Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

MATHEMATICS (SYLLABUS D) **4024/02**

Paper 2 **For Examination from 2018**

SPECIMEN MARK SCHEME

2 hours 30 minutes

MAXIMUM MARK: 100

This document consists of **6** printed pages.

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M – Method marks are given for a correct method.
A – Accuracy marks are given for an accurate answer following a correct method.
B – B marks are given for a correct statement or step, independent of method marks.

Abbreviations

ag answer given
art answer rounds to
cao correct answer only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
sc special case
soi seen or implied
www without wrong working

Question	Answer	Marks	Part marks
1(a)(i)	37.5[%]	**2**	**M1** for $5.5 \div (240 \div 60)$ **soi** by 1.375 Or **B1** for either 90 or figs 15 seen
1(a)(ii)	73.5[0]	**2**	**M1** for $45 \times 5.5 + (60 - 45) \times 5.5 \times 0.8$ **oe** Or **B1** for 247.5 seen or for 66 seen
1(a)(iii)	208.7[0] or 209	**2**	**M1** for $240 \div 1.15$ **oe**
1(a)(iv)	2852.92	**3**	**M2** for $2500 \times \left(1 + \frac{4.5}{100}\right)^3$ **oe** Or **M1** for $2500 \times \left(1 + \frac{4.5}{100}\right)^k$ **oe** where $k > 1$
1(b)	1.21875 to 1.22	**2**	**M1** for $0.78 \div 0.64$

Question	Answer	Marks	Part marks
2(a)(i)	6 correct plots	**2**	**P1** for 4 or 5 correct plots
2(a)(ii)	Positive	**1**	
2(a)(iii)	Line of best fit	**1**	**Ruled** line at least from $x = 5$ to $x = 48$, with at least 3 points on each side and drawn so would cut axis between (5, 0) and (0, 20)
2(a)(iv)	Physics (integer) value on line at M = 22	**1**	**Strict ft** from *their* single ruled line $5 \leqslant x \leqslant 48$.
2(b)	45	**1**	
2(c)	$(26 + 39 + 35 + 28 + 9 + 37 + 45 + 33 + 16 + 12) \div 10$	**1**	
2(d)	46 **cao**	**3**	**M2** for $(31 \times 12 - 28 \times 10) \div 2$ **soi** by $92 \div 2$ Or **M1** for 31×12 **soi** by 372 or 93
2(e)	$\frac{1}{15}$ **oe**	**2**	**M1** for $\frac{3}{10} \times \frac{2}{9}$ or for $\frac{k}{10} \times \frac{k-1}{9}$ with $k \geqslant 2$

Question	Answer	Marks	Part marks
3(a)(i)	Correct triangle	**2**	**B1** for two correct vertices or triangle correct size and orientation
3(a)(ii)	Correct triangle	**2**	**B1** for two correct vertices or triangle correct size and orientation
3(a)(iii)	Complete description **www**	**3**	**B1** for Rotation **B1** for either 90 anticlockwise or centre (0, 3)
3(b)	$y = x + 5$	**2**	**B1** for either $y = x + k$, $k \neq 5$ or for $y = mx + 5$, $m \neq 0$ or 1
3(c)	$y = -x$	**1**	

Question	Answer	Marks	Part marks
4(a)(i)	68.7°	**2**	**M1** for $\tan A = \frac{18}{7}$
4(a)(ii)	257 to 257.5	**4**	**M1** for $\tan 55 = \frac{18}{DE}$ **A1** for DE = 12.6 to 12.61 cm **M1 ft** for $\frac{1}{2}(9 + 7 + \textit{their}\ 12.6) \times 18$ or for a complete alternative method
4(b)	26°	**2**	**M1** for 41.5 or 112.5 used

Question	Answer	Marks	Part marks
5(a)(i)	$2^2 \times 3 \times 7$	**1**	
5(a)(ii)	72	**2**	**M1** for either [504 =] $2^3 \times 3^2 \times 7$ **soi** or answer 8×9 **oe**
5(b)(i)	11	**1**	
5(b)(ii)(a)	4, 8, 12, 16	**1**	
5(b)(ii)(b)	x is a multiple of 4	**1**	
5(c)	21	**2**	**M1** for $n(P \cup F)' = 12$

Question	Answer	Marks	Part marks
6(a)(i)	–8.5	**1**	
6(a)(ii)	8 points correctly plotted and joined with a smooth curve on correct axes	**3**	**B1** for correct scale **B1** for 6 or 7 given table points correctly plotted on *their* axes **B1** for smooth curve through all 8 points on *their* consistent axes
6(a)(iii)	2.5 – 6.5 (**dep** on tangent **soi**)	**2**	**M1** for tangent at $x = 1.5$ **soi**
6(a)(iv)	–0.85 to –0.95	**2**	**M1** for $y = 1$ **soi**
6(b)(i)	$p = 1.2$ $q = 0.5$	**2**	**B1** for p = 1.2, **B1** for q = 0.5 **ft**
6(b)(ii)	$-\frac{4}{5}$ **oe**	**2**	**M1 ft** for $\frac{-2}{3 - \textit{their}\ q}$ **oe**

Question	Answer	Marks	Part marks
7(a)	$x = -4$ **cao**	**2**	**M1** $\pm 2x =$ or $\pm 8 =$
7(b)	$x = 1.5$, $y = -3$	**3**	**B2** for 1 correct value **www** Or **B1** for pair of values satisfying either equation
7(c)	$\frac{10p - 29}{(p + 2)(2p - 3)}$ final answer	**3**	**M1** $\frac{7(2p - 3) - 4(p + 2)}{(p + 2)(2p - 3)}$ **B1** for $14p - 21 - 4p - 8$ seen
7(d)	$\frac{y + 3}{2y + 5}$ final answer	**3**	**M1** for $(y + 3)(y - 3)$ seen **M1** for $(2y + 5)(y - 3)$ seen

Question	Answer	Marks	Part marks
8(a)(i)	$EC = BE$ or $AC = FE$ **and** $\angle AEC = \angle FBE$ or $\angle ECA = \angle BEF$	**B1**	
	Two correct reasons for their choices e.g. $EC = BE$; radii $AC = FE$; diameters $\angle AEC = \angle FBE$ [= 90°]; angle in semicircle $\angle ECA = \angle BEF$ [= 60°]; equilateral triangle	**B1**	
	Third statement, leading to correct congruence condition i.e. RHS, SAS, SSA	**B1**	
8(a)(ii)	BFD	**1**	
8(a)(iii)	$\angle EBF = \angle DFB = 90°$ Cointerior/interior/supplementary/allied angles [sum to 180] **dep**	A1 B1	Both 90° could be marked on diagram
	OR $\angle BEF = \angle EFD = 60°$ Alternate angles [are equal] **dep**	A1 B1	Both 60° could be marked on diagram
	Available marks	**2**	
8(b)(i)	6.126 to 6.13	**2**	**M1** for $\frac{1}{2} \times 4 \times 4 \sin 130$ or $\frac{1}{2}PQ \times$ perpendicular height (numerical)
8(b)(ii)	38.2 to 38.3	**3**	**M1** for $\frac{(360 - 130)}{360} \times \pi \times 4^2$ **soi** by 32.11 or $\frac{130}{360} \times \pi \times 4^2$ **soi** by 18.15 And **M1 ft** for '*their* major sector area' + '*their* triangle area' or for '*their* circle area' – '*their* minor sector area' + '*their* triangle area'

Question	Answer	Marks	Part marks
9(a)	$\frac{320}{x}$ **isw**	**1**	
9(b)	$2x^2 + 5x - 20$ (= 0) correctly found	**3**	**Alternative method 1:** **M1** for (car speed =) $\frac{320}{x+2.5}$ **oe** and **M1** for *their* $\frac{320}{x} - \frac{320}{x+2.5} = 80$ **oe** **Alternative method 2:** **M1** for (car speed =) *their* $\frac{320}{x} - 80$ or (car distance =) $x + 2.5$ and **M1** for $320 = \left(\textit{their}\ \frac{320}{x} - 80\right)(x + 2.5)$ **oe**
9(c)	2.15 –4.65	**3**	**B1** for $\sqrt{5^2 - 4 \times 2 \times (-20)}$ **soi** and **B1** for $\frac{-5 \pm \sqrt{\textit{their}\,185}}{2 \times 2}$ **soi** If **B1** or **B0** at this stage, allow **M1** for both values of $\frac{p \pm \sqrt{q}}{r}$
9(d)	69	**2**	**M1** for $\frac{320}{\textit{their positive}\ x + 2.5}$ **oe** or $\frac{320}{\textit{their positive}\ x} - 80$ **oe**

Question	Answer	Marks	Part marks
10(a)(i)	$\frac{5 \sin 65}{\sin 65 - \sin 45}$ correctly obtained	**3**	**M1** for $\frac{BC}{\sin 65} = \frac{AC}{\sin 45}$ **oe** **soi** and **B1** for $AC = BC - 5$ **oe**
10(a)(ii)	22.7 to 22.75	**1**	
10(b)(i)	$-\frac{11}{40}$ **isw**	**3**	**M2** for $13^2 = 6^2 + 10^2 - 2 \times 6 \times 10 \times \cos PRQ$ Or **M1** for $13^2 = 6^2 + 10^2 \pm (2) \times 6 \times 10 \times \cos PRQ$ **A1** for $\frac{33}{120}$ or for $-\frac{33}{60}$
10(b)(ii)	$\frac{11}{40}$ **ft**	**1**	