times 2 \times 2 \times 21 = 2 \times 2 \times 2 \times 3 \times 7 = 2^3 \times 3 \times 7$.
- Q8.** Let $x = 0.454545\dots$. Then $100x = 45.4545\dots$. Subtract: $99x = 45$, so $x = \frac{45}{99} = \frac{5}{11}$.
- Q9.** $\pounds 238 = 85\%$ of the original price. $1\% = 238 \div 85 = 2.8$. $100\% = 2.8 \times 100 = \pounds 280$.
- Q10.** Area = $\frac{1}{2} \times \text{base} \times \text{height}$: $\frac{1}{2}(x + 2)(8) = 48 \rightarrow 4(x + 2) = 48 \rightarrow x + 2 = 12 \rightarrow x = 10$.
- Q11.** From $3x - y = 7$, $y = 3x - 7$. Substitute into $x + 2y = 14$: $x + 2(3x - 7) = 14 \rightarrow x + 6x - 14 = 14 \rightarrow 7x = 28 \rightarrow x = 4$. Then $y = 3(4) - 7 = 5$. Check: $4 + 2(5) = 14$.
- Q12.** $x^2 + 6x + 8 = (x + 2)(x + 4) = 0$, so $x = -2$ or $x = -4$.
- Q13.** $3p - q = 5r \rightarrow 3p = 5r + q \rightarrow p = (5r + q)/3$.
- Q14.** Differences: 4, 6, 8. The second difference is 2, so the n th term contains n^2 . n^2 gives 1, 4, 9, 16; subtracting from the sequence leaves 1, 2, 3, 4 = n . n th term = $n^2 + n$.
- Q15.** (a) Football only = $19 - 9 = 10$; netball only = $14 - 9 = 5$; both = 9; neither = $40 - 10 - 5 - 9 = 16$. (b) $P(\text{netball but not football}) = \frac{5}{40} = \frac{1}{8}$.
- Q16.** (a) Angle ACB = $104^\circ \div 2 = 52^\circ$, because the angle at the centre is twice the angle at the circumference. (b) PQ is a diameter, so angle PRQ = 90° (angle in a semicircle). Angle PQR = $180^\circ - 90^\circ - 28^\circ = 62^\circ$.
- Q17.** $\cos^2 60^\circ = (1/2)^2 = 1/4$. $\sin^2 45^\circ = (\sqrt{2}/2)^2 = 2/4 = 1/2$. $1/4 + 1/2 = 3/4$, as required.
- Q18.** (a) $\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$; $\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$. So $2\sqrt{12} - \sqrt{27} = 4\sqrt{3} - 3\sqrt{3} = \sqrt{3}$. (b) $5/\sqrt{5} = (5\sqrt{5})/(\sqrt{5} \times \sqrt{5}) = 5\sqrt{5}/5 = \sqrt{5}$.
- Q19.** (a) $y = kx$; $30 = 5k \rightarrow k = 6$. When $x = 9$, $y = 6 \times 9 = 54$. (b) $P = k/Q^2$; $8 = k/9 \rightarrow k = 72$. When $Q = 2$, $P = 72/4 = 18$.
- Q20.** (a) First draw: Red $\frac{4}{7}$, Green $\frac{3}{7}$. After Red: Red $\frac{3}{6}$, Green $\frac{4}{6}$. After Green: Red $\frac{4}{6}$, Green $\frac{2}{6}$. (b) $P(\text{Red then Red}) = \frac{4}{7} \times \frac{3}{6} = \frac{12}{42} = \frac{2}{7}$.
- Q21.** (a) $x^2 + 8x + 12 = (x + 4)^2 - 16 + 12 = (x + 4)^2 - 4$. (b) The turning point is at $(-4, -4)$.
- Q22.** $(x^2 - 16)/(4x + 16) = (x - 4)(x + 4)/(4(x + 4)) = (x - 4)/4$.

- Q23.** (a) $x_1 = (2 + 6/2)/2 = (2 + 3)/2 = 2.5$. $x_2 = (2.5 + 6/2.5)/2 = (2.5 + 2.4)/2 = 2.45$. (b) The iteration converges to $\sqrt{6}$, so $\sqrt{6} \approx 2.45$.
- Q24.** (a) $AB = AO + OB = -a + b = b - a$. (b) $OM = a/2$ and $ON = b/2$. $MN = ON - OM = b/2 - a/2 = (b - a)/2 = \frac{1}{2}AB$. MN is a scalar multiple of AB , so MN is parallel to AB .
- Q25.** $(n + 2)^2 = n^2 + 4n + 4$. $(n - 2)^2 = n^2 - 4n + 4$. Difference = $(n^2 + 4n + 4) - (n^2 - 4n + 4) = 8n = 8 \times n$, always a multiple of 8.
- Q26.** (a) $f(3) = 2(3) - 1 = 5$; $gf(3) = g(5) = 5^2 + 2 = 27$. (b) Let $y = 2x - 1$, so $x = (y + 1)/2$. Hence $f^{-1}(x) = (x + 1)/2$.
- Q27.** $P(\text{blue then blue}) = 4/(n+4) \times 3/(n+3) = 12/((n+4)(n+3))$. Set equal to $1/6$: $12/((n+4)(n+3)) = 1/6 \rightarrow (n+4)(n+3) = 72 \rightarrow n^2 + 7n + 12 = 72 \rightarrow n^2 + 7n - 60 = 0 \rightarrow (n + 12)(n - 5) = 0$. $n = 5$ ($n = -12$ is impossible). Check: $4/9 \times 3/8 = 12/72 = 1/6$.