
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.

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 <i>their</i> single ruled line $5 \leq x \leq 48$.
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 $k \geq 2$

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 $\frac{1}{2}(9 + 7 + \text{their } 12.6) \times 18$ 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 <i>their</i> axes B1 for smooth curve through all 8 points on <i>their</i> 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 $\frac{-2}{3 - \text{their } q}$ 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 $\angle AEC = \angle FBE [= 90^\circ]$; angle in semicircle $\angle ECA = \angle BEF [= 60^\circ]$; equilateral triangle	B1	
	Third statement, leading to correct congruence condition i.e. RHS, SAS, SSA	B1	
8(a)(ii)	BFD	1	
8(a)(iii)	$\angle EBF = \angle DFB = 90^\circ$ Cointerior/interior/supplementary/allied angles [sum to 180] dep	A1 B1	Both 90° could be marked on diagram
	OR $\angle BEF = \angle EFD = 60^\circ$ 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	<p>Alternative method 1: M1 for (car speed =) $\frac{320}{x+2.5}$ oe and M1 for <i>their</i> $\frac{320}{x} - \frac{320}{x+2.5} = 80$ oe</p> <p>Alternative method 2: M1 for (car speed =) <i>their</i> $\frac{320}{x} - 80$ or (car distance =) $x + 2.5$ and M1 for $320 = (\textit{their} \frac{320}{x} - 80)(x + 2.5)$ oe</p>
9(c)	2.15 -4.65	3	<p>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 $\frac{p \pm \sqrt{q}}{r}$</p>
9(d)	69	2	<p>M1 for $\frac{320}{\textit{their positive } x + 2.5}$ oe or $\frac{320}{\textit{their positive } x} - 80$ oe</p>

Question	Answer	Marks	Part marks
10(a)(i)	$\frac{5 \sin 65}{\sin 65 - \sin 45}$ correctly obtained	3	<p>M1 for $\frac{BC}{\sin 65} = \frac{AC}{\sin 45}$ oe soi and B1 for $AC = BC - 5$ oe</p>
10(a)(ii)	22.7 to 22.75	1	
10(b)(i)	$-\frac{11}{40}$ isw	3	<p>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 $-\frac{33}{60}$</p>
10(b)(ii)	$\frac{11}{40}$ ft	1	