Step Up Maths Practice Paper GCSE (9–1) Mathematics Foundation Paper 3

(Calculator) Time: 1 hour 30 minutes Total Marks: 80
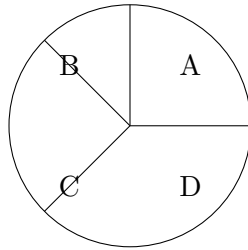
ANSWER ALL QUESTIONS

1. (a) Write 275000 in standard form.

(b) Write 7.218×10^{-3} as an ordinary number.

(Total for Question 1 is 2 marks)

2. Here is a biased spinner.

The table shows the probabilities that when the spinner is spun it will land on A, on B, on C and on D.

Letter	A	B	C	D
Probability	0.35	0.18	0.42	0.05

Ahmed will spin the spinner 250 times.
Work out an estimate for the number of times the spinner will land on C.

(Total for Question 2 is 2 marks)

3. Maya works at a meteorological station.

The table gives information about the wind speed, S mph, at noon for each of 60 cities in the UK on Friday.

Wind speed (S mph)	Frequency
$5 < S \leq 10$	3
$10 < S \leq 15$	9
$15 < S \leq 20$	15
$20 < S \leq 25$	25
$25 < S \leq 30$	8

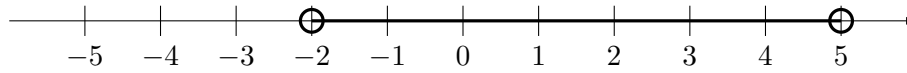(a) Calculate an estimate for the mean wind speed.

Maya says,

"The median wind speed is 17.5 mph because 17.5 is the middle number in the middle group."

(b) Is Maya correct?

Give a reason for your answer.

(Total for Question 3 is 4 marks)

4. Daniel is asked to show the inequality $-2 < x \leq 5$ on a number line.
Here is his answer.

(a) Write down two mistakes Daniel has made.

1 ....

2 ....

(b) Work out the greatest integer that satisfies the inequality $4y - 9 < 15$

(Total for Question 4 is 4 marks)

5. Katie buys boxes of markers and packages of notebooks.
There are 24 markers in each box.
There are 16 notebooks in each package.
Katie buys exactly the same number of markers and notebooks.
Work out how many boxes of markers and how many packages of notebooks she could have bought.
You must show all your working.

(Total for Question 5 is 3 marks)

6. A factory needs to produce a large number of identical parts.
It would take 40 hours to make all the parts using 3 machines.
How many machines are needed to make all the parts in 5 hours?

(Total for Question 6 is 2 marks)

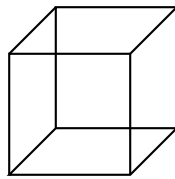**7.** Jasmine traveled by bus and by train.
She traveled 87 miles by bus at an average speed of 29 miles per hour.
Jasmine then traveled for 4 hours and 45 minutes by train.
Work out, in hours and minutes, Jasmine's total traveling time.

<div align="right">(Total for Question 7 is 3 marks)</div>

8. The diagram shows a solid cube placed on a horizontal table.

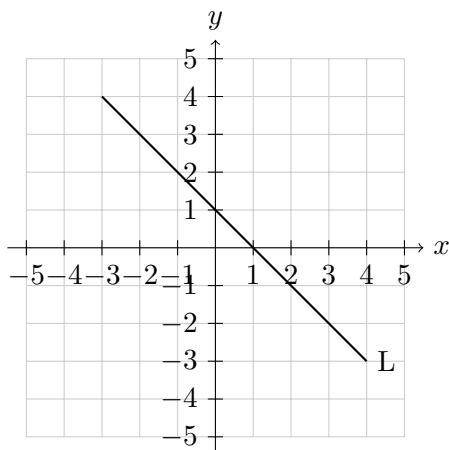pressure $= \frac{\text{force}}{\text{area}}$

The pressure on the table due to the cube is 4.2 newtons/cm^2
The force exerted by the cube on the table is 672 newtons.
Show that the total surface area of the cube is less than 1000 cm^2

<div align="right">(Total for Question 8 is 3 marks)</div>

9. The line L is shown on the grid.

Find an equation for L.

<div align="right">(Total for Question 9 is 3 marks)</div>

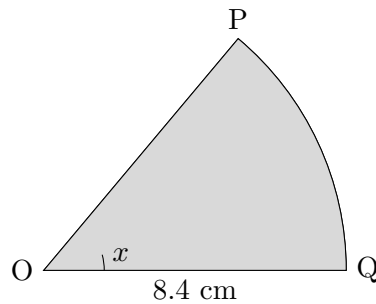**10.** Make n the subject of $j = p + \frac{3n}{4}$

<div align="right">(Total for Question 10 is 3 marks)</div>

11. The floor plan of a garden is drawn using a scale of 1:75
On the plan, a flower bed in the garden has an area of 36 cm^2
Work out the real area of the flower bed.
Give your answer in m^2

<div align="right">(Total for Question 11 is 3 marks)</div>

12. The diagram shows a shaded sector POQ of a circle with center O and radius 8.4 cm.

The area of the shaded sector is 97.8 cm^2
Calculate the size of angle x.
Give your answer correct to 3 significant figures.

<div align="right">(Total for Question 12 is 2 marks)</div>

13. Simon planted 100 seeds of the same type in a greenhouse.
The cumulative frequency graph shows information about the heights, in cm, of these plants.
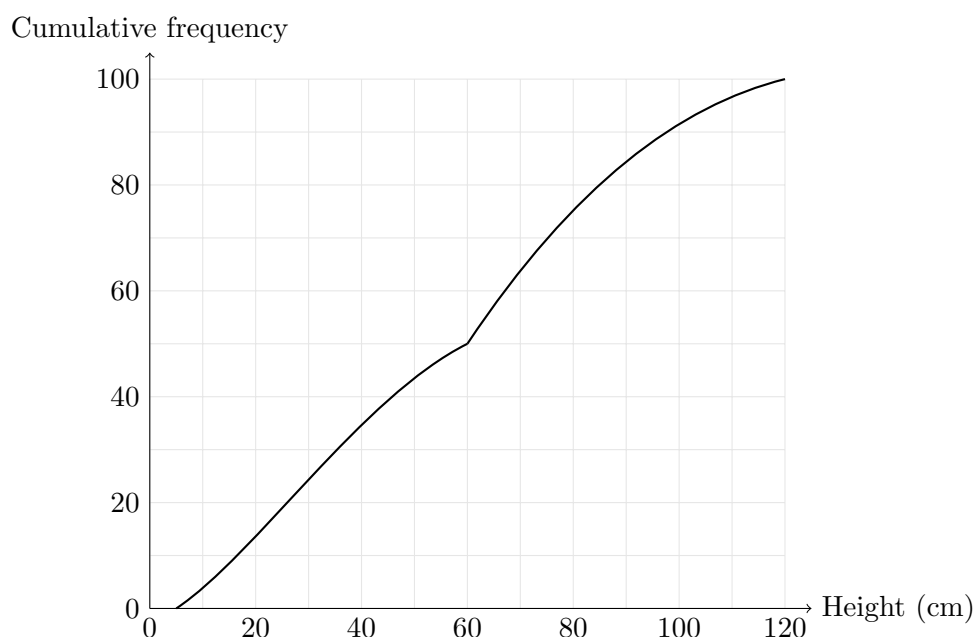
One of the plants is chosen at random.
(a) Find an estimate for the probability that this plant will have a height greater than 65 cm.

(b) Use the graph to find an estimate for the median height.

(c) Use the graph to find an estimate for the interquartile range of the heights.

Simon also planted seeds of the same type outside.
The interquartile range of the heights of these plants is 25 cm.
   (d) Give one comparison between the distribution of the heights of the plants grown in the greenhouse with the distribution of the heights of the plants grown outside.
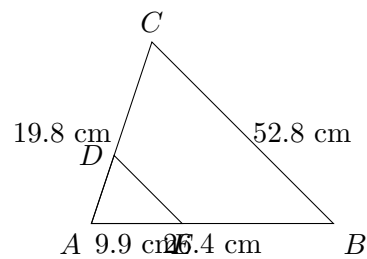
(Total for Question 13 is 6 marks)

14. Here are the first six terms of a quadratic sequence.

$$3 \quad 8 \quad 15 \quad 24 \quad 35 \quad 48$$

Find an expression, in terms of n, for the nth term of this sequence.

<div style="text-align: right;">(Total for Question 14 is 2 marks)</div>

15. The diagram shows triangle ABC and triangle AED.

Show that triangle ABC and triangle AED are similar.

<div style="text-align: right;">(Total for Question 15 is 2 marks)</div>

16. Olivia has to set a 4-digit security passcode on her tablet.
Each digit of the passcode is a number from 1 to 9
She can use each number more than once.
Olivia tells her friend Sophia that:

the first digit is a square number
the second digit is a prime number
the third digit is greater than 5
the fourth digit is an even number.

The diagram shows one possible 4-digit passcode.

4 5 7 6

Sophia is going to have one attempt at guessing Olivia's passcode.
Work out the probability that Sophia guesses Olivia's passcode on the first attempt.

(Total for Question 16 is 3 marks)

17. (a) (i) Write $x^2 - 10x + 6$ in the form $(x - a)^2 - b$ where a and b are integers.

(ii) Hence, write down the coordinates of the turning point on the graph of $y = x^2 - 10x + 6$

(b) Solve $5x^2 + 9x - 4 = 0$
Give your solutions correct to 3 significant figures.

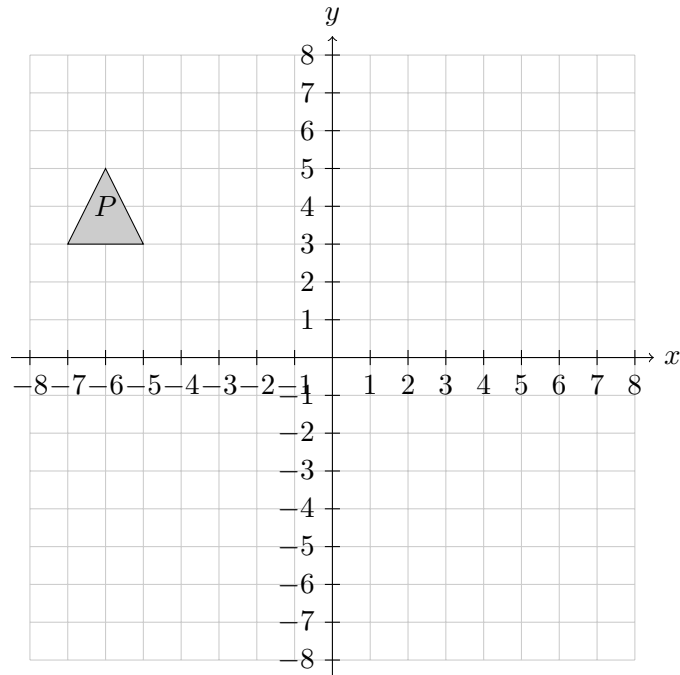Juan has to find the solutions of the quadratic equation $4k^2 - 14k - 6 = 0$
Here is his working and answer.

$$(4k - 6)(k + 1) = 0$$
$$k = 1.5 \text{ or } k = -1$$

(c) What mistake has Juan made?

(Total for Question 17 is 7 marks)

18.

(a) Enlarge triangle P by scale factor -2 with center of enlargement $(-3, -2)$
Label your image Q.

Triangle P is transformed by a combined transformation of a rotation of 90° clockwise about the origin followed by a translation to give triangle R.
Exactly one vertex of triangle P is invariant under the combined transformation.
(b) Find one possible column vector for the translation.
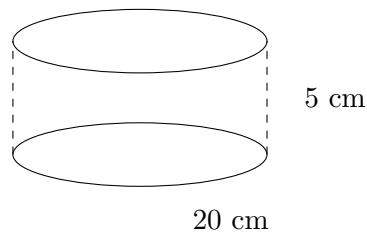
(Total for Question 18 is 3 marks)

19.

Volume of sphere $= \frac{4}{3}\pi r^3$

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

5 cm
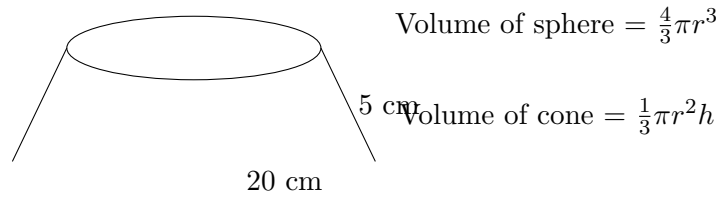
20 cm

The diagram above shows a frustum F of a cone.
The frustum is made by removing a cone with height 8 cm from a solid cone with height 12 cm and base diameter 20 cm.
The solid S is made by removing F from a solid hemisphere as shown in the diagram below.

5 cm

20 cm

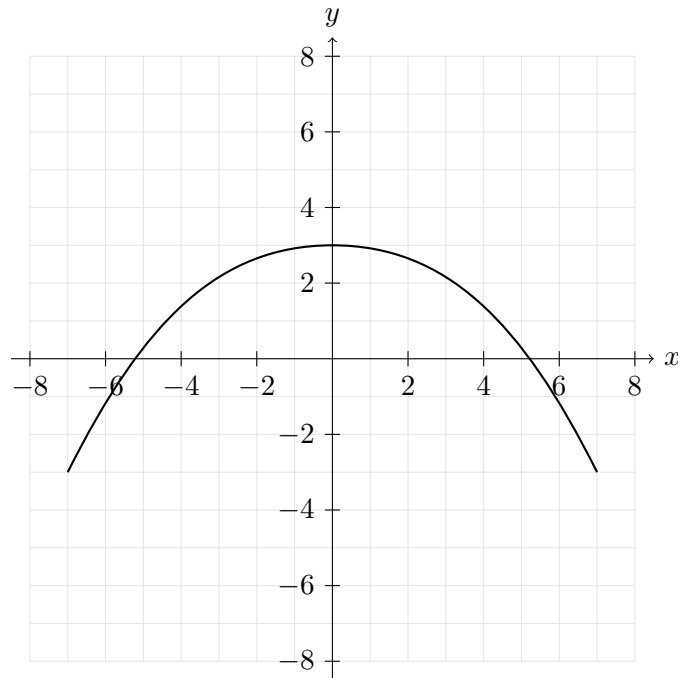The hemisphere has diameter 20 cm.
Calculate the volume of solid S.
Give your answer correct to 3 significant figures.

(Total for Question 19 is 4 marks)

20. The turning point on the graph of $y = h(x)$ has coordinates $(-2, 8)$

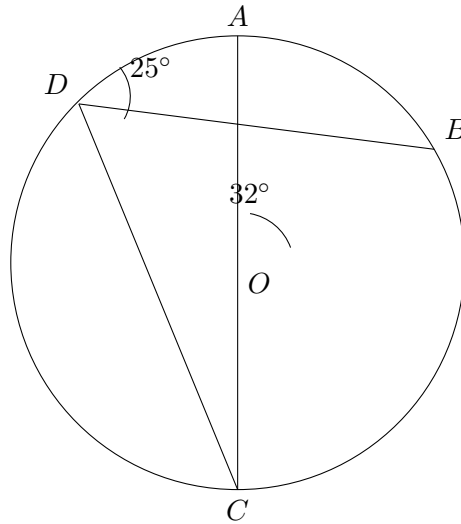(a) Write down the coordinates of the turning point on the graph of $y = h(x - 5)$

The graph of $y = f(x)$ is shown on the grid.

(b) On the grid, sketch the graph of $y = f(-x) - 2$

(Total for Question 20 is 3 marks)

21.

A, B, C and D are points on the circumference of a circle, center O.
AC is a diameter of the circle.
Work out the size of angle BAC.
Write down any circle theorems that you use.

(Total for Question 21 is 4 marks)

22. Theo makes some jewelry to sell.

The materials to make all the jewelry cost £240, correct to the nearest £10

Theo sells all the jewelry for a total of £920, correct to the nearest £10

The total time taken to make and sell all this jewelry was 58 hours, correct to the nearest hour.

Theo uses this method to calculate his hourly rate of pay:

$$\text{Hourly rate of pay} = \frac{\text{total selling price} - \text{total cost of materials}}{\text{total time taken}}$$

The minimum hourly rate of pay for someone of Theo's age is £9.50

By considering bounds, determine if Theo's hourly rate of pay was definitely more than £9.50

You must show all your working.

(Total for Question 22 is 4 marks)

23. Given that $\frac{3x^2+y^2}{5x^2-y^2} = \frac{37}{13}$ where $x > 0$ and $y > 0$
find, in its simplest form, the ratio $x : y$

<div align="right">(Total for Question 23 is 4 marks)</div>

24. The diagram shows a triangular prism with a horizontal rectangular base ABCD.

3.6 cm
T
16.2 cm
D M A P C 4.5 cm B
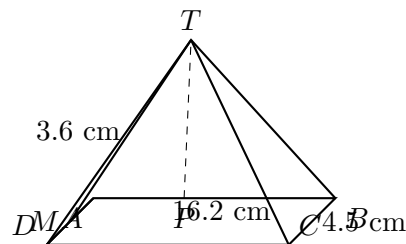
     M is the midpoint of AD.
The vertex T of the prism is vertically above M.
AB = 16.2 cm   BC = 4.5 cm   MT = 3.6 cm
P is the point on AB such that:
AP:PB = 3:5
Calculate the size of the angle between TP and the base ABCD of the prism.
Give your answer correct to 1 decimal place.

<div align="right">(Total for Question 24 is 4 marks)</div>

TOTAL FOR PAPER IS 80 MARKS