

# GCSE Mathematics

## Practice Tests: Set 9

### Paper 2F (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
- 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 FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

Converting FDP

- 1 Write 0.4 as a percentage.

$$= \frac{40}{100} = \underline{40\%}$$

.....%  
40

(Total for Question 1 is 1 mark)

- 2 What is 42 out of 80 as a percentage?

$$\begin{aligned} \text{"42 out of 80"} &= \frac{42}{80} = 0.525 \\ &= 52.5\% \end{aligned}$$

.....%  
52.5

(Total for Question 2 is 1 mark)

- 3 Work out 72% of 350 cm.

Percentages of an Amount

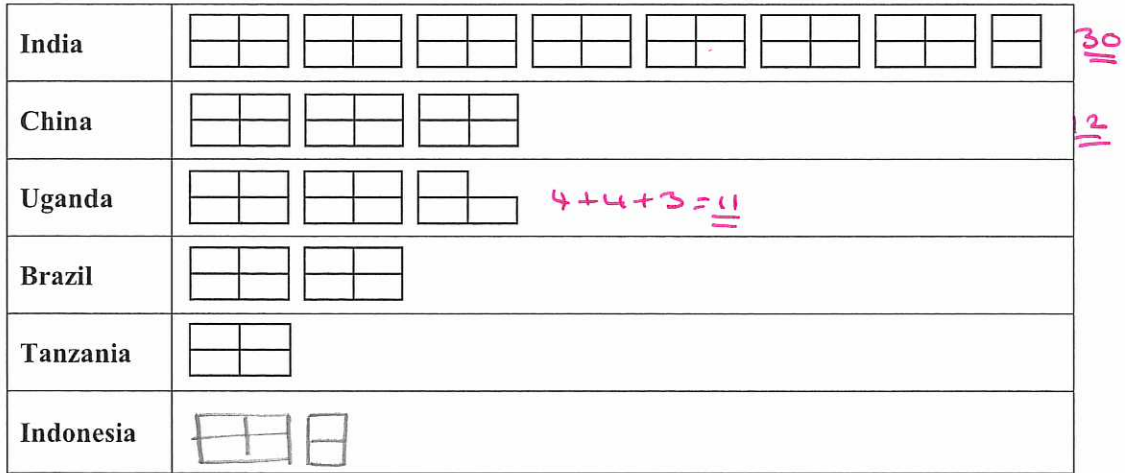
$$\begin{array}{l|l} & 100\% = 350 \\ (\div 100) & 1\% = 3.5 \\ (x 72) & 72\% = \underline{252 \text{ cm}} \end{array}$$

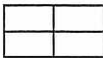
.....cm  
252

(Total for Question 3 is 2 marks)

# Pictograms

- 4 The pictogram shows information about the total weight of bananas grown last year in each of five countries.



 represents 4 million tonnes of bananas 1 rectangle per block.

- (a) How many million tonnes of bananas were grown last year in Uganda?

11  
 .....million tonnes  
 (1)

Last year the weight of bananas grown in India was more than the weight of bananas grown in China.

- (b) How many million tonnes more?

$$30 - 12 = 18$$

18  
 .....million tonnes  
 (1)

Last year the total weight of bananas grown in Indonesia was 6 million tonnes.

- (c) Show this information on the pictogram.

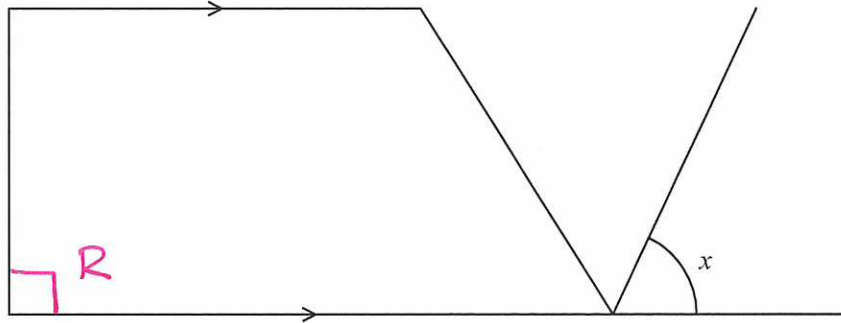
6 boxes

(1)

(Total for Question 4 is 3 marks)

Properties of 2D Shapes and  
Angles in 2D Shapes

5



(a) On the diagram, mark a right angle with the letter *R*.

(1)

There is a quadrilateral in the diagram.

(b) Write down the mathematical name of this quadrilateral.

1 set of parallel lines.  $\therefore$  Trapezium

(1)

(c) Measure the size of angle *x*.

..... 65 .....<sup>o</sup>

(1)

(Total for Question 5 is 3 marks)

## Two way Tables

- 6 Valentino sells ice cream cones and ice cream tubs.  
The ice cream flavours are chocolate, strawberry and vanilla.

On Sunday, 120 people each bought one ice cream from Valentino.  
The two-way table shows some information about these ice creams.

	chocolate	strawberry	vanilla	Total
cone	16	① = 40	22	78
tub	④ = 7	14	⑥ = 21	② = 42
Total	23	③ = 54	⑤ = 43	120

- (a) Complete the two-way table.

$$\textcircled{1} \quad 78 - 22 - 16 = 40$$

$$\textcircled{4} \quad 23 - 16 = 7$$

$$\textcircled{2} \quad 120 - 78 = 42$$

$$\textcircled{5} \quad 120 - 54 - 23 = 43$$

$$\textcircled{3} \quad 40 + 14 = 54$$

$$\textcircled{6} \quad 43 - 22 = 21$$

(3)

One of the 120 people is picked at random.

- (b) Find the probability that this person bought a vanilla ice cream cone.

$$\text{Number of vanilla ice creams} = 22$$

(cones)

$$\text{Total people} = 120$$

$$= 120$$

$$\therefore \frac{22}{120}$$

(2)

(Total for Question 6 is 5 marks)

- 7 Billy works out the answer to  $2 + 5 \times 7$   
He says that the answer is 49.

Billy is not correct as the answer should be 37.

- (a) Explain what Billy has done wrong.

Billy has added 2 and 5 together first.

(1)

Chen says,

“A prime number added to an even number always gives an odd number.”

- (b) Give an example to show that Chen is not correct.

Types of Number.

2 is prime 4 is even.  $2 + 4 = 6$  6 is even  $\therefore$  wrong

(1)

(Total for Question 7 is 2 marks)

# Averages from Frequency Tables

- 8 The table shows information about the number of goals scored by a football team in each of 20 matches.

Number of goals Scored	Frequency
0	6
1	5
2	7
3	1
4	0
5	1

c.f

6

11

- (a) Write down the mode of the number of goals scored.

↓  
most frequent

2

(1)

- (b) Find the median number of goals scored.

$$\text{Median} = \frac{n}{2} = \frac{20}{2} = 10^{\text{th}} \text{ term}$$

$$= 1$$

1

(2)

- (c) Work out the total number of goals scored.

$$0 \times 6 = 0$$

$$1 \times 5 = 5$$

$$2 \times 7 = 14$$

$$3 \times 1 = 3$$

$$4 \times 0 = 0$$

$$5 \times 1 = 5$$

~~$$6 \times 1 = 6$$~~

27

(+)

27

(2)

(Total for Question 8 is 5 marks)

## Worded Simultaneous Equations

- 9 3 kg of carrots cost £1.35.  
5 kg of carrots and 2 kg of potatoes cost a total of £4.15.  
Find the cost of 1 kg of potatoes.

3kg Carrots = £1.35	
(÷3) 1kg Carrots = £0.45	
(x5) 5kg Carrots = £2.25	
	5kg Carrots + 2kg potatoes = £4.15
	£2.25 + 2kg potatoes = £4.15
(-£2.25)	2kg potatoes = <del>£2.05</del> £1.90
(÷2)	£ 1kg potatoes = <del>£1.025</del> £0.95

(Total for Question 9 is 3 marks) ~~1.04~~

- 10 (a) Find the cube root of 421.875.

$$\sqrt[3]{421.875}$$

Calculator Skills

$$\dots\dots\dots 7.5 \dots\dots\dots$$

(1)

- (b) (i) Work out the value of  $\frac{7.61^2}{5.2 \times 3.5}$

Write down all the figures on your calculator display.

USE YOUR CALCULATOR

$$\dots\dots\dots 3.181983516 \dots\dots\dots$$

(2)

- (ii) Write your answer to part (b)(i) correct to 2 significant figures.

$$\dots\dots\dots 3.2 \dots\dots\dots$$

(1)

(Total for Question 10 is 4 marks)



# Sequences

- 11 A sequence is formed by adding 1 to each square number.  
Here are the first five terms of the sequence.

2      5      10      17      26

- (a) Find the 10th term of the sequence.

$$10^{\text{th}} \text{ square number} = 10 \times 10 = 100$$

$$100 + 1 = \underline{\underline{101}}$$

..... 101  
(1)

1025 is a term of this sequence.

- (b) Which term?

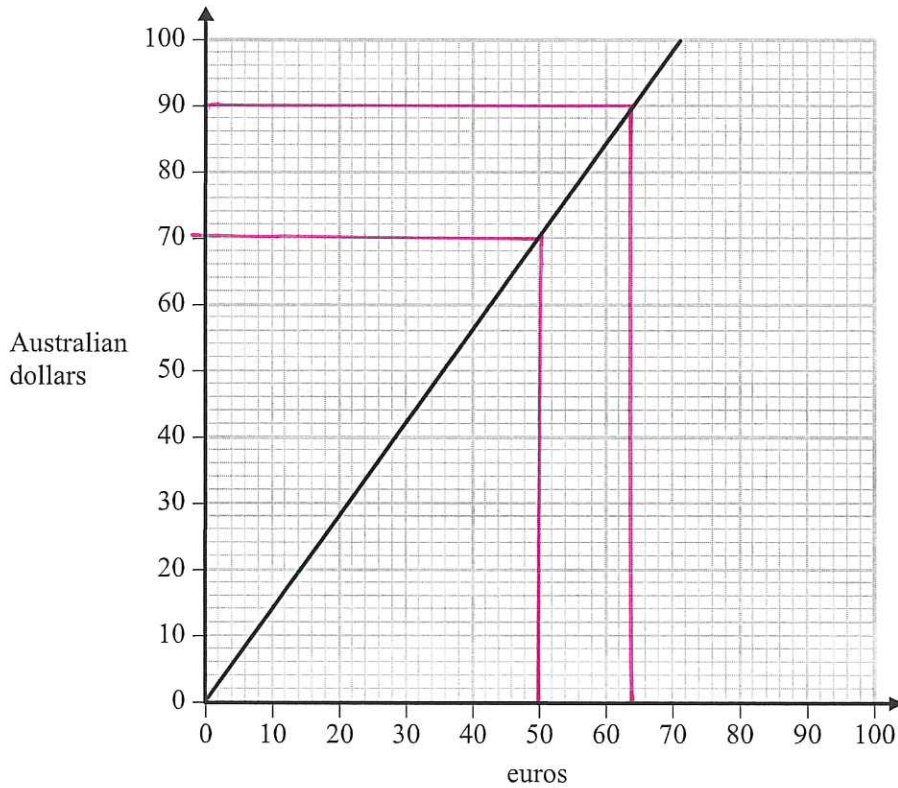
$$\begin{array}{l} (-1) \\ \sqrt{\text{ANS}} \end{array} \left| \begin{array}{l} n^{\text{th}} \text{ term} = n^2 + 1 \\ 1025 = n^2 + 1 \\ 1024 = n^2 \\ \underline{\underline{32}} = n \end{array} \right.$$

..... 32  
(2)

(Total for Question 11 is 3 marks)

# Conversion Graphs

12 Here is a conversion graph to change between euros and Australian dollars.



(a) Use the graph to change

(i) 50 euros to Australian dollars,

.....70.....Australian dollars

(ii) 90 Australian dollars to euros.

.....64.....euros  
(2)

Sheila is on holiday in Italy and is going to the United Arab Emirates. She knows that

1 Australian dollar = 2.7 dirhams

(b) Change 500 euros to dirhams.

USE THE GRAPH

€ 50 = \$70 (from (a)(i))	
(x10)	€ 500 = \$700
\$1 : 2.7D (x700)	\$700 : 1890D

.....1980.....dirhams  
(3)

(Total for Question 12 is 5 marks)

## Forming and Solving Equations Percentages of an Amount

- 13 There are 440 students at a school.  
The number of male students is 40 more than the number of female students.  
65% of the male students like art.  
85% of the female students like art.  
Work out the total number of students at the school who like art.

female = $x$	female + male = 440
male = $x + 40$	$x + x + 40 = 440$
collect	$2x + 40 = 440$
(-40)	$2x = 400$
( $\div 2$ )	$x = 200$
	$\therefore$ female = 200; male = 240
Male art:	65% of 240 = $0.65 \times 240 = 156$
female art:	85% of 240 = $0.85 \times 240 = 204$
Total art:	$156 + 204 = \underline{\underline{360}}$

360

(Total for Question 13 is 4 marks)

# Solving Equations

14 Solve  $8 - 2p = 15$

$$\begin{array}{l|l}
 & 8 - 2p = 15 \\
 (+2p) & 8 = 15 + 2p \\
 (-15) & -7 = 2p \\
 (\div 2) & -\frac{7}{2} = p
 \end{array}$$

$$p = \frac{-7}{2}$$

(Total for Question 14 is 2 marks)

15  $x$ , 10 and  $y$  are three integers written in order of size, starting with the smallest integer.

The mean of  $x$ , 10 and  $y$  is 11.

The range of  $x$ , 10 and  $y$  is 7.

Work out the value of  $x$  and the value of  $y$ .

Missing mean and range

mean	$\frac{x+10+y}{3} = 11$	
(x3)	$x+10+y = 33$	
(-10)	$x+y = 23$ ①	
Range = 7	$\therefore y-x = 7$	$x = \frac{8}{\dots\dots\dots}$
(+x)	$y = x+7$ ②	$y = \frac{15}{\dots\dots\dots}$

(Total for Question 15 is 2 marks)

Put ② in ①	$x+x+7 = 23$
Collect	$2x+7 = 23$
(-7)	$2x = 16$
	$x = 8$

$$y = x + 7$$

$$\therefore y = 15$$

## Pressure Formula

- 16 A box is put on a table.  
The face of the box in contact with the table is in the shape of a rectangle, 2 m by 1.25 m.  
The pressure on the table due to the box is 42 newtons/m<sup>2</sup>

Work out the force exerted by the box on the table.

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

Area = lw

$P = 42 \text{ N/m}^2$

( $\times 2.5$ )

$A = 2 \text{ m} \times 1.25 \text{ m}$   
 $= 2.5 \text{ m}^2$

$42 = \frac{F}{2.5}$

$105 \text{ N} = F$

105 newtons

(Total for Question 16 is 3 marks)

- 17 Anna and Lionel share £675 in the ratio 4 : 5  
Lionel gives  $\frac{3}{5}$  of his share of the money to his mother.  
How much money does Lionel give to his mother?

Ratio and Proportion  
Fractions of an Amount

A : L

( $\div 9$ )

4 : 5 ( $\times 75$ )

Lionel = £375

4 : 5

$4 + 5 = 9 \text{ parts} = \pounds 675$

1 part = £75

300 : 375

$\frac{3}{5}$  of £375 =  $\frac{3}{5} \times \pounds 375$

= £225

£.....

(Total for Question 17 is 3 marks)

## Mean from Grouped Frequency

- 3 The table gives information about the times, in hours, some students spent doing sport one week.

Time ( $T$ hours)	Frequency
$0 < T \leq 2$	5
$2 < T \leq 4$	9
$4 < T \leq 6$	24
$6 < T \leq 8$	40
$8 < T \leq 10$	7

midpoint

1

3

5

7

9

$f_m$

5

27

120

280

63

$\Sigma f_m = 495$

TOTALS  $\Sigma f = 85$

Calculate an estimate for the mean time these students spent doing sport.  
Give your answer in hours, correct to 1 decimal place.

$$\text{Estimate for mean} = \frac{\Sigma f_m}{\Sigma f}$$

$$= \frac{495}{85}$$

$$= 5.8 \text{ hours (1 d.p.)}$$

..... 5.8 ..... hours

(Total for Question 3 is 4 marks)



## Fractions and Percentages of an amount

4 Behnaz makes candles.

She has 6.3 kilograms of wax and uses it all to make candles.  
Each candle Behnaz makes uses 210 grams of wax.

Behnaz sells  $\frac{2}{5}$  of the candles for £13 each.

She then reduces this price by 20% and sells the rest of the candles.

Work out the total amount of money Behnaz gets by selling all the candles she made.

Number of candles made:	
6.3kg = 6300g	$6300g \div 210g = 30$ candles
Number of candles for £13	$30 \times \frac{2}{5} = 12$ candles
Money generated	$£13 \times 12 = £156$
18 candles left	
20% decrease	$£13 - 20\% = £10.40$
money generated	$£10.40 \times 18 = £187.20$
Total money	$£156 + £187.20 = \underline{\underline{£343.20}}$

£ 343.20

(Total for Question 4 is 4 marks)

Speed Distance Time



- 20 Abelle flew by plane from Dubai to Rome.  
 The flight time was 6 hours 42 minutes.  
 The average speed of the plane was 650 kilometres per hour.  
 Work out the distance the plane flew.

Time in hours	$6 \text{ hours } 42 \text{ mins} = 6 \frac{42}{60} \text{ hours}$
Speed in km/h	$= 650 \text{ km/h}$
Distance:	$D = S \times T = 650 \text{ km/h} \times 6 \frac{42}{60} \text{ h}$ $= \underline{4355} \text{ km}$

.....kilometres

(Total for Question 20 is 3 marks)

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# Index Laws

21 (a) Simplify  $(k^3)^5$

$$(a^m)^n = a^{m \times n} \quad | \quad (k^3)^5 = \underline{\underline{k^{15}}}$$

$$k^{15}$$

(1)

(b) Simplify fully

$$\frac{20x^2y^6}{4x^2y^2} = \frac{5x^2y^6}{x^2y^2}$$

$$= \frac{5y^6}{y^2}$$

$$= \underline{\underline{5y^4}}$$

Simplifying Algebraic Expressions

$$5y^4$$

(2)

(c) Make  $e$  the subject of the formula  $h = 3e + f$

$$\begin{array}{l|l} & h = 3e + f \\ (-f) & h - f = 3e \\ (\div 3) & \frac{h-f}{3} = e \\ & \underline{\underline{\frac{h-f}{3}}} \end{array}$$

Rearranging Formula

$$\frac{h-f}{3} = e$$

(2)

(Total for Question 21 is 5 marks)

Compound Interest

- 22 Hiran invests 20 000 rupees in an account for 3 years at 1.5% per year compound interest.

Work out the total amount of money in the account at the end of 3 years.

Give your answer to the nearest rupee.

Start  $\times$  multiplier<sup>F</sup> = End

multiplier =  $1 + 1.5\% = 1.015$

Nearest Rupee

$$20000 \times 1.015^3 = 20913.5675$$

$$= \underline{\underline{20914}}$$

.....20914.....rupees

(Total for Question 22 is 3 marks)

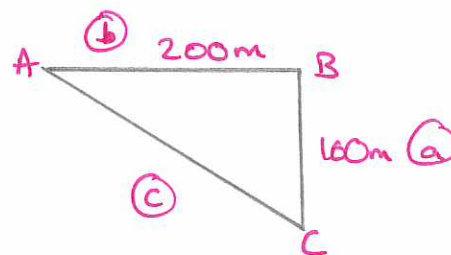
- 23 From point A, Stanley walks 200 m due east to point B.

From B, he then walks 160 m due south to point C.

Work out the length of AC.

Give your answer correct to 3 significant figures.

SOLUTION / Pythagoras  
from Bearings



Pythagoras

$$a^2 + b^2 = c^2$$

$$160^2 + 200^2 = c^2$$

$$65600 = c^2$$

$\sqrt{\text{ANS}}$

$$256.12... = c$$

Round to 3s.f

$$\underline{\underline{256}} = c$$

.....256.....metres

(Total for Question 23 is 3 marks)

# Angles in Polygons

12

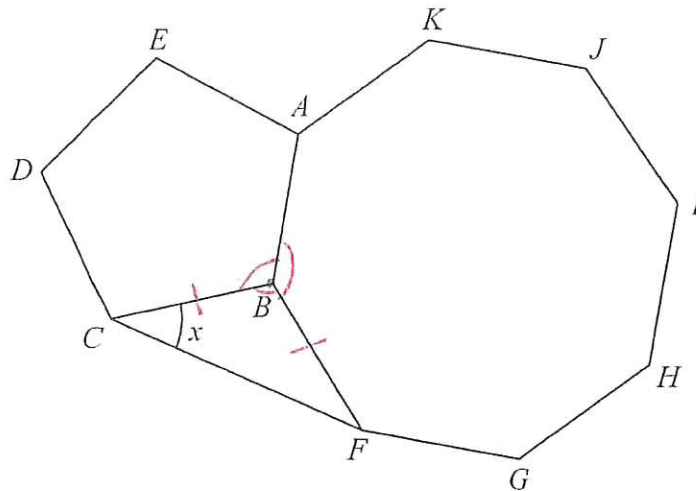


Diagram NOT accurately drawn

The diagram shows a regular pentagon,  $ABCDE$ , a regular octagon,  $ABFGHIJK$ , and an isosceles triangle,  $BCF$ .

Work out the size of angle  $x$ .

$$\hat{A}BC = 108^\circ$$

$$\hat{A}BF = 135^\circ$$

$$\hat{C}BF = 360^\circ - 108^\circ - 135^\circ = 117^\circ$$

$$\hat{B}CF + \hat{B}FC = 63^\circ$$

$$\hat{B}CF = \hat{B}FC$$

$$63 \div 2 = \underline{\underline{31.5}} = x$$

$$\text{Interior angle of pentagon} = \frac{540}{5} = 108^\circ \quad \leftarrow 3 \times 180$$

$$\text{Interior angle of octagon} = \frac{1080}{8} = 135^\circ \quad \leftarrow 6 \times 180$$

\* Both the above use the fact that the sum of interior angles of  $n$ -sided polygon =  $(n-2) \times 180$ .

$$\text{Angles around a point} = 360^\circ$$

$$\text{Angles in a triangle} = 180^\circ$$

Isosceles triangle

..... 31.5 .....

(Total for Question 12 is 4 marks)

14 Change a speed of 72 kilometres per hour to a speed in metres per second.

$$\begin{array}{l}
 \text{metres (x1000)} \\
 \text{1 hour} = 60 \text{ mins} = 3600 \text{ secs} \\
 \text{Seconds... } (\div 3600)
 \end{array}
 \left|
 \begin{array}{l}
 \frac{72 \text{ km}}{1 \text{ hour}} \\
 = \frac{72000 \text{ m}}{1 \text{ hour}} \\
 = \frac{72000 \text{ m}}{3600 \text{ seconds}} \\
 = 20 \text{ m/second}
 \end{array}
 \right.$$

..... 20 ..... metres per second

(Total for Question 14 is 3 marks)