AQA

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I declare this is my own work.

# GCSE MATHEMATICS

**H**

Higher Tier Paper 2 Calculator

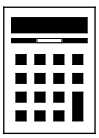
Shadow paper based on Nov 2023 question paper

Time allowed: 1 hour 30 minutes

**Materials**

For this paper you must have:

- a calculator
- mathematical instruments



**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** | |

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

*Do not write outside the box*

**1** Expand $7x(x^2 + 5)$

**[1 mark]**

Answer _____

**2 (a)** Write 1.36 as an improper fraction in its simplest form.

**[1 mark]**

Answer _____

**2 (b)** Work out 200 as a percentage of 50

**[1 mark]**

Answer _____ %



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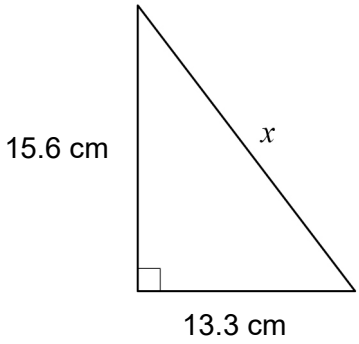
**3** Use Pythagoras' theorem to work out the value of $x$.

**[3 marks]**




Not drawn accurately

$x =$ _____ cm

**Turn over for the next question**

6

**Turn over ►**



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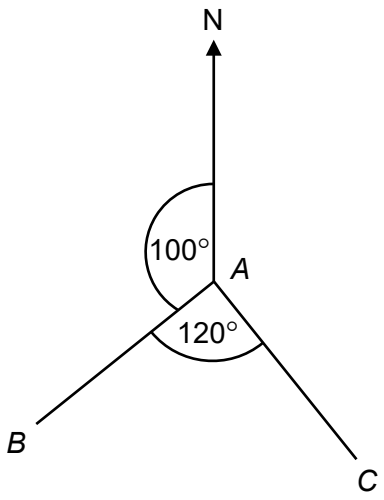
**4** *A*, *B* and *C* are three points.




Not drawn accurately

Work out the bearing of *C* from *A*.

**[1 mark]**

Answer _____ °



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**5** Three shops sell the same type and size of batteries.

**Shop A**

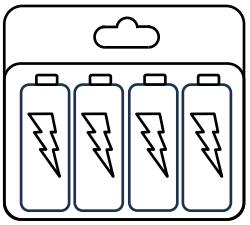
£3.19 each

**Shop B**

£3.82 each

Buy one,
get one half price

**Shop C**



Pack of 4

Was £14.60

Now $\frac{1}{5}$ off

Which shop is the best value for 8 batteries and what is the total cost in that shop?
Show working to support your answer.

**[5 marks]**

Shop _____ Total cost £ _____

**6**



Shadow paper based on November 2023 question paper

8300/2H

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**6** Round 1 of voting for Head Student is taking place in a school.

**6 (a)** To reach round 2, a student must receive **at least** $\frac{21}{100}$ of the votes.

What is the largest possible number of students that can reach round 2?

Circle your answer.

**[1 mark]**

100 79 3 4

**6 (b)** There are 300 votes in round 1

Sam receives 120 votes.

Chloe draws a pie chart to represent the results.

Here is her method to work out the angle needed for Sam.

$120 \div 300 \times 100 = 40$

The angle should be 40°

Is Chloe's method correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

**[1 mark]**



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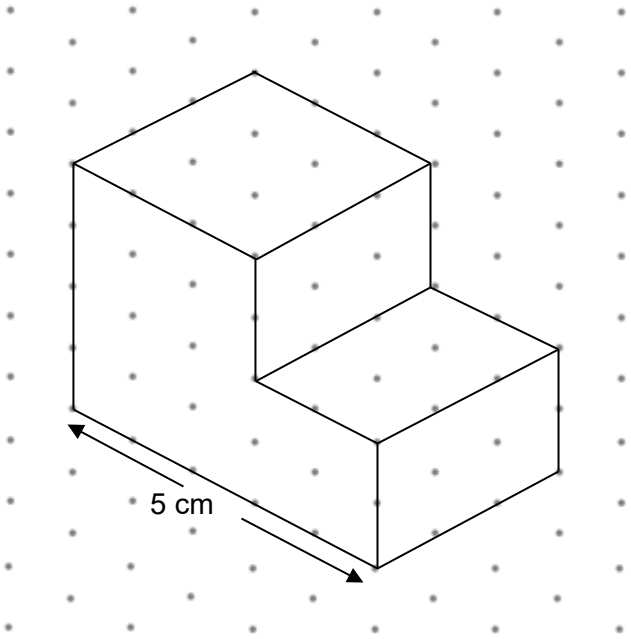
**7** Here is a prism drawn on an isometric grid.




Work out the volume of the prism.

**[3 marks]**

Answer _____ $cm^3$

**5**

**Turn over ►**



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**8** Yasmine drove 237 miles.

Her average speed for the first 4 hours was 34 miles per hour.

Her average speed for the rest of the journey was 50.5 miles per hour.

Work out her average speed for the whole journey.

**[4 marks]**

Answer _____ miles per hour



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**9** Here is the term-to-term rule for a sequence.

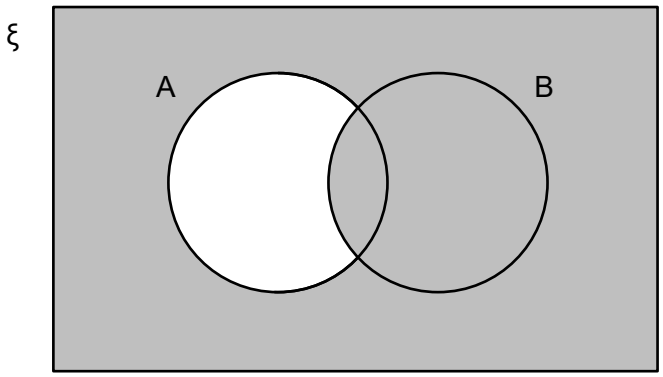
Double the previous term and add 5

The first three terms of the sequence are $a + 2$ $2a + 9$ $4a + 23$

Show that the sum of the first **four** terms is a multiple of 5

**[3 marks]**

**10**




Which of these represents the shaded region?

Circle your answer.

**[1 mark]**

B A' U B A' ∩ B A'

**8**

**Turn over ►**



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**11** A fair coin is thrown a number of times, and it lands on heads every time.

The probability of getting heads on every throw is $\frac{1}{32}$

How many times is the coin thrown?

**[1 mark]**

Answer _____

**12** Here is some information about the members of a basketball club.

| | **Number of members** | **Mean height of members** |
|---|---|---|
| **Junior** | 20 | 1.4 m |
| **Senior** | 30 | 1.95 m |

Work out the mean height of all 50 members of the club.

Give your answer as a decimal.

**[3 marks]**

Answer _____ m



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**13** A straight line passes through (2, 16) and (7, 31)

Work out the equation of the line.

Give your answer in the form $y = mx + c$

**[3 marks]**

Answer _____

**Turn over for the next question**

7





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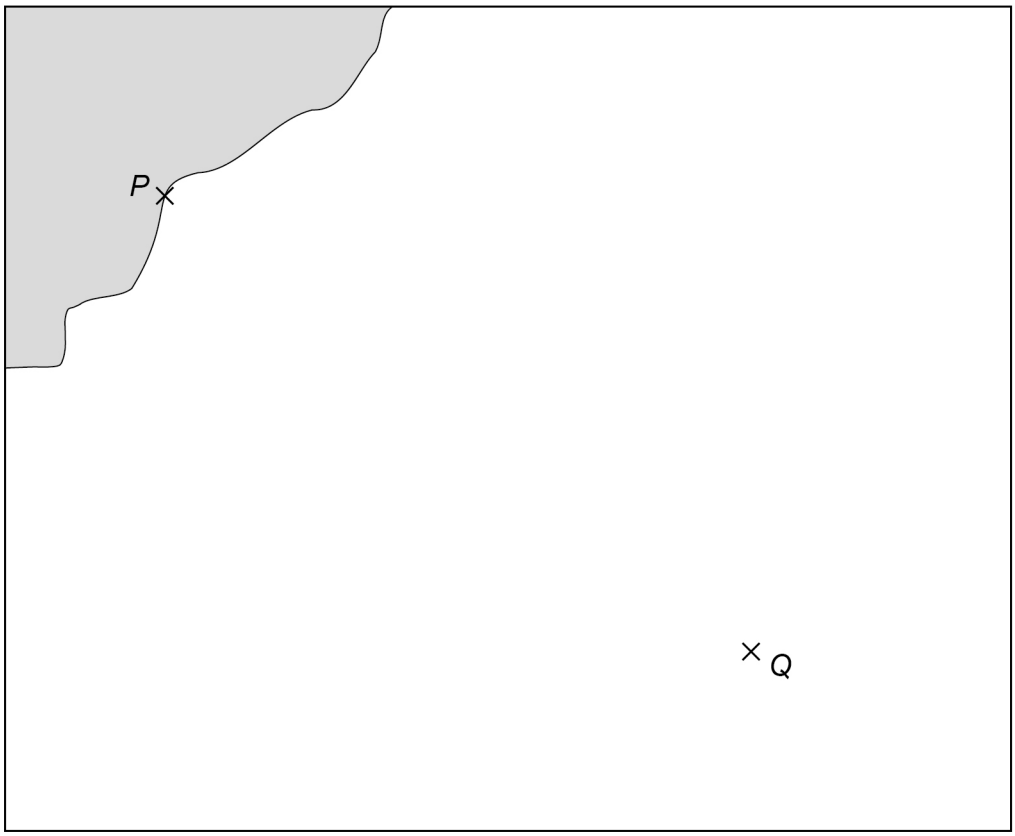
**14** Use a ruler and compasses in this question.

The scale diagram shows port *P* and lighthouse *Q*.

**Scale**: 1 cm represents 5km




A ship is

less than 30 km from *P*

and

closer to *Q* than to *P*.

Label the region, R, where the ship could be.

Show all your construction lines.

**[4 marks]**



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**15** A bag contains counters.

**Trial**

A counter is chosen at random from the bag.

The colour of the counter is noted.

The counter is put back into the bag.

The trial is carried out 200 times.

The table shows the relative frequency of a blue counter after every 50 trials.

| **Total number of trials** | 50 | 100 | 150 | 200 |
|---|---|---|---|---|
| **Relative frequency of a blue disc** | 0.32 | 0.4 | 0.36 | 0.33 |

**15 (a)** For the trials from the 101st to the 150th, how many times was a blue counter chosen?

**[2 marks]**

Answer _____

**15 (b)** There is a total of 400 counters in the bag.

Work out the **best** estimate of the number of blue counters in the bag.

**[1 mark]**

Answer _____

7



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**16** $x > 0$ and $y < 0$

Circle the correct statement.

**[1 mark]**

$x - y > 0$ $\quad \frac{y}{x} > 0$ $\quad \frac{1}{x} < 0$ $\quad y^2 < 0$

**17** 230 people were asked how much they spent on broadband each month.
The table shows information about the results.

| Amount, $x$ (£) | Cumulative frequency |
|---|---|
| $0 < x \leqslant 10$ | 8 |
| $0 < x \leqslant 20$ | 56 |
| $0 < x \leqslant 30$ | 124 |
| $0 < x \leqslant 40$ | 194 |
| $0 < x \leqslant 50$ | 230 |

**17 (a)** How many people spend **more** than £20 ?

**[2 marks]**

Answer _____



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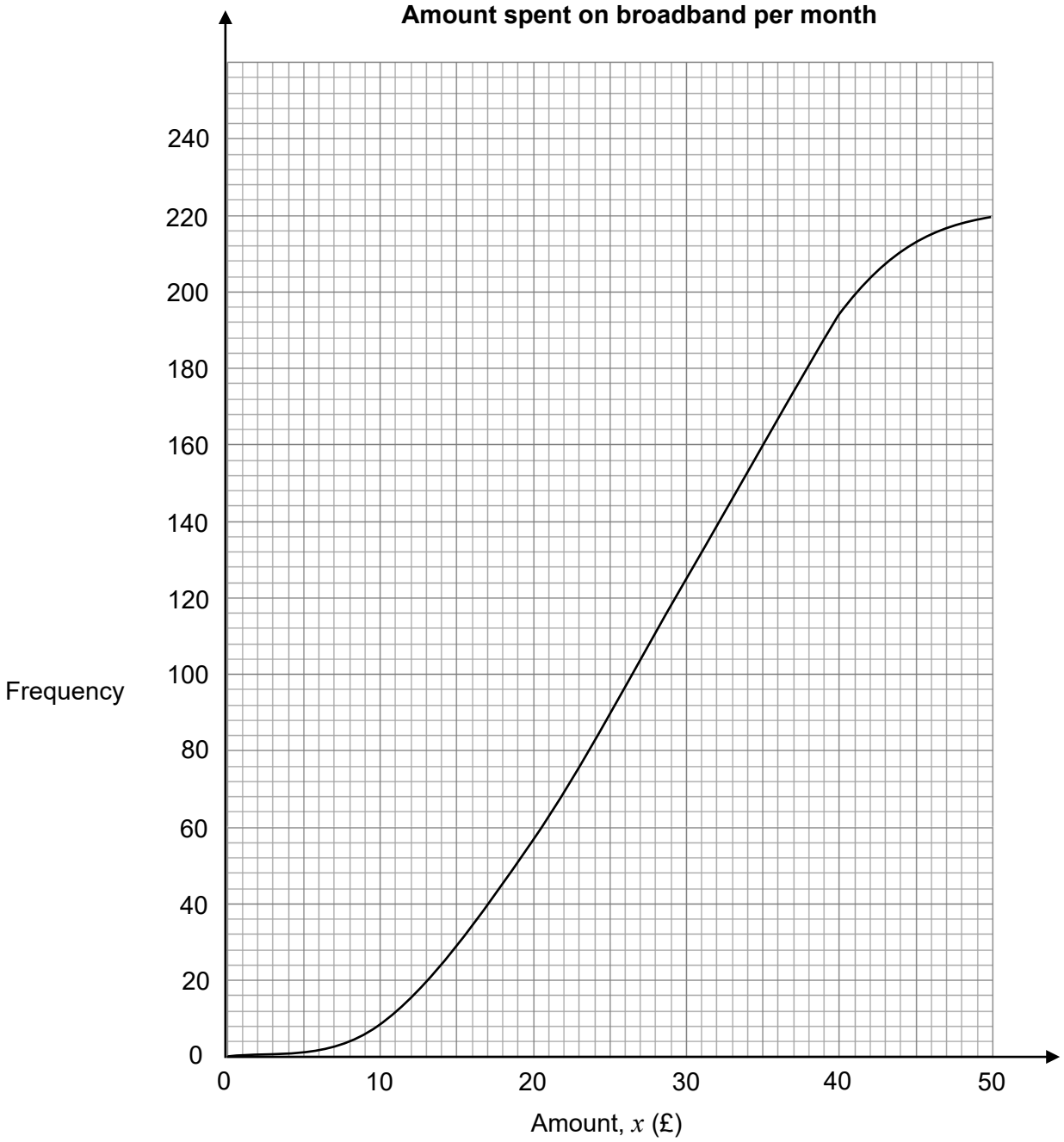
**17 (b)** Ann draws this cumulative frequency curve to represent the results.




Give **two** criticisms of her graph.

**[2 marks]**

Criticism 1 _____

_____

Criticism 2 _____

_____

**5**

**Turn over ►**



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**18** By completing the square, prove that $x^2 + 8x + 18$ is always positive.

**[3 marks]**

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*Do not write outside the box*

**19** $A$ is directly proportional to $B^5$

The value of $B$ is doubled.

Dan thinks that the value of $A$ will be 10 times bigger because 5 × 2 is 10

Is he correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

**[1 mark]**

**Turn over for the next question**

4



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**20** Rearrange $y = \dfrac{3x + 2}{2 - x}$ to make $x$ the subject.

**[4 marks]**

Answer _____



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**21** Mia is loading a trailer.

The trailer can safely carry 1680 kg of furniture.

Mia has already loaded 1450 kg of furniture to the nearest 50 kg

A bookshelf has mass 180 kg to the nearest 10 kg

Can the bookshelf safely be added to the furniture in the trailer?

You **must** show your working.

**[3 marks]**

**22** Factorise $16x^2 - y^2$

**[1 mark]**

Answer _____

8

**Turn over ►**



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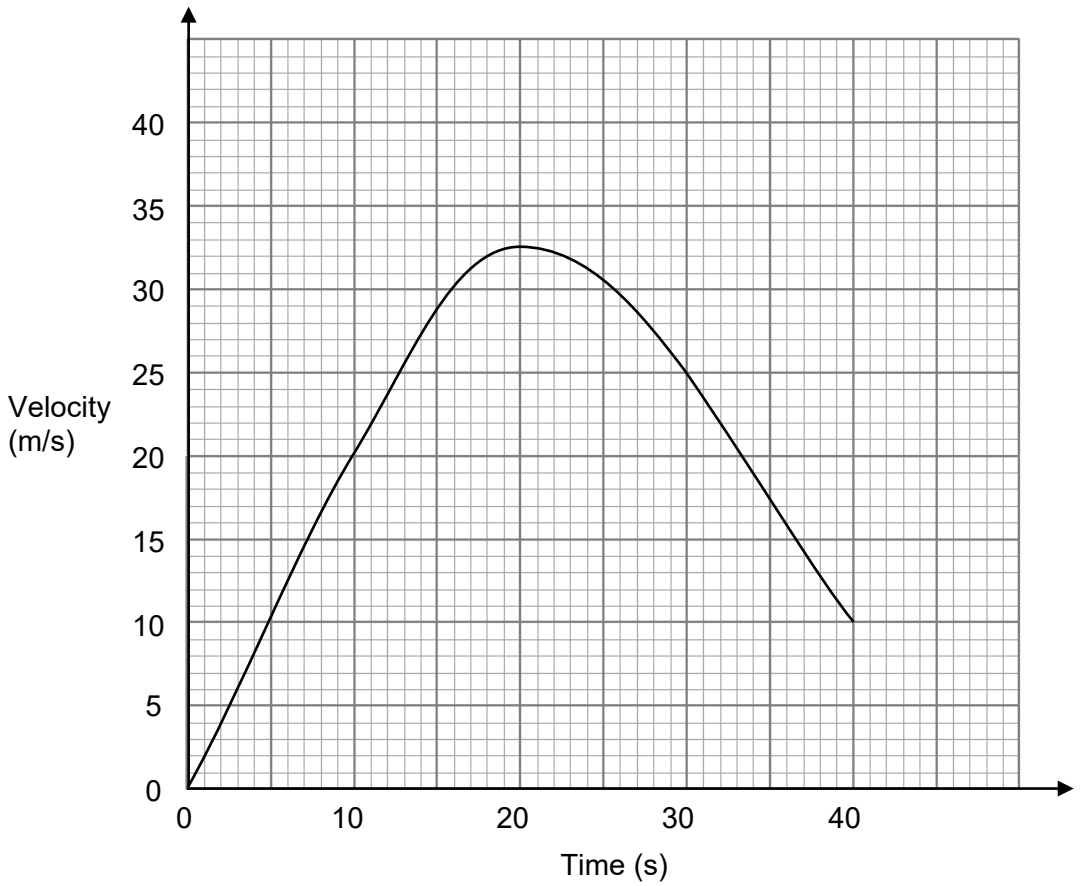
**23** Here is the velocity-time graph of a car for 40 seconds.




**23 (a)** By dividing the area under the graph into four sections of equal widths, estimate the distance travelled during the 40 seconds.

**[3 marks]**

Answer _____ m



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**23 (b)** Work out the average acceleration of the motorist during the 40 seconds.

State the units of your answer.

**[2 marks]**

Answer _____

**24** Simplify fully $\frac{6x^2+2}{9x} \times \frac{8x}{21x^2+7}$

You **must** show your working.

**[3 marks]**

Answer _____

**8**

**Turn over ►**



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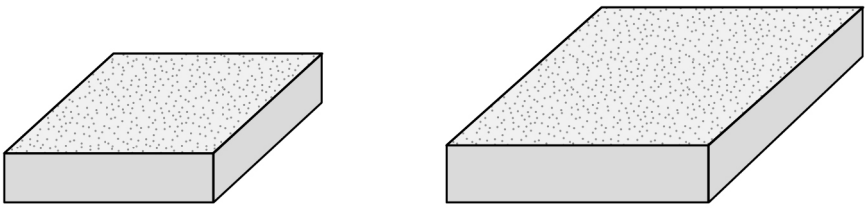
**25** Here are two square-based paving stones.

The stones are similar solids.



16 cm 24 cm

The price per $cm^3$ is the same for both stones.

The price of the **larger** stone is £21.60

Work out the price of the smaller stone.

**[4 marks]**

Answer £ _____



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**26** Linda borrows £2000 from a bank.

She pays back £120 each month.

This iterative formula works out the amount she still owes at the end of each month.

$$A_{n+1} = 1.03 \times A_n - 120$$

$A_0 = 2000$

Work out the amount she still owes at the end of the 2nd month.

**[3 marks]**

Answer £ _____

**Turn over for the next question**

7



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**27** $f(x) = a \times b^x$ where $a$ and $b$ are constants.

$f(0) = 10$ and $f(2) = 160$

Work out the value of f(1)

**[4 marks]**

Answer _____



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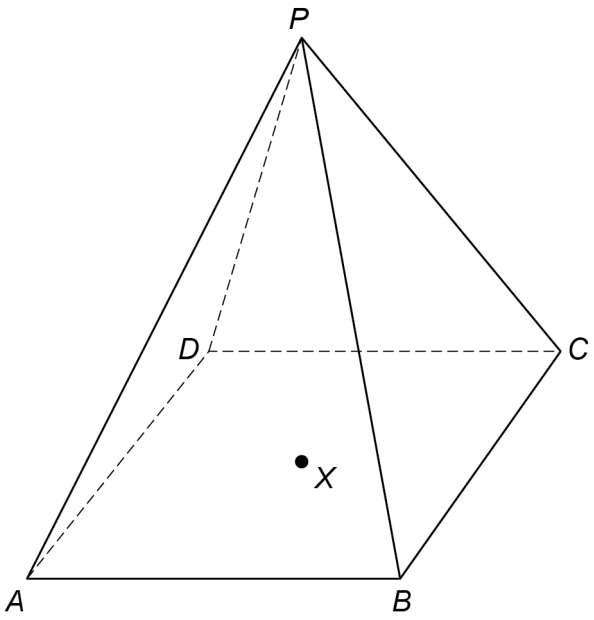
**28** *PABCD* is a pyramid with a horizontal square base.

*X* is the centre of the base.

*P* is vertically above *X*.

$BD = 24$ cm

Angle $PBX = 65°$




Work out the length of *PB*.

**[3 marks]**

Answer _____ cm

7

**Turn over ►**



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**29** A code is three letters, each of which is in the word WONDER

Vincent assumes that letters in the code may be used more than once.

He works out how many possible codes there are.

In fact, the first two letters are the same and the third is different.

How many of Vincent's codes are **not** possible?

**[2 marks]**

Answer _____

**END OF QUESTIONS**

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