



Annual Examinations for Secondary Schools 2022

YEAR 11

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.

NON-CALCULATOR PAPER (20 marks – 1 mark each)

1	2	3	4	5	6
0.871, 0.9, 1.9, 2.327	$\frac{2}{9}; \frac{7}{9}$	142.80	€16 200	65%	1×10^4

7	8	9	10	11	12	13	14
1, 3	a value between 5.8 and 7	16; 22	$20\pi + 40$	900	23.5	€21.50	10 cm

15	16	17	18	19	20
B	40 m	36 cm^2	$y = \frac{180 - 3x}{2}$	2 or -2	32

MAIN PAPER (80 marks)

Que.		Requirements	Mark		Additional Guidance
1	a	3.16227766... 3.162	(M)1 A1	4	Accept ± 3.162 B1 for each choice
	b	A); D)	B2		
2		$\frac{3(x-5) + 2(4-x)}{18}$ $\frac{3x - 15 + 8 - 2x}{18}$ $\frac{x-7}{18}$	M1 M1 A1	3	
3	a	$\angle DMA = \angle CNB$ (90° , given) $\angle DAM = \angle BCN$ (alternate angles) $AD = BC$ (sides of parallelogram) $\triangle ADM \equiv \triangle CBN$ by AAS	M3 A1	5	Award 2 marks if one reason is missing or incorrect. Award 1 mark if two or three reasons are missing or incorrect
	b	Side NC = x cm $20 - 2x$	B1		

7		<p>Speed of A ≥ 4.5 m/s Speed of B ≥ 2.5 m/s</p> <p>After 1 second, the total distance between A and B is at least $4.5 \text{ m} + 2.5 \text{ m} = 7 \text{ m}$</p> <p>Yes, it is possible.</p>	<p>M2</p> <p>M1</p> <p>A1</p>	<p>4</p>	<p>Award 1 mark if only one lower bound is accurate</p> <p>Award this mark only after a correct explanation.</p>
8	a	<p>i) $(5.5 \times 2) + (0.75 \times 3)$ 13.25 mg</p> <p>ii) A 17-year old female needs 1.75 mg more iron. If we decide to add spinach, we need at least $\frac{100 \times 1.75}{2.8}$ 62.5 g.</p> <p>OR</p> <p>If we decide to add potatoes, we need at least $\frac{100 \times 1.75}{0.8}$ 218.75 g.</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>8</p>	<p>Accept 60 g or more accurate</p> <p>Accept 220 g or more accurate</p>
	b	<p>i) $\frac{5}{9} \times 100\%$ = 55.555...%</p> <p>ii) $\frac{3.5}{5} \times 100\%$ = 70%</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>		<p>accept 56% or more accurate</p>

9	a	$y = (3.5)^3 - 4(3.5)^2 + 3.5 + 2$ $= -0.625$	(M)1 A1	13	
	b		M1 M1 A1		plotting 5 points plotting another 6 points joining points to form a curve <i>Do not deduct marks if the turning point between $x = 0$ and $x = 1$ is drawn at $(0, 2)$.</i>
	c	$x = -0.6$ $x = 1$ $x = 3.6$	B1 B1 B1		Accept $-0.7 \leq x \leq -0.4$ Accept $3.4 \leq x \leq 3.7$ B1 for any 2 correct entries
	d	i) The straight line is $y = \frac{1}{2}x$ Obtaining 2 points on this line Plotting the straight line ii) $x = -0.6; 0.9; 3.7 (\pm 0.2)$	(M)1 (M)1 A1 B2		 -1 e.e.o.o.

10	a	9, 49; 6, 55; 4, 59	B3	7	B1 for each two correct entries
	b	60	B1		
	c	Halfway up the cumulative frequency curve (30 or 30.5) Using the curve, the median is 22%	(M)1 A1		Accept values between 22% and 23%
	d	Yes, because there is only one country in the $60\% < p \leq 70\%$ interval and this must be Germany.	M1		
11	a	$\frac{x}{2x + 2 + x}$ $= \frac{x}{3x + 2}$	(M)1 A1	8	
	b	$\frac{x}{3x + 2} = \frac{12 - x}{13}$ $13x = (12 - x)(3x + 2)$ $13x = 36x - 3x^2 + 24 - 2x$ $3x^2 - 21x - 24 = 0$ $x^2 - 7x - 8 = 0$	M1 M1		
	c	i) $(x + 1)(x - 8) = 0$ $x = -1; 8$ ii) Total number of beads = $8 + 2(8) + 2$ 26 beads	M1 A1 M1 A1		
12	a	BY : YQ = 5 : 15 = 1 : 3 AY : YP = 6.4 : 19.2 = 1 : 3 $\angle BYA = \angle PYQ$ (vertically opp. angles) $\triangle ABY$ is similar to $\triangle PQY$ since two pairs of sides are in the same ratio and the included angle is equal.	M1 M1 A1	8	comparing two pairs of sides
	b	7×3 21 cm	(M)1 A1 f.t.		f.t. from part a)
	c	$\angle BAY = 180^\circ - (68^\circ + 72^\circ)$ $\angle BAY = 40^\circ$ $\angle YPQ = \angle BAY = 40^\circ$ (similar $\triangle$ s)	M1 A1		
	d	Since triangles are similar all corresponding angles are equal. In particular $\angle YPQ = \angle BAY$ (or $\angle YQP = \angle ABY$). Since angles in the same segment are equal, A, B, P and Q lie on a circle.	M1		