H

GCSE (9–1)

Mathematics

J560/04: Paper 4 (Higher tier)

General Certificate of Secondary Education

Mark Scheme for November 2022

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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.

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.

3. Log-in to RM Assessor then mark and annotate the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader via the RM Assessor messaging system.

5. Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners should give candidates the benefit of the doubt and mark the crossed out response where legible.

6. When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

7. On each blank page the annotation **BP** must be inserted to confirm that the page has been checked. For additional objects (if present), a tick must be inserted on each page to confirm that it has been checked.

8.   There is a NR (No Response) option. Award NR (No Response)
        -       if there is nothing written at all in the answer space
        -       OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
        -       OR if there is a mark (e.g. a dash, a question mark) which is not an attempt at the question.

        The hash key (#) on your keyboard will enter NR.

        Note: Award 0 marks for an attempt that earns no credit (including copying out the question).

9.   The RM Assessor **comments box** is used by the Principal Examiner or your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

        If you have any questions or comments for your Team Leader, use the RM Assessor messaging system.

10.   Assistant Examiners should send a brief report on the performance of candidates to their Team Leader (Supervisor) by the end of the marking period. Please follow the direction of your Team Leader about which questions you should report on and how to submit your report. Your report should contain notes on particular strengths displayed as well as common errors or weaknesses.

11.   Annotations available in RM Assessor. These **must** be used whenever appropriate during your marking.

Annotation	Meaning
✔	Correct
✖	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0

M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign
BP	Blank page
SEEN	Seen

For a response awarded zero (or full) marks a single appropriate annotation (cross, tick, M0 or ^) is sufficient, but not required. For responses that are not awarded either 0 or full marks, you must make it clear how you have arrived at the mark you have awarded and all responses must have enough annotation for a reviewer to decide if the mark awarded is correct without having to mark it independently.

It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.

Subject-Specific Marking Instructions

12. **M** marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
    A marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
    B marks are <u>independent</u> of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
    SC marks are for <u>special cases</u> that are worthy of some credit.

13. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

    - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
    - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
    - **nfww** means **not from wrong working**.
    - **oe** means **or equivalent**.
    - **rot** means **rounded or truncated**.
    - **soi** means **seen or implied**.
    - **dep** means that the marks are **dependent** on the marks indicated. You must check that the candidate has met all the criteria specified for the mark to be awarded.
    - **with correct working** means that full marks **must not** be awarded without some working. The required minimum amount of working will be defined in the guidance column and **SC** marks given for unsupported answers.

14. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

15. Unless the command word requires that working is shown and the working required is stated in the mark scheme, then if the correct answer is clearly given and is <u>not from wrong working</u> **full marks** should be awarded.

    Do not award the marks if the answer was obtained from an incorrect method, i.e. incorrect working is seen and the correct answer clearly follows from it.

16. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct. For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.
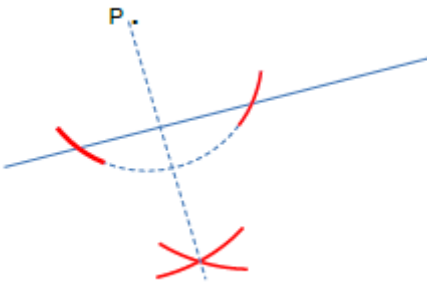
Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, e.g. FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '52 + 72'). Answers to part questions which are being followed through are indicated by
e.g. FT 3 × *their* (a).

17. In questions **with no final answer line**, make no deductions for wrong work after an acceptable answer (i.e. **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

18. In questions **with a final answer line and incorrect answer given**:

    (i) If the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

    (ii) If the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

    (iii) If the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded if there is no other method leading to the incorrect answer. Use the **M0**, **M1**, **M2** annotations as appropriate and place the annotation ✗ next to the wrong answer.

19. In questions **with a final answer line**:

    (i) If one answer is provided on the answer line, mark the method that leads to that answer. A correct step, value or statement that is not part of the method that leads to the given answer should be awarded **M0** and/or **B0**.

    (ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

    (iii) If more than one answer is provided on the answer line and there is more than one method provided, award marks for the poorer response unless the candidate has clearly indicated which method is to be marked.

20. In questions with **no final answer line**:

    (i) If a single response is provided, mark as usual.

    (ii) If more than one response is provided, award marks for the poorer response unless the candidate has clearly indicated which response is to be marked.

21. 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. If a candidate corrects the misread in a later part, do not continue to follow through, but award **A** and **B** marks for the correct answer only.

22. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the 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.

23. Ranges of answers given in the mark scheme are always inclusive.

24. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

25. If in any case the mark scheme operates with considerable unfairness consult your Team Leader.

Question			Answer	Mark	Part Marks and Guidance	
1	(a)		6.54×10^4	1		Condone trailing zeros
	(b)		[0].00082	1		Condone trailing zeros
2 (18)			2439	4	**B3** for [LCM=] 420 or answer 2439 + 420n **OR** **B2** for listing the next 3 multiples for **both** comets 168, 252, 336 **and** 210, 315, 420 or [84 =] $2^2 \times 3 \times 7$ **and** [105=] $3 \times 5 \times 7$ or [LCM=] 420k or **B1** for listing the next 3 multiples for **one** comet or [84 =] $2^2 \times 3 \times 7$ or [105=] $3 \times 5 \times 7$ allow in a factor tree or table Alternative method 1 **B2** for listing the next 3 years for **both** comets 2103, 2187, 2271 **and** 2124, 2229, 2334 or **B1** for listing the next 3 years for **one** comet Alternative method 2 **B2** for Venn diagram with 3, 7 in the intersection 2,2 in set 84 and 5 in set 105 or **B1** for the diagram with one error	n = 1,2,3 …
3 (23)			61 with correct working	5	**M1** for [0] .65 × 60 or 39 **M1** for [0].7 × 40 or 28 **M1** for [0].64 × 200 or 128 **M1** for *their* 128 – *their* 28 – *their* 39 If **0** or **M1** scored, instead award **SC3** for answer 61 with no or insufficient working If **0** scored, instead award **SC1** for answer 67 with no or insufficient working	"Correct working" requires evidence of at least **M1M1**. For **5** marks allow for answer $\frac{61}{100}$ or 61%. Do not lose the first two **M1 M1** if further work does not include these.

Question			Answer	Mark	Part Marks and Guidance	
4	**(a)**		[0].0625 or $\frac{6}{96}$ oe or 6.25%	1		e.g. $\frac{1}{16}$ but not in words or as a ratio
	(b)		770	2	**FT** *their* (a) for **2** marks, answer must be an integer **M1** for 12 321 × *their* [0].0625 or 12 320 × *their* [0].0625	condone 771 as answer. **M1** implied by 770.06… or 770.1
5 **(24)**			Accurate and correct isosceles triangle with A, B and C points labelled and angles 45°, 45° and 90° correctly labelled	4	**B1** for B 6 cm (± 2 mm) due east of A (± 2˚) **B1** for C from A **B1** for C from their B For those who put B due west of A, award the second **B1** if *their* C is marked at 225 ± 2˚ from A and the third **B1** if *their* C is marked at 135 ± 2˚ from B	condone dotted lines and accept symbol for 90° line accurately drawn or point B marked 6 cm (±2 mm) and east (90 ± 2˚) from A line accurately drawn or C marked at 135 ± 2˚ from A line accurately drawn or C marked at 225 ± 2˚ from B
6	**(a)**		39	2	**M1** for 3 × 4 × 5 oe	
6	**(b)**		A and 120 000 or [0].095 or A and 1200 **and** 950	2	**M1** for correct use of $(10^3)^2$ oe or correct use of $(10^2)^2$ or $(10^1)^2$ if converted to cm²	for **M1** ignore units and can be implied by one correct result e.g. 1200 or 950

Question			Answer	Marks	Part Marks and Guidance	

7 (26)	(a)		Ruled line through P and perpendicular to AB constructed with correct arcs (one pair intersecting AB)	2	**B1** for correct arcs (one pair intersecting AB) only
					    but no line
					    or
					    correct ruled line but no, or incomplete, construction arcs
					
						Condone dotted lines
						Set protractor to 90° and check 88° to 92° at AB
						Correct construction arcs as shown (may be two pairs of arcs used to draw line through P)
						Ignore other arcs if correct arcs clearly used to construct line
						Condone perpendicular extending beyond AB but must pass through P and reach AB (no daylight)
						<u>Alternative arcs (eg a kite construction)</u>
						One centred on A length AP and one centred on B length BP meeting below AB (may also pass through P).
						Candidates may use points on AB other than A and B for this construction. In such cases check radii of arcs using on-line ruler to judge
						
						See appendix for exemplars

	(b)		accurate and correct ruled angle bisector of angle M with supporting arcs and accurate and correct ruled perpendicular bisector of MN with supporting arcs and 'cannot' with full evidence	5	**B2** for accurate and correct ruled angle bisector of angle M with supporting arcs or **B1** for accurate and correct ruled angle bisector of angle M **B2** for accurate and correct ruled perpendicular bisector of MN with supporting arcs or **B1** for accurate and correct ruled perpendicular bisector of MN **B1 dep** for correct decision (No) with full evidence **dep** on at least **B1 B1**	tolerance on angles ± 2° and on radius of arcs ± 2mm For 5 marks the diagram must be fully correct with no extra constructions and lines touching the opposite sides of the triangle. Bisectors to be at least 2 cm long full evidence means two correct ruled lines within tolerance

Question			Answer	Marks	Part Marks and Guidance	
8 (27)			14 1 with correct working	5	**B2** for 21 and 14 or M**1** for $\frac{35}{3+2}$ oe AND **B2** for 35 and 15 OR **B1** for 42 with 18 or 21 with 4 or 49 with 21 or 28 with 7 etc If **0, 1** or **2** scored, instead award **SC3** for answer 14 and 1 with no or insufficient working If **0** or **1** scored, instead award **SC2** for answer red = 14 or for answer [red=] 1 and [green=] 14 with no or insufficient working	"Correct working" requires evidence of at least the first **B2**

Question			Answer	Mark	Part Marks and Guidance	
9	(a)		it should be −17	1		accept any correct explanation
			$x = \dfrac{y - 17}{3}$	1		allow correct equation if written in the question just missing "$x =$ "
	(b)		it should be 2x	1		Do not accept ± 2x or "the error is that they missed the ±"
			$x = \dfrac{\sqrt{A}}{2}$ or $x = \sqrt{\dfrac{A}{4}}$	1		Do not penalise twice missing the "$x =$". allow correct equation if written in the question just missing "$x =$ "
10			140	4	**M1** for 11 = 3 + 20a oe implied by [0].4 **A1** for [$a =$] [0].4 **M1** for 3 × 20 + $\frac{1}{2}$ × *their* 0.4 × 20² Alternative method **M3** for 3 × 20 + $\frac{1}{2}$ × (11 − 3) × 20 oe OR **M1** for 3 × 20 **M1** for $\frac{1}{2}$ × (11 − 3) × 20 **M1** for *their* (3 × 20) + *their* ($\frac{1}{2}$ × (11 − 3) × 20)	Condone one error in second **M1**. If *their a* is clearly stated do not count as an error. Equivalent includes $\frac{1}{2}$ (11 + 3) × 20 may be implied by 60 may be implied by 80

Question			Answer	Mark	Part Marks and Guidance	
11			9.6 with correct working	**6**	**M5** for $\sqrt{8.3^2 + (5.4\tan42)^2}$ OR **M2** for 5.4 × tan 42 oe or **M1** for tan 42 = $\frac{opp}{5.4}$ oe **A1** for 4.8[6…] or 4.9 and **M2** for $\sqrt{8.3^2 + (their\ 4.8[6\ldots])^2}$ or **M1** for $8.3^2 + (their\ 4.8[6\ldots])^2$ If **0**, **1** or **2** scored, instead award **SC3** for answer 9.6 with no or insufficient working If **0** or **1** scored, instead award **SC2** for answer 9.619… or 9.62 with no or insufficient working If **0** scored, instead award **SC1** for 4.8[6…] or 4.9 with no or insufficient working	"Correct working" requires evidence of at least **M1 M1** or **M2** and also accept 2sf numbers 4.8[6…] or 4.9 can imply **M2** if **M1** given Alternative method (sine rule): **M2** for $\frac{5.4 \times sin42}{\sin{(their 48)}}$ oe or **M1** for $\frac{x}{\sin 42} = \frac{5.4}{\sin(their 48)}$ oe 9.619… or 9.6[2] can imply **M2** if **M1** awarded Allow full and correct equivalent trig. methods to score **M2** in both triangles e.g. using the other angle in the first triangle, i.e. *their* 48

Question	Answer	Mark	Part Marks and Guidance	
12	10.1 or 10.07 to 10.08 with correct working	6	**M4** for $\frac{4}{3}\times\pi\times4^3 = \frac{1}{3}\times\pi\times(\frac{1}{2}d)^2\times d$ oe **M1** for rearranging *their* equation OR **M1** for $\frac{4}{3}\times\pi\times4^3$ implied by 268.[08…] or 268.1 **B1** for [radius of water =] $\frac{1}{2}d$ **M2** for $\frac{1}{3}\times\pi\times(\frac{1}{2}d)^2\times d = $ *their* 268.08… or **M1** for $\frac{1}{3}\times\pi\times(\frac{1}{2}d)^2\times d$ condone one error **M1** for rearranging *their* equation e.g. $d^3 = \dfrac{their\,268.08…\times12}{\pi}$ implied by [d^3 =] 1024 Alternative method **M4** for $\dfrac{\frac{256\pi}{3}}{\frac{1}{3}\pi\times15^2\times30} = \left(\dfrac{d}{30}\right)^3$ oe **M1** for rearranging *their* equation OR **M1** for $\frac{4}{3}\times\pi\times4^3$ implied by 268.[08…], 268.1 or $\frac{256\pi}{3}$ **M1** for $\frac{1}{3}\pi\times15^2\times30$ implied by 2250π or 7068[.58…] or 7069 or 7068.6 **M2** for [sf=] $\sqrt[3]{\dfrac{\frac{256\pi}{3}}{\frac{1}{3}\pi\times15^2\times30}}$ oe or 0.33597… rot or **M1** for $\dfrac{\frac{256\pi}{3}}{\frac{1}{3}\pi\times15^2\times30}$ oe or 0.0379… **M1** for *their* sf × 30 If **0** or **1** scored, instead award **SC3** for answer 10.1 or 10.07 to 10.08 with no or insufficient working	allow 10 only if working supports it "Correct working" requires evidence of at least **M2** or **M1 M1** **M1** implied by $\frac{256\pi}{3}$ Note they can use $h = 2r$ so apply the scheme accordingly, 1024 will become 256 Complete method with trials giving the correct answer can score **6** marks **M1** for each correct trial up to a maximum of **M3**

Question			Answer	Mark	Part Marks and Guidance	
13			$y = 0.25\sqrt{x}$ oe	**3**	**M1** for $y = k\sqrt{x}$ oe **B1** for $k = 0.25$ or $\frac{1}{4}$ oe	**M1** includes e.g. $y = k\sqrt{16}$ and $1 = k\sqrt{16}$
14	**(a)**		2[%]	**1**		
	(b)		$5200 \div 1.02^5$ oe 4709 to 4710	**2**	**M1** for $5200 \div 1.02^k$ or 4700×1.02^5 or $5200 = n \times 1.02^5$	equivalent is 5200×1.02^{-5} condone : $4700 \times 1.02^5 = 5189$ to 5190 for **2** marks accept 1.104… for 1.02^5 and 0.9057… for 1.02^{-5}
15	**(a)**		Correct cumulative frequency curve	**5**	**B2** for 8 22 30 42 59 64 can be implied from plots or **M1** for cf calculated with one arithmetic error **M2** for accurately plotting these frequencies against the upper group values or **M1** for accurately plotting these frequencies against a group value condoning one error **B1** for an accurate curve **FT** *their* frequencies and **dep** on increasing frequencies	tolerance for plotting and drawing the curve is $\pm \frac{1}{2}$ small square and ignore curve before (20, 8), if they draw bars award **M1** if the bars are the same widths as the groups.
	(b)		cycling and medians [cycling] 40 to 43 [tennis] 51	**2**	**FT** *their* curve for medians providing it is increasing frequencies **B1** for one correct median or a statement with one error	See appendix condone a statement which is equivalent and condone tennis median of 50 to 52 and condone 'average' for 'median'
16			$\frac{17}{25}$ or 0.68 or 68%	**2**	**B1** for $\frac{17}{n}$ or $\frac{n}{25}$ and it must be a proper fraction	
17			$y = -\frac{1}{2}x + 7$ final answer oe	**3**	**M1** for $m_2 = -\frac{1}{2}$ **M1** for $5 = \textit{their } m_2 \times 4 + c$ or $y - 5 = \textit{their } m_2 (x - 4)$	implied by (4,5) satisfying *their* answer but not when *their* $m_2 = 2$

Question			Answer	Mark	Part Marks and Guidance	
18	**(a)**	**(i)**	$[u_3 =]\ x + y$ $[u_4 =]\ y + x + y\ [= x + 2y]$	1 1		
		(ii)	3 2 with correct working	6	**M2** for $[u_7 =]\ 7 + x + y + 7 + x + y + 7$ oe or better or **M1** for $[u_5 =]\ x + y + 7$ oe or better and **B1** for $x + 2y = 7$ oe **B1FT** for *their* $(2x + 2y + 21) = 31$ oe **M1** for solving *their* equations e.g. subtracting equations to give $x = 3$ If **0** or **1** scored, instead award **SC2** for answers $[x =]\ 3$ and $[y =]\ 2$ with no or insufficient working If **0** scored, instead award **SC1** for $[x =]\ 3$ or $[y =]\ 2$ or both correct answers switched, with no or insufficient working	"Correct working" requires evidence of at least **B1 B1** or **M2 or M1 M1** e.g. $2x + 2y + 21$ or $2x + 3y + x + 2y + 2x + 3y$ or $5x + 8y$ e.g. $x + y + x + 2y$ or $2x + 3y$ e.g. $5x + 8y = 31$ **FT** *their* u_7 e.g. multiplying one equation and correctly adding or subtracting to eliminate one variable correct answers with trials will score **6** marks **M1** for each correct trial (value of x and a value of y) up to a maximum of **M3** e.g. $x = 1\ y = 4$ gives 1 4 5 9 [14 23 37]
	(b)		$(\sqrt{3})^{n-1}$ or $3^{\frac{1}{2}(n-1)}$ oe	2	**M1** for common ratio of $\sqrt{3}$ implied by answer of $(\sqrt{3})^k$	
	(c)		3 −5	3	**B2** for $b = 3$ OR **M1** for $[-1\ \ \ 5\ \ \ 13\ \ \ 23] - [1\ \ \ 4\ \ \ 9\ \ \ 16]$ implied by −2 1 4 7 **B1** for $c = -5$	condone $3n$ for **2** marks If equations used **M1** for e.g. $1 + b + c = -1$ oe $4 + 2b + c = 5$ oe Allow any correct method

Question			Answer	Mark	Part Marks and Guidance	
19			translation $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$	1 2	**B1** for $\begin{pmatrix} -3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 5 \end{pmatrix}$ or a correct vector with a line	If more than one transformation score **0** condone 3 left and 5 up for **B2** or **B1** for either correct
20			1080	3	**M2** for 8 × 9 × 15 or **M1** for 8 × 9 × 15 with at most one error If **0** scored award **SC2** for $\frac{1}{8} \times \frac{1}{9} \times \frac{1}{15}$ or $\frac{1}{1080}$ or **SC1** for 1 × 1 × 2 = 2	e.g. **M1** for 8 × 9 × 17 or 1224 condone 8 × 9 × 1 for **M1** not 8 × 9
21	(a)		correct histogram with four bars with frequency densities 2.4, 1.9, 1.2, [0].55 and correct width bars	3	**B2** for two correct bar heights or **B1** for one correct bar height or two correct frequency densities from 2.4, 1.9, 1.2, [0].55 soi	bar heights should be accurate, condone for height 0.5 ≤ bar 0.55 ≤ 0.6 tolerance for plotting and drawing the bars is ± $\frac{1}{2}$ small square
	(b)		e.g. the mean should be higher because these people would have taken longer than 50 minutes	1		
22			Some algebraic working leading to an answer of 3 −3	5	**M1** for e.g. $x^2 + (x - 6)^2 = 18$ **M1** for expanding *their* square term e.g. $x^2 - 12x + 36$ **M1** for $2x^2 - 12x + 18 = 0$ or better **M1** for $[2](x - 3)^2$ or $(2x - 6)(x - 3)$ If **0** scored **SC2** for correct answers with no algebraic working	condone one error in expanding brackets simplifying to $ax^2 - bx + c$ e.g. solving *their* quadratic equation by e.g. factors or quadratic formula Note : apply scheme to substitution for *x* e.g. **M1** for $(y + 6)^2 + y^2 = 18$ etc

APPENDIX

Non Calculator methods for percentages

Labels only

This is when labels such as 10% = are used.   If only labels are used the final answer scores full marks if it is correct.
Condone a numerical slip if the answer is correct.
If there is an error in the values and so the **final answer is incorrect** this cannot
score method marks
e.g. Find 65% of 60

Method scoring M1

10% = 6   10% = 6
5% = 3   5% = 4 ✖

                                              condone this slip as answer correct
50% = 30   50% = 30
65% = 39 ✔ M1   65% = 39 ✔ M1

Method scoring M0

10% = 6
5% = 4 ✖   Do not condone this slip as answer incorrect
50% = 30
65% = 34 ✖ M0

Build up method
This is where the candidate finds the percentages to build up to the required value but shows the operations used.

e.g. Find 65% of 60
10% = 60 ÷ 10 = x
5% = $x \div 2 = y$
50% = $x \times 5 = z$
65% = $x + z + y$
Because the operations have been shown and they are correct, if there is an error in
one of x, y or z, method marks can still be earned

Question 7(a)
The overlay only shows one solution.

| A | | **Scores 2**
This is the a correct alternative method for arcs centred on A and B

Use overlay to see arcs lie within circles

(We can also check using on-line ruler)

Candidates may use points on AB other than A and B for this construction. In such cases check radii of arcs using on-line ruler to judge. |

| B | | **Scores 2**
This is the main method not the alternative. Arc from P intersects AB at A and another point. Red arc from A intersects the arc from that other point. |
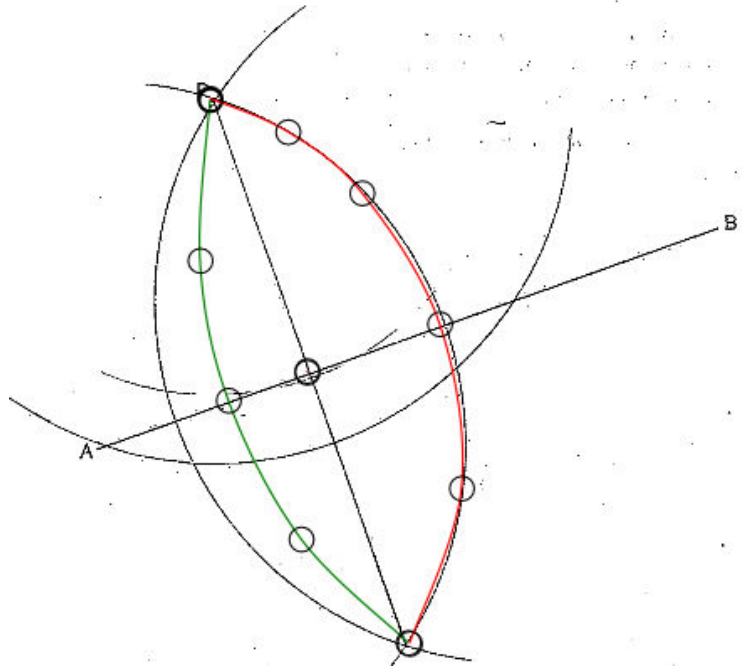
C	[2]	**Scores 2** Looks similar to Exemplar B but shows why the overlay must be used with caution. Overlay shows red arc is centred at A. The other arc is centred elsewhere on the line AB, but there is no evidence of where it is centred. This is checked by eye. This is a valid alternative method.
D		**0 marks** Only one correct (pair of) arcs (One arc centred on P and cutting AB twice) and inaccurate line.

E
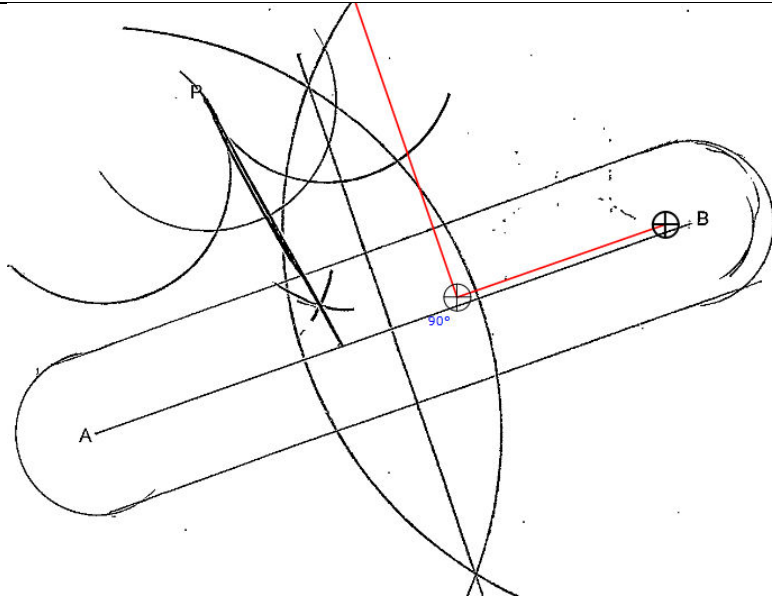
0 marks
No valid sets of arcs nor a correct line

Exemplar responses for Q9(a)

Response	Mark
it should be −17	**1**
the sign of 17 is wrong	**1**
the error is adding 17	**1**
he has added 17	**1**
the sign on the right should not be plus	**1**
he has to do the inverse of +17	**1**
the 17 maintained a positive sign on the other side	**1**

Exemplar responses for Q9(b)

Response	Mark
it should be 2x	**1**
It should be $\sqrt{4}$	**1**
take the root of 4	**1**
include 4 in the square root	**1**
only A is rooted	**1(BOD)**
they just square rooted A	**1(BOD)**
they should have divided by 4 first	**0**

Exemplar responses for Q15(b)

Response	Mark
Cycling + curve is higher for smaller values	**2**
Cycling + they have more under 40	**2**
Cycling + have a higher cf at 30	**2**
Cycling + earlier end of graph is higher than tennis	**2**
Cycling + the curve for younger members is steeper	**2**
Tennis + tennis has less members under the age of 40	**1**
Tennis + tennis curve is below cycling curve for lower ages	**1**
Tennis + tennis curve is less steep for lower ages	**1(BOD)**
Tennis + its curve is below the other one	**1(BOD)**
anything to do with spread	**0**

Exemplar responses for Q21(b)

Response	Mark
the mean should be higher because these people would have taken longer than 50 minutes	**1**
the recorded time is less than the actual time	**1**
they might have taken a lot longer	**1(BOD)**
actual time [for some people] is over 50 minutes	**1**
there are some people more than 50 who are counted as 50	**1(BOD)**
she used the mid-interval values	**0**
results are not uniformly distributed within each group	**0**
she did not use all the results	**0**

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