



THIRD SPACE  
LEARNING

# Mathematics

## Paper 6

### (Calculator)

### Higher Tier

OCR GCSE

SET 2

# Mathematics Paper 6 (Calculator) Higher Tier OCR GCSE

## SET 2

Name

Total marks



Paper length: 1hr 30mins

## 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.
- You must show all your working.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- Calculators may be used.

## Information

- The total mark for this paper is 100
- 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.

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

*Please note, this practice paper is an example to help revision, these topics can be tested in other ways and other topics may be included in the actual papers*

1 (a) Simplify  $p^3 \times p^4$ .

(a) ..... [1]

(b) Simplify  $\frac{12q^7}{3q^2}$ .

(b) ..... [2]

2 Yusef's car cost 45% more than Georgia's car.

Altogether their cars cost £30625.

Calculate the cost of Yusef's car.

..... [4]

- 3 (a)** A number,  $n$ , is rounded to 1 decimal place.

The result is 8.7.

Complete the error interval for  $n$ .

**(a)** .....  $\leq n <$  ..... **[2]**

- (b)** A builder measures the length,  $w$ , of a plank of wood.

He writes

$$2.85 \leq w < 2.95$$

Put rings around all possible values of  $w$  in the list below.

2.849

2.85

2.9

2.95

2.959

2.999

**[2]**

- (c)** The distance from the builder's house to the job is 30 miles, to the nearest 10 miles.

The builder's car travels 26 miles per gallon of fuel.

The builder has 1.2 gallons of fuel in his car.

Can the builder definitely make it to the job?

You must show how you decide.

because

**[3]**

**Turn over**

4 Here is some information about the number of siblings that 32 children have.

Number of siblings	Frequency
0	8
1	13
2	7
3	3
4	1

(a) Work out the mean number of siblings.

(a) ..... [3]

(b) Explain how you know that your answer is reasonable.

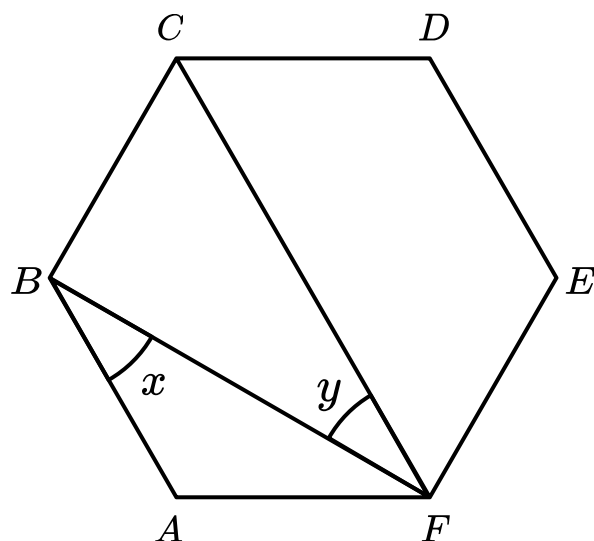
.....

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.....

[1]

5 Here is a regular hexagon.



- (a) Work out the size of angle  $x$ .  
Give reasons for each stage of your working.

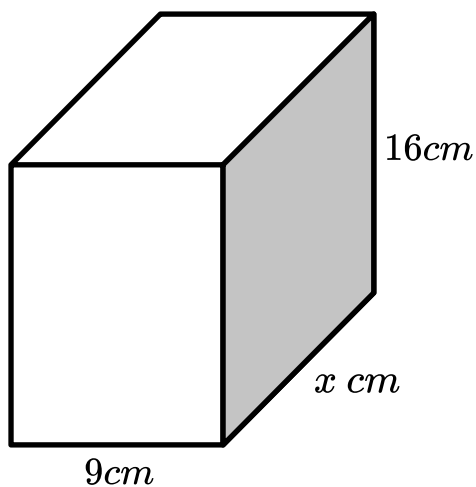
(a) ..... [4]

- (b) Work out the size of angle  $y$ .

(b) ..... [2]

**Turn over**

- 6 A company is designing some new packaging in the shape of a cuboid.
- The packaging must have a height of  $16\text{cm}$ , a length of  $9\text{cm}$  and a width of  $x\text{ cm}$ , as shown below.



The company wants the surface area to be less than  $900\text{cm}^2$ .

- (a) Show that  $50x + 288 < 900$ .

[4]

- (b) Solve  $50x + 288 < 900$ .

(b) ..... [2]

- (c)  $x$  must be an integer. Write down the greatest possible value of  $x$ .

(c) ..... [1]

7 (a)  $x = 4 \times 10^5$   
 $y = 6 \times 10^3$

Work out  $x + 2y$ .

Give your answer in standard form.

(a) ..... [2]

- (b) The weight of a grain of rice is  $2.9 \times 10^{-2}$  *grams*.  
The weight of a grain of sugar is  $6.25 \times 10^{-4}$  *grams*.

Which weighs more, one grain of rice or 20 grains of sugar?

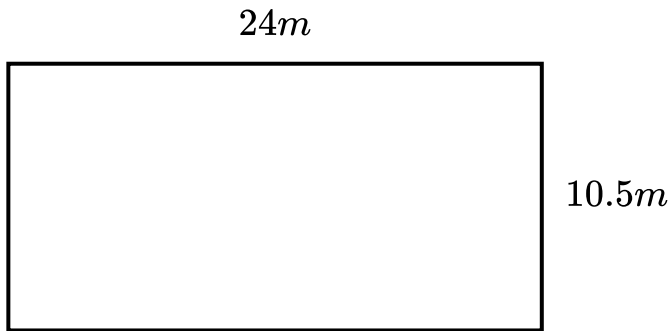
Show how you decide.

(b) ..... [2]

**Turn over**



8 Here is a plan of Harry's garden.



Harry wants to create a wildflower meadow.

To do this, Harry is going to mix a wildflower seed mix with a grass seed mix in the ratio 2:5.

Harry will then spread the seed mix on his garden.

1kg of his seed mix will cover  $20m^2$ .

Grass seed comes in 5kg bags, which cost £32 each.

Wildflower seed comes in 1kg bags, which cost £21 each.

Work out the total cost of the seed for Harry's garden.

----- [5]

- 9 (a) Show that the equation  $x^3 + 6x - 10 = 0$  has a solution between  $x = 1$  and  $x = 2$ .

[3]

- (b) Find this solution correct to 1 decimal place.

You must show your working.

[4]

- 
- 10 (a) Write 540 as a product of its prime factors.

(a) ..... [2]

- (b) Hence write down the smallest number that 540 could be multiplied by to give a square number.

(b) ..... [1]

**Turn over**

**11** Thais has 30 cards.

30% of the cards show odd numbers and the rest show even numbers.

Thais takes two cards and multiplies the two numbers on the cards to get their product,  $P$ .

Work out the probability that the product is odd.

----- [5]

- 12** An object exerts a force of  $80\text{N}$  on an area of  $16\text{cm}^2$ .  
Brian increases the area of the base of the object,  
which decreases the pressure caused by the force by  $20\%$ .  
By what percentage does Brian increase the area?

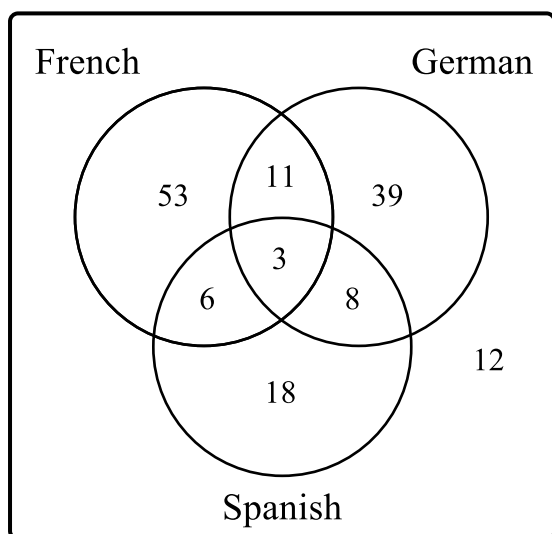
----- **[4]**

- 
- 13** Prove algebraically that  $0.\dot{4}\dot{5} = \frac{5}{11}$

**[3]**

**Turn over**

- 14** This Venn diagram shows the number of year 11s who study French ( $F$ ), German ( $G$ ) and Spanish ( $S$ ).



One student is chosen at random.

Write down

**(a)**  $P(F)$

**(a)** ..... [1]

**(b)**  $P(G \cup S)$

**(b)** ..... [1]

**(c)**  $P(F \cap G' \cap S')$

**(c)** ..... [1]

- (d)** One of the students is chosen. The student studies German.

Elliot says the probability that the student also studies Spanish is  $\frac{11}{150}$ .

Elliot is not correct. Explain why.

.....

.....

[1]

- 15** At the start of year  $t$ , the mass of a radioactive substance is  $M_t$ .  
At the start of the following year, the mass of the radioactive substance is  $M_{t+1}$  where

$$M_{t+1} = 0.8M_t$$

- (a)** At the start of 2021 the mass of a radioactive substance is 4500g.  
Find the mass of the substance at the start of 2022.

**(a)** ..... g **[1]**

The half life of a radioactive substance is the amount of time taken for the amount of the radioactive substance to halve.

- (b)** Nigel says that the half life of this substance is between 3 and 4 years.

Is Nigel correct? Explain how you decide.

because

.....

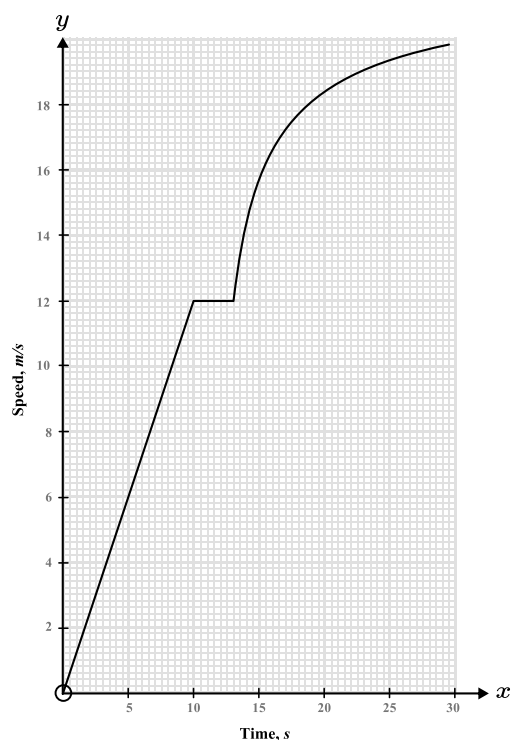
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.....

**[3]**

**Turn over**

**16** Here is a speed-time graph for a train.



**(a)** Describe what is happening between 10 and 13 seconds.

.....

.....

**[1]**

**(b)** Work out the distance travelled by the train in the first 13 seconds of the journey.

**(b)** ..... **[2]**

**(c)** Work out an estimate for the acceleration of the train at 20 seconds.

**(c)** ..... **[2]**

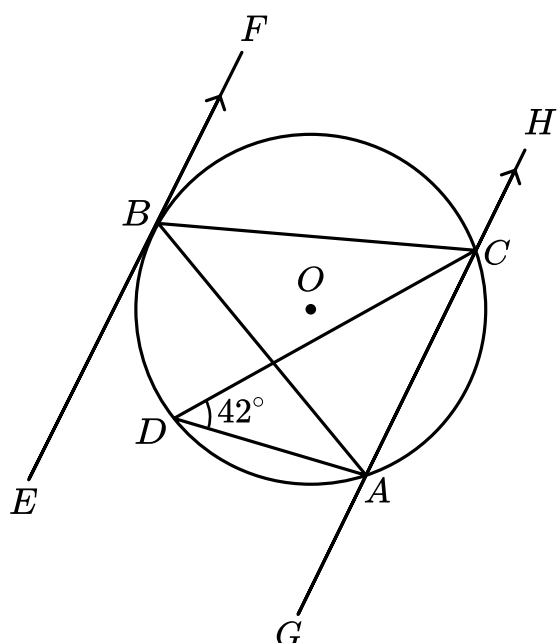
**17**  $m$  is inversely proportional to the cube root of  $n$ .

$m = 46$  when  $n = 125$ .

Find the value of  $m$  when  $n = 8$

..... [3]

**18**



O is the centre of the circle.

The line EF is a tangent to the circle at the point B.

The lines EF and GH are parallel.

Angle  $ADC = 42^\circ$ .

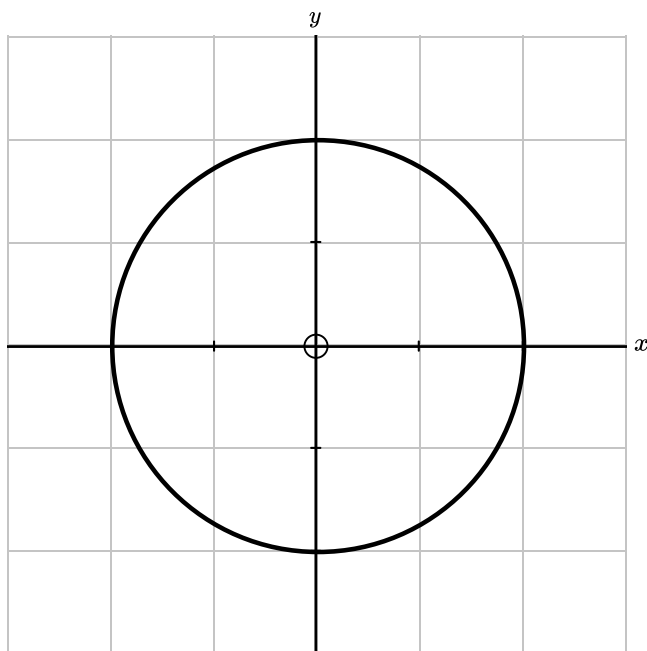
Work out the size of angle CBF.

..... [3]

**Turn over**



**19** Here is the graph of a circle.



- (a)** The circumference of the circle is  $20\pi$   
Work out the equation of the circle.

**(a)** ..... **[3]**

- (b)** Decide whether the point  $(7, 8)$  lies inside or outside the circle.  
You must show how you decide.

**[3]**

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