MATHEMATICS - MARKING SCHEME

Notes for Marking of Scripts

Types of Marks

<u>Method marks</u> 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 <u>Method</u> marks: **M** marks and **(M)** marks.

- **M marks** are <u>only</u> 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 <u>Accuracy</u> 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.
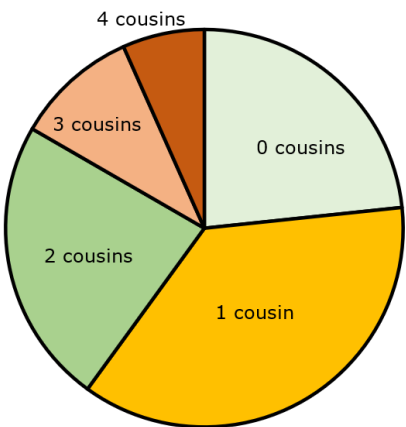
Units
In general, missing or inaccurate units are not penalised unless otherwise indicated in the marking scheme.
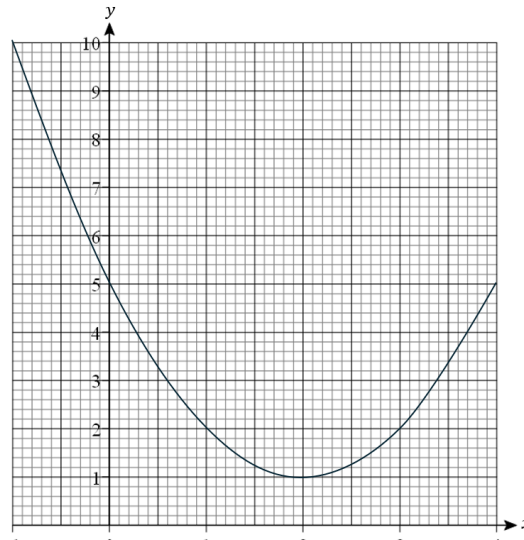
Other
- Incorrect working or statement following a correct answer is ignored.
- Marks are not sub-divisible; no half marks may be awarded.
- Other abbreviations used:
    - ✸ o.e. (or equivalent)
    - ✸ e.e.o.o. (each error or omission)
- Markers are advised to indicate the M, (M), A or B marks awarded 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)	8	B1		
	(b)	5.4	B1	**4**	
	(c)	49	B1		
	(d)	29	B1		
2	(a)	7, 9, 11	B1		All entries correct
	(b)	$2n - 1$	B1	**4**	
	(c)	$(2 \times 30) - 1$ $= 59$	(M)1 A1		
3	(a)	$150 : 240$ $5 : 8$	(M)1 A1		
	(b)	(i) $(240 \div 12) \times 108$ $= 2160$ g (or 2.16 kg) Nina is not correct	M1 A1	**7**	
		(ii) $108 \div 4 = 27$ $27 \times €5.50$ $= €148.50$	(M)1 M1 A1		
4	(a)	$\dfrac{(0 \times 7) + (1 \times 11) + (2 \times 7) + (3 \times 3) + (4 \times 2)}{30}$ $= 42 \div 30$ $= 1.4$	(M)1 A1		
	(b)	0 or 2 cousins $= \frac{7}{30} \times 360 = 84°$ 1 cousin $= \frac{11}{30} \times 360 = 132°$ 3 cousins $= \frac{3}{30} \times 360 = 36°$ 4 cousins $= \frac{2}{30} \times 360 = 24°$ 	(M)1 A1 A1 M1 A1	**9**	One angle correct Two more angles correct Two correct sectors drawn All other sectors correctly drawn and labelling
	(c)	Maria is not correct. No cousins $= \frac{7}{30} \times 100 = 23.3\% < 25\%$	B1 B1		

5	(a)	$21 - 9 \times 2$	(M)1		
		3	A1		
	(b)	$21 - 9x = -15$		**4**	
		$9x = 36$	M1		
		$x = 36 \div 9$			
		$x = 4$	A1		

6				**6**	
	(a)	Correct orientation	B1		
		Accurate size and position	B1		
	(b)	Correct orientation	B1		
		Accurate size and position	B1		
	(c)	Translation	B1		
		By column vector $\begin{pmatrix} 3 \\ -8 \end{pmatrix}$	B1		Accept 3 right and 8 down

7	(a)	(see table below)	B2		B1 for at least 4 correct possibilities. B1 all correct
	(b)	(i) $\frac{1}{9}$	B1	**5**	
		(ii) 0	B1		
		(iii) $\frac{1}{3}$ o.e.	B1		

Table for 7(a):

		Basket 2		
		Yellow (Y)	Blue (B)	Red (R)
Basket 1	White (W)	(W, Y)	(W, B)	(W, R)
	Red (R)	(R, Y)	(R, B)	(R, R)
	Green (G)	(G, Y)	(G, B)	(G, R)

8	(a)	$4y(4xy - 1)$	B2		Award B1 for a correct partially factorised expression.
	(b)	$3x^2 + 6x - 8 - 4x$ $3x^2 + 2x - 8$	M1 M1 A1	**7**	Award M1 for each expression correctly expanded.
	(c)	$8x - 2x = 8 + 7$ $6x = 15$ $x = 2.5$	 M1 A1		
9	(a)	$16ax = 4y + 7$ $x = \dfrac{4y + 7}{16a}$	M1 A1		
	(b)	$3x + 4y = 26$ $2x - 4y = -16$ $5x = 10$ $x = 2$ $3 \times 2 + 4y = 26$ $4y = 20$ $y = 5$	M1 A1 M1 A1	**6**	 For substitution
10	(a)	(i) $25\% \times 35\,000$ $= €8750$	(M)1 A1		
		(ii) $1.06 \times €8750$ $= €9275$	(M)1 A1 f.t.		f.t. for incorrect (a)(i)
	(b)	$\frac{4}{7} \times 35\,000 = 20\,000$ $35\,000 - (9275 + 20\,000)$ $= €5725$	M1 (M)1 A1 f.t.	**9**	 f.t. for incorrect (a)
	(c)	$\frac{5725}{35\,000} \times 100$ $= 16\%$ or more accurate	M1 A1 f.t.		 f.t. for incorrect (b)
11		$x = 90°$ Angle in a semicircle is equal to $90°$	B1 B1		
		$y = 38°$ Angles in a triangle add up to $180°$	B1 B1	**6**	
		$z = 128°$ Opposite angles of a cyclic quadrilateral add up to $180°$	B1 B1		

12	(a)	Line XY = 10 cm	M1		± 1 cm
	(b)	Angle of 90° drawn at X. Accurate construction including arcs.	M1 A1		
	(c)	Triangle with XZ = 8 cm	M1	**8**	
	(d)	Bisector of angle XYZ drawn. Accurate construction including arcs.	M1 A1		
	(e)	Area WXY = $(3.5 \times 10) \div 2$ $= 17.5$ cm^2	M1 A1		Note: WX = 3.5 cm ± 1 cm Accept answers 16.5 cm^2 to 18.5 cm^2.
13	(a)	Area of rectangle = $24 \times 30 = 720$ cm^2 Area of semicircle = $(\pi \times 12^2) \div 2$ $\qquad\qquad\qquad = 226.2$ cm^2 Remaining area = $720 - 226.2$ $\qquad\qquad\qquad = 493.8$ cm^2	M1 M1 (M)1 A1	**6**	Accept 494 cm^2 or more accurate.
	(b)	493.8×50 $= 24\,690$ cm^3	M1 A1 f.t.		f.t. for incorrect (a) Accept 24 690 cm^3 or more accurate.

14 (a)

x	−1	0	1	2	3	4
x^2	1	0	1	4	9	16
$-4x$	4	0	−4	−8	−12	−16
$+5$	5	5	5	5	5	5
y	10	5	2	1	2	5

14	(a)		B2	Award B1 for values in the $x = -1$ column. Award B1 for values in the $x = 4$ column.
	(b)		M2 A1	**6**	Award M1 for every three coordinates correctly plotted. Award A1 for all points correctly plotted and smooth curve drawn.
	(c)	Accept $1.1 \le y \le 1.4$	B1		Accurate answer is $y = 1.25$

15	(a)	Tan C = $\frac{12}{6.2}$	M1		Accept 63° or more accurate.
		Angle C = 63°	A1		
	(b)	AC = $\sqrt{6.2^2 + 12^2}$	M1		Accept 13.5 m or more accurate.
		= 13.5 m	A1		
	(c)	Tan 42° = $\frac{12}{BD}$	M1	**7**	
		BD = $\frac{12}{Tan\ 42°}$			
		BD = 13.3 m			
		BC = 13.3 − 6.2	M1		
		BC = 7.1 m	A1		Accept 7.1 m or more accurate.
16	(a)	In ΔCPQ and ΔCDE ∠PCQ = ∠DCE (common angle) ∠CPQ = ∠CDE (corresponding angles) ∠CQP = ∠CED (corresponding angles)	M2	**6**	Award M1 for any correct angle with reason.
		ΔCPQ is similar to ΔCDE (AAA)	A1		
	(b)	$\frac{9.2}{CD}$ = $\frac{8.6}{21.5}$	M1		
		CD = $\frac{9.2 \times 21.5}{8.6}$	M1		
		CD = 23 cm	A1		