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.

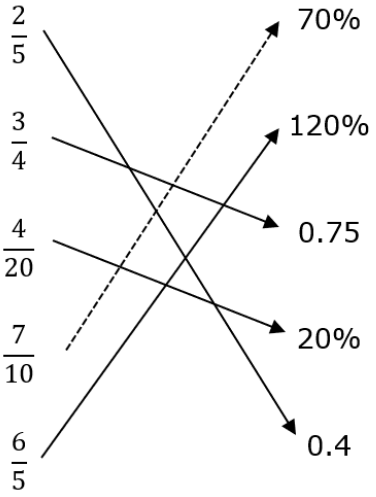
Misreading
Method marks can still be earned (unless that part of the question is trivialised) but the final Accuracy marks are lost.

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.

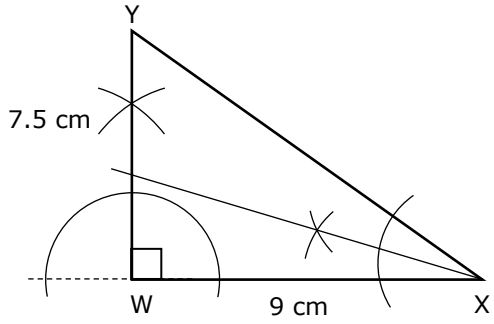
Units
In general, missing or inaccurate units are not penalised unless otherwise indicated in the marking scheme.

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.

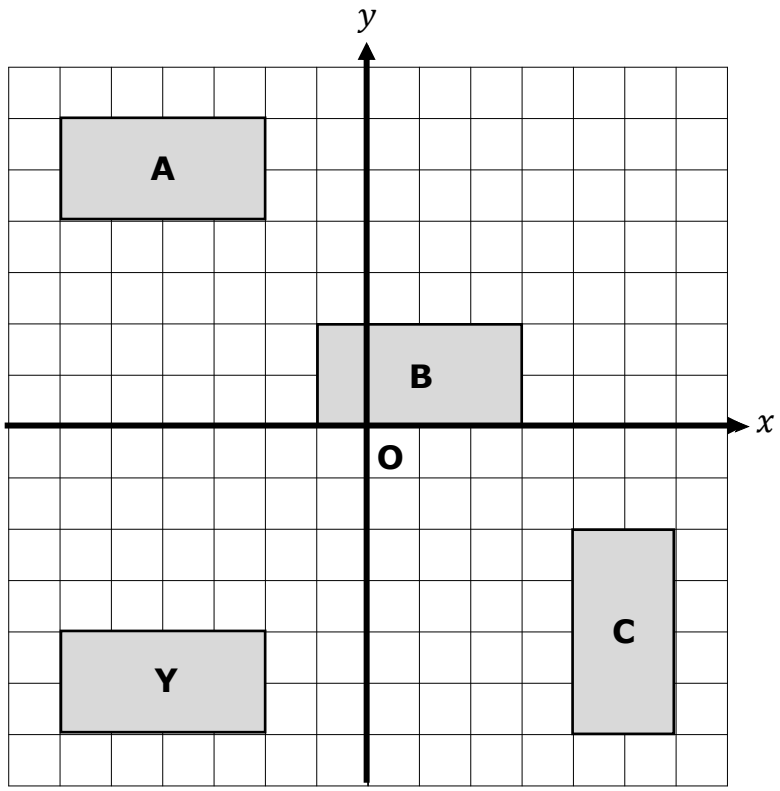
Marking Scheme (Total 100 marks)

Que.		Requirements	Mark		Additional Guidance
1			B4	**4**	
2	(a)	14	(M)1 A1	**5**	
	(b)	$3a - 6 - 8a + 12$ $6 - 5a$	M1 M1 A1		Award 1 mark for 2 correct terms o.e.
3	(a)	(i) $a = 0$	B1	**5**	
		(ii) $b = 2$	B1		
	(b)	$\left(\frac{6}{8} - \frac{3}{8}\right) \times \frac{4}{9}$ $\frac{3}{8} \times \frac{4}{9}$ $\frac{1}{6}$	M1 M1 A1		o.e.
4	(a)	$10x - 5 = 13$ $10x = 18$ $x = 1.8$	M1 M1 A1	**7**	
	(b)	(i) $4w + 10 = 40$ (ii) $4w = 30$ $w = 7.5$ length = 12.5	B1 M1 M1 A1		o.e.
5	(a)	12 : 36 : 96 1 : 3 : 8	(M)1 A1	**5**	
	(b)	3.6 × 50 000 180 000 ÷ 100 = 1800 1800 ÷ 1000 = 1.8 km	M1 M1 A1		

Que.		Requirements	Mark		Additional Guidance
6	(a)	(i) $\angle HEF = 180° - 129° = 51°$ $\angle GHE = 51°$ (ii) $\angle DBE = 180° - (74° + 51°)$ $= 55°$	M1 A1 B1	**6**	f.t. from a(i)
	(b)	(i) $(10 - 2) \times 180° = 1440°$ $1440° \div 10 = 144°$ (ii) $360° - (144° \times 2) = 72°$	M1 A1 B1		f.t. from b(i)
7	(a)	Accommodation = $\frac{90}{360} \times 600$ = €150	M1 A1	**6**	
	(b)	Travel = $360 - (130 + 90 + 80)$ $= 60^{\circ}$ $\frac{60}{360} \times 600$ €100	M1 M1 M1 A1		
8	(a)	$2x(x^2 - 2x + 3)$	M1 A1	**4**	Partial factorisation
	(b)	B	B2		
9	(i)	$\hat{D} = \hat{P}$ (given) $\hat{E} = \hat{Q}$ (given) } $\hat{F} = \hat{R}$ (third angle) So, triangles DEF and PQR are similar (AAA)	M1 M1 A1	**5**	
	(ii)	Scale factor = $\frac{70}{20} = 3.5$ QR = $15 \times 3.5 = 52.5$ cm	(M)1 A1		
10		$x = 108°$ Angle at centre twice angle at circumference $y = 126°$ Opposite angles of cyclic quadrilateral are supplementary	A1 M1 A1 M1	**4**	Accept $54° \times 2 = 108°$ Accept $180° - 54° = 126°$
11	(a)	(i) $30 \times 16 \times 52$ 24 960	M1 A1	**6**	
		(ii) $\frac{15}{100} \times 24960$ €3744	M1 A1		f.t. from a(i)
	(b)	$I = \frac{3500 \times 2.5 \times 5}{100}$ $= €437.50$	M1 A1		

Que.		Requirements	Mark		Additional Guidance
12	(a)	(i) 17, 20	B1	**6**	Both correct
		(ii) C	B1		
	(b)	(i) 10	B1		
		(ii) $3n - 5 = 175$ $3n = 180$ $n = 60$	M1 (M)1 A1		
13		(i) (0, 12)	B1 B1	**6**	
		(ii) valid method to work out gradient 1	M1 A1		
		(iii) $y = x + 3$	M1 A1		f.t. from (ii)
14	(a)	 Correct WX 9 cm long and WY 7.5 cm long Correct angle of 90°	B1 M1 A1	**7**	Both correct Arcs seen
	(b)	Correct angle bisector	M1 A1		Arcs seen
	(c)	Area of $\Delta = \frac{1}{2} \times 9 \times 7.5$ 33.75 cm^2	(M)1 A1		
15		(i) $3V = \pi r^2 h$ $r^2 = \frac{3V}{\pi h}$ $r = \sqrt{\frac{3V}{\pi h}}$	M1 M1 A1	**6**	
		(ii) $r = \sqrt{\frac{3 \times 310}{\pi \times 10.2}}$ = 5.3872… = 5.39 cm	M1 M1 A1		For substitution

Que.		Requirements	Mark		Additional Guidance
16	(a)	(i) 8 (ii) 10 (iii) $\frac{8+10}{2} = 9$	B1 B1 (M)1 A1	**6**	
	(b)	$\frac{60+x}{7} = 11$ $x = 77 - 60 = 17$	M1 A1		Award M1 if 77 is seen
17	(i)	$HX^2 = 1500^2 - 1200^2$ $HX = \sqrt{810{,}000}$ HX = 900 m	M1 A1	**7**	
	(ii)	Sin ∠HXP = $\frac{1200}{1500}$ ∠HXP = $Sin^{-1}(0.8)$ ∠HXP = 53.1301… ∠HXP = 53°	M1 A1		
	(iii)	Tan 16° = $\frac{1200}{HY}$ HY = 1200 ÷ Tan 16° HY = 4184.897… m XY = 4184.897… − 900 = 3284.897… m	M1 M1 A1		f.t. from (a) Accept 3285 m or more accurate

Que.		Requirements	Mark		Additional Guidance
18					
	(a)	Correct reflection in x-axis	B1	5	
	(b)	Correct orientation after translation Correct position after translation	B1 B1		
	(c)	Correct orientation after rotation Correct position after rotation	B1 B1		