

# GCSE Mathematics

## Practice Tests: Set 20

### 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 not 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 questions.**

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

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

- 1** Shane invests £7200 for 3 years in a savings account.  
He gets 2.5% per year compound interest.

How much money will Shane have in his savings account at the end of 3 years?  
Give your answer to the nearest pound.

£.....

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

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- 2 A tin contains tea bags with a choice of four different flavours of tea.  
The four flavours of tea are Assam or Darjeeling or Nilgiri or Rize.

Sara takes at random a tea bag from the tin.

The table shows each of the probabilities that the flavour of the tea Sara takes is Assam or Darjeeling or Rize.

| Flavour of tea | Assam | Darjeeling | Nilgiri | Rize |
|----------------|-------|------------|---------|------|
| Probability    | 0.38  | 0.24       |         | 0.16 |

- (a) Work out the probability that the flavour of the tea Sara takes is Nilgiri.

.....  
(2)

- (b) Work out the probability that the flavour of the tea Sara takes is either Darjeeling or Rize.

.....  
(2)

(Total for Question 2 is 4 marks)

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**3** Mary saves for a holiday each year.

In 2020 she saved a total of \$720

In 2021, each month she saved \$78

The total amount Mary saved in 2021 was  $P\%$  more than the total she saved in 2020

(a) Work out the value of  $P$

.....  
**(4)**

Roberto is going to go on holiday.  
He has two coupons that will save him money on his holiday.

|                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;"><b>Coupon A</b></p> <p style="text-align: center;">18% off the cost of the<br/>accommodation</p> |
|---------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;"><b>Coupon B</b></p> <p style="text-align: center;">12.5% off the total cost of the<br/>accommodation <b>and</b> the flights</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

For Roberto's holiday  
the cost of the accommodation is \$1600  
the cost of the flights is \$800

Roberto can only use one of the coupons.  
He wants to save as much money as he can.

- (b) Which of the two coupons, **A** or **B**, should he use?  
Show your working clearly.

**(3)**

**(Total for Question 3 is 7 marks)**

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- 4 The table gives information about the population and the total amount of money, in dollars, spent on healthcare for two countries in 2016

| Country    | Total population  | Total spent on healthcare (\$) |
|------------|-------------------|--------------------------------|
| Austria    | $8.7 \times 10^6$ | $4.2 \times 10^{10}$           |
| Luxembourg | $6.3 \times 10^5$ | $3.7 \times 10^9$              |

Work out how much more was spent **per person** on healthcare in Luxembourg than in Austria.

Give your answer correct to the nearest whole number.

..... dollars

**(Total for Question 4 is 3 marks)**

- 5 The shaded shape is made using three identical right-angled triangles and a square.

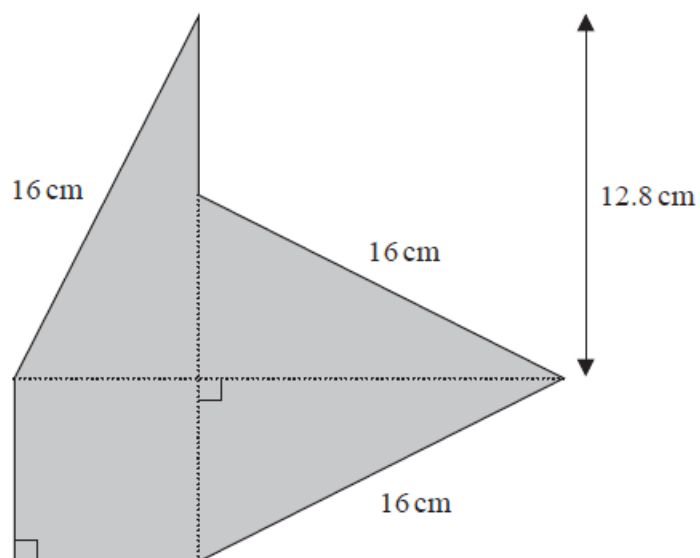


Diagram **NOT**  
accurately drawn

Work out the perimeter of the shaded shape.

..... cm

**(Total for Question 5 is 4 marks)**

- 6 The diagram shows sector  $OPQ$  of a circle, centre  $O$

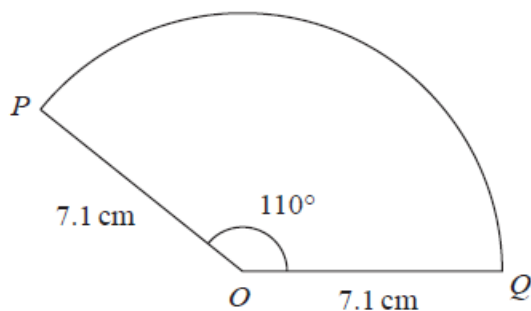


Diagram **NOT**  
accurately drawn

$$OP = OQ = 7.1\text{ cm}$$

$$\text{Angle } POQ = 110^\circ$$

Calculate the area of sector  $OPQ$

Give your answer correct to one decimal place.

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

(Total for Question 6 is 2 marks)

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- 7 A scientist is investigating the weight of 50 tigers.  
Here is some information about these tigers.

|                            | Type of tiger |        |
|----------------------------|---------------|--------|
|                            | Siberian      | Bengal |
| Number of tigers           | 22            | 28     |
| Mean weight of tigers (kg) | 260           |        |

The mean weight of all 50 tigers is 218 kg

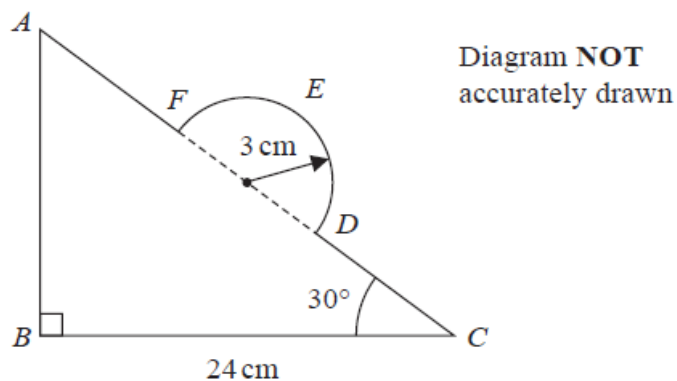
Work out the mean weight of the Bengal tigers.

..... kg

(Total for Question 7 is 3 marks)

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- 8 In the diagram,  $ABC$  is a right-angled triangle and  $DEF$  is a semicircular arc.



In triangle  $ABC$

$$BC = 24\text{ cm} \quad \text{angle } ABC = 90^\circ \quad \text{angle } BCA = 30^\circ$$

The points  $D$  and  $F$  lie on  $AC$  so that  $DF$  is the diameter of the semicircular arc  $DEF$   
The radius of the semicircular arc is  $3\text{ cm}$ .

Work out the length of  $AFEDC$

Give your answer correct to 2 significant figures.

..... cm

**(Total for Question 8 is 5 marks)**

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- 9 (a) Work out the lowest common multiple (LCM) of 36 and 120

.....  
(2)

$$A = 5^2 \times 7^4 \times 11^p$$

$$B = 5^m \times 7^{n-5} \times 11$$

$m$ ,  $n$  and  $p$  are integers such that

$$m > 2$$

$$n > 10$$

$$p > 1$$

- (b) Find the highest common factor (HCF) of  $A$  and  $B$   
Give your answer as a product of powers of its prime factors.

.....  
(2)

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

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- 10** Milly went on a car journey.  
She travelled from Anesey to Breigh to Clando and then to Duckbridge.
- For Anesey to Breigh, Milly drove the 245 km in 2.5 hours.  
For Breigh to Clando, Milly drove the 220 km at an average speed of 80 km/h  
For Clando to Duckbridge, Milly drove at an average speed of 72 km/h in 50 minutes.
- Work out Milly's average speed, in km/h, for the journey from Anesey to Duckbridge.  
Give your answer correct to one decimal place.

..... km/h

**(Total for Question 10 is 4 marks)**

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- 11 Jonty has a storage container in the shape of a cuboid, as shown in the diagram.

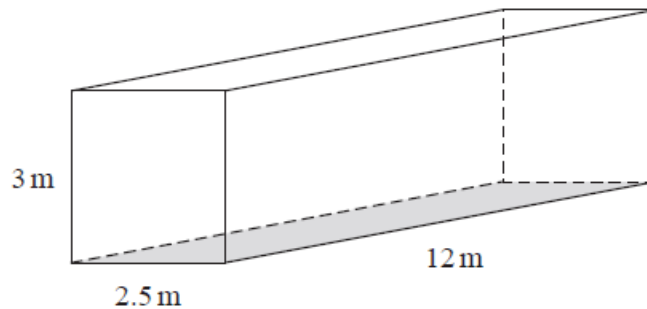


Diagram **NOT**  
accurately drawn

Jonty is going to paint the outside of his storage container, apart from the base which is shown shaded in the diagram.

He needs enough paint to cover the four sides and the top.

Each tin of paint covers an area of  $15 \text{ m}^2$

The cost of each tin of paint recently increased by 10%

**After** the increase, the cost of each tin of paint is £26.95

Jonty says

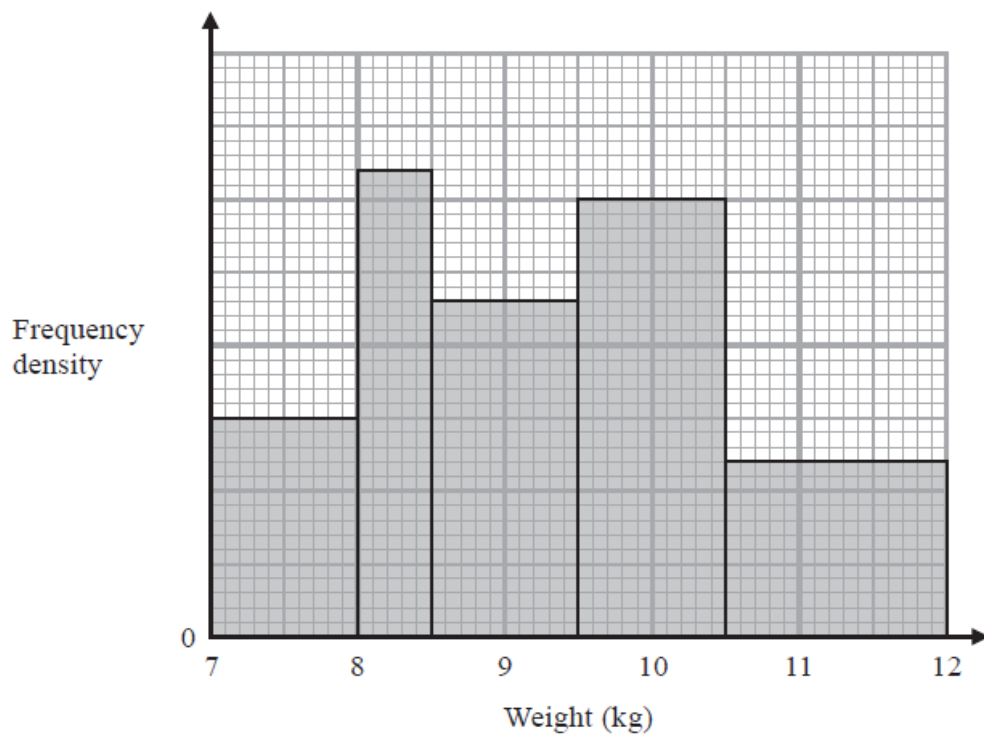
“**Before** the increase, I could have bought enough paint for less than £200”

Show that Jonty is correct.

Show your working clearly.

**(Total for Question 11 is 6 marks)**

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The histogram gives information about the weights, in kg, of all the watermelons in a field.  
There are 16 watermelons with a weight between 8 kg and 8.5 kg

Work out the total number of watermelons in the field.

.....  
(Total for Question 12 is 3 marks)

**13**  $a = \sqrt{8} + 4$

$$b = \sqrt{8} - 4$$

$(a - b)(a + b)$  can be written in the form  $y\sqrt{4y}$

Find the value of  $y$

Show your working clearly.

$y = \dots\dots\dots$

**(Total for Question 13 is 3 marks)**

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- 14 The diagram shows a regular octagon  $ABCDEFGH$  and a regular pentagon  $ABIJK$

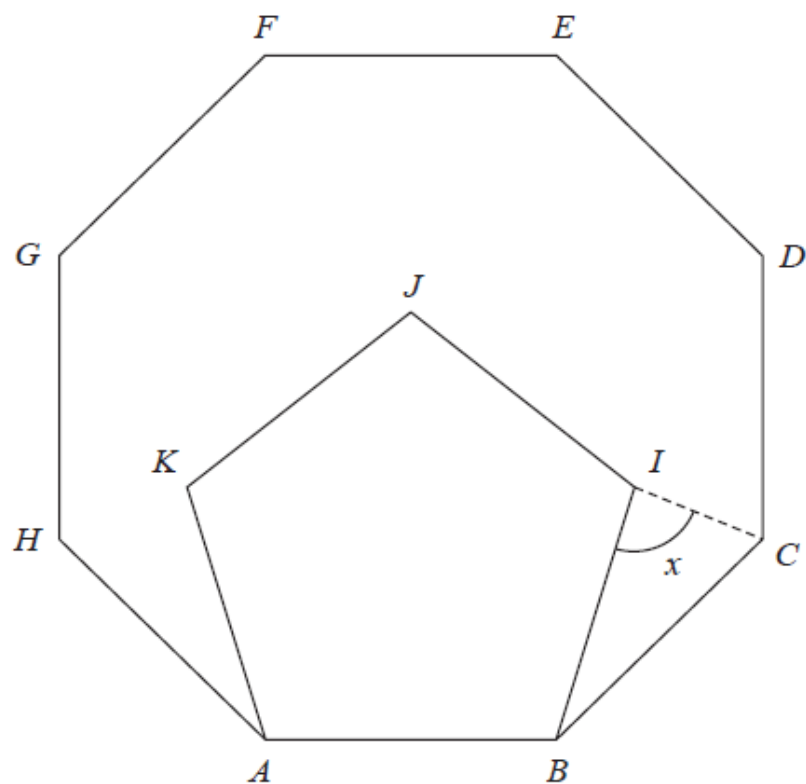


Diagram **NOT**  
accurately drawn

Work out the size of the angle  $x$

.....<sup>o</sup>  
(Total for Question 14 is 4 marks)

**15** Yusuf sat 8 examinations.

Here are his marks for 5 of the examinations.

68            72            75            77            80

For his results in all 8 examinations

- the mode of his marks is 80
- the median of his marks is 74
- the range of his marks is 16

Find Yusuf’s marks for each of the other 3 examinations.

.....  
.....  
.....

**(Total for Question 15 is 4 marks)**

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- 16** An arithmetic series has first term 1 and common difference 4  
Find the sum of all terms of the series from the 41st term to the 100th term inclusive.

.....  
**(Total for Question 16 is 4 marks)**

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- 17**  $y$  is inversely proportional to  $\sqrt{x}$   
 $x$  is directly proportional to  $T^3$   
Given that  $y = 8$  when  $T = 25$   
find the exact value of  $T$  when  $y = 27$

$T = \dots\dots\dots$

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

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- 18 The diagram shows a solid made from a cylinder and a hemisphere.  
The cylinder and the hemisphere are both made from the same metal.

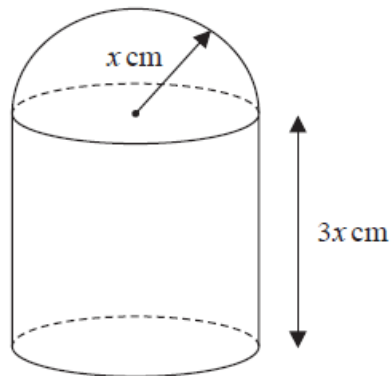


Diagram **NOT**  
accurately drawn

The plane face of the hemisphere coincides with the upper plane face of the cylinder.

The radius of the cylinder and the radius of the hemisphere are both  $x \text{ cm}$ .

The height of the cylinder is  $3x \text{ cm}$ .

The total surface area of the solid is  $81\pi \text{ cm}^2$

The mass of the solid is 840 grams.

The following table gives the density of each of four metals.

| Metal     | Density ( $\text{g/cm}^3$ ) |
|-----------|-----------------------------|
| Aluminium | 2.7                         |
| Nickel    | 8.9                         |
| Gold      | 19.3                        |
| Silver    | 10.5                        |

The metal used to make the solid is one of the metals in the table.

Determine the metal used to make the solid.

Show your working clearly.

.....  
**(Total for Question 18 is 6 marks)**

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**19** The three solids **A**, **B** and **C** are similar such that  
the surface area of **A** : the surface area of **B** = 4 : 9

and

the volume of **B** : the volume of **C** = 125 : 343

Work out the ratio

the height of **A** : the height of **C**

Give your ratio in its simplest form.

.....  
(Total for Question 19 is 4 marks)

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- 20** Hector has a bag that contains 12 counters.  
There are 7 green counters and 5 red counters in the bag.

Meghan has a jar containing 15 counters.  
There are only blue counters, green counters and red counters in the jar.

Hector is going to take at random one of the counters from his bag of 12 counters.  
He will look at the counter and put the counter back into the bag.

Hector is then going to take at random a second counter from his bag.  
He will look at the counter and put the counter back into the bag.

Meghan is then going to take at random one of the counters from her jar of counters.  
She will look at the counter and put the counter back into the jar.

The probability that the 3 counters each have a different colour is  $\frac{7}{24}$

Work out how many blue counters there are in the jar.

.....  
(Total for Question 20 is 3 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

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