Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

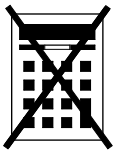
F

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.

Advice

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

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	

Please note that these worked solutions have neither been provided nor approved by AQA and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

.CG Maths.

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

$$5\overline{)150} = 30$$

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

[1 mark]

–12 (–2) 2 12

5 - 7 = -7 + 5. Adding to a negative subtracts from how negative it is.
7 - 5 = 2, so -7 + 5 = -2. Alternatively, counting back 7 from 5 gives -2

1 (c) Circle the answer to -3×3

[1 mark]

(–9) –6 6 9

3 x 3 = 9. As one of the numbers is negative the answer will be negative

Do not write outside the box

2 P is double r.

Circle the correct formula.

[1 mark]

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

'is' means equals. To double r it can be multiplied by 2

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

[3 marks]

30x20

31 rounds to 30 as there is a 1 in the units place this causes the 3 in the tens place to stay the same and everything after it is set to zero and ignored. 18 rounds to 20 as there is an 8 in the units place this causes the 1 in the tens place to round up and everything after it is set to zero and ignored. 3 x 2 = 6 so 30 x 20 = 600

Answer 600

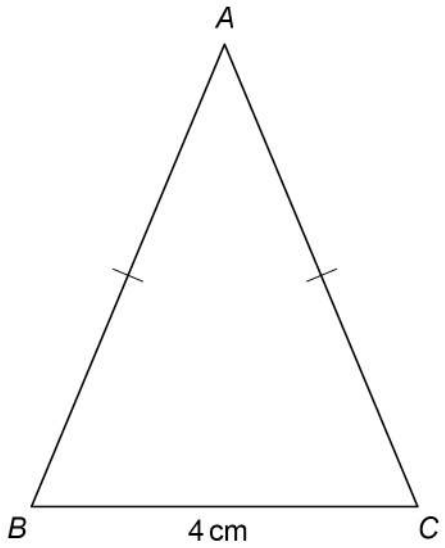
Turn over for the next question

7

Do not write outside the box

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]

22
− 4
18 ÷ 2

The perimeter is all of the outside edges added together. Subtracting BC from the 22 leaves the total of AB and AC. As both of these sides are equal, dividing the total by 2 finds each of them and therefore the length of AB

2 x 9 = 18, so 18 ÷ 2 = 9

Answer 9 cm

Do not write outside the box

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
RVH
HRV
HVR
VRH
VHR

The possible orders are listed systematically

Turn over for the next question

5

Do not write outside the box

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]

17+3=20 ← Working out the value of the the left side

29−10=19 ← Working out the value of the the right side

20 is greater than 19. The inequality symbol points to the smaller side

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

[2 marks]

The order of operations, BIDMAS, needs to be followed. Division comes before addition. 6 ÷ 2 = 3 so 60 ÷ 2 = 30. 30 + 4 = 34

Answer 34

Do not write outside the box

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]

$$\begin{array}{r} 49 \\ \times\ 4 \\ \hline 196 \\ {\scriptstyle 3} \end{array}$$

400 grams is 4 lots of 100 grams. So the cost of 100 grams of cereal is multiplied by 4 to work out the cost of the 400 grams of cereal

$$\begin{array}{r} 14 \\ \times\ 2 \\ \hline 28 \\ +\ 7 \\ \hline 35 \\ {\scriptstyle 1} \end{array}$$

250 grams is $2^{1}/_{2}$ lots of 100 grams. So the cost of 100 grams of pasta is multiplied by 2 and then the cost of half of the 100 grams of pasta is added on. 14 ÷ 2 = 7

$$\begin{array}{r} +196 \\ \hline 231 \\ {\scriptstyle 1\ 1} \end{array}$$

Adding the cost of the 400 grams of cereal to the 250 grams of pasta works out the total cost in pence

There is 100p in £1. So dividing the cost in pence by 100 converts it into pounds. The decimal point is moved two places to the left to do this

Answer £ 2.31

Turn over for the next question

8

Do not write outside the box

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]

Writing the numbers in ascending order. Starting by putting 12 in the middle so that it is the median. Then putting two 8s before this so that most of the numbers are 8 and it is the mode. The other two numbers after the 12 can be anything more than 12 as long as they are not the same. If they were the same there would be two modes

Answer 8 8 12 13 14

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 159 cm

The height of 159cm is significantly different to the others. The others are relatively close together

Do not write outside the box

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]

14 ÷ 2
7 − 5
2 + 1 = 3

50% = 1/2. Half of the 14 dresses is 7, so there are 7 red dresses at the start. Subtracting the 5 red dresses she gave to the charity shop leaves 2 red dresses. Adding the 1 new red dress means that there are now 3 red dresses

14 − 5
9 + 1 = 10

There were 14 dresses in total at the start. Subtracting the 5 red dresses she gave to the charity shop leaves 9 dresses in total. Adding the 1 new red dress means that there are now 10 red dresses in total

$\frac{3}{10} \times 100$

3 out of the 10 dresses are red. Expressing this as a fraction then multiplying it by 100 converts it into a percentage

Answer 30 %

To multiply by a number by a fraction, divide the number by the denominator then multiply the result by the numerator. 100 ÷ 10 = 10 then 10 x 3 = 30

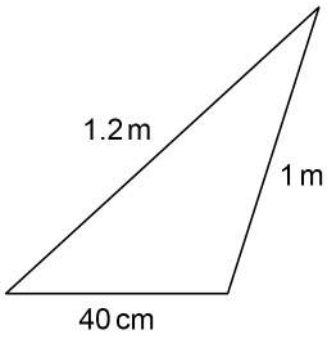
Turn over for the next question

7

Do not write outside the box

10 (a) Here is a triangle.

Not drawn accurately



There are 100cm in 1m. So multiplying the lengths in metres by 100 converts them into centimetres. 1.2m = 120cm and 1m = 100cm

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]

$\frac{40}{120}$ ← The shortest side is 40cm. The longest side is 120cm. Expressing these in the fraction

$\frac{4}{12}$ ← Simplifying the fraction by dividing both the numerator and denominator by 10

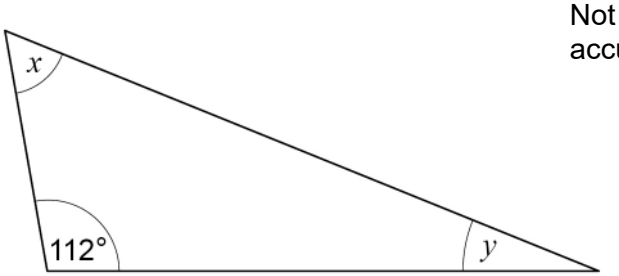
Simplifying the fraction by dividing both the numerator and denominator by 4

Answer $\frac{1}{3}$

Do not write outside the box

10 (b) Here is a different triangle.

Not drawn accurately



$x = 3y$

Work out the size of angle y.

[3 marks]

$\begin{array}{r} \overset{1}{\cancel{1}}\overset{7}{\cancel{8}}\overset{1}{0} \\ -\,1\,1\,2 \\ \hline 6\,8 \end{array}$ ← There are 180° in total in a triangle. Subtracting the 112° leaves the total of the other two angles

$4\overline{)\,6\overset{2}{\cancel{8}}}\;\;1\,7$ ← Angle x can be replaced with 3y. This angle and y add up to 4y, which must equal to 68°. Dividing the 68 by 4 works out y

$y =$ 17 °

Turn over for the next question

5

Do not write outside the box

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]

12.20
− 8.65
3.55

The two different types of cover are Damage and Loss. The Damage cover for Company A is £8.65. The Loss cover for Company A is £12.20. Difference = largest - smallest

Answer £ 3.55

Do not write outside the box

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

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

[3 marks]

7.25
x 12
14.50
72.50
87.00

The monthly cost for Damage cover with Company B is £7.25. There are 12 months in a year. Multiplying the monthly cost by 12 works out the total he will pay for one year

Answer £ 87

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

[2 marks]

$\frac{11}{18} - \frac{6}{18}$

To subtract fractions the denominators need to be the same. The 3 in the second fraction can be multiplied by 6 to get 18 then the numerator also needs to be multiplied by 6 to keep it equivalent. Then the numerators can be subtracted and the denominator stays the same

Answer $\frac{5}{18}$

7

Do not write outside the box

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

multiply by 2

Going backward in the sequence means doing the opposite of multiplying by 2, which is dividing by 2

The 3rd term of the sequence is 46

Work out the 1st term.

Give your answer as a decimal.

[3 marks]

$2\overline{)46} = 23$ ← This works out that the 2nd term is 23

$2\overline{)23.0} = 11.5$ ← This works out that the 1st term is 11.5

Answer 11.5

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]

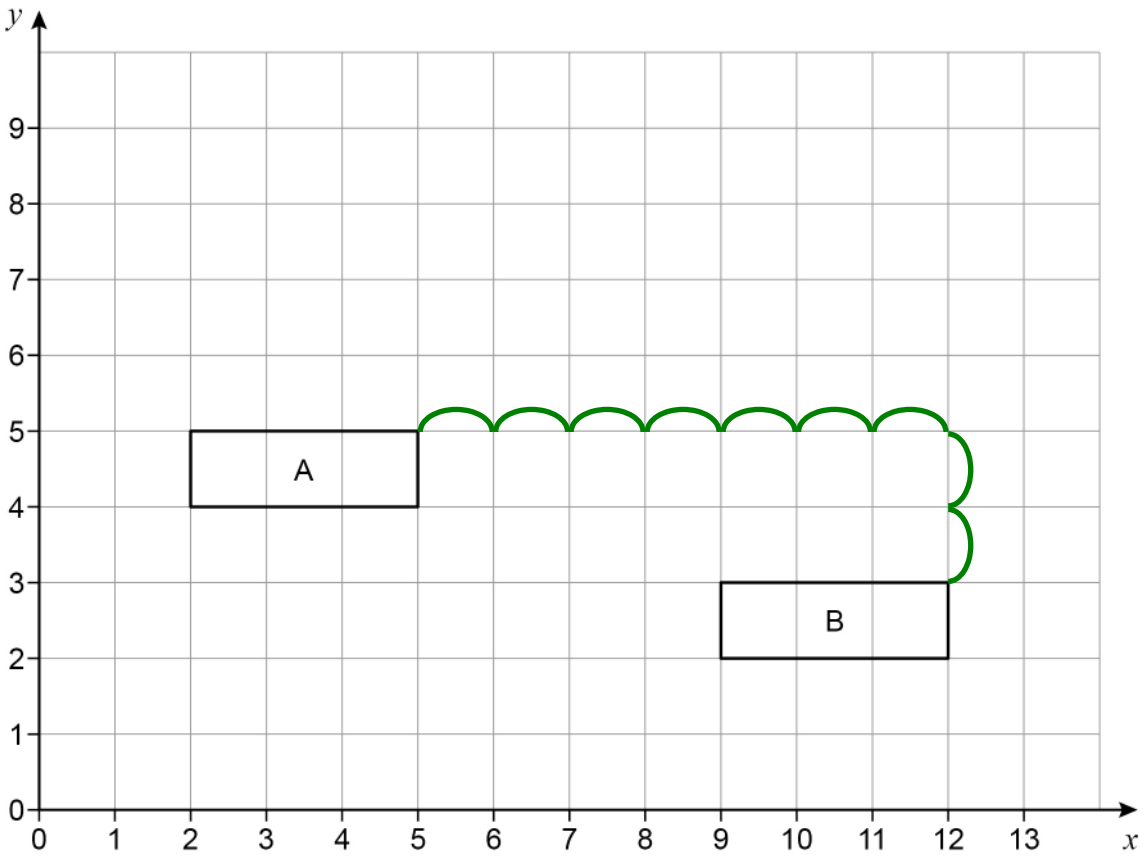
$34 - 10$ ← This works out that the difference between 34 and 10 is 24. This is how much has been subtracted

$24 \div 3$ ← The 4th term is 3 terms after the 1st term, so k must have been subtracted 3 times. Therefore 3k = 24. Dividing both sides by 3 finds that k = 8

$k =$ 8

Do not write outside the box

14



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

[2 marks]

Answer $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$

From one of the corners on A to the same corner of B, it has been translated 7 to the right and 2 down. This is 7 in the x-direction and -2 in the y-direction

Turn over for the next question

8

Do not write outside the box

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]

10×8

The probability of red is 1/8 so 1/8 of the discs are red. There are 10 red discs. Multiplying this by 8 does the opposite of doing 1/8 and finds that the total number of discs is 80

5|8⁰0 → 16

16 × 2 = 32

Finding 2/5 of the 80 discs finds how many blue discs there are. To do a fraction of an amount, divide the amount by the denominator then multiply the result by the numerator

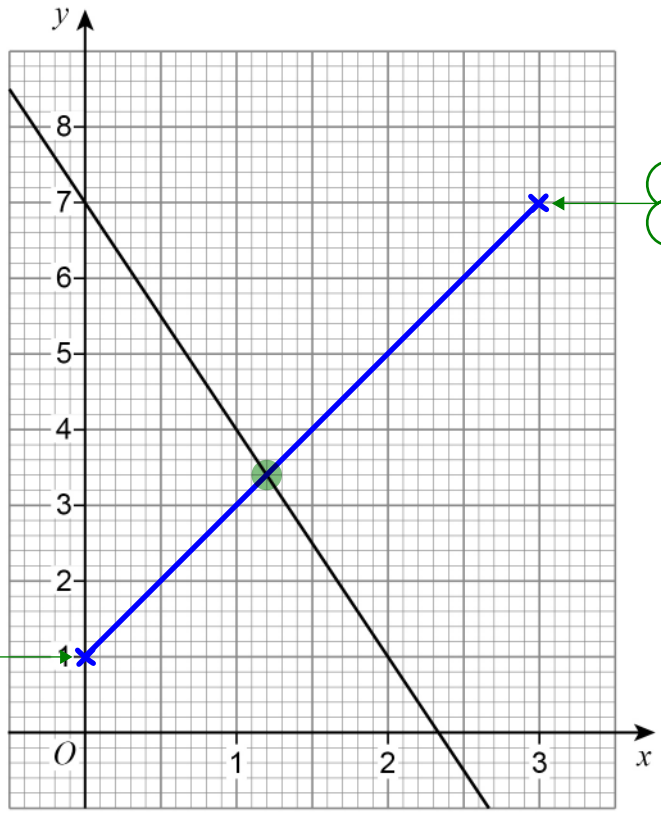
⁷8⁰0 − 10 − 32 = 38

Subtracting the 10 red discs and 32 blue discs from the total 80 discs works out that there are 38 green discs

Answer 38

Do not write outside the box

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



When x = 3, y = 2(3) + 1 = 7

When x = 0, y = 2(0) + 1 = 1

Draw the graph of $y = 2x + 1$ on the grid

and then

work out an approximate solution to $7 - 3x = 2x + 1$

[3 marks]

This is basically asking when the graphs are equal to each other. This is where they cross

The graph of y = 2x + 1 is a straight line as it is in the form y = mx + c. Plotting two points and drawing a straight line through these completes the graph

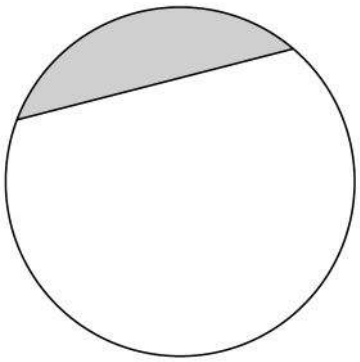
Answer 1.2

The two graphs cross where x = 1.2

7

Do not write outside the box

17 Part of this circle is shaded.



Circle the name of the shaded part.

[1 mark]

arc sector chord segment

18 Work out $80\,000\,0\cancel{00} \div 2\cancel{00}$

Give your answer in standard form.

[2 marks]

400000
2|800000

The 80000000 and 200 can both be divided by 100, which takes two zeros off, to make the division simpler

Answer 4×10^5

400000 must be divided by 10 5 times to get 4, which is between 1 and 10. The 4 must be multiplied by 10^5 to keep it equal and to put it into standard form

Do not write outside the box

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

Give your answer as a whole number.

[2 marks]

3^5 ← When dividing powers of the same number, the powers can be subtracted. $a^x \div a^y = a^{x-y}$. 12 - 7 = 5

27
x 3
81
x 3
243

← $3^5 = 3 \times 3 \times 3 \times 3 \times 3$. Starting with 3 and keep multiplying by 3: 3, 9, 27, 81, 243

Answer 243

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

Give your answer as a power of 2

[2 marks]

$2^3 \times 2^6 \times 2^4$ ← Expressing 8 as a power of 2. $8 = 2^3$

Answer 2^{13}

When multiplying powers of the same number, the powers can be added. $a^x \times a^y = a^{x+y}$. 3 + 6 + 4 = 13

7

Do not write outside the box

20 In a group of 98 students

25 study both Art and French

10 study Art but do not study French

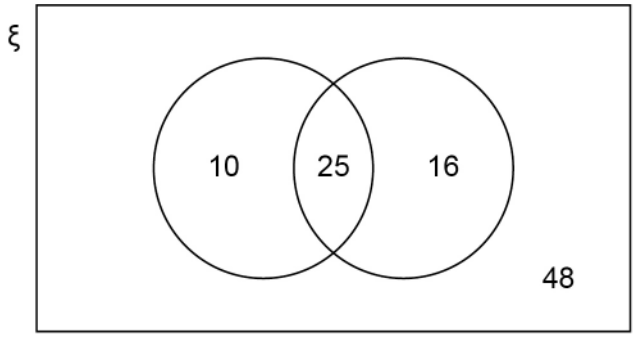
41 study French.

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 The circles aren't labelled

It isn't clear which circle represents Art and which one represents French

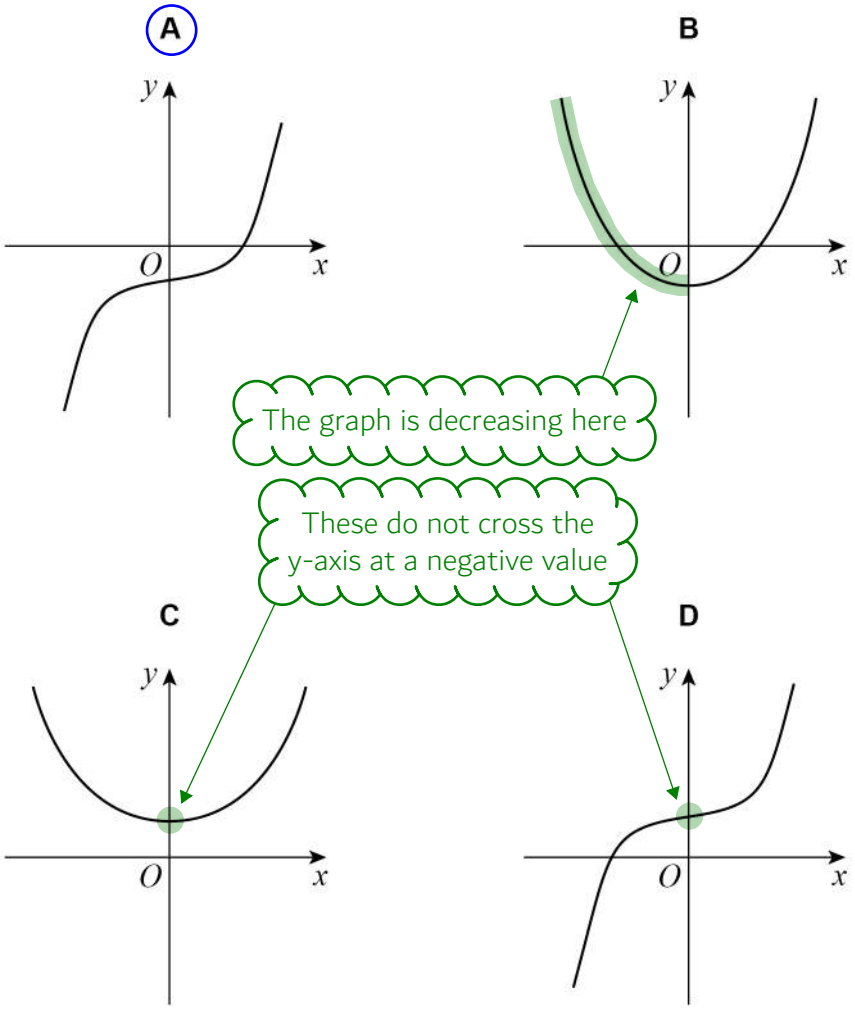
Criticism 2 The numbers don't add up to 98

10 + 25 + 16 + 48 = 99 and there are 98 students in total

Do not write outside the box

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

[1 mark]



x	-1	0	1
y	-5	-4	-3

Doing a small table of values for the graph of $y = x^3 - 4$ works out that it can only be A as this is the only one crossing the y-axis with a negative value which continually increases as x increases.
$(-1)^3 - 4 = -5$. $(0)^3 - 4 = -4$. $(1)^3 - 4 = -3$

Turn over for the next question

3

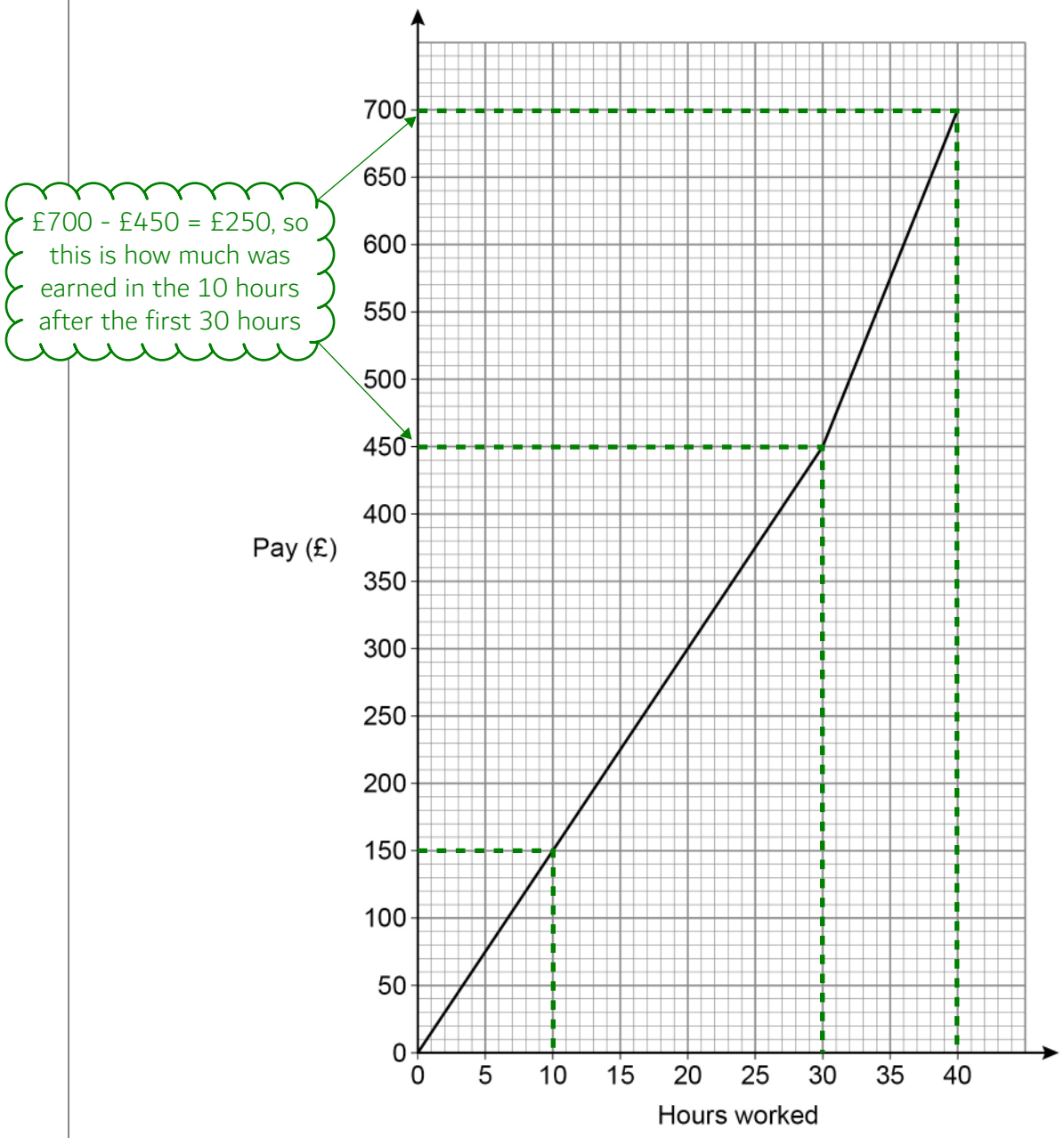
Do not write outside the box

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.



Do not write outside the box

Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

[3 marks]

150 ÷ 10 ← £150 was earned in 10 hours within the range of the first 30 hours. Dividing the £150 by the 10 hours works out that the basic hourly rate is £15 per hour

250 ÷ 10 ← £250 was earned in the 10 hours after the first 30 hours. Dividing the £250 by the 10 hours works out that the overtime hourly rate is £25 per hour

15:25 ← Expressing the ratio of the basic hourly rate : overtime hourly rate

Answer 3 : 5

Dividing both sides of the ratio by 5 simplifies the ratio. It cannot go any simpler as 3 and 5 cannot be divided by the same amount to get smaller whole numbers

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

[1 mark]

$$\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$$

To multiply fractions, multiply the numerators and multiply the denominators. The fraction is less than 1 if the denominator is more than the numerator

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

[1 mark]

$$0.1 \times 0.6 = 0.06$$

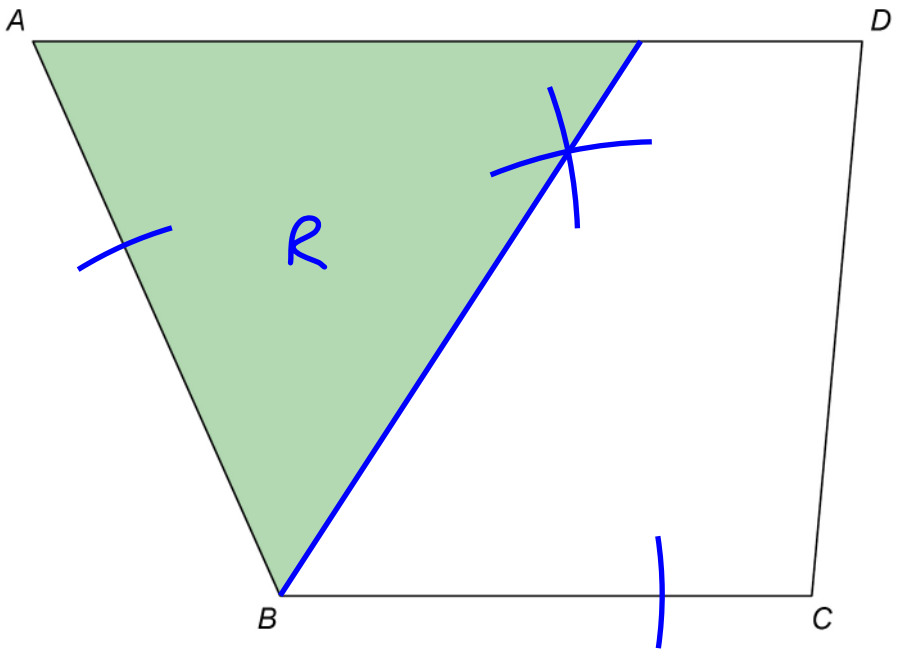
Ignoring the decimals, 1 x 6 = 6. There is 2 decimal places in 0.06 therefore there must be 2 decimal places in total in first and second number

5

Do not write outside the box

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]

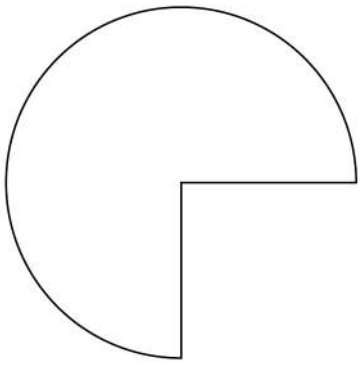
The line which represents all points which are an equal distance from AB and BC needs to be drawn. This will be an angle bisector of angle ABC. To draw this, put the needle of the compass in at B and scribe two arcs using the same radius, one which cuts line AB and the other which cuts line BC. Then put the needle of the compass in the arc which cuts line AB and draw another arc which is at least half way between lines AB and BC. Repeat this step but put the needle in the arc which cuts line BC. This should form a cross. Draw a straight line from point B through this cross. The region is everything to the left of the line and is shaded in green (but it does not need to be shaded in the exam)

Do not write outside the box

25 Here are two shapes, P and Q.

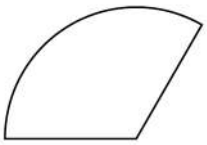
P

$\frac{3}{4}$ of a circle, radius 20 cm



Q

$\frac{1}{3}$ of a circle, radius 15 cm



Not drawn accurately

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

You **must** show your working.

[4 marks]

20^2
$400 \div 4$
100×3
300π

Area of circle = π x radius^2. The radius of P is 20cm. $2^2 = 2 \times 2 = 4$, so $20^2 = 400$. Doing 3/4 of this by dividing the 400 by 4 to get 100 then multiplying this by 3 to get 300, which is then multiplied by π. The area of P is 300π

15
x15
75
150
225

Area of circle = π x radius^2. The radius of Q is 15cm. $15^2 = 15 \times 15 = 225$. Doing 1/3 of this by dividing the 225 by 3 to get 75, which is then multiplied by π. The area of Q is 75π

075
3|225

$\frac{300\pi}{75\pi}$

Dividing the area of P by the area of Q works out how many times bigger the area of P is than the area of Q. π cancels out from the numerator and denominator of the fraction then 300 can be divided by 75

004
75|300
150
225
300

Answer 4

7

Do not write outside the box

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

[2 marks]

$\frac{12}{15}$ ← Multiplying both the numerator and denominator of 4/5 by 3 makes the denominator of both fractions the same and converts it into 12/15

$2w = 12$ ← The numerator of the fraction on the left of the equation must equal to the numerator on the right of the equation as both fractions have the same denominator

$w =$ 6

Dividing both sides of the equation by 2 finds that w = 6

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**

d^m_v ← From the formula triangle, mass = density x volume = 2 x 300 = 600

28 $x : y$ is 9 : 5

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

[1 mark]

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

x could be 9 and y could be 5. 2(9)/5 = 18/5

END OF QUESTIONS

4