
MATHEMATICS - MARKING SCHEME

Notes for Marking of Scripts***Types of Marks***

Method marks are awarded for knowing a correct method of solution and attempting to apply it. Method marks cannot be lost for arithmetic mistakes. They can only be awarded if the method used would have led to the correct answer had not an arithmetic mistake been made. Unless otherwise stated, any valid method not specified in the marking scheme is to be accepted and marked accordingly.

There are two types of Method marks: **M** marks and **(M)** marks.

- **M marks** are only awarded if method is seen.
- **(M) marks** are awarded even when a correct answer is given and no work is shown.

There are two types of Accuracy marks: **A** marks and **B** marks.

- **A** marks are accuracy marks given for correct answer only (c.a.o.).
 - * Incorrect answers, even though nearly correct, score no marks.
 - * Accuracy marks are also awarded for incorrect answers which are correctly followed through (f.t.) from an incorrect previous answer, **provided that f.t. is indicated in the marking scheme.**
 - * No Method marks **M/(M)** or Accuracy marks **A** are awarded when a wrong method leads to a correct answer.
 - * When a question is assigned **M** and **A** marks and students present a correct answer without any working, only **A** marks are awarded.
- **B** marks are accuracy marks awarded for specific results or statements independent of the method used.

Misreading

Method marks can still be earned (unless that part of the question is trivialised) but the final Accuracy marks are lost.

Crossed out working

An answer or working that is crossed out and not replaced is marked as if it were not crossed out. If the answer or working is replaced, then the crossed out answer or working is ignored and should not be considered for marking.

Units

In general, missing or inaccurate units are not penalised unless otherwise indicated in the marking scheme.

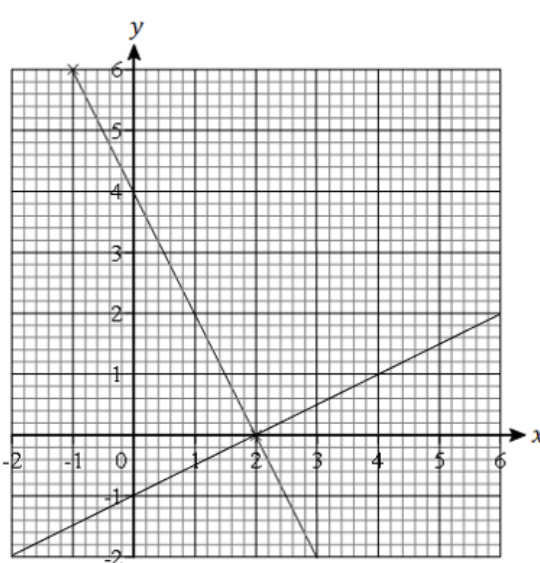
Other

- Incorrect working or statement following a correct answer is ignored.
- Marks are not sub-divisible; no half marks may be awarded.
- Other abbreviations used:
 - * o.e. (or equivalent)
 - * e.e.o.o. (each error or omission)
- Markers are advised to indicate the **M**, **(M)**, **A** or **B** marks awarded in the body of the script and then write their total in the margin. The total mark for each question should be written in the table included at the top of page 1 of the main paper. This measure facilitates the moderation of papers.

Marking Scheme (Total 100 marks)

Que.		Requirements	Mark		Additional Guidance										
1	(a)	2.03, 2.23, 2.3, 2.33, 20.3	M1 A1	7	2.03 as the smallest										
	(b)	Valid attempt $2^4 \times 3 \times 5$	M1 A1												
	(c)	(i) -5 (ii) $\frac{9}{8} \times \frac{4}{3}$ $= \frac{3}{2}$ o.e.	B1 M1 A1												
2	(a)	$\frac{33 + 28 + 42 + 36 + 44 + 57}{6} = \frac{240}{6}$ $= 40$	M1 A1	4											
	(b)	$42 \times 6 = 252$ $252 - 240$ $= 12$	(M)1 A1												
3	(a)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>Number of Books</td> <td>1 - 5</td> <td>6 - 10</td> <td>11 - 15</td> <td>16 - 20</td> </tr> <tr> <td>Frequency</td> <td>11</td> <td>8</td> <td>4</td> <td>1</td> </tr> </table>	Number of Books	1 - 5	6 - 10	11 - 15	16 - 20	Frequency	11	8	4	1	B2	4	Award B1 for at least two correct entries
	Number of Books	1 - 5	6 - 10	11 - 15	16 - 20										
Frequency	11	8	4	1											
(b)	$\frac{5}{24} \times 100$ $= 20.8\%$	M1 A1													
4	(a)	$52 : 120 : 108$ $13 : 30 : 27$	(M)1 A1	8											
	(b)	$10 : 1000 \times 100$ $1 : 10\ 000$	(M)1 A1												
	(c)	Niece A $\Rightarrow \frac{12}{40} \times 12000 = \text{€}3600$ Niece B $\Rightarrow \frac{13}{40} \times 12000 = \text{€}3900$ Niece C $\Rightarrow \frac{15}{40} \times 12000 = \text{€}4500$	M1 A1 A1 A1												
5	(a)	7 , 11 , 15	(M)1 A1	4	Award for substituting All correct										
	(b)	$4n + 3 = 25$ $4n = 22$ $n = 5.5$ The value of n is not a whole number.	M1 A1												

6	(a)	$9x + 72 + 12x - 4x^2$ $72 + 21x - 4x^2$	M2 A1	8	M1 for two correct terms
	(b)	$15x(2 + y)$	B2		Award B1 for partially correct factorisation
	(c)	$8x - 6x = 23 + 17$ $2x = 40$ $x = 20$	M1 M1 A1		
7	(a)	$\frac{8}{15}$	B1	3	
	(b)	$\frac{2}{3}$ o.e.	B1		
	(c)	0	B1		
8	(a)	$\frac{30}{100} \times 17\,100 = 5130$ Each manager = $5130 \div 3 = \text{€}1710$ Employee = $(17\,100 - 5130) \div 9$ $= \text{€}1330$	M1 A1 M1 A1	7	
	(b)	$1710 - 1330 = 380$ $\frac{380}{1330} \times 100 = 28.6\%$ Do not agree.	(M)1 M1 A1 f.t.		f.t. from (a)
9	(a)	$20 + 11 \times -2$ $20 - 22$ -2	M1 A1	4	
	(b)	$2x - 19 = 0$ $2x = 19$ $x = 9.5$	M1 A1		
10	(a)	$v^2 - u^2 = 2as$ $a = \frac{v^2 - u^2}{2s}$	M1 A1	7	
	(b)	(i) $4m + 6p = 67$ $5m + 7p = 80$ (ii) $20m + 30p = 335$ $20m + 28p = 320$ $2p = 15$ $p = 7.5$ (or €7.50) $4m + (6 \times 7.5) = 67$ $4m = 22$ $m = 5.5$ (or €5.50)	M1 M1 A1 M1 A1		Both correct

11	(a)	YZ = 10 cm Construction of 60° at Y, arcs shown XY = 5 cm Accurate triangle drawn	M1 M1 M1 A1	7									
	(b)	90°	B1		±1°								
	(c)	Area = 0.5 × 5 × 8.66... = 21.65 cm ²	M1 A1		Accept answers between 21 cm ² and 22 cm ²								
12	(a)	Area ABCD = (7.2 + 12.6) × 10.4 ÷ 2 = 102.96 cm ² Area semicircle = π × 3.6 ² ÷ 2 = 20.357... cm ² Shaded area = 102.96 – 20.357... = 82.6 cm ²	M1 M1 M1 A1	6									
	(b)	Volume = 82.602... × 0.6 = 49.6 cm ³	M1 A1 f.t.		f.t. for incorrect (a)								
13	(a)	4	B1	10	Accept also (0, 4)								
	(b)	$m = \frac{\text{change in } y}{\text{change in } x}$ m = -2	(M)1 A1										
	(c)	C. y = 4 - 2x	B1										
	(d)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>x</td> <td>-2</td> <td>1</td> <td>6</td> </tr> <tr> <td>y</td> <td>-2</td> <td>-0.5</td> <td>2</td> </tr> </tbody> </table>	x		-2	1	6	y	-2	-0.5	2	B3	-1 e.e.o.o.
	x	-2	1		6								
y	-2	-0.5	2										
(e) i)		B2	-1 e.e.o.o.										
ii)	(2, 0)	B1											

14	(a)	070°	B1	5	Accept also 70°
	(b)	$180^\circ + 70^\circ$ 250°	(M)1 A1		
	(c)	$360^\circ - 50^\circ$ 310°	(M)1 A1		
15	(a)	$\tan 35^\circ = \frac{AB}{42}$ $AB = 42 \times \tan 35^\circ$ $AB = 29.4087\dots \text{ m} = 29.4 \text{ m}$	(M)1 M1 A1	9	
	(b)	$DE^2 + 22^2 = 28^2$ $DE = \sqrt{300}$ $DE = 17.3205\dots \text{ m} = 17.3 \text{ m}$	(M)1 M1 A1		
	(c)	$EF = 42 - 17.3208\dots = 24.679\dots \text{ m}$ $GF = 29.4087\dots + 50 + 22 = 101.409 \text{ m}$ $\tan \angle EGF = \frac{24.679\dots}{101.409\dots}$ $\angle EGF = 13.7^\circ$	M1 M1 A1 f.t.		Award for both correct f.t. for incorrect (a) or (b)
16	(a)	$\angle PQT = 180^\circ - (32^\circ + 95^\circ)$ $= 53^\circ$	M1 A1	7	
	(b)	In $\triangle PQT$ and $\triangle SRT$ $\angle TPQ = \angle TSR = 32^\circ$ (given) $\angle PQT = \angle SRT = 53^\circ$ (found in (a)) $QT = RT$ (given) Then, $\triangle PQT$ is congruent to $\triangle SRT$, AAS	M1 M1 M1		Award M1 for each correct statement and reason
	(c)	Reason: Since $\triangle PQT$ is congruent to $\triangle SRT$ $PT = ST$ Then $\triangle PTS$ is isosceles.	M1 A1		