

GCSE (9–1)

Mathematics

J560/01: Paper 1 (Foundation 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.

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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
	Benefit of doubt
	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 using a correct method and are not lost for purely numerical errors.
A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
SC marks are for special cases 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.
 - **nfw** 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 not from wrong working **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. $FT\ 180 \times (their\ '37' + 16)$, or $FT\ 300 - \sqrt{(their\ '52 + 72)}$. Answers to part questions which are being followed through are indicated by
e.g. $FT\ 3 \times their\ (a)$.

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)		16	1		
	(b)		4	1		
	(c)		Bar height 13	1		Condone freehand. Must have sides and a top nearer to 13 than 12 or 14 Width $\pm 2\text{mm}$ by eye
2	(a)	(i)	12, 14 or 16	1		If more than one all must be correct
		(ii)	16 or 25	1		If more than one all must be correct
		(iii)	4	1		
	(b)		17	1		
	(a)		Arrow at 0.4	1		In both parts allow clear indication other than an arrow. 2mm by eye
3	(b)		Arrow at 0	1		
	(a)		(4, 0)	1		
	(b)		Point plotted at (3, -3)	1		Accept unlabelled if no others
5	(a)		Correct centre	1		Centre clearly marked. By eye. Do not allow diagonal lines
	(b)		Square drawn	1		Condone good freehand
6	(a)		=	1		
	(b)		>	1		

Question			Answer	Mark	Part Marks and Guidance	
7			2.76 with correct working	4	M2 for $\frac{15 \times 18}{120}$ or M1 for 15×18 may be implied by 270 M1 for <i>their</i> number of rolls $\times 92$ or for <i>their</i> number of rolls $\times [0].92$ If 0 scored SC1 for answer 2.76 with no working or insufficient working Alternative method M2 for $120 \div 18 = [6.6 \text{ to } 6.7]$ and either $6 + 6 = 12$ or $6 + 6 + 6 = 18$ oe or M1 for $120 \div 18$ may be implied by 6.6 to 6.7 or 6 M1 3×92 or $3 \times [0].92$ If 0 scored SC1 for answer 2.76 with no or insufficient working	“Correct working” requires evidence of at least the first M1 For M2 and M1 accept in other correct consistent units i.e m or mm <i>their</i> number of rolls dep on at least M1 and must be 3, 23 or 225 Dep on at least M1
8			Incorrect, they have divided not multiplied [£]	1		See appendix
9	(a)	(i)	$2r - 5t$ final answer	2	B1 for $2r$ or $-5t$ in final answer or correct answer seen and spoilt. $2r + -5t$ scores B1	
		(ii)	a^5	1		
		(iii)	$7b^4$	1		
	(b)		$4(a - 3b)$	1		Allow $4(1a - 3b)$ and $2(2a - 6b)$

Question			Answer	Mark	Part Marks and Guidance	
10	(a)		$\frac{43}{50}$ or 0.86 or 86% or $\frac{86}{100}$	2	M1 for 43 or 50 – 7 or 31 + 3 + 9 or $1 - \frac{7}{50}$	Is incorrect cancelling of correct fraction but do not allow conversion to incorrect form e.g 43 out of 50 or 43 : 7 for 2 marks
	(b)		2 : 3	1		
11	(a)		-4	1		
	(b)		5	1		
	(c)		$\frac{9}{10}$ oe fraction	1		
12	(a)		39	1		Ignore extras after 39
	(b)		Add 8	1		Need direction and quantity
	(c)		The sequence is all odd numbers oe	1		See appendix
13			212.5	4	M1 for 185.5×5 may be implied by 927.5 M1 for 190×6 may be implied by 1140 M1 for <i>their</i> $190 \times 6 - \text{their } 185.5 \times 5$ Alt method e.g. M2 for $(190 - 185.5) \times 5$ M1 for <i>their</i> $(190 - 185.5) \times 5 + 190$	
14			$\frac{8}{15}$	3	M1 for $\frac{5}{7} \times 56$ may be implied by 40 B1 for $\frac{\text{their } 40}{75}$	<i>their</i> 40 must be from an attempt at $\frac{5}{7} \times 56$
15	(a)		11	1		
	(b)		19 in correct position	2	M1 for $53 - (16 + 7 + 11)$ may be implied by 19 in working space	For 2 marks only 19 added to diagram

Question			Answer	Mark	Part Marks and Guidance	
	(c)		$\frac{23}{53}$ or 0.43, 0.434 or 43%, 43.4%	2	M1 for 16 + 7 implied by 23	23 must clearly be their final total lsw incorrect cancelling of correct fraction but do not allow conversion to incorrect form e.g 23 out of 53 or 23 : 53 for 2 marks
16	(a)		$d = \frac{f-4}{5}$ or $d = \frac{f}{5} - \frac{4}{5}$	2	M1 for $f - 4 = 5d$ or $\frac{f}{5} = d + \frac{4}{5}$ or $\frac{f-4}{5}$ or $\frac{f}{5} - \frac{4}{5}$ as answer	
	(b)		50	2	M1 for $5 + 7.5 \times 6$	
17			144.75	2	M1 for 19.3×7.5	Allow 144.8 for 2 marks after M1

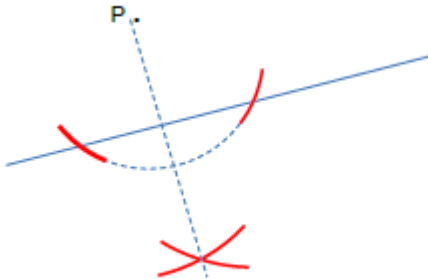
Question			Answer	Mark	Part Marks and Guidance	
18			2439	4	B3 for [LCM=] 420 or answer $2439 + 420n$ OR B2 for listing the next 3 multiples for both comets 168, 252, 336 and 210, 315, 420 or [84 =] $2^2 \times 3 \times 7$ and [105=] $3 \times 5 \times 7$ or [LCM=] $420k$ OR B1 for listing the next 3 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	$n = 1, 2, 3 \dots$
19			840	4	M2 for $\left(\frac{450}{3}\right) \times 7$ oe may be implied by 1050 or M1 for $\frac{450}{3}$ oe may be implied by 150 M1 for <i>their</i> $\left(\left(\frac{450}{3}\right) \times 7\right) \times 0.8$	
20			4750.75	3	M2 for $4000 \times (1.035)^5$ oe may be implied by 4750.74 or 4750.745... M1 for $4000 \times (1.035)^k$ ($k \neq 5$ and $k \geq 2$)	oe includes $4000 \left(1 + \frac{3.5}{100}\right)^5$ May be done as separate years, mark method, condone premature rounding.

Question			Answer	Mark	Part Marks and Guidance	
21	(a)		1.31×10^5	4	B3 for 131000 or 131×10^3 oe or 1.3×10^5 or $1.30[8] \times 10^5$ or B2 for 130800 or 1308×10^2 oe or M1 for figs 119 + figs 118 If 0 scored SC1 for <i>their</i> value correctly rounded to 3 sf	Addition may be implied by figs 131 or 1308, Must clearly be their answer from attempt at addition The unrounded value must be seen
	(b)		$\frac{1.44 \times 10^9}{1.18 \times 10^4}$ 1.22×10^5 or 122 000 to 122 034 OR $1.18 \times 10^4 \times 120\,000$ 1.416×10^9 or 1416000000 to 1420000000 OR $\frac{1.44 \times 10^9}{120000}$ 1.2×10^4 or 12000	M1 A1 M1 A1 M1 A1		Accept in ordinary numbers e.g. $\frac{1440000000}{11800} =$

Question			Answer	Mark	Part Marks and Guidance	
22			[a =] 19 [c =] 12 with correct working	5	B4 for one correct answer with correct working OR M1 for $4a + 5c = 136$ oe M1 for $3a + 2c = 81$ oe M1 for method to find a common coefficient, allow one arithmetic error M1 for correct method to eliminate 1 variable, allow one arithmetic error OR If 0 or M1 scored instead award SC2 for both correct answers with no or insufficient working or SC1 for two answers which satisfy one of the original conditions	“Correct working” requires evidence of at least M1M1M1 Correct answer from trial and improvement scores 5 Accept other variables for <i>a</i> and <i>c</i> If substitution method used M1 for correct rearrangement of equation M1 for correctly substituting into other equation A sign error is not an arithmetic error Do not allow 16.2[0] 16.2[0] for SC1

Question			Answer	Mark	Part Marks and Guidance	
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 <i>their</i> 128 – <i>their</i> 28 – <i>their</i> 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 marks if further work does not include these
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 <i>their</i> B For those who put B due west of A, award the second B1 if <i>their</i> C is marked at 225 ± 2° from A and the third B1 if <i>their</i> 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

Question			Answer	Mark	Part Marks and Guidance	
25			17 or 17.2 to 17.3 with correct working	5	M4 for $(\sin 27 \times 19) \times 2$ or $(\cos 63 \times 19) \times 2$ or M3 for $\sin 27 \times 19$ or $\cos 63 \times 19$ or M2 for $\sin 27 = \frac{x}{19}$ oe or $\cos 63 = \frac{x}{19}$ oe or B1 for 27 as angle If 0 or 1 scored, instead award SC2 for 17.2 to 17.3 with no or insufficient working If 0 scored, instead award SC1 for 8.6 or 8.62 to 8.63 or 17 with no or insufficient working	“Correct working” requires evidence of at least M2 May be seen in the correct place on the diagram Accept fully correct alternative methods

Question			Answer	Mark	Part Marks and Guidance	
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 $\pm 2^\circ$ and on radius of arcs $\pm 2\text{mm}$ 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 2cm long full evidence means two correct ruled lines within tolerance

Question			Answer	Mark	Part Marks and Guidance	
27			14 1 with correct working	5	B2 for 21 and 14 or M1 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 of 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

APPENDIX

Exemplar responses for 8

Response	Mark
Incorrect / wrong with	
You need to multiply not divide	1
You need to multiply	1
pound is worth more than a dollar therefore you have to x it	1
need to times	1
$1.34 \times 450 = 603$ so he would have 603 dollars instead of 335.82	1
$\pounds 450 = \$603$	1
$\$335.82 = \pounds 250.61$	1
1.34 is higher than 1 so $\pounds 450$ should be higher than itself	1
1.34 is more than 1 so dollars should be higher than pounds	1
It should be 603	1 bod
\$1 is worth more than $\pounds 1$ so he should get a higher answer – <i>first part incorrect</i>	0
Should be higher than 335.82	0
The pound is valued more meaning the amount of money Blake has is wrong	0
Dollar is worth more than pound	0
	0

Exemplar responses for 12c

Response	Mark
$8n - 1 = 80$; $n = 10.125$ it's not an integer	1
The last digits of the number always end with 1, 3, 5, 7, 9 never 0	1
After 79 it goes to 87	1
After 71 it goes to 79 so 80 can't be	1 bod
If you add on in 8's you get to 79 not 80	1 bod
Nearest term would be 79 which is 1 off	1 bod
.... 39, 47, 55, 63, 71, 79, 87	1 bod
$80 \div 8 = 10$	0
There is 79 in the sequence, followed by the sequence to 79	0
Because the sequence didn't start at 0 it started at -1 mean that the sequence isn't the 8 times table	0
Because the next two terms only take you to 79	0
Because each term is prime	0
None of the terms end in 0 / are a multiple of 10.	0
Because 80 is an even number – <i>not enough</i>	0
Because it's not possible to add 8 from the terms to get to 80	0

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 M1A1

10% = 6
5% = 3

10% = 6
5% = 4 ✗

condone this slip as answer correct

50% = 30
65% = 39 ✓ M1A1

50% = 30
65% = 39 ✓ M1A1

Method scoring M0A0

10% = 6
5% = 4 ✗ M0
50% = 30
65% = 40 ✗

Do not condone this slip as answer incorrect

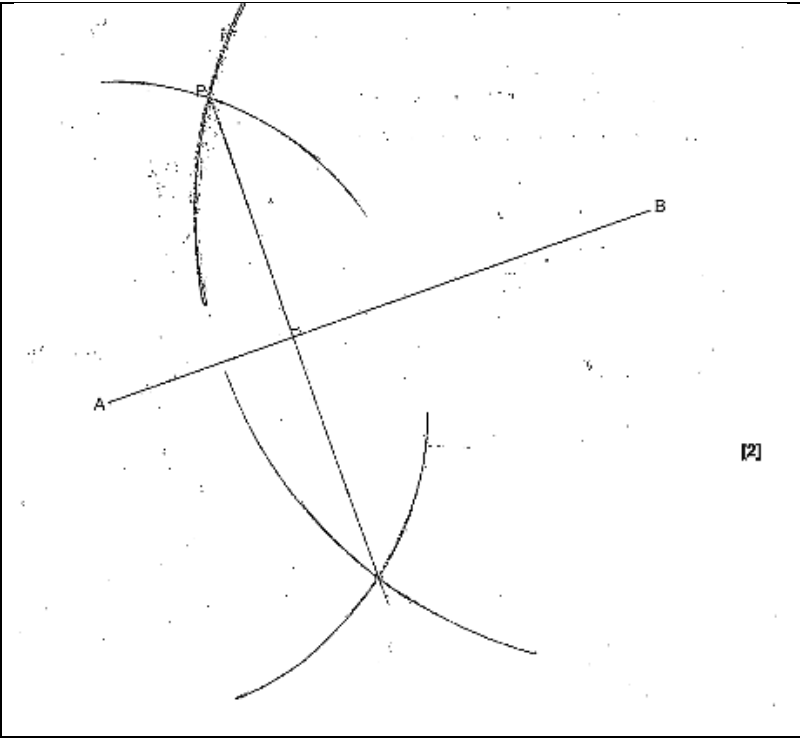
Build up method

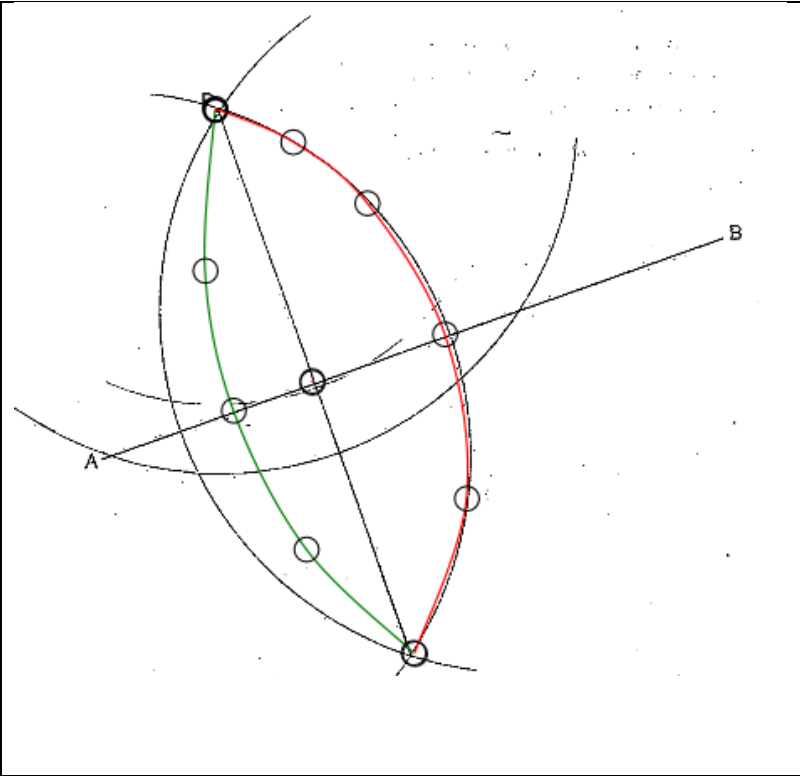
This is where the candidate finds the percentages to build up to the required value but shows the operations used.

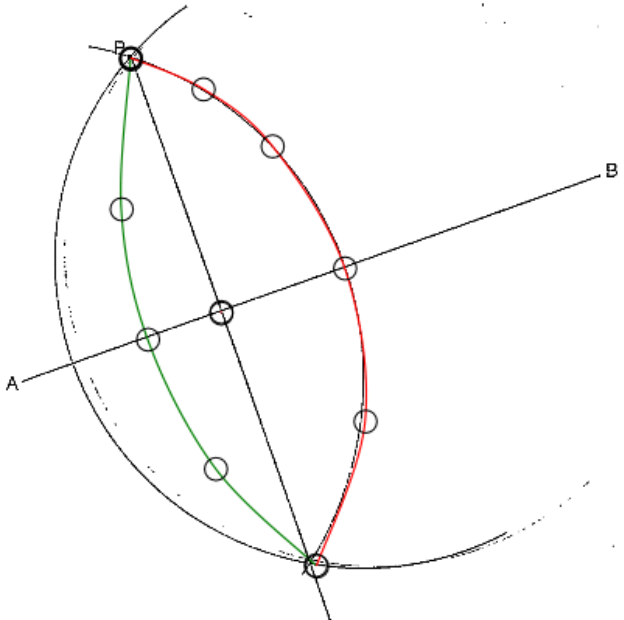
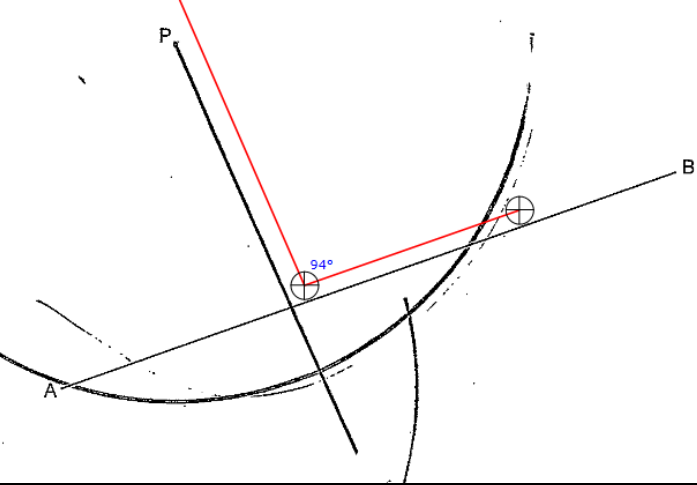
e.g. Find 65% of 60
10% = $60 \div 10 = x$
5% = $x \div 2 = y$
50% = $x \times 5 = z$
65% = $x + z + y$

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

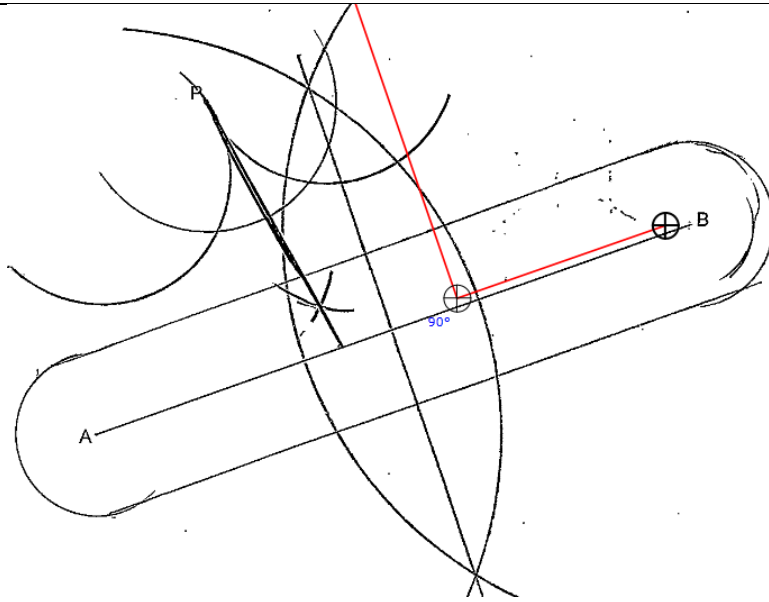
Exemplar responses for Q26(a)

A		Scores 2 This is 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.
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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.
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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

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