

# GCSE Mathematics

## Practice Tests: Set 22

### Paper 2H/3H (Calculator)

**Time: 1 hour 30 minutes**

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

#### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



#### Information

- The total mark for this paper is 80
- Questions are in order of mean difficulty as found by students achieving Grade 7.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

#### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

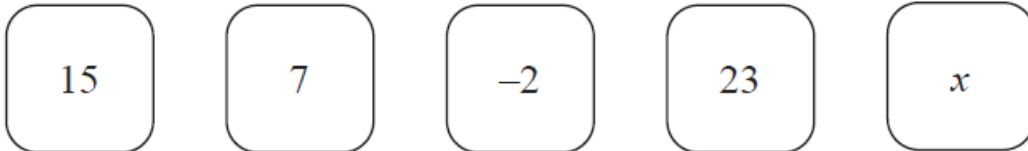
**Answer ALL TWENTY TWO questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** Here are five cards.

Each card has a number written on it.



The mean of the five numbers is 12

Work out the value of  $x$

$x = \dots\dots\dots$

**(Total for Question 1 is 3 marks)**

- 2 The table gives information about the population, correct to 2 significant figures, of each of five cities in 2018

| City      | Population (2018) |
|-----------|-------------------|
| Ahmedabad | $7.7 \times 10^6$ |
| Barcelona | $5.5 \times 10^6$ |
| Chicago   | $8.8 \times 10^6$ |
| Lagos     | $1.3 \times 10^7$ |
| Tokyo     | $3.7 \times 10^7$ |

- (a) Write  $8.8 \times 10^6$  as an ordinary number.

.....  
(1)

- (b) Which of these cities had the least population in 2018?

.....  
(1)

- (c) Work out the difference between the population of Tokyo and the population of Ahmedabad in 2018  
Give your answer in standard form correct to 2 significant figures.

.....  
(2)

**(Total for Question 2 is 4 marks)**

3 Solve  $p = \frac{3p-5}{10}$

Show clear algebraic working.

$p = \dots\dots\dots$

**(Total for Question 3 is 3 marks)**

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4 Write 1200 as a product of powers of its prime factors.  
Show your working clearly.

$\dots\dots\dots$   
**(Total for Question 4 is 3 marks)**

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- 5** Jane bought a new car for £18 000  
The car depreciates in value by 15% each year.  
Work out the value of the car at the end of 4 years.  
Give your answer correct to the nearest £

£.....

**(Total for Question 5 is 3 marks)**

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- 6** A cinema increased the cost of an adult ticket by 12%  
After the increase, the cost of an adult ticket was £18.20  
Work out the cost of an adult ticket before the increase.

£.....

**(Total for Question 6 is 3 marks)**

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7 The diagram shows a quadrilateral  $ABCD$

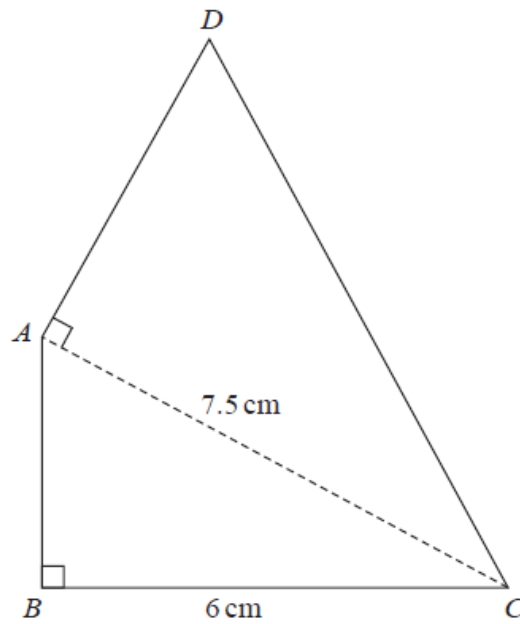


Diagram **NOT**  
accurately drawn

In the diagram,  $ABC$  and  $DAC$  are right-angled triangles.

$$BC = 6 \text{ cm} \quad AC = 7.5 \text{ cm}$$

The area of quadrilateral  $ABCD$  is  $31.5 \text{ cm}^2$

Work out the length of  $AD$

..... cm

**(Total for Question 7 is 6 marks)**

8 The diagram shows a solid cylinder made from iron.

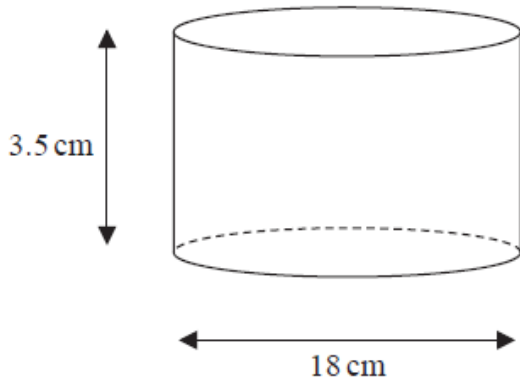


Diagram **NOT**  
accurately drawn

The cylinder has diameter 18 cm and height 3.5 cm

The mass of the cylinder is 7.04 kg

Work out the density of the iron.

Give your answer in  $\text{g/cm}^3$  correct to 2 significant figures.

.....  $\text{g/cm}^3$

**(Total for Question 8 is 3 marks)**

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- 9 The diagram shows a shape made from a square  $ABCD$  and 4 identical semicircles.

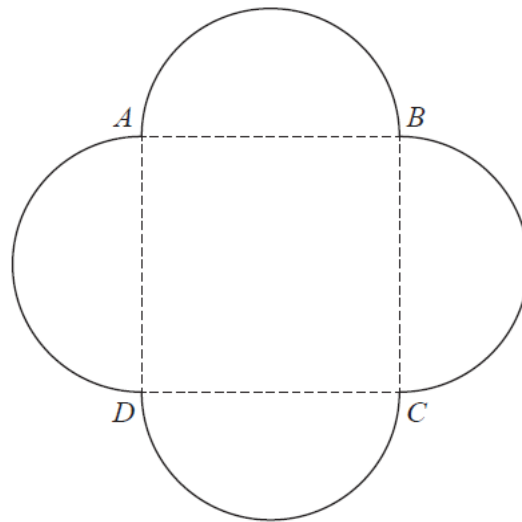


Diagram **NOT**  
accurately drawn

As shown in the diagram, the semicircles have  $AB$ ,  $BC$ ,  $CD$  and  $DA$  as diameters.

The area of the square is  $36 \text{ cm}^2$

Calculate the total area of the shape.

Give your answer correct to one decimal place.

.....  $\text{cm}^2$

**(Total for Question 9 is 4 marks)**



10 The diagram shows triangle  $ABP$  inside the regular hexagon  $ABCDEF$

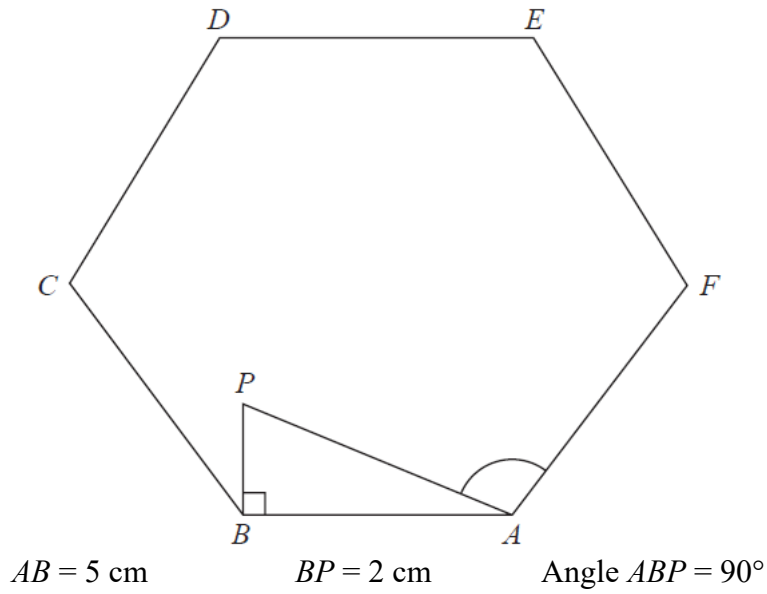


Diagram **NOT** accurately drawn

Work out the size of angle  $PAF$   
 Give your answer correct to 3 significant figures.

.....<sup>o</sup>  
**(Total for Question 10 is 5 marks)**

**11**  $P = 3^3 \times 5^2 \times 7$

$$Q = 3^2 \times 5 \times 7^2$$

(a) Write down the highest common factor (HCF) of  $P$  and  $Q$

.....  
**(1)**

$$P = 3^3 \times 5^2 \times 7$$

$$Q = 3^2 \times 5 \times 7^2$$

(b) Work out the value of  $P^3 \times Q$   
Give your answer in the form  $3^x \times 5^y \times 7^z$  where  $x, y$  and  $z$  are positive integers.

.....  
**(2)**

**(Total for Question 11 is 3 marks)**

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- 12** The language department of a college has 180 students.  
Each student studies exactly one of French, German, Italian or Spanish.  
15 students study French.  
45% of the students study German.

Express the percentage of students studying Italian or Spanish as a percentage of those studying French or German.

.....%

**(Total for Question 12 is 4 marks)**

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13

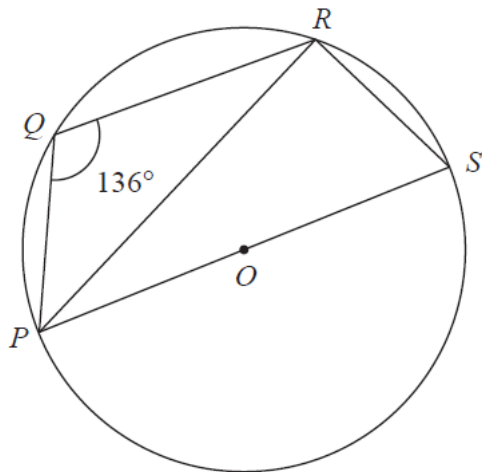


Diagram **NOT**  
accurately drawn

$P$ ,  $Q$ ,  $R$  and  $S$  are points on a circle with centre  $O$

$PS$  is a diameter of the circle.

Angle  $PQR = 136^\circ$

Work out the size of angle  $RPS$

.....<sup>o</sup>  
**(Total for Question 13 is 3 marks)**

14 The diagram shows a sector  $AOB$  of a circle with centre  $O$

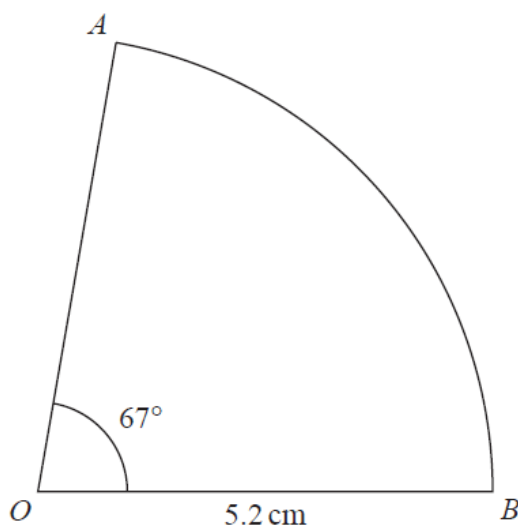


Diagram **NOT** accurately drawn

Angle  $AOB = 67^\circ$   
 $OA = OB = 5.2\text{ cm}$

Calculate the perimeter of the sector.  
Give your answer correct to 3 significant figures.

..... cm  
(Total for Question 14 is 3 marks)

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**15** Alberto, Bill, Candela and Diana are four friends.

Here is some information about the height of each of these friends.

Alberto's height is 158 cm.

Bill's height is 175 cm.

Candela's height is greater than Diana's height.

The median height of these four friends is 160 cm.

The range of the heights of these four friends is 21 cm.

Work out Candela's height and Diana's height.

Candela ..... cm

Diana ..... cm

**(Total for Question 15 is 3 marks)**

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16 The diagram shows a kite  $ABCD$

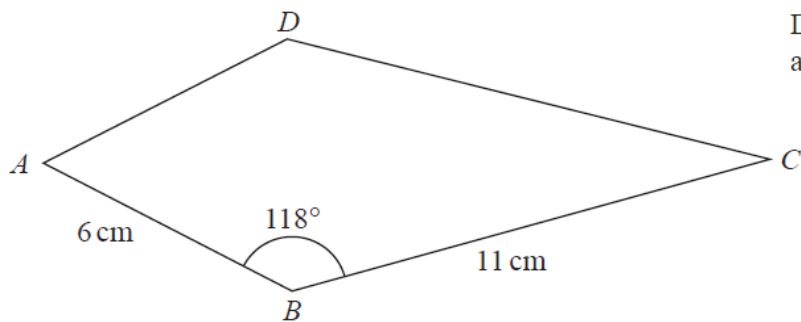


Diagram **NOT**  
accurately drawn

$AB = 6\text{ cm}$        $BC = 11\text{ cm}$       Angle  $ABC = 118^\circ$

Calculate the area of the kite.  
Give your answer correct to 3 significant figures.

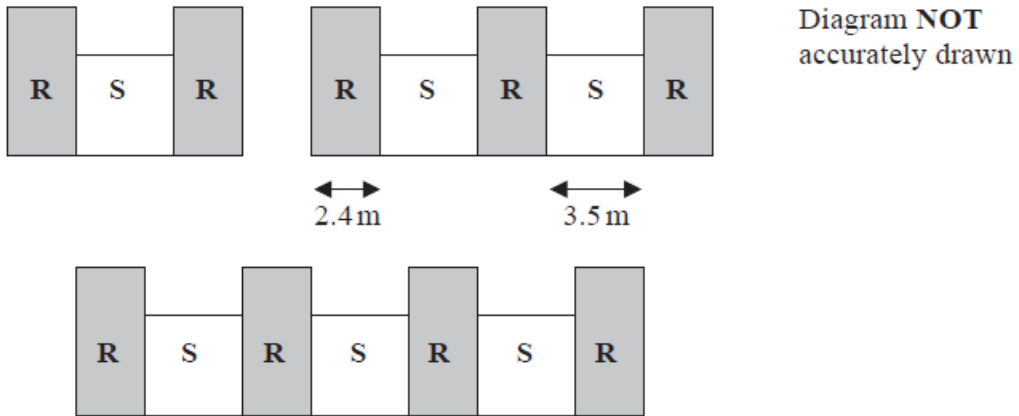
.....  $\text{cm}^2$   
(Total for Question 16 is 3 marks)

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17 In a warehouse there are two types of shelves, type **R** and type **S**.

These two types of shelves are arranged into shelving units that form a sequence of patterns.

Here are the first three terms in the sequence.



The width of each type **R** shelf is 2.4 m and the width of each type **S** shelf is 3.5 m

(a) Work out the total width of a shelving unit that has 6 type **R** shelves.

..... m  
(2)

A shelving unit has  $n$  type **R** shelves.  
The total width of this shelving unit is  $W$  metres.

(b) Find an expression for  $W$  in terms of  $n$   
Give your answer in its simplest form.

$W =$  .....  
(2)

**(Total for Question 17 is 4 marks)**



**18** Kaidan and Sonja went on two different car journeys.

For Kaidan's journey

distance = 80 km correct to the nearest 5 km

time = 2.7 hours correct to 1 decimal place

For Sonja's journey

distance = 33 km correct to 2 significant figures

time = 1 hour correct to the nearest 0.1 hour

Kaidan says,

“My average speed could have been greater than Sonja's average speed.”

By considering bounds, show that Kaidan is correct.

Show your working clearly.

**(Total for Question 18 is 4 marks)**

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19 Here is a parallelogram  $PQRS$ , in which angle  $SPQ$  is acute.

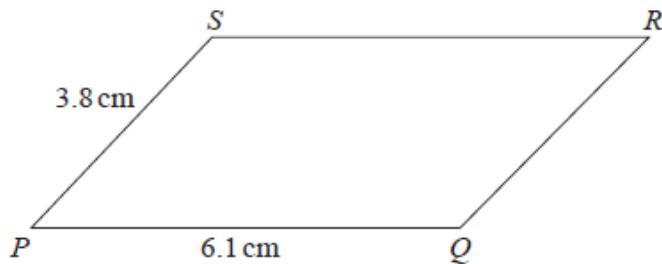


Diagram NOT  
accurately drawn

$$PQ = 6.1 \text{ cm} \quad PS = 3.8 \text{ cm}$$

The area of the parallelogram is  $18 \text{ cm}^2$

Work out the length of  $QS$

Give your answer correct to 3 significant figures.

..... cm

**(Total for Question 19 is 5 marks)**

**20** The centre  $O$  of a circle has coordinates  $(4, 7)$

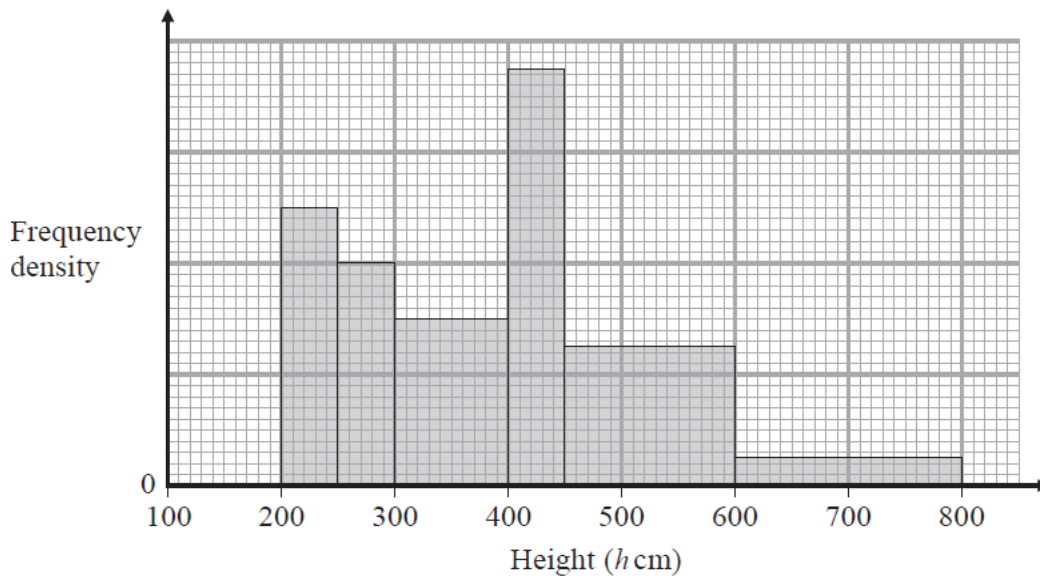
The point  $A$ , on the circle, has coordinates  $(6, 11)$  and  $AOP$  is a diameter of the circle.

Find an equation of the tangent to the circle at the point  $P$

.....  
**(Total for Question 20 is 4 marks)**

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21 The histogram gives information about the height,  $h$  cm, of each tree in part of a forest.



There are no trees for which  $h \leq 200$  and for which  $h > 800$

The number of trees for which  $300 < h \leq 400$  is 8 fewer than the number of trees for which  $400 < h \leq 500$

Work out an estimate for the number of trees in this part of the forest that have a height greater than 500 cm.

.....  
**(Total for Question 21 is 3 marks)**

22 The diagram shows two similar metal statues.



A



B

Diagram **NOT**  
accurately drawn

The volume of statue **B** is 20% less than the volume of statue **A**

The surface area of statue **B** is  $k\%$  less than the surface area of statue **A**

Work out the value of  $k$

Give your answer correct to 3 significant figures.

$k = \dots\dots\dots$

**(Total for Question 22 is 4 marks)**

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**TOTAL FOR PAPER IS 80 MARKS**

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