

General Certificate of Secondary Education

GCSE AQA Mathematics (Grade 9-1) Higher Tier

Centre name				
Centre number				
Candidate number				

Practice Set 2 Paper 3: 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 π button, take the value of π 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		12	
2		13	
3		14	
4		15	
5		16	
6		17	
7		18	
8		19	
9		20	
10		21	
11		22	
Total			

1 Circle the fraction that is closest to the decimal 0.648

$\frac{1}{2}$

$\frac{15}{21}$

$\frac{3}{7}$

$\frac{11}{16}$

[Total 1 mark]

2 Circle the expression below that is equivalent to $3x + 5y + 7y - (9x + y)$.

$-6x + 13y$

$6x - 11y$

$6x + 11y$

$-6x + 11y$

[Total 1 mark]

3 Fully factorise $20x^3y + 4xy^2$. Circle your answer.

$4x^3(5xy + y^2)$

$4y(5x^3 + 2xy)$

$4x^3y^2(5y + 4x)$

$4xy(5x^2 + y)$

[Total 1 mark]

4 Solve $\frac{3x + 4}{2} = \frac{5x + 3}{3}$

$x = \dots\dots\dots$

[Total 3 marks]

- 5 A DVD that costs £8.99 on a British internet shopping website costs \$12.99 on an American website and €10.99 on a French website.

Exchange rates for dollars, pounds and euros are shown below:

$$£1 = \$1.43$$

$$€1 = £0.81$$

Which website is selling the DVD for the cheapest price?

.....
[Total 3 marks]

- 6 The width of a rectangular room is 5.4 m, truncated to 1 decimal place.

(a) Find the error interval for the width, w .

.....
[2]

The length of the room is 12.3 m, correct to 3 significant figures.

(b) Find the smallest possible area of the room.

..... m²
[3]

[Total 5 marks]

7 Two stationery shops have special offers on sticky notes.

Shop A: £2.65 for 160 sticky notes + 25% extra free

Shop B: £2.98 for 160 sticky notes — buy 1, get 1 half price

Harold needs to buy 2700 sticky notes for his business.
Which shop would be cheaper? Show your working.

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.....
[Total 4 marks]

8 Show clearly that $16^{-\frac{3}{2}} = \frac{1}{64}$

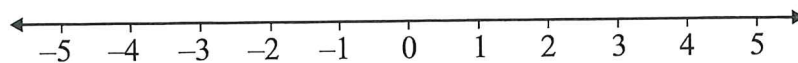
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[Total 2 marks]

9 (a) Solve $2x - 5 < 5x + 4$

.....
[2]

(b) Show the solution on this number line.

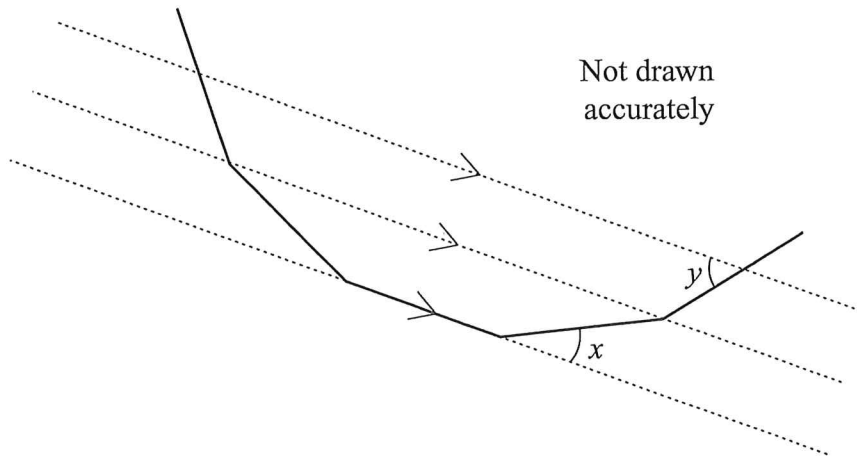


[1]

[Total 3 marks]

10 The diagram shows part of a 16-sided regular polygon.

Leave blank



(a) Circle the size of angle x .

72°

22.5°

45°

16°

[1]

(b) Calculate the size of angle y .

$y = \dots\dots\dots^\circ$
[2]

[Total 3 marks]

11 A scientist models the population of a colony of penguins using the formula $P = 8000 \times 0.93^t$, where t is the number of years after 2015.

(a) Write down the value of P in 2015.

$P = \dots\dots\dots$
[1]

(b) Find the number of penguins that the model predicts there will be in 2018.

$\dots\dots\dots$
[2]

(c) How many whole years after 2015 is the population of penguins predicted to have fallen below 5000?

$\dots\dots\dots$
[2]

[Total 5 marks]

Leave
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12 $\mathbf{a} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$

If $m\mathbf{a} + n\mathbf{b} = \begin{pmatrix} 1 \\ -6 \end{pmatrix}$, find the values of m and n .

$m = \dots\dots\dots$

$n = \dots\dots\dots$

[Total 4 marks]

13 Eddie drove from Carlisle to Preston in 1 hour 45 minutes, at an average speed of 60 mph. He then drove a further 23 miles to Blackpool in 35 minutes.

Find Eddie's average speed for his journey from Carlisle to Blackpool, to the nearest 1 mph.

$\dots\dots\dots$ mph

[Total 3 marks]

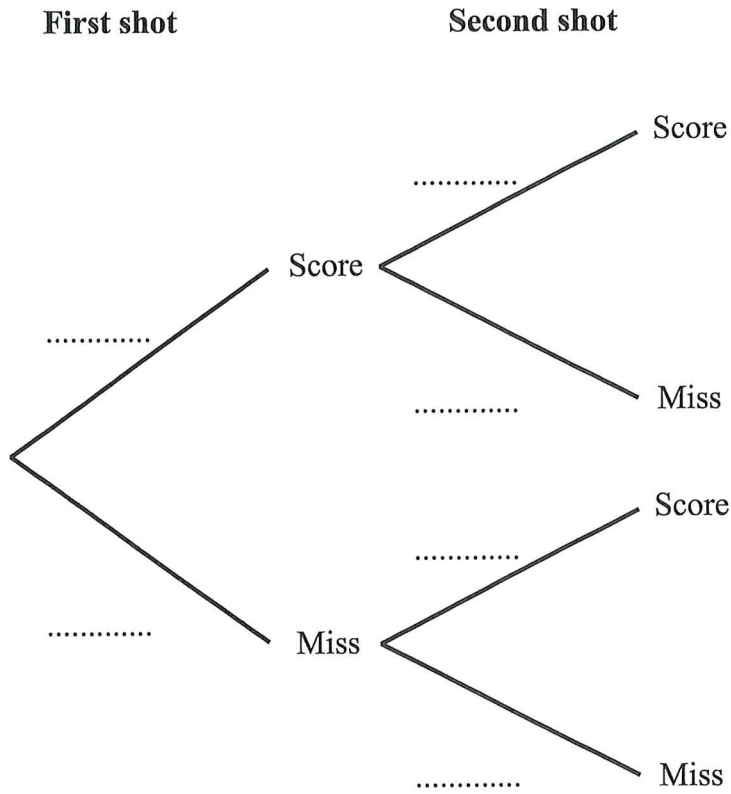
14 In a basketball game, Jack takes two shots.

The probability that Jack scores with the first shot is 0.7

The probability of Jack scoring with both shots is 0.56

The probability of Jack missing with both shots is 0.18

(a) Complete the tree diagram to show these probabilities:



[3]

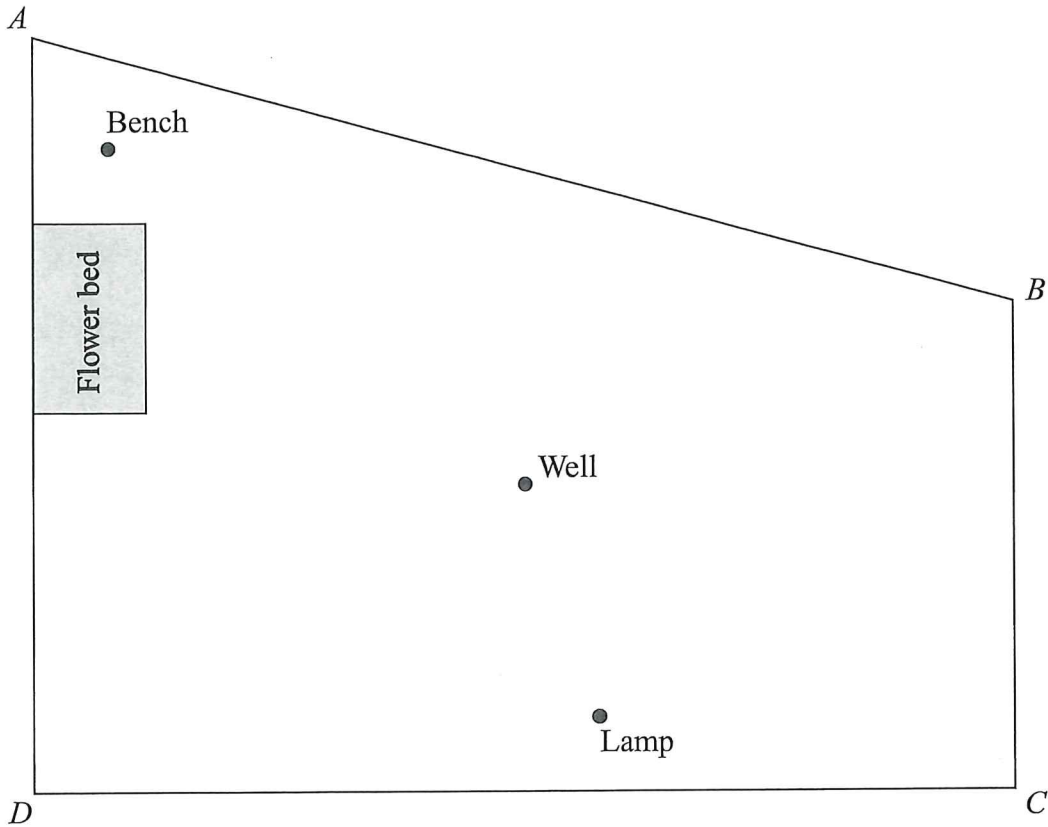
(b) Given that Jack scores with exactly one shot, is it more likely that Jack missed his first or his second shot? Show your working.

.....
[3]

[Total 6 marks]

- 15 Antony is drawing a scale diagram of a show garden.
 On the diagram the scale is 1 cm = 1 m.
 Lines AB , BC , CD and AD make up the boundaries of the garden.

Leave
blank



- (a) A fountain is placed closer to the bench than the well,
and within 3 m of boundary CD .

Shade the area in which the fountain is placed.
Show all of your construction lines.

[3]

- (b) An electrical wire runs from a point on boundary AB to the lamp.

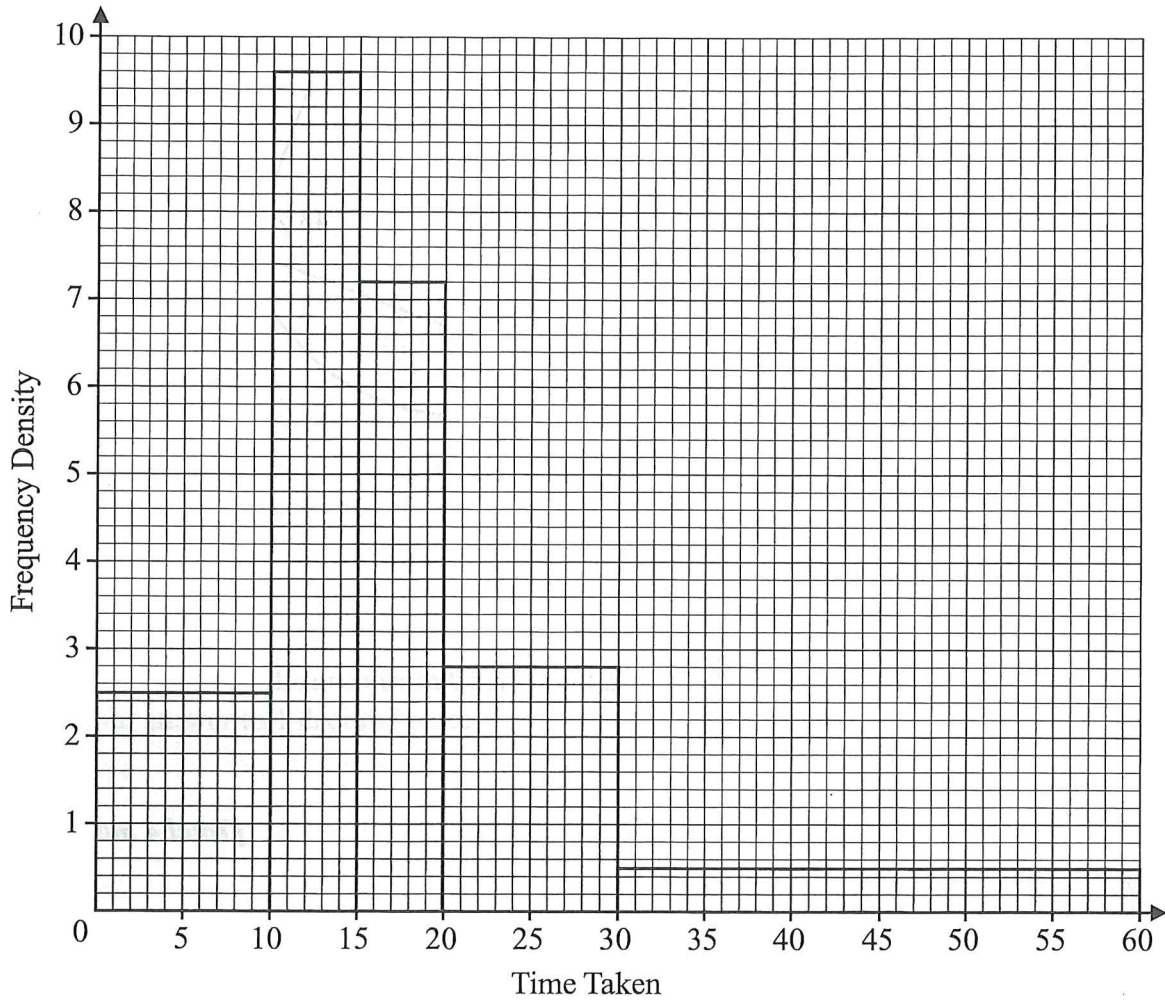
What is the shortest length that the wire could be?
Show all of your construction lines.

..... m
[2]

[Total 5 marks]

- 16 The time taken for students to travel to school was recorded. The histogram shows the results.

Leave blank



- (a) Use the histogram to complete the grouped frequency table below.

Time taken (t)	$0 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 60$
Frequency					

[2]

- (b) The school day begins at 8:40 am. Estimate the number of students who must leave home before 8:15 am if they are to arrive at school on time.

[3]

[Total 5 marks]

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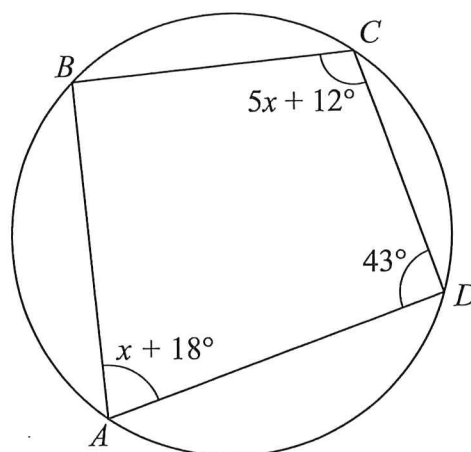
17 A, B, C and D are points on the circumference of a circle.

Angle $BAD = x + 18^\circ$

Angle $BCD = 5x + 12^\circ$

Angle $ADC = 43^\circ$

Show that $ABCD$ is a trapezium.



Not drawn
accurately

[Total 4 marks]

18 A sequence is defined by the term-to-term rule $u_{n+1} = (u_n)^2 - 3u_n - 1$

(a) If $u_1 = 5$, show that $u_3 = 53$

[2]

(b) If $u_1 = 3$, what is the value of u_{171} ?

$u_{171} = \dots\dots\dots$ [3]

[Total 5 marks]

During an orienteering competition, Mhairi runs 457 m on a bearing of 060° from checkpoint C to Checkpoint D . She then runs 350 m on a bearing of 160° to Checkpoint E .

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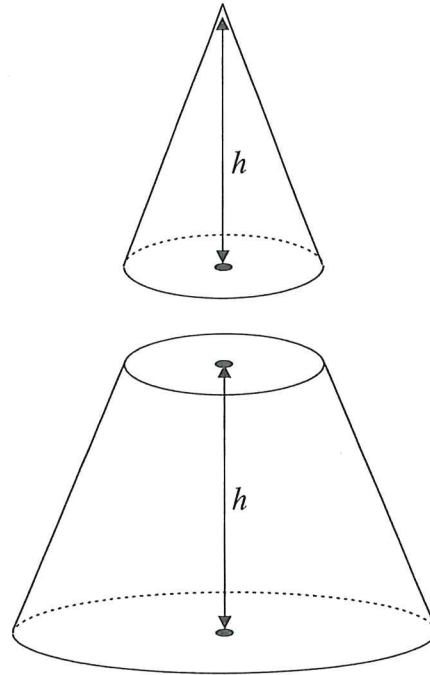
Calculate the direct distance from Checkpoint E to Checkpoint C .
Give your answer to 1 decimal place.

..... m

[Total 4 marks]

- 20 A frustum is made by removing a small cone from the pointed end of a full cone.
The small cone and the frustum have the same height.
Find the following ratio in its simplest form.

Volume of the small cone : Volume of frustum



$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

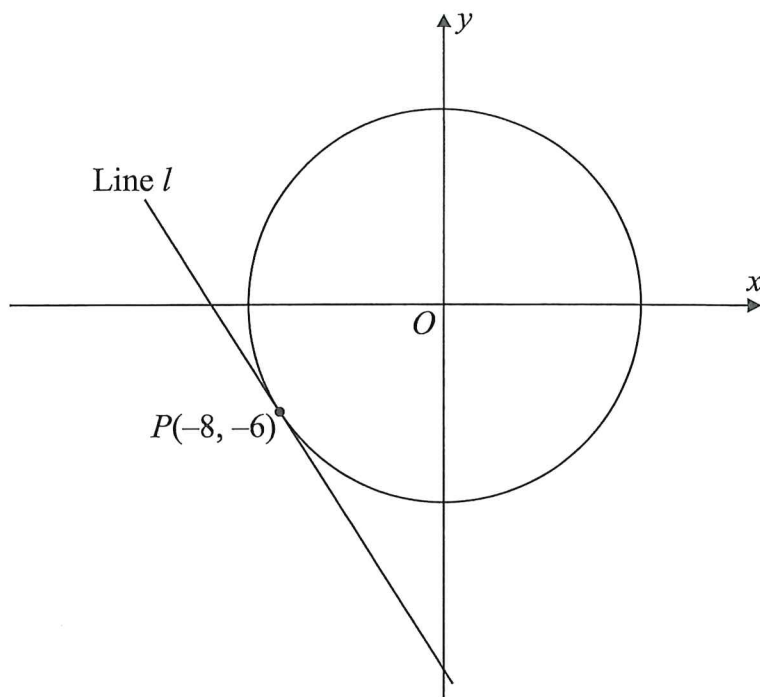
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.....

[Total 4 marks]

- 21 The diagram shows a circle with centre $(0, 0)$.
Line l is a tangent to the circle at the point $P(-8, -6)$.

Leave
blank



Find the equation of line l .

.....

[Total 4 marks]

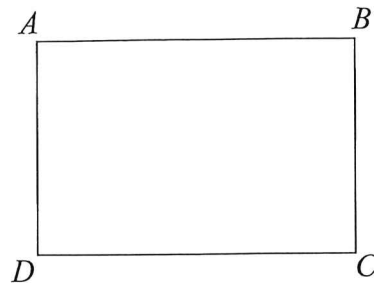
22 A rectangular field, $ABCD$, has lengths such that:

$$AB = CD, BC = AD \text{ and } AB > BC$$

$$AB = \frac{1}{3x} \text{ miles, } BC = \frac{x}{6} \text{ miles.}$$

The perimeter of the field is exactly 1 mile.

Find the lengths of sides AB and BC .



Not drawn
accurately

Leave
blank

$$AB = \dots\dots\dots \text{ miles}$$

$$BC = \dots\dots\dots \text{ miles}$$

[Total 5 marks]

[TOTAL FOR PAPER = 80 MARKS]