

# **Mathematics Syllabus A**

General Certificate of Secondary Education **J512/02**

Paper 2

## **Mark Scheme for June 2010**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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**Marking Instructions & Abbreviations****Marking instructions**

- 1 Mark strictly to the mark scheme.
- 2 Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
- 3 Work crossed out but not replaced should be marked.
- 4 **M** (method) marks are not lost for purely numerical errors.  
**A** (accuracy) marks depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.  
**B** marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
- 5 As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).
- 6 When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads.
- 7 If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or cao. If the answer is missing, but the correct answer is seen in the body allow full marks. If the correct answer is seen in working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would normally be given.
- 8 For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work.
- 9 For answers scoring no marks, you must either award NR (no response) or 0, as follows:  
  
Award NR (no response) if:
  - Nothing is written at all in the answer space
  - There is any comment which does not in any way relate to the question being asked ("can't do", "don't know", etc.)
  - There is any sort of mark that is not an attempt at the question (a dash, a question mark, etc.)  
Award 0 if:
  - There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.
- 10 Where a follow through mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. answer on mark scheme is 15.75 which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.
12. Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.
13. Ranges of answers given in the mark scheme are always inclusive.
14. Annotating scripts. The following annotations are available:

✓ and ✕

**BOD** - Benefit of doubt

**FT** - Follow through

**ISW** - Ignore subsequent working

**M0, M1, M2** - Method mark awarded 0, 1, 2

**A1** - Accuracy mark awarded

**B1, B2** - Workless mark awarded 1, 2

**MR** - Misread

**SC** - Special case

^ - Omission sign

These should be used whenever appropriate during your marking.

### Abbreviations

- Where you see **oe** in the mark scheme it means **or equivalent**.
- Where you see **isw** in the mark scheme it means **ignore subsequent working** (after correct answer obtained), provided the method has been completed.
- Where you see **cao** in the mark scheme it means **correct answer only**.
- Where you see **soi** in the mark scheme it means **seen or implied**.
- Where you see **www** in the mark scheme it means **without wrong working**.
- Where you see **seen** in the mark scheme it means that you should award the mark if that number / expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
- Figs: for example **figs 237** means any answer with just these digits with leading or trailing zeros disregarding any decimal point. E.g. 237000, 2.37, 2.370, 0.00237 but not 23070 or 2374.

1		12.50 7.60 5.90 11.40 37.40	1 1 1 1 1	If zero not shown award no marks for the first time (only) that this occurs    <b>FT</b> from <i>their</i> four values added
2		20 2 full circles and $\frac{1}{2}$ circle 38 or 39 4 full circles and $\frac{1}{4}$ circle or less	1 1 1 1	
3	(a)	$4\frac{1}{2}$	2	<b>B1</b> for 4 to 5 inclusive
	(b)	$\checkmark \times \checkmark \times$	2	<b>B1</b> for 2 or 3 correct
4	(a)	Certain	1	
	(b)	Certain or likely	1	
	(c)	Evens	1	
	(d)	Impossible	1	
5	(a)	(4 or four) thousand or 4000	1	
	(b)	876 432	1	
	(c)	2, 3, 4, 6	1	
	(d)	4	1	
	(e)	$\begin{array}{r} 3 \mathbf{2(3)} 7 4 6 \mathbf{8(6)} \\ + 8 \mathbf{3(2)} 3 7 4 \mathbf{6(8)} \end{array}$	2	<b>B1</b> for 6 and 8 in units column or 2 and 3 in ten thousands column
	(f)	2/6	1	
6	(a)	(i) 7	1	
		(ii) 2	2	<b>M1</b> for $5y = 9 + 1$ or better or $10/5$ seen
		(iii) $\frac{2}{4}$ or $\frac{1}{2}$ or 0.5	2	<b>M1</b> for $4t = 19 - 17$ or better
	(b)	6 cao -3	1 1	<b>FT</b> ( <i>their</i> 6) - 9
7	(a)	Smallest and largest Difference or correct subtraction with nothing else	1 1 <b>dep</b>	<b>SC2</b> for $25 - 2 = 23$ seen with no incorrect statements or working <b>Or SC1</b> for 23 with no words or working
	(b)	Arrange in order  Find the <b>middle</b> or <b>5<sup>th</sup></b> (number)	1  1 <b>dep</b>	<b>SC2</b> for 10 with correct working and no incorrect statements <b>Or SC1</b> for 10 with no working or correct statements

8	(a)	'Correct' circle	1	May be freehand but whole circumference must lie between a radius of 2.8 and 3.2cm
	(b)	(i) Cross between 4.6 and 4.9cm	1	Inclusive
		(ii) Line parallel to EF labelled Y	1	By eye, minimum 3cm
		(iii) Line perpendicular to EF labelled Z $\pm 5^\circ$	1	By eye, minimum 2cm After 0 in (ii) and (iii), <b>SC1</b> for two correct unlabelled lines in (ii) and (iii)
		(iv) 9.5 or $9\frac{1}{2}$	1	$\pm 0.2$ cm
9	(a)	(i) Angle $123^\circ$ drawn labelled, $\pm 2^\circ$	1	
		(ii) Angle $205^\circ$ drawn labelled, $\pm 2^\circ$	2	<b>B1</b> for angle unlabelled or correct angles drawn (within tolerance) but 155 angle labelled $205^\circ$ or angle $205^\circ$ drawn labelled, $\pm 5^\circ$
	(b)	(i) Obtuse between 90 and 180	1 1 <b>dep</b>	Dependent on mark for 'obtuse'
		(ii) Reflex between 180 and 360	1 1 <b>dep</b>	Dependent on mark for 'reflex'
10	(a)	110	3	<b>M2</b> for $180 - ((180 - 40) \div 2)$ soi <b>Or M1</b> for $(180 - 40) \div 2$ or 70 soi
	(b)	104	3	<b>M2</b> for $180 - (360 - (80 + 115 + 89))$ soi <b>Or M1</b> for $360 - (80 + 115 + 89)$ or 76 soi
11	(a)	Reality	1	
	(b)	$\frac{1}{6}$ cao	2	<b>M1</b> for 60/360 oe or 0.17 or 0.167 or 0.16(6...) or 17% or 16.7% or 16.(6...)%
	(c)	143	2	<b>M1</b> for $360 - (90 + 60 + 67)$ soi
12	(a)	$\frac{3}{16}$ or 0.1875 cao	1	
	(b)	$\frac{5}{16}$ or 0.3125 cao	1	<b>SC1</b> for 3 out of (or in) 16 in (a) <b>and</b> 5 out of (or in) 16 in (b)
	(c)	$\frac{10}{16}$ isw or $\frac{5}{8}$ isw or 0.625	2	<b>SC1</b> for 10 and 16 seen <b>or</b> $\frac{13}{16}$ isw

13	(a)	(i) 2	1	
		(ii) -6	1	
	(b)	(i) 15	1	
		(ii) -8	1	
	(c)	(i) 28.1	1	
		(ii) 28.06	1	
		(iii) 28.059	1	
	(d)	(i) 11	1	
		(ii) 27	1	
14	(a)	31.491	1	
	(b)	5.088	2	<b>M1</b> for 12.72/2.5 or 636/125 or 5.09
15	(a)	$168 + 44x$ or $2(84 + 22x)$ or $2 \times 84 + 44x$	1	Mark final answer only
	(b)	8	3	Provided correct equation seen, no ft of expression in part (a) <b>M2</b> for $44x = 352$ <b>Or M1</b> for $2 \times 84 + 44x = 520$ oe If <b>M0</b> , then <b>SC2</b> for 8 or <b>SC1</b> for 0.08
16	(a)	$280 \pm 2^\circ$	1	
	(b)	(i) Correct line drawn $\pm 2^\circ$	1	
		(ii) X marked correctly	1	$90^\circ \pm 10^\circ$ , ft <i>their</i> line starting at S provided it is not the line PS and Richard's route is drawn on bearing $> 180^\circ$
		(iii) $90^\circ$ or right angle	1	
17	(a)	Single, correct ruled line	3	<b>M2</b> for two correct points plotted <b>Or M1</b> for two correct x and y pairs in table. Ignore any incorrect. Accept any x values <b>Or SC1</b> for any two of <i>their</i> points from table correctly plotted
	(b)	2.3 to 2.7	1	

18	(a)	4.5 or $4\frac{1}{2}$	3	<b>M2</b> for $2x = 9$ or $(x =) 9/2$ <b>Or M1</b> for $3x = x + 9$ or $2x - 5 = 4$ If M0, then <b>SC2</b> for $3 \times 4.5 - 5 = 4.5 + 4$ (only as final answer)
	(b)	$x > 4.4$ or $x > 4\frac{2}{5}$	2	Mark final answer only <b>M1</b> for $5x > 22$ or 4.4 or $22/5$
19		Red – 7.5 Yellow – 3      www White – 1.5	4	<b>B3</b> for two correct values www <b>Or M2</b> for <i>their</i> $12/(5 + 2 + 1) \times (5 \text{ or } 2)$ <b>Or M1</b> for $12/(5 + 2 + 1)$ soi by 1.5
20		198	3	<b>M2</b> for $6 \times 11 \times 3$ <b>Or M1</b> for $11 \times 3$ only for area of base or $6 \times$ <i>their</i> base area
21		$2 \times 2 \times 3 \times 3$ or $2^2 \times 3^2$ or $(2 \times 3)^2$ or $2^2 \times 3 \times 3$ or $2 \times 2 \times 3^2$	2	Mark final answer <b>M1</b> for factor tree or division or product of factors with at least two of the correct prime factors in each of these methods or all four prime factors <b>not</b> given as a product

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