

GCSE MATHEMATICS
MARK SCHEME – Specimen paper (Linear) Higher Paper 4

Questions	Working	Answer	Mark	Notes
1 (a)	$15.6/5.28=2.954545$	2.9545.....	2	B2 for 2.9545..... or better (B1 for 5.28 seen or 2.95 or 2.954(5)) B1 ft for 2.95
(b)		2.95	1	
2	$60 \div 3 = 20$ $20 - 11$	9	2	M1 for $\div 3$ or 20 seen or $3(x+11)$ A1 cao
3 (i)	$180 - 90 - 38$	52°	3	M1 for $180 - (90 + 38)$ A1 for $x = 52^\circ$ OR B1 for angle $QTU = 38^\circ$ B1 for $x = 52^\circ$ B1 for mention of alternate angles on parallel lines
(ii)		Alternate angles on parallel lines and either angles in a triangle or angles on a straight line.		
4	$0.3 + 0.25$ $1 - 0.55$	0.45 oe	2	M1 for $1 - (0.3 + 0.25)$ A1 for 0.45 oe [SC:B1 for 0.72]
5 (i)	0 6 8 8 9 1 2 2 4 5 5 6 6 8 8 2 1 1 1 2 5 3 2 4	Diagram	2	B2 for fully correct (B1 for 2 errors in leaves or omitted key or unordered)
(ii)		16	2	B1 for putting in order A1 cao
6	$4.20 \div 3 \times 7$	9.80	3	M1 for $4.20 \div 3$ or sight of 1.4 M1 for “1.40” $\times 7$ A1 for 9.8 or equivalent

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7	$8.80 \times \frac{17.5}{100} = 1.54$ $8.80 + 1.54 = 10.34$ $650 \times "10.34"$	£ 6 721	4	<p>M1 for $8.80 \times \frac{17.5}{100}$ or 1.54 seen or 8.80×1.175 (oe)</p> <p>Award M1 for 10%, 5% and $2\frac{1}{2}$ % correctly calculated)</p> <p>M1 for $8.80 + "1.54"$ (dep on previous M1)</p> <p>M1 (indep) for $650 \times "10.34"$ or digits 6721 seen A1 cao OR M1 for 650×8.8 or 5720 seen M1 for $"5720" \times \frac{17.5}{100}$ or 1001 seen (Award M1 for 10%, 5% and $2\frac{1}{2}$ % correctly calculated) M1 for $"5720"+"1001"$ (dep on both previous M marks) [or M2 for $"5720" \times 1.175$ (oe)] A1 cao</p>
8	3.25×1000000	3250000	2	<p>M1 for 3.25×1000000 or $3.25 \times 100 \times 100 \times 100$ A1 cao</p>

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9	$4y + 12 = 6$ or $y + 3 = \frac{6}{4}$ $4y = -6$ $y = \frac{6}{4} - 3$	-1.5	3	B1 for $4y + 12$ or $y + 3 = \frac{6}{4}$ M1 for a correct rearrangement of their 3 terms to isolate $4y$ or y A1 for -1.5 oe
10 (a) (b)		Reason Question Response	1 2	B1 Pass at $0.6 > \text{Fail at } 0.4$ B1 Improved question B1 Response boxes
11		Rhombus	4	B1 for arcs to locate D B1 for AD drawn B1 for arcs to locate C B1 for complete rhombus, within guidelines [SC:B1 for one correctly drawn 2 nd side, if no marks awarded]
12	$\frac{180 \times 1000}{60 \times 60} = 50$	50	3	M2 for $180 \times 1000 \div 60 \div 60$ or $50 \times 60 \times 60 \div 1000$ or for a correct method to obtain two comparable values eg $50 \times 60 \times 60$ and 180×1000 A1 for final proof (M1 for $180 \div 60 \div 60$ or $50 \times 60 \times 60$ or 180000 seen or for 180×1000)
13	$2.5 \rightarrow 40.6$ (25) $2.6 \rightarrow 43.5$ (76) $2.7 \rightarrow 46.6$ (83) $2.8 \rightarrow 49.9$ (50) $2.9 \rightarrow 59.3$ (89) $2.85 \rightarrow 51.6$ (49)	2.8	4	B2 for a trial between 2 and 3 exclusive (B1 for a trial at 2 or 3) B1 for a trial between 2.8 and 2.9 exclusive B1 (dep on at least one previous B1) for 2.8 NB trials should be evaluated to at least 1 dp truncated or rounded

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14 (a)	$48 \div (5 + 4 + 3)$ "4" \times 3	12	3	M1 for $48 \div (5 + 4 + 3)$ M1 (dep) for "4" \times 3 or "4" \times 5 or "4" \times 4 A1 cao [SC: B2 for 20:16:12 only]
(b)	$1.24 \times \frac{95}{100} = 0.1178$ $1.24 + 0.1178 = 1.3578$	1.36 or 1.4	4	M1 for $1.24 \times \frac{95}{100}$ or 0.11(78) seen M1 (dep) for 1.24 + "0.11(78)" A1 for 1.4 or better B1 (indep) for rounding their answer correctly to 1 or 2dp OR M1 for $1.24 \times \frac{100 + 9.5}{100}$
15 (a)		Angle between tangent and radius.	1	M1 (dep) for $1.24 \times "1.095"$ or $0.0124 \times "109.5"$ A1 for 1.4 or better B1 (indep) for rounding their answer correctly to 1 or 2dp B1
(b)	$26^2 = 24^2 + r^2$ $\sqrt{26^2 - 24^2} = \sqrt{100}$	10	4	M1 for $26^2 = 24^2 + r^2$ M1 for $\sqrt{676 - 576}$ A1 cao B1 for $OQ = "10"$
(c)	$\pi \times 10^2$	314	2	M1 for $\pi \times "10"$ ² A1 for 314 – 315 inclusive

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16 (a)	$(1 \times 10) + (3 \times 20) + (5 \times 25) + (7 \times 40) + (9 \times 15) + (11 \times 10) = 720$ “720” $\div 120 = 6$	6	4	M1 for use of fx with x consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1 st M1) for use of $\sum fx/\sum f$ A1 cao B1 for all correct
(b)		(10), 30, 55, 95, 110, 120 graph	1	B1 for all correct
(c)			2	B1 ft for 5 or 6 points plotted correctly $\pm \frac{1}{2}$ square (1mm) at the end of interval; dep on a sensible table (condone 1 addition error) B1 (dep) for points joined by a curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points (SC:B1 if 5 or 6 points plotted not at end but consistent within each interval and joined) M1 for reading from a cf graph at 5
(d)		39 – 44	2	A1 ft $\frac{1}{2}$ square (1mm) Or B2 for 39 – 44
17 (a)	$\tan x = 2.4/4.5$ $x = \tan^{-1}(2.4/4.5) = 28.1$	28.1	3	M1 for $\tan x = \frac{2.4}{4.5}$ or $\tan \frac{2.4}{4.5}$ M1 for $\tan^{-1}(2.4/4.5)$ A1 for 28.0 – 28.1
(b)	$90 + \text{“28.1”}$	118	1	B1 (indep) ft for 90 + “28.1” rounded to 3 or 4 sf

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18 (a) (b) (c)		a^9 $12x^3y^4$ $(p - 4q)(p + 4q)$ $x = 2$ $y = 1.5$	1 2 2	B1 for a^9 , accept a^{4+5} B2 cao (B1 for two of $12, x^3, y^4$) B2 for $(p - 4q)(p + 4q)$ (B1 for $(p \pm 4q)(p \pm 4q)$)
19	Eqn[1] $\times 2$ then add eqn [2] leads to $7x = 14$ Eqn[2] $\times 3$ then subtract from eqn [1] leads to $-14y = -21$		3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao (SC: B1 for one correct answer only if M's not awarded)
20	$D = 5t + \pi t + 5w$ $D - 5w = 5t + \pi t$ $D - 5w = (5 + \pi)t$ OR $D = t(5 + \pi) + 5w$ $\frac{D}{5 + \pi} = t + \frac{5w}{5 + \pi}$	$t = \frac{D - 5w}{5 + \pi}$ $t = \frac{D}{5 + \pi} - \frac{5w}{5 + \pi}$	3	M1 for subtracting $5w$ from both sides M1 for factorising to get $(5 + \pi)t$ A1 for $t = \frac{D - 5w}{5 + \pi}$ oe [SC:M1 M1 A0 for $\frac{D - 5w}{8.14}$ oe]
21	Area $\Delta ABC = \frac{1}{2} \times 15 \times 9 \times \sin 110$	63.4	3	M1 for $\frac{1}{2} \times 15 \times 9 \times \sin 110$ M1 (dep) for $67.5 \times 0.939(69 \dots)$ or $126.85 \dots$ A1 63.4 to 63.5 [SC:B2 for 126.9 or better]

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22	$P = \frac{2}{6} \times \frac{3}{6} + \frac{1}{6} \times \frac{2}{6}$	$\frac{8}{36}$ oe	3	M1 for $\frac{2}{6} \times \frac{3}{6}$ or $\frac{1}{6} \times \frac{2}{6}$ or for clearly identifying in $P(R) \times P(R) + P(Y) \times P(Y)$ M1 for $P = \frac{2}{6} \times \frac{3}{6} + \frac{1}{6} \times \frac{2}{6}$ "2" "1" "2" A1 for $\frac{8}{36}$ oe
23	$600 \times 1.055^{15} = 1339.48$	1339 to 1340	3	M1 for 5.5 seen M1 for 600×1.055^{15} A1 for 1339 to 1340 (SC:B1 for 739 to 740)
24 (a)	Graph translated 3 units to the left passing through the points $(-6, -3)$, $(-3, 0)$, $(0, 3)$, $(-1, 1)$, $(-5, -1)$		2	M1 for moving 3 horizontal A1 for translation left passing through 3 correct points
(b)	Graph reflected in x axis and translated 1 unit in the positive y-direction; passing through points $(3, -2)$, $(0, 1)$, $(-3, 4)$, $(2, 0)$, $(-2, 2)$		2	B1 for a reflection in x-axis B1 for translations of $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ passing through 3 correct points

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25	Upper bound of 30 is 30.5 Lower bound of 9.8 is 9.75 $2 \times \pi \times \sqrt{\frac{30.5}{9.75}}$	11.1	4	B1 for 30.5 or 29.5 seen B1 for 9.85 or 9.75 seen M1 for $2\pi \sqrt{\frac{30.5}{9.75}}$ A1 cao
26 (a)	$\frac{x(x-4)}{(x-2)(x-4)}$	$32x^{15}y^5$	2	B2 cao
(b)		$\frac{x}{x-2}$	3	(B1 for two of $32, x^{15}, y^5$) B1 for $x(x-4)$ B1 for $(x-4)(x-2)$ B1 cao