AQA

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

# GCSE MATHEMATICS

**H**

Higher Tier

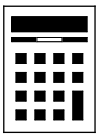
Paper 2 Calculator

Shadow paper based on June 2022 question paper

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:
- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



### 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 | |
| **TOTAL** | |

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

*Do not write outside the box*

**1** Circle the fraction that is equal to 2.5%

**[1 mark]**

$\frac{1}{125}$ $\frac{1}{40}$ $\frac{1}{25}$ $\frac{1}{4}$

**2** Circle the expression that means the probability of B and **not** A.

**[1 mark]**

P(A' U B) P(A U B') P(A' ∩ B) P(A ∩ B')

**3** Circle the triangular number.

**[1 mark]**

9 14 21 32

*Do not write outside the box*

**4** Circle the inequality represented by the diagram.


**[1 mark]**

$-4 < x < 2$ $-4 < x \leqslant 2$ $-4 \leqslant x < 2$ $4 \leqslant x \leqslant 2$

**5** Solve $2(4x - 2) = 6x + 5$

**[3 marks]**

$x =$ _____

7

**Turn over ►**

*Do not write outside the box*

**6** Show that 1216 can be written as

a cube number **multiplied** by a prime number between 10 and 20

**[2 marks]**

**7** A machine makes a constant number of computer chips per minute.
It takes 12 minutes to make 520 computer chips.

How long does it take the machine to make 2366 computer chips?
Give your answer in minutes and seconds.

**[3 marks]**

Answer _____ minutes _____ seconds

*Do not write outside the box*

**8** A concert takes place each evening from Tuesday to Saturday.
Here is the number of programmes sold on four of the days.

| Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|
| 92 | 98 | 103 | 112 |

For all **five** days, the mean number of programmes sold is 105

Work out the number of programmes sold on Saturday.

**[3 marks]**

Answer _____

**Turn over for the next question**

8

**Turn over ►**

*Do not write outside the box*

**9** Rosalind works in a call centre.

Today, she received 240 calls.

The table shows the results.

| Result of call | Frequency |
|---|---|
| Answered and fully resolved | 192 |
| Answered and partly resolved | 28 |
| Answered and **not** resolved | 20 |

**9 (a)** Write down the relative frequency that a call was **answered and fully resolved**.

**[1 mark]**

Answer _____

**9 (b)** During the **rest of the week**, Rosalind will receive 900 calls.

Using the results in the table, how many calls does she expect to answer and partly resolve during the **rest of the week**?

**[2 marks]**

_____

_____

_____

_____

Answer _____

*Do not write outside the box*

**10** Hetty and Eloise each bought a jacket and a shirt.

Here is some information about how much they paid.

| | **Jacket** | **Shirt** |
|---|---|---|
| **Hetty** | £160 | £35 |
| **Eloise** | 10% less than Hetty | 40% more than Hetty |

Eloise says,

''In total, I paid less than Hetty because 40% is more than 10%''

Is she correct?

Tick a box.

Yes ☐ No ☐

Show calculations to support your answer.

**[2 marks]**

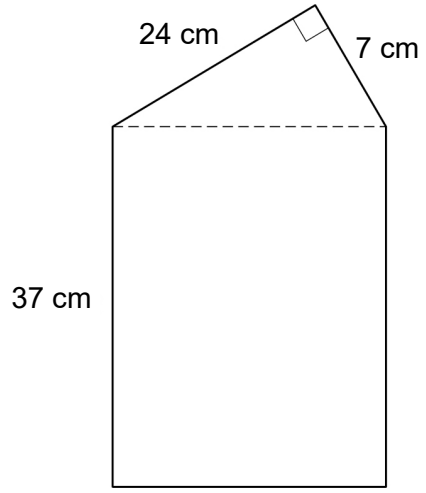
5

**Turn over ►**

*Do not write outside the box*

**11** A shape is made by joining a right-angled triangle to a rectangle.

Not drawn accurately




Work out the area of the shape.

**[5 marks]**

Answer _____ $cm^2$

*Do not write outside the box*

**12** $5y = 4x$

Which statement is correct?

Tick **one** box.

**[1 mark]**

- ☐ $y$ is 80% of $x$
- ☐ $y$ is 125% of $x$
- ☐ $x$ is 25% of $y$
- ☐ $x$ is 500% of $y$

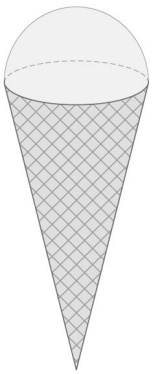
**Turn over for the next question**

6

*Do not write outside the box*

**13** Outside a cafe there is a large plastic ice cream cornet.

The cornet is a hemisphere on top of a cone.



The cone and the hemisphere each have radius 21 cm

The cone has perpendicular height 105 cm

| | |
|---|---|
| Volume of a cone $= \frac{1}{3}\pi r^2 h$<br>$r$ is the radius<br>$h$ is the perpendicular height | Volume of a hemisphere $= \frac{2}{3}\pi r^3$<br>$r$ is the radius |

**13 (a)** Work out the total volume of the cornet.

**[4 marks]**

Answer _____ $cm^3$

*Do not write outside the box*

**13 (b)** The actual cornets that the cafe sells are **similar** to the plastic one.

For the actual cornets, the cone and the hemisphere each have radius 3 cm

How many times greater is the volume of the plastic cornet than an actual cornet?

**[3 marks]**

Answer _____

**Turn over for the next question**

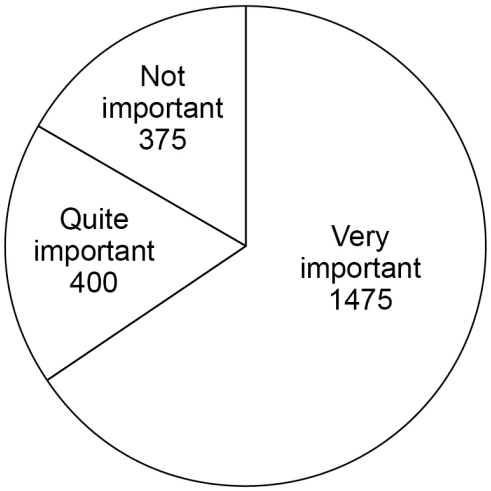
7

*Do not write outside the box*

**14** A survey was held in a football stadium in July.

A sample of the crowd was asked about the importance of a family area.

The pie chart represents the answers.




**14 (a)** The total number of people in the crowd was 87 192

Estimate how many people in the crowd think that a family area is **not important**.

Assume that the sample is representative of the crowd.

**[3 marks]**

Answer _____

*Do not write outside the box*

**14 (b)** In fact,

40% of the **sample** were sitting in the family area

10% of the **crowd** were sitting in the family area.

What is this likely to mean about the actual number of people in the crowd who think that a family area is **not** important?

Tick **one** box.

**[1 mark]**

☐ It is larger than the answer to part (a)

☐ It is the same as the answer to part (a)

☐ It is lower than the answer to part (a)

**15** In the grid, the **product** of each row, column and diagonal is 1

Complete the grid.

**[2 marks]**

| | | |
|---|---|---|
| | 3 | $\frac{1}{9}$ |
| | | |
| | $\frac{1}{3}$ | |

**6**

**Turn over ►**

*Do not write outside the box*

**16** Arthur owns a pizza stall in a market.

The stall is open from Tuesday to Saturday.

In November, Arthur sold 1500 pizzas.

**16 (a)** Arthur wants to work out the mean number of pizzas he sold per day in November.

His method is $1500 \div 30 = 50$

Make **one** criticism of Arthur's method.

**[1 mark]**

**16 (b)** Arthur received £8058 from selling the 1500 pizzas in November.

The numbers of pizzas sold were in the ratio

meat : cheese : vegan = 13 : 3 : 9

The price of a meat pizza is £5.99

The price of a vegan pizza is £4.77

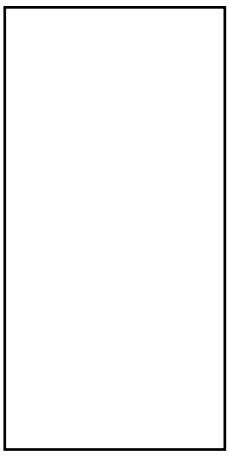
Work out the price of a cheese pizza.

**[4 marks]**

Answer £ _____

*Do not write outside the box*

**17** Here is the plan of a solid.



Circle the solid that it could be.

**[1 mark]**

sphere cylinder hemisphere cone

**18** Solve $x^2 + 5x - 13 = 0$

Give your solutions as decimals.

**[2 marks]**

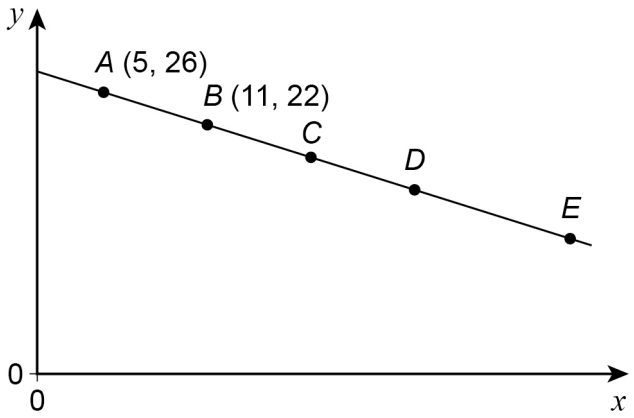
Answer _____

8

**Turn over ►**

*Do not write outside the box*

**19** *A*, *B*, *C*, *D* and *E* are points on a straight line.




Not drawn accurately

*A*, *B*, *C* and *D* are equally spaced.

*AD* : *DE* = 3 : 2

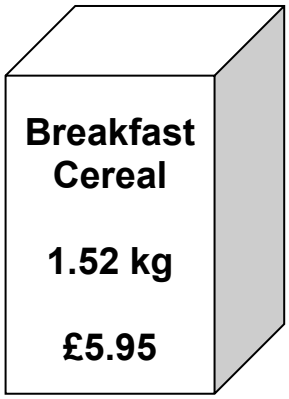
Work out the coordinates of *E*.

**[3 marks]**

Answer ( _____ , _____ )

*Do not write outside the box*

**20** A company makes and sells boxes of breakfast cereal.




The company wants to increase the amount of money it receives **per kg** of cereal.

To get the required increase it can

increase the price to £6.46

or

reduce the mass of cereal in the box by $x$%

Work out the value of $x$ to 1 decimal place.

**[4 marks]**

$x =$ _____

7

**Turn over ►**

*Do not write outside the box*

**21** Which of these is **not** the equation of a circle?

Circle your answer.

**[1 mark]**

$y^2 = 16 - x^2$ $\quad$ $x^2 + y^2 = 16$ $\quad$ $y = x^2 - 16$ $\quad$ $x^2 = 16 - y^2$

**22** Circle the reciprocal of $3^4$

**[1 mark]**

$3^{-4}$ $\quad$ $4^{-3}$ $\quad$ $-3^4$ $\quad$ $4^3$

**23** Factorise $3x^2 + x - 10$

**[2 marks]**

Answer _____

*Do not write outside the box*

**24** A straight line

is perpendicular to the straight line through (1, 6) and (6, 13)

and

passes through (0, 2) and ($x$, 17)

Work out the value of $x$.

**[4 marks]**

$x =$ _____

8

**Turn over ►**

*Do not write outside the box*

**25** $f(x) = 3x + 4$

Show that $2f(x) - 18f^{-1}(x)$ simplifies to an integer.

**[4 marks]**

*Do not write outside the box*

**26** Two objects, A and B, are applying pressure to areas of ground.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

For A, the force is 11.2 newtons and the area is $0.35\,m^2$

pressure for A : pressure for B = 8 : 9

area for A : area for B = 7 : 5

Work out the force for B.

**[4 marks]**

Answer _____ newtons

8

**Turn over ►**

*Do not write outside the box*

**27** To be hired for a party, a room must have a floor area of at least $88.2\,m^2$

A room has a rectangular floor.

The floor measures 9.8 m by 8.9 m, each correct to 2 significant figures.

Show that the room **cannot** be hired.

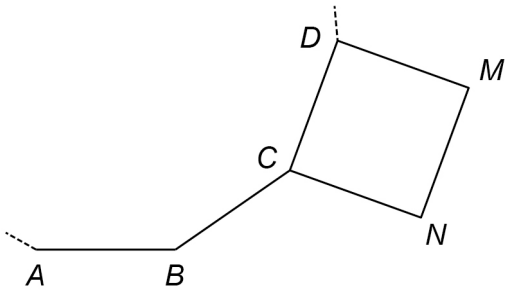
**[3 marks]**

*Do not write outside the box*

**28** *AB*, *BC* and *CD* are sides of a regular 12-sided polygon.

*CDMN* is a square.

Not drawn accurately




Prove that points *A*, *C* and *M* lie on a straight line.

**[4 marks]**

7

**Turn over ►**

*Do not write outside the box*

**29** The equation of a curve is $y = x^2 - 14x + 44$

By completing the square, work out the coordinates of the turning point.

You **must** show your working.

**[3 marks]**

Answer ( _____ , _____ )

**3**

**END OF QUESTIONS**

*Do not write outside the box*