

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE MATHEMATICS

F

Foundation Tier Paper 1 Non-Calculator

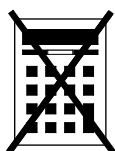
Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments
- the Formulae Sheet (enclosed).

You must **not** use a calculator.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



J U N 2 2 8 3 0 0 1 F 0 1

Answer **all** questions in the spaces provided.

Do not write
outside the
box

1 (a) Circle the answer to $150 \div 5$

[1 mark]

3

30

300

3000

1 (b) Circle the answer to $5 - 7$

[1 mark]

-12

-2

2

12

1 (c) Circle the answer to -3×3

[1 mark]

-9

-6

6

9



2

 P is double r .

Circle the correct formula.

[1 mark]

$P = \frac{r}{2}$

$P = r + 2$

$P = r - 2$

$P = 2r$

3

By rounding each number to the nearest 10, estimate the value of 31×18

[3 marks]

Answer _____

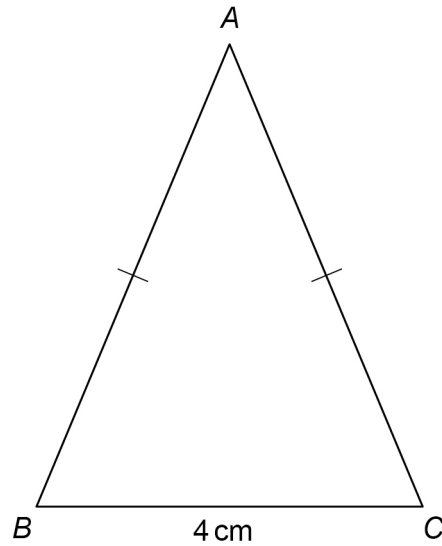
Turn over for the next question



4

In this isosceles triangle,

$$AB = AC$$

Not drawn
accurately

The perimeter of the triangle is 22 cm

Work out the length of AB .**[3 marks]**

Answer _____ cm



5

After school, Priya will

- go running (R)
- do her homework (H)
- play a video game (V).

Complete the list of the 6 possible orders in which she could do them.

[2 marks]

RHV

Turn over for the next question**Turn over ►**

6 (a) Which statement is correct?

Tick **one** box.

☐

$$17 + 3 < 29 - 10$$

☐

$$17 + 3 = 29 - 10$$

☐

$$17 + 3 > 29 - 10$$

Show working to support your answer.

[2 marks]

6 (b) Work out $60 \div 2 + 4$

[2 marks]

Answer _____



7

	Cost of 100 grams
Cereal	49p
Pasta	14p

Leah buys 400 grams of cereal and 250 grams of pasta.

Work out the **total** cost in £

[4 marks]

Answer £ _____

Turn over for the next question

Turn over ►



- 8 (a) For a set of five numbers,
the mode is 8
the median is 12

Work out **one** possible set of five numbers.

[2 marks]

Answer _____

- 8 (b) Here are the heights, in centimetres, of some children.

98 103 91 85 159 102 91

Which height is an outlier?

[1 mark]

Answer _____ cm



9

Shona has 14 dresses.

50% of these dresses are red.

She gives 5 of her red dresses to a charity shop.

She buys 1 new red dress.

What percentage of the dresses she has now are red?

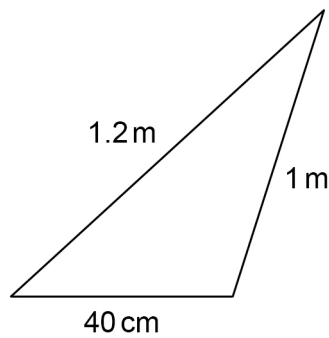
[4 marks]

Answer _____ %

Turn over for the next question



10 (a) Here is a triangle.



Not drawn
accurately

Work out $\frac{\text{length of shortest side}}{\text{length of longest side}}$

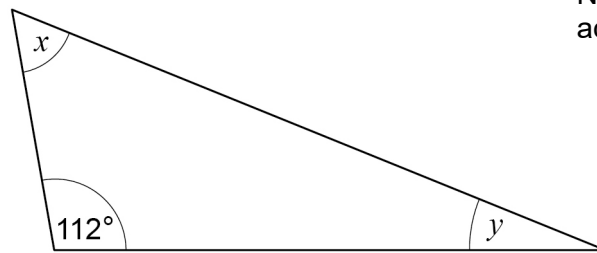
Give your answer as a fraction in its simplest form.

[2 marks]

Answer _____



10 (b) Here is a different triangle.



Not drawn
accurately

$$x = 3y$$

Work out the size of angle y .

[3 marks]

$$y = \underline{\hspace{2cm}}^\circ$$

Turn over for the next question

Turn over ►



11

Companies A and B sell insurance for mobile phones.

The table shows the **monthly** costs for two types of cover, Damage and Loss.

Company	Damage	Loss
A	£8.65	£12.20
B	£7.25	£14.10

11 (a) Work out the difference in monthly cost for the two types of cover with **Company A**.**[2 marks]**

Answer £ _____



11 (b) Ben wants Damage cover with **Company B**.

How much in total will he pay for one **year**?

[3 marks]

Answer £ _____

12 Work out $\frac{11}{18} - \frac{1}{3}$

[2 marks]

Answer _____



- 13 (a)** The term-to-term rule for a sequence is

multiply by 2

The 3rd term of the sequence is 46

Work out the 1st term.

Give your answer as a decimal.

[3 marks]

Answer _____

- 13 (b)** The term-to-term rule for a different sequence is

subtract k

The 1st term is 34

The 4th term is 10

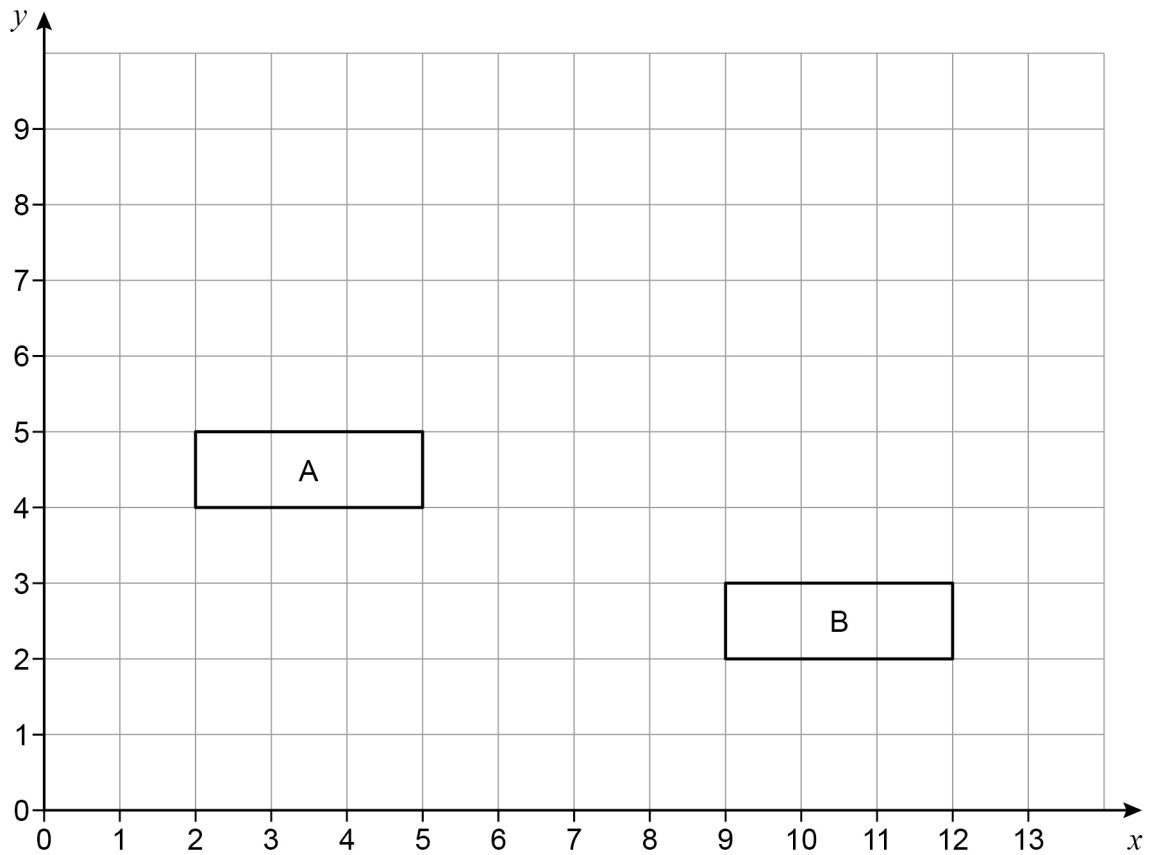
Work out the value of k .

[3 marks]

$k =$ _____



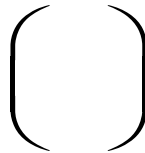
14



Work out the vector that translates shape A to shape B.

[2 marks]

Answer



Turn over for the next question

Turn over ►



15

In a bag there are only red discs, blue discs and green discs.

There are 10 red discs.

When one disc is picked at random

$$P(\text{red}) = \frac{1}{8}$$

$$P(\text{blue}) = \frac{2}{5}$$

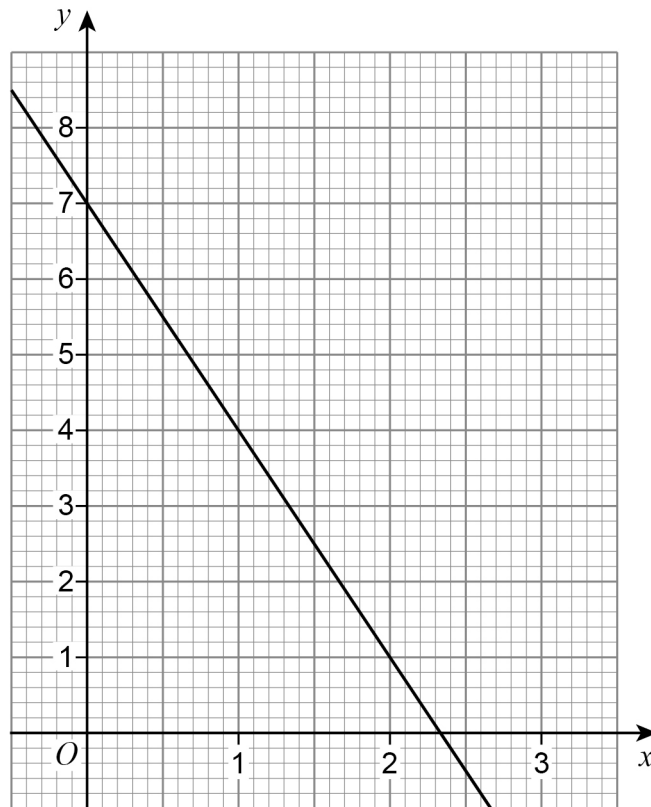
How many **green** discs are in the bag?

[4 marks]

Answer _____



16 Here is the graph of $y = 7 - 3x$



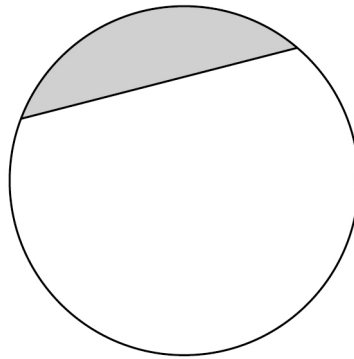
Draw the graph of $y = 2x + 1$ on the grid
and then
work out an approximate solution to $7 - 3x = 2x + 1$

[3 marks]

Answer _____



- 17** Part of this circle is shaded.



Circle the name of the shaded part.

[1 mark]

arc

sector

chord

segment

- 18** Work out $80\,000\,000 \div 200$
Give your answer in standard form.

[2 marks]

Answer _____

19 (a) Work out $\frac{3^{12}}{3^7}$

Give your answer as a whole number.

[2 marks]

Answer _____

19 (b) Simplify $8 \times 2^6 \times 2^4$

Give your answer as a power of 2

[2 marks]

Answer _____



20

In a group of 98 students

25 study both Art and French

10 study Art but do not study French

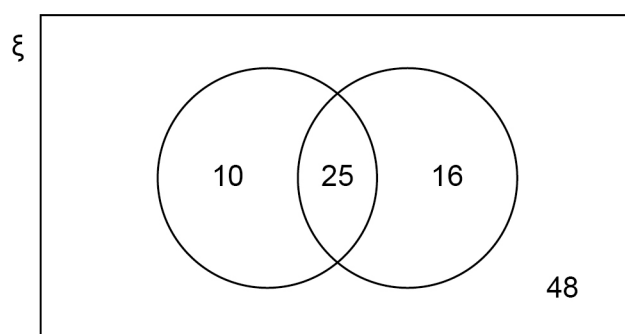
41 study French.

Joel draws this Venn diagram to represent the information.

ξ = the group of 98 students

A = the students who study Art

F = the students who study French



Make **two** criticisms of his diagram.

[2 marks]

Criticism 1 _____

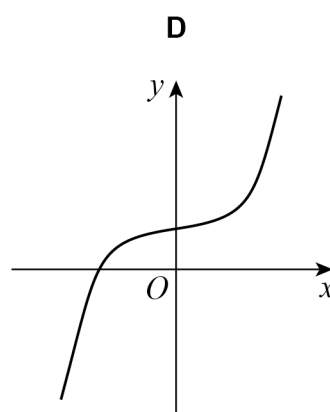
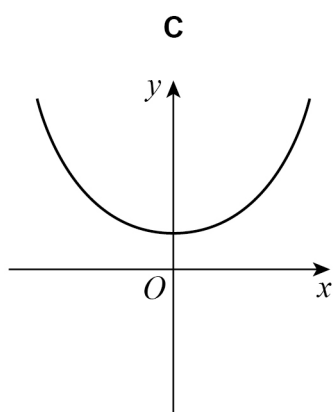
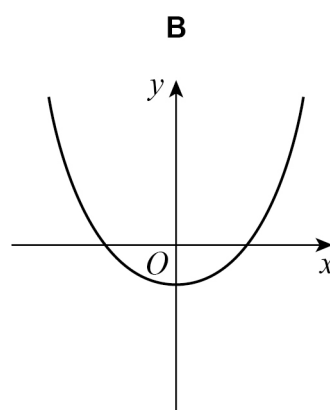
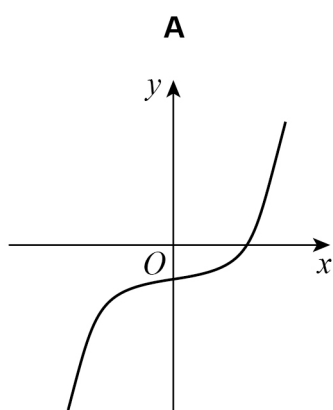
Criticism 2 _____



21

Circle the letter of the possible sketch graph of $y = x^3 - 4$

[1 mark]



Turn over for the next question

Turn over ►



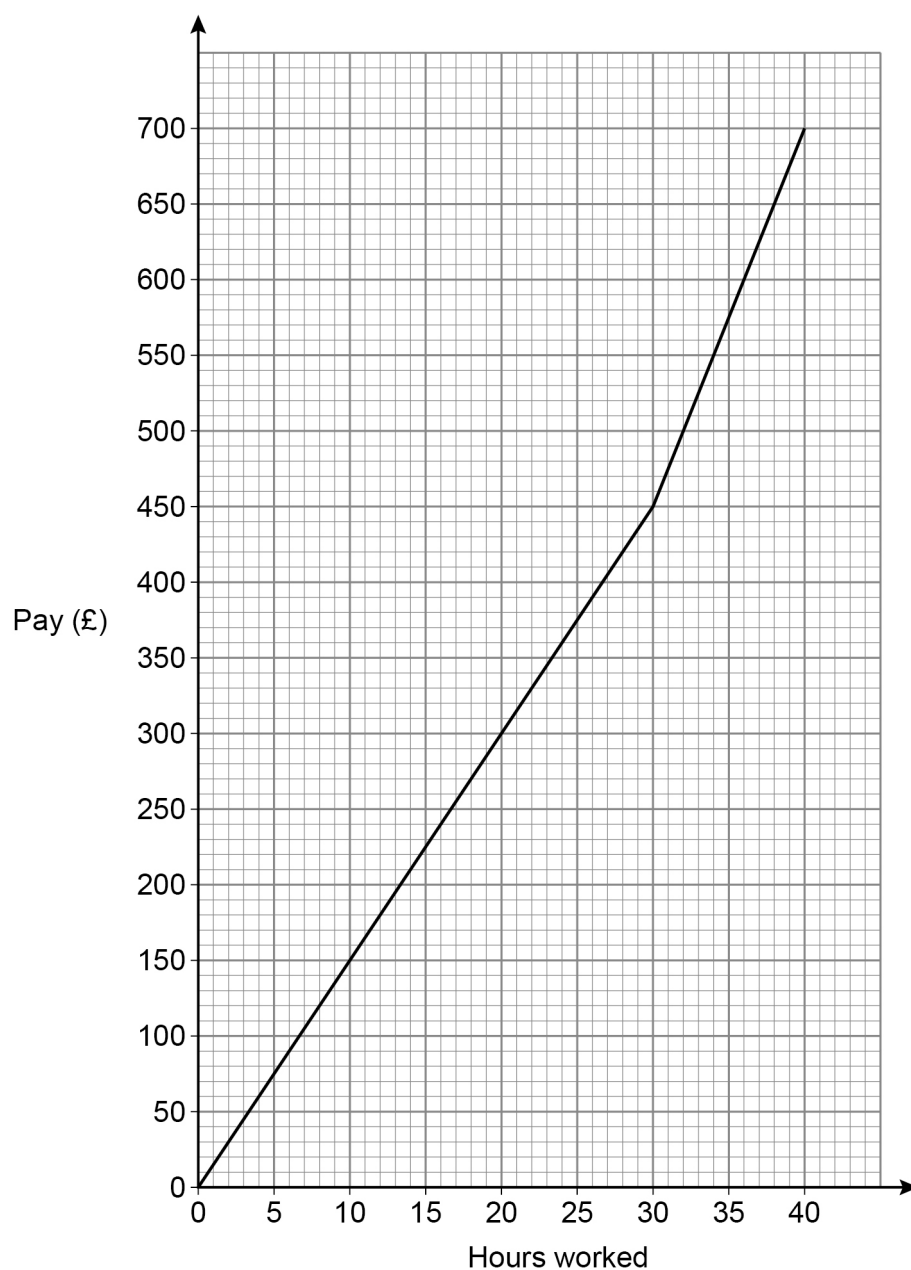
22

In a week, Samir is paid

a basic hourly rate for the first 30 hours worked

an overtime hourly rate for any extra hours worked.

The graph shows his pay for working up to 40 hours in a week.



Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

[3 marks]

Answer _____ : _____

23 (a) In each box, write a fraction **less** than 1 to make a correct calculation.

[1 mark]

$$\boxed{\frac{\quad}{\quad}} \times \boxed{\frac{\quad}{\quad}} = \frac{3}{10}$$

23 (b) In each box, write a decimal **less** than 1 to make a correct calculation.

[1 mark]

$$\boxed{\quad} \times \boxed{\quad} = 0.06$$

5

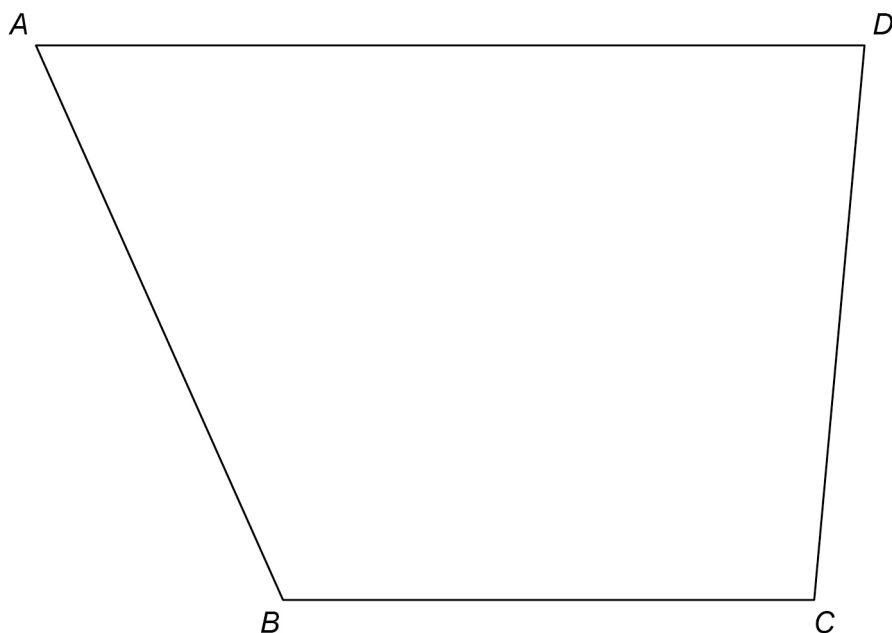
Turn over ►



24

Use a ruler and compasses in this question.

$ABCD$ represents a garden.



A tree is to be planted in the garden.

The tree will be in the region that is closer to AB than to BC .

Label the region, R , where the tree could be planted.

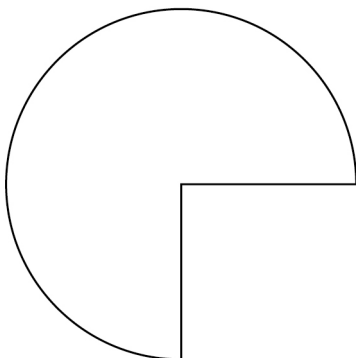
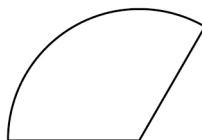
Show all your construction lines.

[3 marks]



25

Here are two shapes, P and Q.

P $\frac{3}{4}$ of a circle, radius 20 cm**Q** $\frac{1}{3}$ of a circle, radius 15 cmNot drawn
accurately

How many times bigger is the area of P than the area of Q?

You **must** show your working.**[4 marks]**

Answer _____



26 Solve $\frac{2w}{15} = \frac{4}{5}$

[2 marks]

$$w = \underline{\hspace{4cm}}$$

27 A solid has volume 300 cm^3 and density 2 g/cm^3

Circle the mass of the solid.

[1 mark]

150 g

298 g

302 g

600 g

28 $x : y$ is $9 : 5$

Circle the value of $\frac{2x}{y}$

[1 mark]

 $\frac{5}{18}$ $\frac{18}{5}$ $\frac{9}{10}$ $\frac{10}{9}$

END OF QUESTIONS



There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



[illegible]

*Do not write
outside the
box*

[illegible]

[illegible]

There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright information

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.aqa.org.uk.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.

Copyright © 2022 AQA and its licensors. All rights reserved.



GCSE MATHEMATICS 8300/1F

Foundation Tier Paper 1 Non-Calculator

Mark scheme

June 2022

Version: 1.0 Final



Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Copyright information

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2022 AQA and its licensors. All rights reserved.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14 ...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles.

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Mark	Comments
1(a)	30	B1	

Q	Answer	Mark	Comments
1(b)	−2	B1	

Q	Answer	Mark	Comments
1(c)	−9	B1	

Q	Answer	Mark	Comments
2	$P = 2r$	B1	

Q	Answer	Mark	Comments
3	30	B1	
	20	B1	
	(30 and 20 and) 600	B1ft	ft their $30 \times$ their 20 with B1B0 or B0B1 SC1 ($31 \times 18 =$) 558, answer 560
	Additional Guidance		
	Answer 600 with no working		B1B1B1
	Answer 558 with neither 30 nor 20 seen		B0B0B0
	30×18 with answer 540 31×20 with answer 620 and answer 600 (ignore further work) 31×20 with answer 600		B1B0B1ft B0B1B1ft B0B1B0ft

Q	Answer	Mark	Comments
4	22 – 4 or 18 or $22 \div 2$ or 11 or $4 \div 2$ or 2	M1	oe
	their $18 \div 2$ or their $11 - \text{their } 2$	M1dep	oe
	9	A1	may be seen on diagram SC1 20 or 14
	Additional Guidance		
	Ignore units or incorrect statements eg the lines are parallel		
	Condone poor notation eg $22 - 4 \div 2 = 9$		M1M1A1
	Embedded answer of 9		M1M1A0

Q	Answer	Mark	Comments
5	RHV	B2	any order
	RVH		B1 3 or 4 correct or 5 correct with 1 or more incorrect
	VRH		
	VHR		
	HVR		
	HRV		
	Additional Guidance		
	Accept any unambiguous indication of R, H, V		
	Ignore repeated orders		

Q	Answer	Mark	Comments
6(a)	20 or 19 and no incorrect evaluations and 3rd box indicated	B2	oe eg 30 and 29 and no incorrect evaluations and 3rd box indicated B1 20 or 19 or incorrect values seen and correct box indicated for their values SC1 3rd box indicated but no evaluations seen
	Additional Guidance		
	14 and 39 and 1st box indicated		B1
	Ignore any incorrect statements such as $20 < 19$ if the correct box is ticked as they may be checking each statement		

Q	Answer	Mark	Comments
6(b)	34	B2	B1 ($60 \div 2 =$) 30 or (their $60 \div 2$) + 4 evaluated
	Additional Guidance		
	Condone poor notation eg $60 \div 2 = 30 + 4 = 34$		B2
	$60 \div 2 = 20$, answer 24		B1
	$60 \div 2 = 20$, $20 + 4 = 25$		B1
	$60 \div 2 = 20$, $20 + 4$ (no attempt at evaluation)		B0
	Condone $2 \div 60 = 30$ (recovery seen)		B1
	$60 \div 6 = 10$		B0

Q	Answer	Mark	Comments
7	Alternative method 1 – working in £		
	Any correct conversion from pence to pounds	B1	may be seen at any stage
	$0.49 \times \frac{400}{100}$ or 0.49×4 or $0.14 \times \frac{250}{100}$ or 0.14×2.5	M1	
	1.96 or 0.35	A1	
	2.31	A1	
	Alternative method 2 – working in pence		
	$49 \times \frac{400}{100}$ or 49×4 or $14 \times \frac{250}{100}$ or 14×2.5	M1	
	196 or 35	A1	
	231	A1	
	2.31	B1ft	ft their 231 correctly converted to £
	Additional Guidance		
	Reward correct work seen amongst multiple attempts Use the scheme that gives the better mark		
	Condone p after their final answer eg £2.31p		

Q	Answer	Mark	Comments
8(a)	Five numbers with mode 8 and median 12	B2	B1 five numbers with mode 8 eg 2 5 8 8 8 or 8 10 19 4 8 or five numbers with median 12 eg -3 6 12 14 20 or 7 10 18 12 16
	Additional Guidance		
	8 8 12 16 25		B2
	8 8 8 8 8		B1
	12 12 12 12 12		B1
	Do not allow bimodal sets of numbers for mode 8 but median may still be 12 eg 8 8 12 12 13 eg 7 7 8 8 10		B1 B0
	A set of four or more than five numbers may score B1 if the mode is 8 and the median is 12 eg 8 8 11 13 20 21 eg 8 8 16 17		B1 B1

Q	Answer	Mark	Comments
8(b)	159	B1	
	Additional Guidance		
	Mark answer line but if blank allow unambiguous selection in the list of heights		

Q	Answer	Mark	Comments
9	$\frac{50}{100} \times 14$ or 7	M1	oe eg $14 \div 2$
	$14 - 5 + 1$ or 10 or their $7 - 5 + 1$ or 3	M1	oe their 7 must be an integer, where $4 < \text{their } 7 < 14$ 3 implies M1M1
	$\frac{3}{10}$ or 3 : 7	A1	oe
	30	B1ft	ft their $\frac{3}{10}$ correctly converted to a percentage
	Additional Guidance		
	For the B1ft, their percentage must be correct to 2sf or better		
	30 on the answer line with no incorrect working		M2A1B1
	3 in 10 or 3 out of 10		M2A1
	3 : 10		M2A0
	$7 - 5 = 3 + 1 = 4$, answer 40 (10 implied)		M2A0B1ft

Q	Answer	Mark	Comments
10(a)	$\frac{1}{3}$	B2	B1 (may be seen in diagram) 120 or 100 or 0.4(0) may be seen in a fraction eg $\frac{120}{40}$ or $\frac{0.4}{1.2}$ or correct, but unsimplified fraction eg $\frac{20}{60}$ or their fraction written in simplest form SC1 1 : 3
	Additional Guidance		
	Ignore units on answer line		
	Do not ignore further work after $\frac{1}{3}$ seen		
	If converting to mm both values must be correct		
	$\frac{1}{3}$ given as a decimal or percentage must be correct to 2sf or better		B1
	B1 for simplifying their fraction can only be awarded from the use of digits 1, 12 and 4, eg $\frac{40}{1200}$, answer $\frac{1}{30}$ $\frac{1200}{40}$, answer 30 $\frac{40}{1200}$, answer $\frac{1}{3}$ $\frac{2}{4}$, answer $\frac{1}{2}$		B1 B1 B0 B0
	$\frac{0.04}{1.2}$, answer $\frac{1}{30}$		B1
	$\frac{1}{40}$ or $\frac{40}{1} = 40$		B0

Q	Answer	Mark	Comments
10(b)	180 – 112 or 68 or $3y + y + 112 = 180$	M1	oe
	their $68 \div (3 + 1)$ or their $68 \div 4$ or $y = \frac{\text{their } 68}{4}$ or 51 or $x = 17$	M1	oe their 68 must be < 180 but not 112 51 or $x = 17$ imply M1M1
	17	A1	
	Additional Guidance		
	Check diagram for workings and answer		
	17 seen in diagram or working and 51 on answer line		M1M1A0
	$180 \div 4$		M0M0
	$68 \div 3$		M1M0
	$180 - 112 = 78$ and $78 \div 4$ $78 \div 4$		M1M1 M0M1
	Embedded answer eg $4 \times 17 + 112 = 180$		M1M1A0

Q	Answer	Mark	Comments
11(a)	12.2(0) – 8.65 or answer with 55p or 355	M1	oe
	3.55	A1	accept 355p SC1 6.85 or 685p (Company B used)
	Additional Guidance		
	Answer with 55p eg 4.55 or 455p eg 455		M1A0 M0A0
	Condone £3.55p		M1A1

Q	Answer	Mark	Comments
11(b)	7.25×12 or 725×12	M1	oe eg $7 \times 12 + 0.25 \times 12$ accept repeated addition of twelve 7(.)25s
	Correct vertical method of long multiplication with at least one of 1450 and 7250 correct or Correct set up of grid method with at least three products correct or Correct set up of Gelosia method with at least three products correct or $10 \times 725 = 7250$ and $2 \times 725 = 1450$ attempted with at least one correct or $12 \times 700 = 8400$ and $12 \times 20 = 240$ and $12 \times 5 = 60$ attempted with at least one correct	M1dep	oe allow a placeholder space to be present instead of a physical zero in vertical method
	87(.00)	A1	SC2 103.8(0) or 146.4(0) or 169.2(0) or 190.8(0) or 256.2(0) or 250.2(0) or 315.6(0) SC1 8.65×12 or $12.2(0) \times 12$ or $14.1(0) \times 12$ or $15.9(0) \times 12$ or 21.35×12 or 20.85×12 or $26.3(0) \times 12$
	Additional Guidance		
	Condone 87.0	M2A1	
	Accept answers in pence		
	Condone p after their final answer eg £87.00p		
	Method of repeated addition must have no more than one error. If broken down into groups, the one error made may be seen multiple times		

Q	Answer	Mark	Comments
12	$\frac{6}{18}$ or Converts both fractions to an appropriate common denominator with at least one correct numerator	M1	eg $\frac{33}{54}$ and $\frac{18}{54}$
	$\frac{5}{18}$	A1	oe fraction eg $\frac{15}{54}$ SC1 $\frac{17}{18}$ (oe fraction)
	Additional Guidance		
	Ignore incorrect attempt to simplify after correct answer seen		
	$\frac{22}{30}$ and $\frac{10}{30}$ not an appropriate denominator		M0

Q	Answer	Mark	Comments
13(a)	$46 \div 2$ or 23 or $4x = 46$	M1	oe
	their $23 \div 2$ or $46 \div 2 \div 2$ or $46 \div 4$	M1dep	oe may be seen as a fraction eg $\frac{23}{2}$ or $11\frac{1}{2}$ or $\frac{46}{4}$ or $11\frac{2}{4}$
	11.5	A1	SC2 5.75 or 11 remainder 1
	Additional Guidance		
	$46 \div 2 = 25$, ($25 \div 2 =$) 12.5		M1M1A0
	$46 \div 2 = 24$, followed by 11		M1M0A0
	11.5 in working, different answer on answer line (do not ignore further work)		M1M1A0

Q	Answer	Mark	Comments
13(b)	Alternative method 1		
	$34 - k$ or $34 - 10$ or 24	M1	oe implied by $34 - 2k$ or $34 - 3k$
	$3k = 34 - 10$ or $3k = \text{their } 24$ or $\frac{34 - 10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 -8 or all terms seen 34, 26, 18, 10 SC1 6
	Alternative method 2		
	$10 + k$ or $34 - 10$ or 24	M1	oe implied by $10 + 2k$ or $10 + 3k$
	$10 + 3k = 34$ or $3k = \text{their } 24$ or $\frac{34 - 10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 -8 or all terms seen 34, 26, 18, 10 SC1 6
	Alternative method 3		
	One correct trial	M1	a correct trial is either a subtraction of the same value, exactly three times, from 34 and evaluated correctly or addition of the same value, exactly three times, from 10 and evaluated correctly
	Two or more correct trials	M1dep	
	8	A1	SC2 -8 or all terms seen 34, 26, 18, 10 SC1 6
	Additional Guidance		
	Accept any letter in place of k		

Q	Answer	Mark	Comments
14	$\begin{pmatrix} 7 \\ -2 \end{pmatrix}$	B2	B1 $\begin{pmatrix} 7 \\ a \end{pmatrix}$ or $\begin{pmatrix} b \\ -2 \end{pmatrix}$ or $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$ or $\begin{pmatrix} 7x \\ -2y \end{pmatrix}$ or $\begin{pmatrix} -7 \\ 2 \end{pmatrix}$ SC1 7 right 2 down or 2 down 7 right or (7, -2)
	Additional Guidance		
	B1 responses must be in vector form		
	Condone $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$		B2
	7 → 2 ↓ 7 across, 2 down		SC1 B0
	$\begin{pmatrix} 2 \\ 7 \end{pmatrix}$		B0
	7 ← 2 ↑		B0

Q	Answer	Mark	Comments
15	Alternative method 1		
	10×8 or 80	M1	oe 80 may be seen as a denominator
	$\frac{2}{5} \times \text{their } 80$ or 32	M1	oe their 80 can be any integer >10 32 will imply M1M1 and may be seen as a numerator
	their 80 – their 32 – 10 or $\frac{38}{80}$ or their 32 + 10 or 42	M1dep	oe calculation dep on 2nd M1 42 will imply M1M1M1dep and may be seen as a numerator
	38	A1	
	Alternative method 2		
	10×8 or 80	M1	oe 80 may be seen as a denominator
	$\frac{1}{8} + \frac{2}{5}$ or $\frac{21}{40}$ or $1 - \frac{1}{8} - \frac{2}{5}$ or $\frac{19}{40}$	M1	oe
	their $\frac{21}{40} \times \text{their } 80$ or 42 or their $\frac{19}{40} \times \text{their } 80$	M1dep	oe calculation dep on M1M1 42 will imply M1M1M1dep and may be seen as a numerator
	38	A1	
	Additional Guidance		
	Alt 1 $\frac{2}{5} \times 40 = 15, 40 - 15 - 10 = 15$ $\frac{2}{5} \times 40 = 16, 16 + 10$		M0M1M1depA0 M0M1M1depA0

Q	Answer	Mark	Comments
16	At least two points from (0, 1) (1, 3) (2, 5) and (3, 7)	M1	may be seen in a table of values or embedded in calculations may be implied by correct line $\pm \frac{1}{2}$ square tolerance
	Correct straight line between (1, 3) and (2, 5)	A1	$\pm \frac{1}{2}$ square tolerance
	[1.15, 1.25] from using the graph or 1.2	B1ft	oe ft x-coordinate of any line drawn that intersects the given line $\pm \frac{1}{2}$ square tolerance
	Additional Guidance		
	Ignore further work after B1 scored		
	1.2 with M0 scored		M0A0B1
	1.2 with two correct points seen but no or incorrect line		M1A0B1
	For the A1, ignore incorrect lines unless used to read off for intersection and then only allow for the B1ft		
	Answer given as coordinates eg (1.2, 3.4)		B0
Q	Answer	Mark	Comments
17	segment	B1	

Q	Answer	Mark	Comments
18	4×10^5	B2	B1 400 000 or correct answer not in standard form eg 40×10^4 or 8×10^7 or 2×10^2 or $8 \times 10^5 \div 2$ or $4 \times 10^7 \div 100$ or any value seen and then correctly converted to standard form eg 4 000 000 and 4×10^6 40 000 and 4×10^4
	Additional Guidance		
	Ignore incorrect position of commas or spacing in long numbers		
	Condone 400 000 and 4×10^5 on the answer line, in either order		B2
	Condone 40 000 and 4×10^4 on the answer line, in either order		B1
	400 000 only on the answer line		B1
	Do not award both marks for the correct answer from incorrect working but B1 can be awarded for one or both numbers incorrectly converted to standard form and the result of their division given correctly in standard form eg $(8 \times 10^8) \div (2 \times 10^3) = 4 \times 10^5$ eg $(0.8 \times 10^7) \div (2 \times 10^3) = 4 \times 10^5$		B1 B0
	Condone a decimal point and any number of zeros after 4 eg 4.00000×10^5		B2
	8×10^7 is implied by $(8 \div 2) \times (10^7 \div 10^a)$ or condone $(8 \div 2) \times (10^7 \times 10^a)$		B1
	2×10^2 is implied by $(8 \div 2) \times (10^b \div 10^2)$ or condone $(8 \div 2) \times (10^b \times 10^2)$		B1

Q	Answer	Mark	Comments
19(a)	243	B2	B1 3^{12-7} or 3^5 oe single index or $3 \times 3 \times 3 \times 3 \times 3$ oe multiplication string or 531 441 seen as 3^{12} or as a numerator or 2187 seen as 3^7 or as a denominator or 3^n correctly evaluated, where n is an integer ≥ 4
	Additional Guidance		
	Condone 3^5 and 243 on the answer line, in either order		B2
	3^5 only on the answer line		B1
	Do not allow a misread		
	12 – 7 is insufficient for B1 unless 3^{12-7} or 3^5 is also seen		
	Do not award B1 for a correct evaluation of 3^n not ascribed to a particular value of n eg a list 3, 9, 27, 81 ... does not score the mark unless 81 is identified as 3^4		

Q	Answer	Mark	Comments
19(b)	2^{13}	B2	B1 2^{3+6+4} or $(8 \Rightarrow) 2 \times 2 \times 2 \text{ or } 2^3$ or $(2^6 \times 2^4 \Rightarrow) 2^{6+4}$ or $(2^6 \times 2^4 \Rightarrow) 2^{10}$ or $2^9 (\times 2^4)$ or $2^7 (\times 2^6)$ or 8192
			Additional Guidance
			8192 and 2^{13} on answer line, in either order
			B2
			8192 only on the answer line
			B1
			Correctly combined powers can be implied eg $8 = 2^4$ with answer 2^{14} implies $2^6 \times 2^4 = 2^{10}$
			B1
			Evaluations other than 8192 do not score eg 8×1024 without seeing 8×2^{10} eg $8 \times 64 \times 16$
			B0 B0
			Do not award B1 for 8192 if it is in a list of powers of 2 unless it is indicated or it is the highest power evaluated
			Changing terms to numbers with a base of 8 scores zero unless converted to a number with a base of 2

Q	Answer	Mark	Comments
20	Valid criticism referring to one or both sets not being labelled	B1	eg the circles should be labelled or the labels are missing
	Valid criticism referring to the numbers not adding to 98	B1	eg the numbers add to 99 or 48 should be 47 SC1 no written criticisms, but circles labelled correctly and 48 changed to 47 on diagram
	Additional Guidance		
	Accept both statements written in one criticism		
	For more than two criticisms mark the best two unless contradicted		
	Condone written corrections as criticisms eg Add labels		B1
	Criticism 1 - There is no A label and Criticism 2 - There is no F label		B1B0
	Didn't label the diagram		B1
	There are no subjects		B1
	The diagram doesn't have labels/headings/titles		B1
	The diagram doesn't have a label/heading/title		B0
	It doesn't show how many study French		B0
	48 is wrong/one of the numbers is wrong		B1
	There's an extra student		B1
	It doesn't add up correctly/the total is wrong		B1
	It doesn't add up		B0
	The numbers are wrong		B0
	Do not accept an incorrect statement eg The number doing Art and French should be 47		B0
	If a value is used as evidence it must be correct eg the total is 100, not 98		B0

Q	Answer	Mark	Comments
21	A	B1	

Q	Answer	Mark	Comments
22	Alternative method 1: using different time periods		
	450 ÷ 30 or 15 or 250 ÷ 10 or 25	M1	oe for any section of the basic rate or the overtime rate eg $\frac{450-150}{30-10}$
	15 and 25	A1	implied by any ratio equivalent to 3 : 5 do not allow as a ratio in the wrong order eg 25 : 15
	3 : 5 or $\frac{3}{5} : 1$ or $1 : \frac{5}{3}$	B1ft	oe fully simplified ft full simplification of their two values
	Alternative method 2: using equal time periods		
	Four correct readings from equal time periods of at least 5 hours from the two sections of the graph	M1	eg at 5 and 10 hours and at 35 and 40 hours if a reading from 30 is used, there may only be 3 readings a reading of 0 from 0 may be implied
	15 and 25 or correct totals for their equal time periods	A1	eg 10 hours = 150 and 10 hours = 250 implied by any ratio equivalent to 3 : 5 must not be seen as a ratio in the wrong order eg 250 : 150
	3 : 5 or $\frac{3}{5} : 1$ or $1 : \frac{5}{3}$	B1ft	oe fully simplified ft full simplification of their two values

Additional Guidance for this question is on the next page

22 cont	Additional Guidance	
	In alt 2, only three readings are needed if a reading from 30 hours is included in both time periods or a reading of 0 is used eg readings of 300 from 20, 450 from 30 and 700 from 40	M1
	Readings from 10, 20, 30 and 40 should be 150, 300, 450 and 700 For readings from other numbers of hours not giving a multiple of £10 allow the multiple of 10 above or below the reading or any value between, which can then be used to score all three marks eg allow [220, 230] for a reading at 15 hours eg alt 1 readings of 70 at 5 hours, 380 at 25 hours, 450 at 30 hours and 700 at 40 hours, followed by hourly rates of 15.50 and 25 and an answer of 31 : 50 eg alt 2 readings of 370 at 25 hours, 450 at 30 hours, 580 at 35 hours and 700 at 40 hours, followed by totals of 80 and 120 or hourly rates of 16 and 24 and an answer of 2 : 3	M1A1B1ft M1A1B1ft
	For $1\frac{2}{3}$ allow 1.67 or better with correct rounding	
	450 : 250 = 45 : 25 does not get the mark for 25, but gets the final mark if simplified to 9 : 5	
	Ignore units throughout eg answer £3 : £5	M1A1B1
	15 : 25	M1A1B0
	25 : 15 or 25 : 10 not simplified	M1A0B0
	25 : 15 with answer 5 : 3 or 25 : 10 with answer 5 : 2	M1A0B1ft
	Answer 5 : 3 without working implies	M1A0B1ft
	15 : 17.5	M1A0B0
	15 : 17.5 followed by 6 : 7	M1A0B1ft
	20 : 25	M1A0B0
	20 : 25 followed by 4 : 5	M1A0B1ft
	3 : 5 in working with answer 1.5 : 2.5	M1A1B0
	30 : 10 = 3 : 1	M0A0B1ft

Q	Answer	Mark	Comments
23(a)	Two fractions less than 1 with product $\frac{3}{10}$	B1	eg $\frac{3}{5}$ and $\frac{1}{2}$ or $\frac{6}{10}$ and $\frac{5}{10}$ either order
	Additional Guidance		
	Accept negatives if each processed fraction is less than 1 eg $-\frac{3}{2}$ and $-\frac{1}{5}$		B1
	eg $-\frac{1}{2}$ and $\frac{3}{5}$		B1
	eg $-\frac{3}{2}$ and $\frac{1}{5}$		B0
	Do not accept decimals within the fractions eg $\frac{0.6}{1}$ and $\frac{0.5}{1}$		B0
	$\frac{11}{10}$ and $\frac{3}{11}$		B0
	$\frac{3}{10}$ and $\frac{1}{1}$		B0
	0.6 and 0.5		B0

Q	Answer	Mark	Comments
23(b)	Two decimals less than 1 with product 0.06	B1	eg 0.3 and 0.2 or 0.60 and 0.10 or 0.5 and 0.12 or 0.75 and 0.08 either order
	Additional Guidance		
	Accept negatives eg -0.3 and -0.2		B1
	Condone negative integers eg -6 and -0.01		B1
	0.06 and 1		B0
	6 and 0.01		B0
	$\frac{3}{10}$ and $\frac{2}{10}$		B0

Q	Answer	Mark	Comments
24	Alternative method 1		
	Pair of arcs, equal radii (± 2 mm), centre B , intersecting AB and BC	M1	oe eg single arc, centre B , intersecting AB and BC or single arc, centre B , radius BC (± 2 mm), intersecting AB
	Pair of intersecting arcs, equal radii (± 2 mm), centres the intersections on AB and BC and angle bisector drawn from B at least to the intersection of their arcs	A1	dashed line or condone solid line
	Correct region R shown as the area between AB and a straight line from B to within 2mm of AD	B1	R may be labelled or shaded arcs not required for this mark only SC1 angle bisector for a different angle correctly constructed with arcs
	Alternative method 2		
	Concentric arcs from B , each intersecting AB and BC	M1	intersections with AB and BC must be seen, but full arcs are not necessary
	Two lines from the AB intersection of one arc to the BC intersection of the other arc and angle bisector drawn from B at least to the intersection of their lines	A1	dashed line or condone solid line
	Correct region R shown as the area between AB and a straight line from B to within 2mm of AD	B1	R may be labelled or shaded arcs not required for this mark only SC1 angle bisector for a different angle correctly constructed with arcs
	Additional Guidance		
	Mark any correct construction, ignoring incorrect attempts		
	Unless shaded incorrectly, ignore construction arcs or other lines in the region labelled		
	Bisector drawn with no construction arcs, but region correctly identified		M0A0B1

Q	Answer	Mark	Comments
25	$20^2 (\times \pi)$ or $400 (\times \pi)$ or $15^2 (\times \pi)$ or $225 (\times \pi)$	M1	oe
	$\frac{3}{4} \times 20^2 (\times \pi)$ or $300 (\times \pi)$ or $\frac{1}{3} \times 15^2 (\times \pi)$ or $75 (\times \pi)$	M1dep	oe
	$\frac{3}{4} \times 20^2 (\times \pi)$ or $300 (\times \pi)$ and $\frac{1}{3} \times 15^2 (\times \pi)$ or $75 (\times \pi)$	M1dep	
	$300 (\times \pi)$ and $75 (\times \pi)$ and 4	A1	Accept $P = 4Q$ for 4 SC2 $40 (\times \pi)$ and $30 (\times \pi)$ and $30 (\times \pi)$ and $10 (\times \pi)$ and answer 3
	Additional Guidance		
	Answer 4 with no working		M0A0
	Condone inconsistent use of π eg 300π and 75 and 4		M3A1
	Condone, for example, $\pi 400$ for 400π		
	Allow use of a numerical value for π for method marks and for the A mark with answer 4		
	Ignore units throughout		

Q	Answer	Mark	Comments
26	$2w = \frac{4}{5} \times 15$ or $2w = \frac{60}{5}$ or $2w = 12$ or $\frac{2w}{15} = \frac{12}{15}$ or $\frac{w}{3} = \frac{2}{1}$ or $\frac{w}{2} = \frac{3}{1}$ or $\frac{w}{15} = \frac{4}{5} \div 2$ or $\frac{w}{15} = \frac{2}{5}$ or $2w \times 5 = 4 \times 15$ or $10w = 60$ or $\frac{4}{5} \div \frac{2}{15}$	M1	oe in the form $aw = n$ where a is an integer and n is an integer, fraction or decimal oe in the form $\frac{bw}{x} = \frac{c}{x}$ where x is a common denominator oe calculation
	6	A1	
	Additional Guidance		
	Embedded answer 6 eg $\frac{2 \times 6}{15} = \frac{4}{5}$		M1A0

Q	Answer	Mark	Comments
27	600g	B1	

Q	Answer	Mark	Comments
28	$\frac{18}{5}$	B1	