

# General Certificate of Secondary Education

## GCSE AQA Mathematics (Grade 9-1) Higher Tier

Centre name					
Centre number					
Candidate number					

### Practice Set 1 Paper 2: Calculator

Time allowed: 1 hour 30 minutes

Surname
Other names
Candidate signature

In addition to this paper you should have:

- A pen, pencil and eraser.
- A ruler.
- A protractor.
- A pair of compasses.
- A calculator.



#### Instructions to candidates

- Write your name and other details in the spaces provided above.
- Answer all questions in the spaces provided.
- In calculations show clearly how you worked out your answers.
- Calculators may be used — if your calculator doesn't have a  $\pi$  button, take the value of  $\pi$  to be 3.142

#### Information for candidates

- There are 80 marks available for this paper.
- The marks available are given in brackets at the end of each question.
- You may get marks for method, even if your answer is incorrect.

#### Advice to candidates

- Work steadily through the paper.
- Don't spend too long on one question.
- If you have time at the end, go back and check your answers.

For examiner's use			
Q	Mark	Q	Mark
1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10		22	
11		23	
12		24	
<b>Total</b>			

Answer ALL the questions.

Write your answers in the spaces provided.

You must show all of your working.

- 1 The mass of a snowflake is 2.5 mg.  $1\,000\,000\text{ mg} = 1\text{ kg}$ .

Circle the calculation that gives the mass of the snowflake in kg.

$1\,000\,000 \times 2.5$

$1\,000\,000 \div 2.5$

$2.5 \div 1\,000\,000$

$1 \div 2.5$

**[Total 1 mark]**

- 2 Circle the name of the shape which always has perpendicular diagonals.

rhombus

trapezium

parallelogram

rectangle

**[Total 1 mark]**

- 3 Convert 0.000453 into standard form. Circle your answer.

$4.53 \times 10^4$

$45.3 \times 10^{-5}$

$4.53 \times 10^{-4}$

$4.53 \times 10^{-3}$

**[Total 1 mark]**

- 4 Circle the expression that is equivalent to  $\frac{12x^4y^3}{2x^3y^7}$

$6xy^{-4}$

$6x^7y^{11}$

$\frac{1}{2}xy^{-4}$

$6x^{\frac{4}{3}}y^{\frac{3}{7}}$

**[Total 1 mark]**

- 5 Solve  $3(x - 5) = 5x + 11$

$x = \dots\dots\dots$

**[Total 2 marks]**

- 6 Alison, Boris and Che shared a lottery win in the ratio 7 : 3 : 2.  
If Boris' share was £11 367, how much more did Alison get than Che?

Leave  
blank

£ .....

**[Total 3 marks]**

- 7 (a) Solve  $2 - 4x \leq 12$

.....  
[2]

- (b)  $n$  is an integer.

What is the smallest value of  $n$  that satisfies  $2 - 4n \leq 12$ ? Circle your answer.

-3

-2.5

-2

1

[1]

**[Total 3 marks]**

Leave  
blank

- 8 (a) Hamed and Javez are waiting together at a bus station.  
Hamed's bus leaves every 18 minutes and Javez's bus leaves every 15 minutes.  
The buses left the station at the same time at 2:00 pm.  
When will the buses next leave the station at the same time?

.....  
[2]

- (b) Explain an assumption you made in part (a).

.....  
.....  
[1]

**[Total 3 marks]**

- 9 Express  $0.4\bar{1}$  as a fraction in its simplest form.

.....  
**[Total 2 marks]**

- 10 Declan keeps chickens and weighs all the eggs they lay. The table shows the weights of eggs he collected last month.

Leave blank

Mass ( $m$ ) in grams	Frequency
$40 \leq m < 50$	27
$50 \leq m < 60$	30
$60 \leq m < 70$	16
$70 \leq m < 80$	7

- (a) Calculate an estimate of the mean mass of Declan's eggs.

..... g  
[3]

- (b) Eggs are classified as small if they weigh 53 g or less.

Estimate the percentage of his eggs that would be classified as small. Clearly describe any assumptions you make.

.....

.....

.....

.....

.....

.....

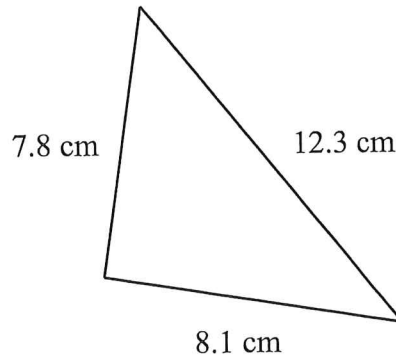
.....

[3]

[Total 6 marks]

- 11 Decide whether the triangle shown below is right-angled, making your reasoning clear.

Leave blank



Not drawn accurately

.....

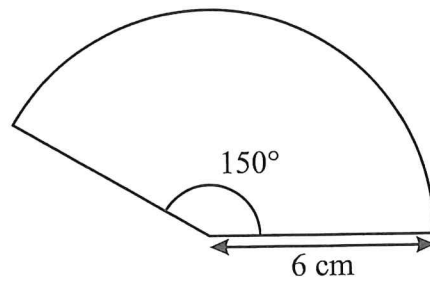
.....

.....

.....

**[Total 3 marks]**

- 12 Find the arc length of the sector shown below.  
Give your answer in terms of  $\pi$ .



Not drawn accurately

..... cm

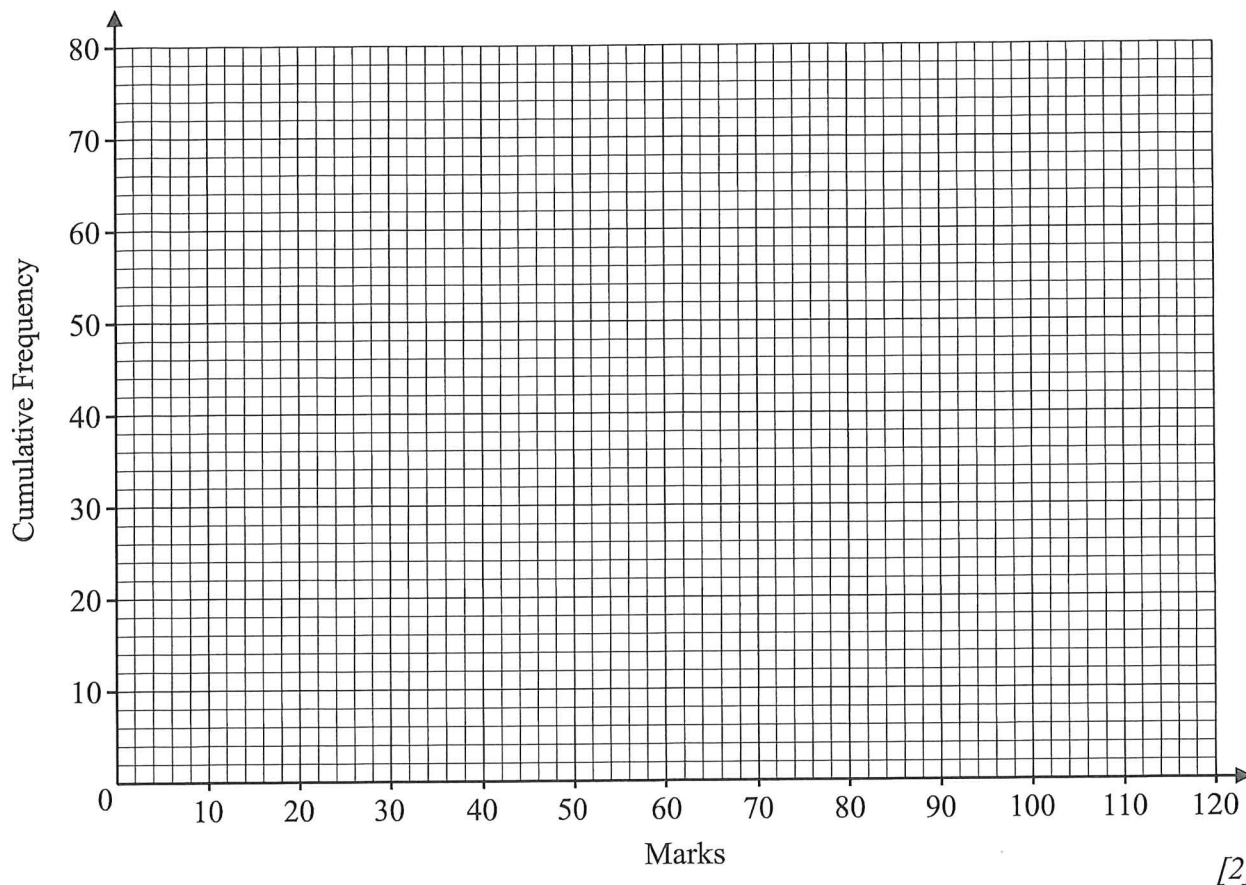
**[Total 2 marks]**

13 The table shows the distribution of marks in a School Maths challenge.

Leave blank

Mark ( $m$ )	$m \leq 40$	$m \leq 60$	$m \leq 80$	$m \leq 100$	$m \leq 120$
Cumulative Frequency	6	20	50	68	80

(a) Draw a cumulative frequency graph to show these results.



[2]

(b) Students with 90 or more marks are awarded either a platinum or a gold certificate. Platinum and gold certificates are awarded in the ratio 1 : 1.5. Students with the highest marks are awarded a platinum certificate.

Estimate the minimum mark needed to be awarded a platinum certificate. Show how you get your answer.

[3]

[Total 5 marks]

17 (a) Write an expression for the  $n^{\text{th}}$  term of the following sequence.

8      13      18      23      28      ...

..... [2]

(b) Use your answer from part (a) to write an expression for the  $n^{\text{th}}$  term of the following sequence.

13      33      63      103      153      ...

..... [3]

(c) Are all the numbers of the second sequence also in the first sequence?  
Tick a box.

Yes

No

Explain your answer.

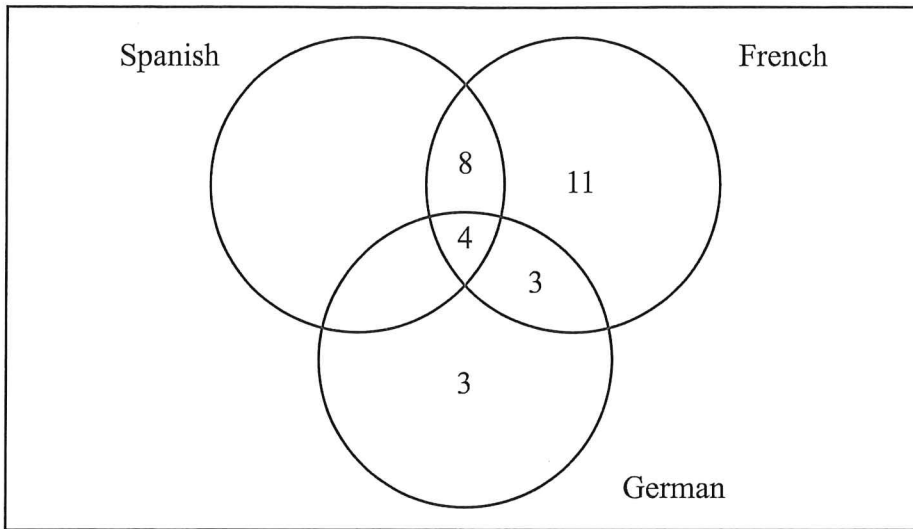
.....  
.....  
.....  
..... [1]

**[Total 6 marks]**



- 18 The incomplete Venn diagram shows how many Year 11 students study Spanish, French and German. There are 50 Year 11 students in total.

Leave blank



- (a) 27 students study Spanish. 6 students study Spanish and German. Use this information to complete the Venn diagram.

[2]

- (b) What percentage of students study German? Circle your answer.

30%

24%

32%

6%

[1]

- (c) If a student is chosen at random, what is the probability that they study exactly one language? Circle your answer.

$\frac{27}{50}$

$\frac{2}{25}$

$\frac{12}{25}$

$\frac{13}{50}$

[1]

- (d) If a student studying French is chosen at random, what is the probability that they study exactly one other language?

.....  
[2]

[Total 6 marks]

Leave  
blank

- 19  $y$  is inversely proportional to the square root of  $x$ .  
When  $y = 12$ ,  $x = 0.09$   
Find the value of  $x$  when  $y = 9$

$x = \dots\dots\dots$

**[Total 3 marks]**

- 20 The volumes of two spheres are in the ratio 1 : 8.  
The surface area of the larger sphere is  $28 \text{ cm}^2$ .  
What is the radius,  $r$ , of the smaller sphere?  
Give your answer to 2 decimal places.

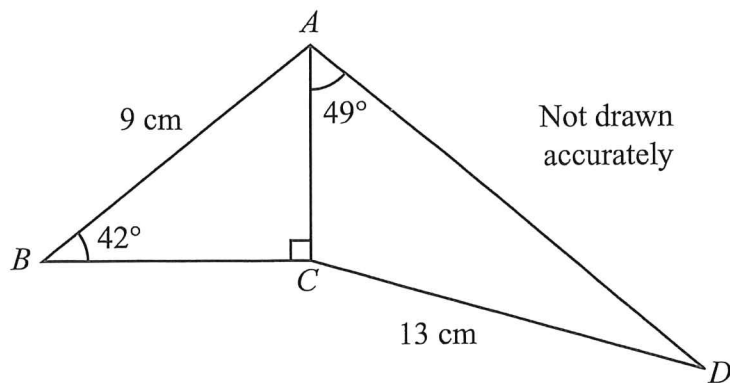
Surface area of a sphere = $4\pi r^2$
---------------------------------------

$r = \dots\dots\dots \text{ cm}$

**[Total 4 marks]**

- 21 The diagram below shows two triangles,  $ACB$  and  $ACD$ .

Leave  
blank



Find the size of angle  $ADC$ .

angle  $ADC = \dots\dots\dots^\circ$

**[Total 4 marks]**

22 The functions  $f$  and  $g$  are defined as follows.

*Leave  
blank*

$$f(x) = 2x + 3$$

$$g(x) = f^{-1}(x)$$

(a) Solve the equation  $f(x)^2 = 5$ . Give your answers to 3 significant figures.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

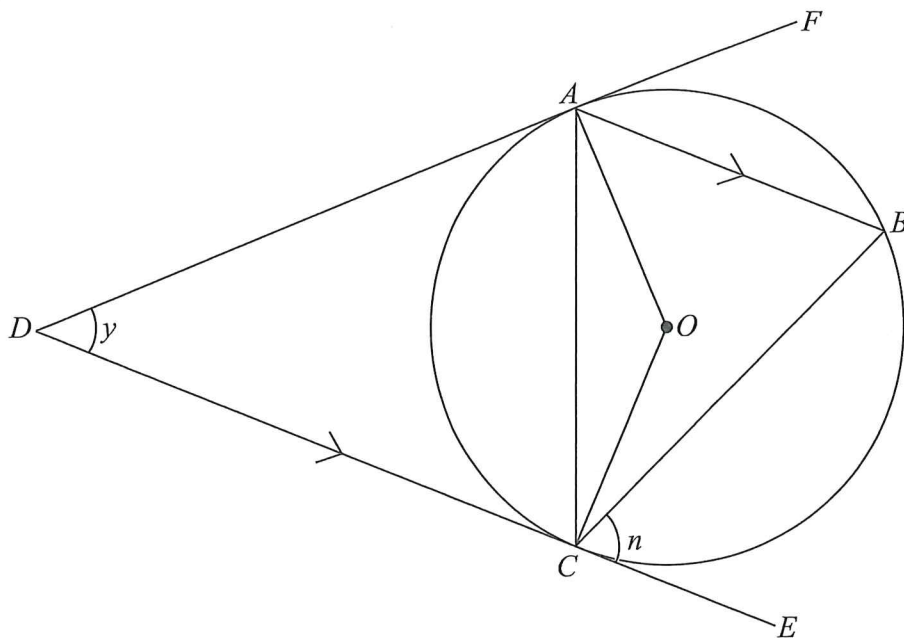
(b) Work out the value of  $gg(x)$  when  $f(x) = 27$

$\dots\dots\dots$  [3]

**[Total 6 marks]**

- 23 The points  $A$ ,  $B$  and  $C$  lie on a circle.  
 Point  $O$  lies at the centre of the circle.  
 Lines  $DF$  and  $DE$  are tangents to the circle at points  $A$  and  $C$  respectively.  
 Lines  $AB$  and  $DE$  are parallel.  
 Angle  $BCE = n$

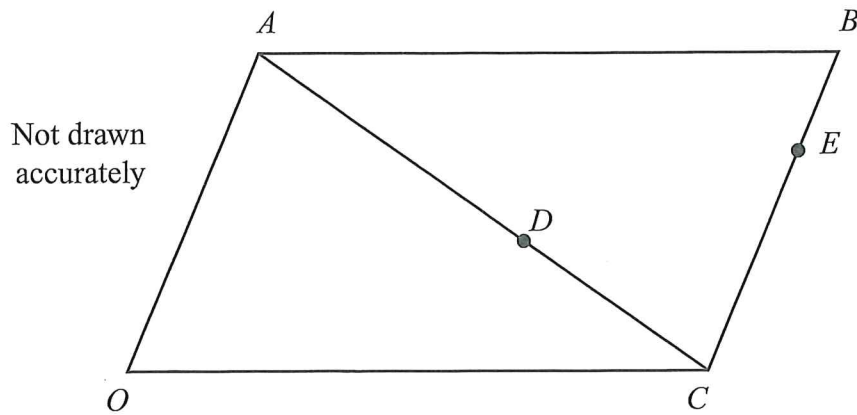
Leave  
blank



Show that  $y = 180^\circ - 2n$ . You must give a reason for each stage of your working.

**[Total 4 marks]**

- 24 The diagram shows the parallelogram  $OABC$ .  
The point  $D$  lies on  $AC$ , such that  $AD:DC = 3:2$ .  
The point  $E$  lies  $\frac{2}{3}$  of the way along line  $CB$ .



$$\overrightarrow{OA} = \mathbf{a} \text{ and } \overrightarrow{OC} = \mathbf{c}$$

Show that  $ODE$  is a straight line.

Leave  
blank

*[Total 5 marks]*

***[TOTAL FOR PAPER = 80 MARKS]***