Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Rounding to a degree of accuracy, upper and lower bounds, and using bounds in contextual calculations. Sourced from legacy WJEC GCSE Mathematics and M

REVISE
.wales

1.13 — Rounding & bounds in context

Spec 1.1.5, 1.6.1 — Unit 1 (calculator allowed)

Rounding to a degree of accuracy, upper and lower bounds, and using bounds in contextual calculations. Sourced from legacy WJEC GCSE Mathematics and Mathematics-Numeracy Higher papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~2 hours

*Derived from the GCSE Higher pace of **~1.5 min/mark** (80 marks across 20 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

A calculator is allowed on every question in this pack (Unit 1 is the calculator-allowed paper).

Rounding & bounds in context — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 1: calculator-allowed.

Degree of accuracy 1.1.5

- "Correct to the nearest cm" means rounded to 1 cm precision.
- Look for: nearest 10, nearest 0.1, nearest 5, 2 dp, etc.
- State explicitly which degree of accuracy is being used.

Lower & upper bounds 1.6.1

- Bounds straddle the rounded value by half a unit either side.
- Lower bound is inclusive; upper bound is exclusive ($<$).
- Convention: write as $a \leq x < b$.

Bounds in real contexts 1.6.1

- For maximum area: max length × max width.
- For minimum time: min distance ÷ max speed.
- Identify the formula first, then pick max/min for each input.

Truncation 1.1.5

- Truncation chops digits without rounding — always rounds *towards zero*.
- £3.79 truncated to nearest £ = £3 (not £4).
- Banks sometimes truncate interest; questions flag this explicitly.

Crib sheet »

Rounding & bounds in context in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

Upper & lower bounds

$$\text{value} \pm \tfrac{1}{2} \times \text{unit}$$

30 cm to nearest cm: bounds $29.5 \leq x < 30.5$.

430 kg to nearest 10 kg: $425 \leq x < 435$.

Half-unit rule

Always half the degree of accuracy.

Nearest 0.1: ±0.05.

Nearest 5: ±2.5.

Nearest 100: ±50.

Bounds in calculations

For a maximum, use the *upper* bound of things that are multiplied and the *lower* bound of things that are divided.

For a minimum, do the opposite.

Area / perimeter example

Rectangle 38 cm × 26 cm, nearest cm.

Lower area = 37.5×25.5.

Upper area = 38.5×26.5.

Truncation vs rounding

Rounded: nearest value (up or down).

Truncated: chopped — always rounded *down* for positives.

Truncating loses more accuracy.

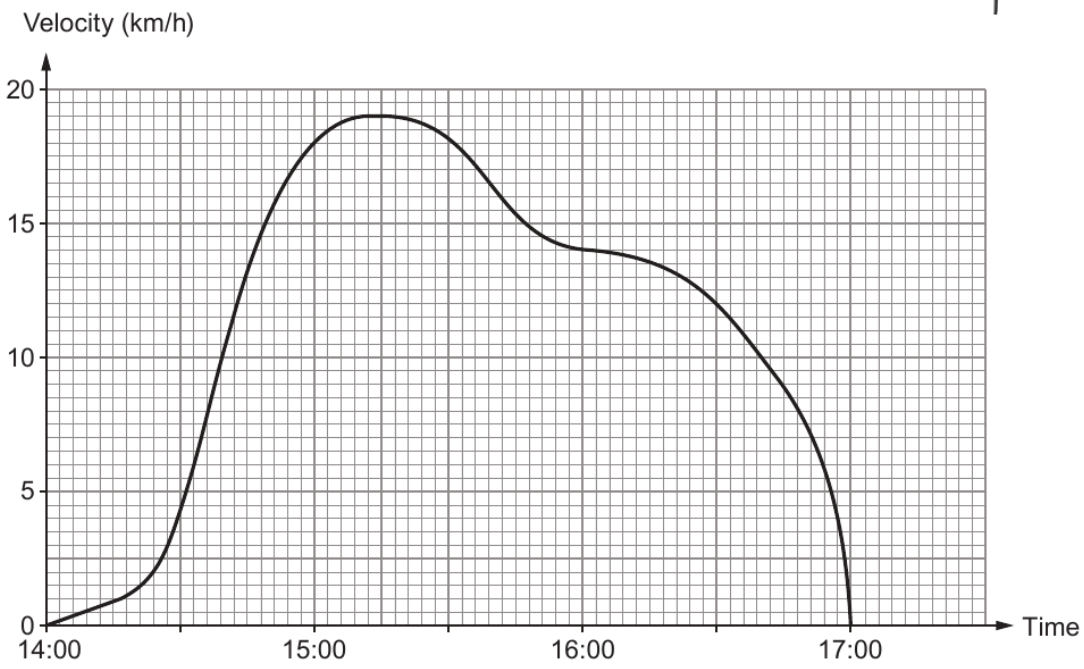
Common traps

- Forgetting the upper bound is exclusive ($<$, not $\leq$).
- Using the wrong direction (upper vs lower) for a min/max.
- Halving the wrong unit (e.g. nearest 5 needs ±2.5, not ±0.5).

Examiner only

7. Siân went for a ride on her bike.

She started her ride at 14:00.
The graph below shows information about her bike ride.



(a) During which quarter-hour period was Siân's acceleration the greatest? [1]

(b) At about what time did Siân stop accelerating? [1]

(c) Siân usually finds cycling at a velocity of 18 km/h very comfortable.
Express 18 km/h in metres per second. [2]

Examiner only

(d) Using her velocities at 14:00, 15:00 and 16:00, calculate an estimate for the total distance Siân travelled **between 14:00 and 16:00**. [3]

Distance travelled ..... km

(e) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Siân estimated the distance she travelled between 16:00 and 17:00 as **5 miles**.
Is Siân's estimate reasonable?
You must justify your answer and show your working. [3 + 2 OCW]

Examiner only

11. A rectangle measures 38 cm by 26 cm.
Each measurement is correct to the nearest cm.
Calculate the least possible area of the rectangle. [2]

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Examiner only

1. Mali's scooter depreciated (decreased) in value by 24% in the **first** year.
In all further years, her scooter depreciated by 13% of its previous year's value.
She originally paid £850 for her scooter.
Calculate the value of Mali's scooter after 7 years. [3]

After 7 years, the value of Mali's scooter was £ .....

2. Sanjay stacks three boxes in a pile.
The heights of the boxes are 25 cm, 36 cm and 47 cm.
They are all measured correct to the nearest centimetre.
What is the greatest possible height of the stack of the three boxes? [2]

Greatest possible height of the stack of three boxes is ..... cm

Examiner only

12. A plan view of Lowri's garden is shown below.

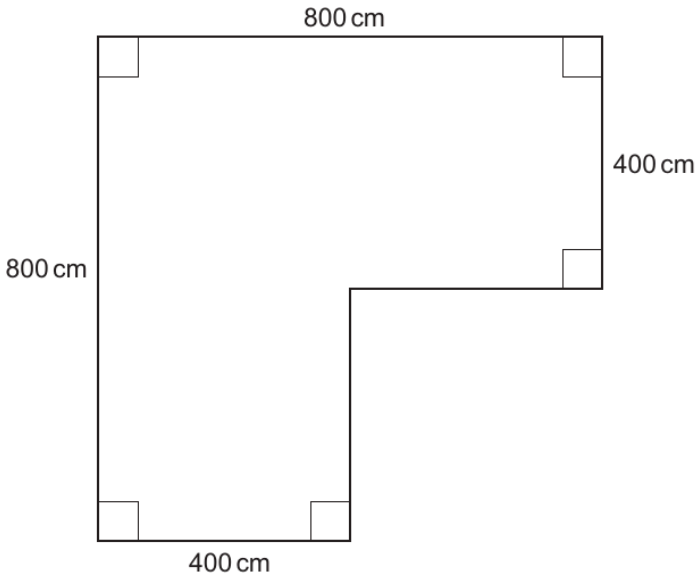


Diagram not drawn to scale

All the measurements are correct to the nearest 10 cm.

(a) Calculate the greatest possible area of Lowri's garden. [4]

Examiner only

(b) Lowri plans to spread grass seed over her garden using a spreading tool.
Over **each square metre**, the spreading tool spreads 30 g of grass seed, correct to the nearest 5 g.

Lowri has exactly 1·5 kg of grass seed.
Can she be **certain** that she has enough grass seed?
You must show all your calculations. [3]

Examiner only

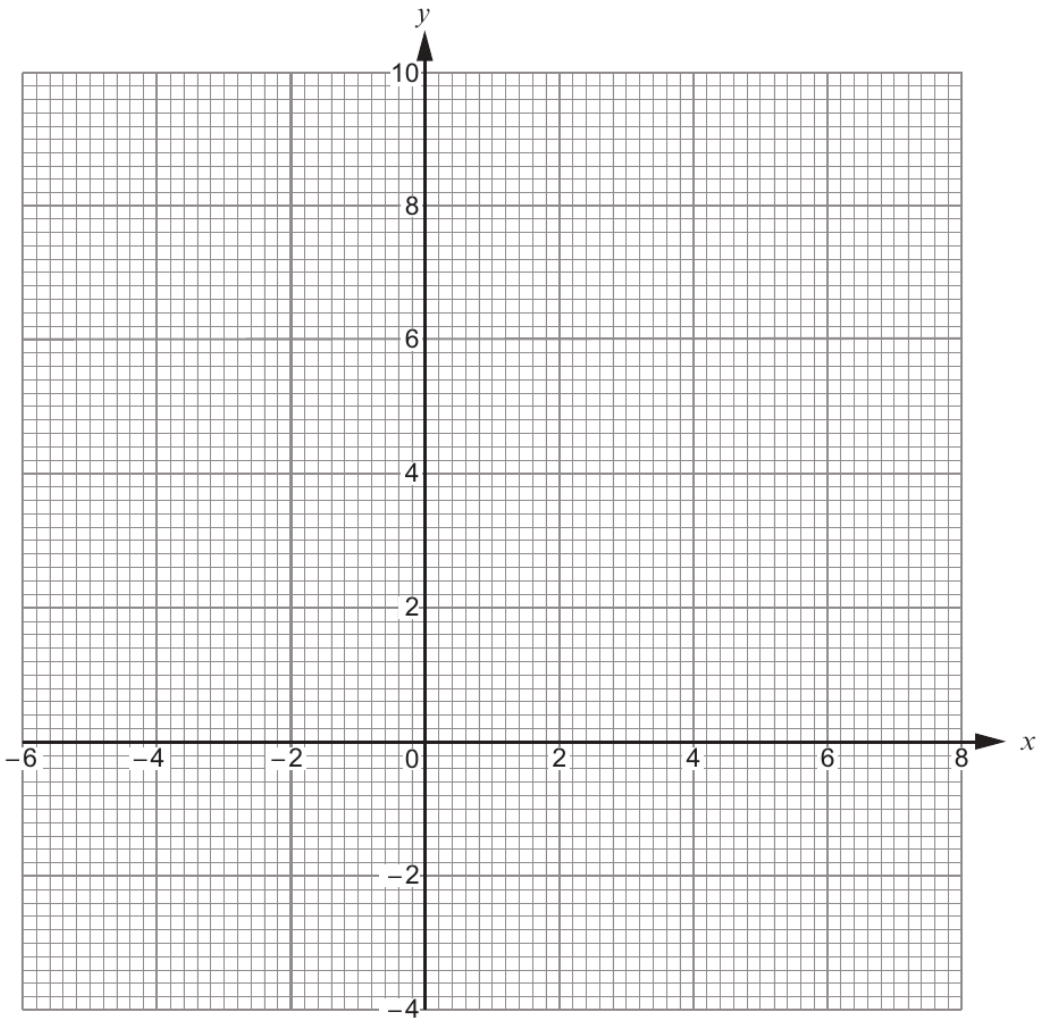
13. *(a)* On the graph paper below, draw the region which satisfies all of the following inequalities.

$$x + y \leqslant 6$$

$$y \geqslant \frac{x}{2} + 3$$

$$x \geqslant -2.$$

Clearly indicate the region that represents your answer. [3]



Examiner only

(b) (i) What is the greatest possible value of x such that all three conditions are met? [1]

x = ...

(ii) What is the greatest possible value of y such that all three conditions are met? [1]

y = ...

Examiner only

14. The region between two rectangles is shaded, as shown in the diagram below.
All of the measurements shown are given **correct to the nearest cm**.

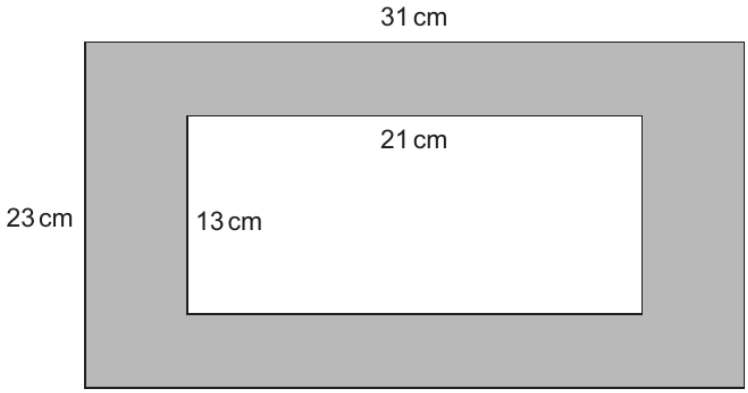


Diagram not drawn to scale

Calculate the greatest possible area of the shaded region. [3]

Examiner only

9. An engineering company employs 85 staff.
The company plans to carry out a survey on staff health.
It will conduct the survey using a sample of 15 of its staff, stratified by job type.

(a) Circle either TRUE or FALSE for each statement given below. [2]

STATEMENT		
Choosing every 4th person on an alphabetical list of office staff is a suitable method of randomly choosing the office staff required for the sample.	TRUE	FALSE
Numbering the cleaning staff, placing the numbers in a hat and drawing out numbers at random is a suitable method of choosing the cleaners required for the sample.	TRUE	FALSE
There are 9 managers employed by the company. The calculation to find the number of managers in the sample is $\frac{9}{85} \times 15 = 1{\cdot}59$. This answer means there will **definitely** be 2 managers in the sample.	TRUE	FALSE
The proportion of the staff in each job type in the sample will be **exactly** the same as the proportion of the staff in each job type in the company as a whole.	TRUE	FALSE

Examiner only

(b) 50 engineers are employed by the company.
Use the following extract from a table of random digits to choose 9 engineers for the sample.
You must start with the first number in the list.
Describe clearly how you are using the numbers to select the sample. [3]

29974 55479 07248 33999 17038 02475 49979 01218

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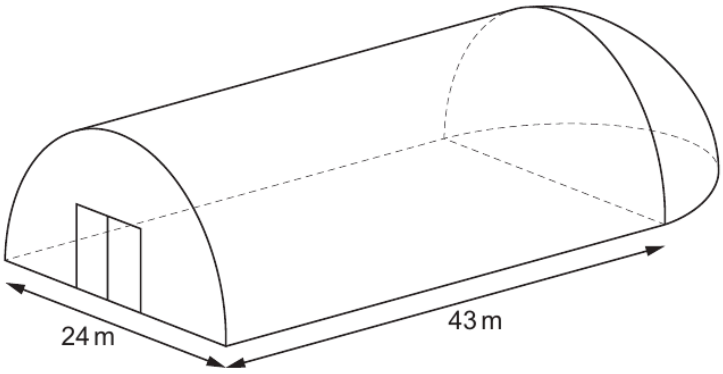
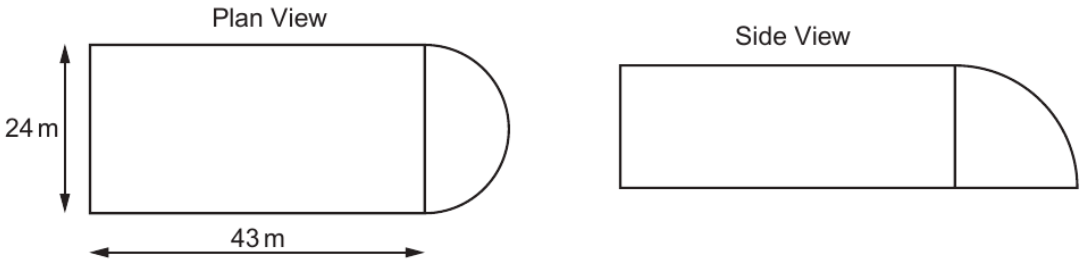
Examiner only

(c) The engineering company has a storage building, as shown below.
The building is in the form of half a cylinder, with half a hemisphere attached at one end.





Diagrams not drawn to scale

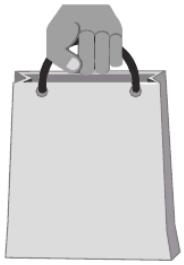
The company needs to paint all the exterior surfaces of the building, including the doors.

The measurements on the diagram are given **correct to the nearest metre**.
The paint comes in tins that cover an area of 40 m^2, **correct to the nearest m^2**.

Calculate the smallest number of tins that would guarantee having enough paint to cover these exterior surfaces. [8]

Examiner only

1. In October 2011, a charge of 5p for a carrier bag was introduced in Wales.
Money raised from this charge is given to charity.



For the period 1st October 2011 to 31st January 2015, it was estimated that a total of between £16.8 million and £21.9 million was donated to charity. This is as a result of people buying 5p carrier bags.

(a) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Calculate an estimate of how much per month was given to charity between 1st October 2011 and 31st January 2015.

You must show all your working. [4 + 2 OCW]

Examiner only

(b) Over time, there has been a reduction in the use of 5p carrier bags. This is because more people are using their own bags.

What impact might this have had on the amount given to charity for the month of September 2014 when compared with September 2012? [1]

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Examiner only

4. A grass racetrack is shown in the diagram below.
This is the region shaded in the diagram.
Each end of the grass racetrack is created from semicircles.
The inner semicircles have a radius of 15 m.
The outer semicircles have a radius of 20 m.
Each of the straight sections of the racetrack has a length of 65 metres.

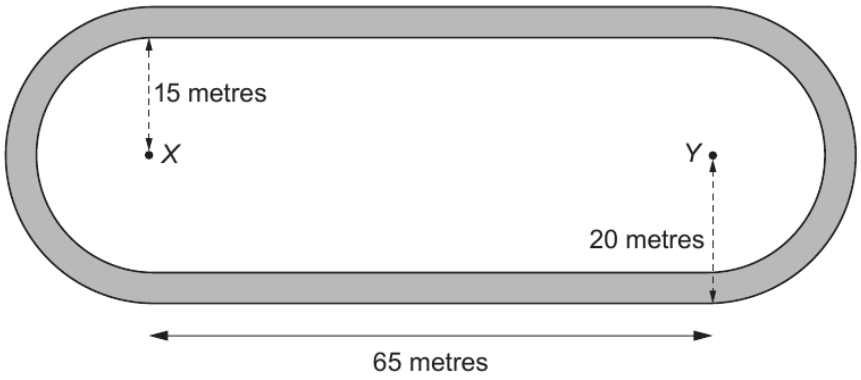

Diagram not drawn to scale

(a) What is the total area of grass in the two **straight** sections of the racetrack?
You must show all your working. [2]

Examiner only

(b) Calculate the area of the grass racetrack.
You must show all your working. [4]

(c) The grass is to be treated with a fertiliser.
It costs 20p to treat each $3\,m^2$ of grass.
How much will it cost to treat the grass racetrack?
Give your answer correct to the nearest pound.
You must show all your working. [2]

Cost is £ .....

5. Michelle owns a café.
She stacks coffee mugs as shown in the diagram below.

Michelle measures the height of each coffee mug as 12 cm, **correct to the nearest centimetre**.
Each stacked coffee mug creates 4 cm extra height, **correct to the nearest centimetre**.

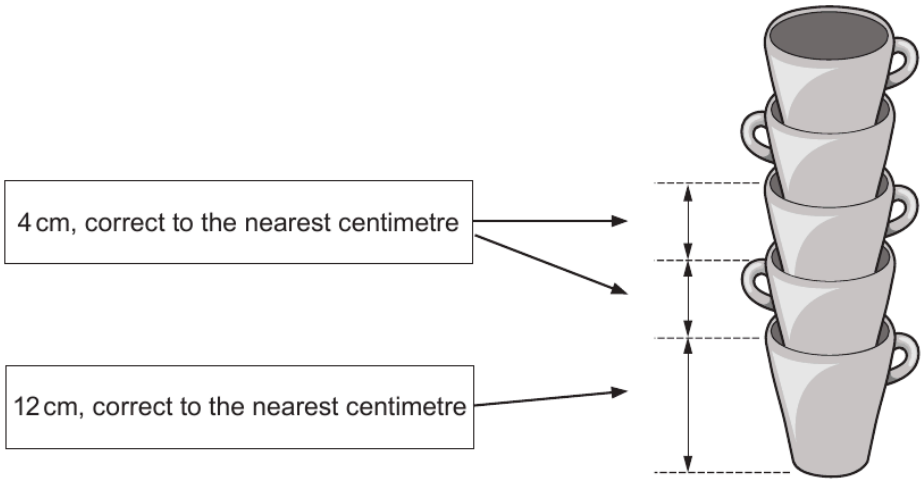

Diagram not drawn to scale

Michelle knows that the vertical height between two shelves is exactly 39 cm, as shown below.

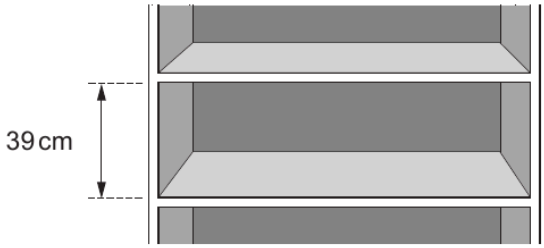

Diagram not drawn to scale

Examiner only

Can Michelle be certain that she will be able to place one stack of 7 coffee mugs between the two shelves?
Give a reason for your answer.
You must show all your working. [5]

Examiner only

11. A group of pupils are taking turns to ride a zip wire.

Aled models the time it takes each rider to travel sections of the zip wire.
He uses the formula

$$t = \frac{2s}{u+v}$$

where:

- t is the time taken, in seconds,
- s is the distance travelled, in metres,
- u is the starting velocity, in metres per second (ms^{-1}),
- v is the final velocity, in metres per second (ms^{-1}).

(a) Vrishank is the first pupil to ride the zip wire.
The following values were recorded for a section of his ride:

- s = 195 m, measured correct to the nearest 5 m,
- u = 5 ms^{-1}, measured correct to the nearest ms^{-1},
- v = 14 ms^{-1}, measured correct to the nearest ms^{-1}.

Using Aled's model, calculate the least possible time it could have taken Vrishank to travel this section of the zip wire. [4]

Examiner only

(b) Mari is the second pupil to ride the zip wire.
Values for a section of Mari's ride were recorded:

- $u = 8\,\text{ms}^{-1}$, measured correct to the nearest ms^{-1},
- $v = 21\,\text{ms}^{-1}$, measured correct to the nearest ms^{-1},
- $t = 14\,\text{s}$, measured correct to the nearest second.

Using Aled's model, calculate the greatest possible distance that Mari could have travelled in this section of her ride. [4]

Examiner only

7. *(a)* (i) A mass is written as 430 kg, correct to the nearest 10 kg.
Circle the **least** possible value of this mass. [1]

420 kg 425 kg 429·5 kg 426 kg 424·9 kg

(ii) A time period is written as 22 seconds, correct to the nearest second.
Circle the **least** possible value of this time period. [1]

22 s 20 s 21 s 21·5 s 21·4 s

(iii) A population is written as 85 people, correct to the nearest five people.
Circle the **least** possible value of this population. [1]

83 people 81 people 84 people 82 people 80 people

(b) Calculate $(3{\cdot}4 \times 10^{-5}) \times 700$.
Give your answer in standard form. [2]

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Examiner only

9. The voltage, V volts, of an electric circuit is given by the formula

$$V = IR,$$

where I is the current measured in amps, and R is the resistance measured in ohms.

During an experiment,

- V was measured at 280 volts, correct to the nearest 10 volts,
- I was measured at 0·2 amps, correct to the nearest 0·1 amps.

Calculate the least possible value and greatest possible value of the resistance R. [6]

Least possible value of R = ... ohms

Greatest possible value of R = ... ohms

Examiner only

9. A cuboid has dimensions of 40 mm, 25 mm and 12 mm.
All of these measurements are correct to the nearest mm.

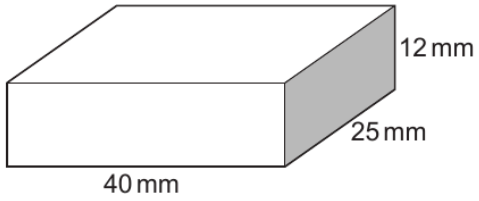

Diagram not drawn to scale

Four of these cuboids are stacked together as shown below.

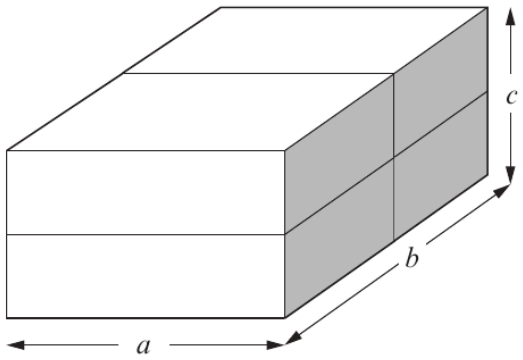

Diagram not drawn to scale

(a) Write down the **greatest** possible value of length a.
Give your answer in mm. [1]

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(b) Calculate the **greatest** possible value of length b.
Give your answer in mm. [1]

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(c) Calculate the **least** possible value of length c.
Give your answer in mm. [1]

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Examiner only

16. An amount written correct to the nearest £10 is £7180.
This amount is increased by 23·5%, correct to the nearest 0·1%.
Calculate the **least** possible value of the increased amount.
Give your answer correct to the nearest pound. [3]

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Examiner only

6. Two times are recorded correct to the **nearest 0·1 second**.

12·4 seconds
25·5 seconds

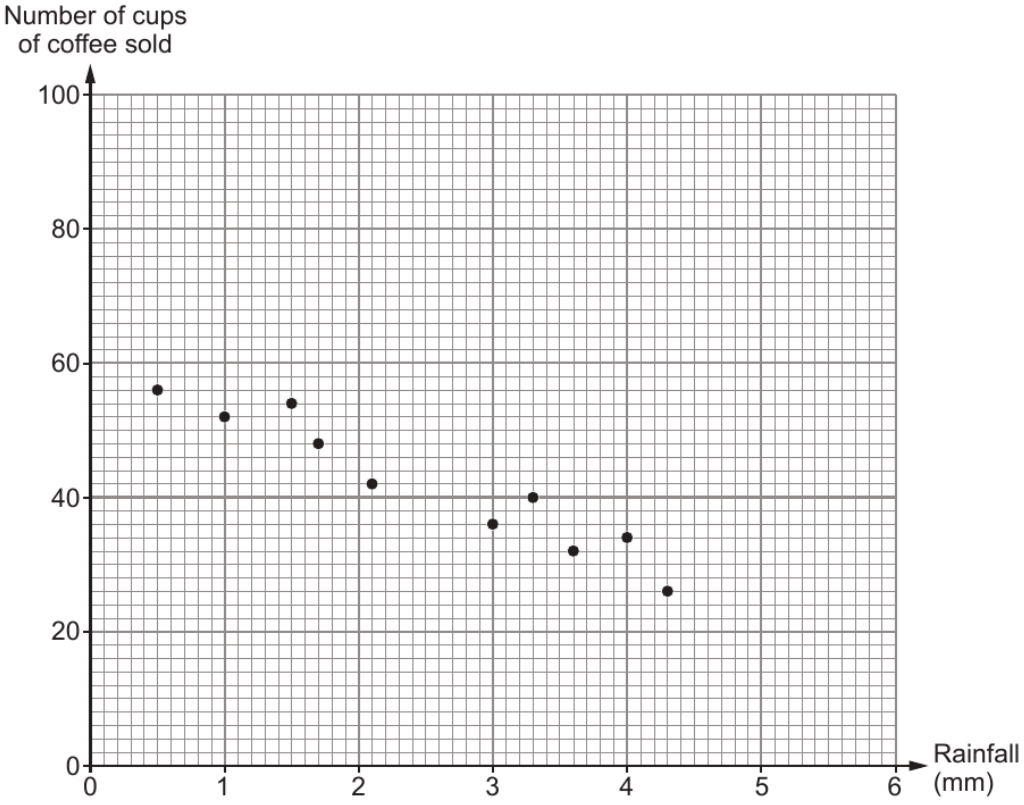
Calculate the greatest possible difference between these times. [3]

7. A number has been increased by 60% to give an answer of 64.
What was the original number? [2]

Examiner only

3. Anwen has an outdoor mobile coffee stall.

(a) It rained on each of the last 10 days.
Each day, Anwen recorded the amount of rainfall and the number of cups of coffee she sold.
The scatter diagram below shows her results.



For the last 10 days:
- the mean number of cups of coffee sold per day was 42
- the **total** rainfall was 25 mm.

(i) Give the coordinates of the point through which a line of best fit should be drawn.
Hence, draw a line of best fit on the scatter diagram. [2]

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Coordinates of the point are (..... , ...)

Examiner only

(ii) Estimate the number of cups of coffee that Anwen expects to sell on a day when the rainfall is 2·0 mm.
Use your line of best fit to find your estimate. [1]

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Number of cups of coffee is .....

(b) Anwen buys her coffee beans in tins.
Each tin has a height of 18 cm, correct to the nearest 1 cm.

Calculate the maximum height of a stack of 5 of these tins. [2]

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(c) The height of the storage space under Anwen's serving counter is 97·5 cm, correct to the nearest 0·5 cm.

Anwen is going to buy a recycling bin of height exactly 97·3 cm.
Can Anwen be certain that she can fit this bin under her serving counter?

Yes ☐ No ☐ Can't decide ☐

You must show working to support your answer. [1]

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Examiner only

7. Carys is buying a new caravan, priced at £20 000.
She is going to take out a loan to buy the caravan.

The table below shows her finance options.
The monthly payment is missing from Option B.

	Option A	Option B
Deposit	£0	£2000
Loan amount	£20 000	£18 000
Loan period	5 years	4 years
APR of the loan	3·3%	3·3%
Monthly payment	£362.05	

The formula for calculating the monthly payment on a loan is

$$M = \frac{r \times L}{1-(1+r)^{-n}}$$

where:

- M is the amount of each monthly payment
- L is the loan needed
- r is the **monthly** interest rate as a decimal
- n is the number of **months** taken to pay back the loan.

(a) Show that Carys's monthly payment for Option B would be £400.81, correct to the nearest penny. [3]

(b) Carys chooses Option B, rather than Option A.
Calculate how much Carys would save on the total amount paid for the caravan. [3]

Carys would save £ .....

Examiner only

7.

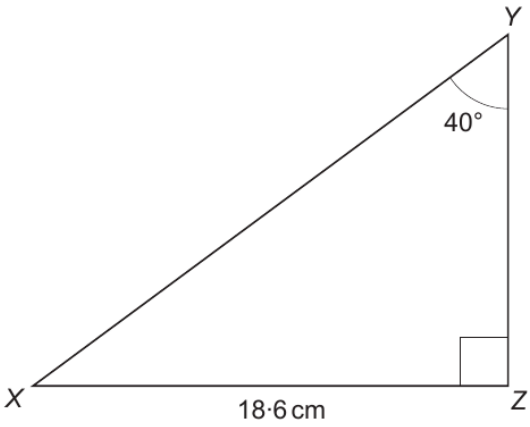


Diagram not drawn to scale

Calculate the length of the side *YZ*. [3]

8. 7 cubes are stacked on top of each other.
Each of these cubes has edges of length 60 mm, measured correct to the nearest millimetre.

Calculate the greatest possible height of this stack of 7 cubes. [2]

Examiner only

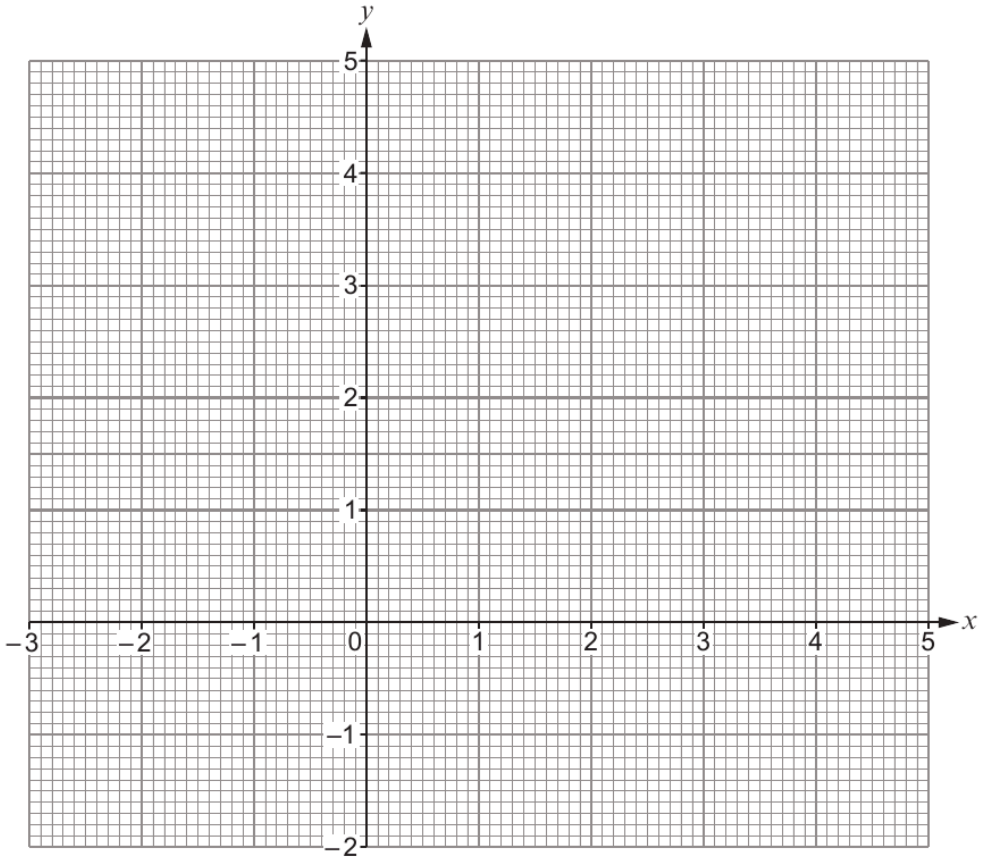
10. (a) On the graph paper below, draw the region that satisfies all of the following conditions.

$$y - x \leqslant 1$$

$$y \geqslant \frac{x}{2}$$

$$x \leqslant 3$$

Clearly indicate the region that represents your answer. [3]



(b) (i) What is the **least** possible value of x so that all three conditions are met? [1]

x = ...

(ii) What is the **greatest** possible value of y so that all three conditions are met? [1]

y = ...