

Dr Oliver Mathematics
Mathematics: National Qualifications N5
2025 Paper 2: Calculator
1 hour 30 minutes

The total number of marks available is 50.

To earn full marks you must show your working in your answers.

1. The number of visitors to a zoo in 2024 was 118 750. (3)

The number of visitors is expected to increase by 4% each year over the next two years.

Calculate the expected number of visitors in 2026.

2. A shop sells footballs in the shape of a sphere with diameter 21 centimetres. (3)



Calculate the volume of the football.

Give your answer correct to 3 significant figures.

3. The mass of one atom of gold is 3.27×10^{-22} grams. (2)

The mass of one atom of carbon is 6.1% of the mass of an atom of gold.

Calculate the mass of one atom of carbon.

Give your answer in scientific notation.

4. The weights, in kilograms, of a sample of rugby players in Scotland are shown:

93 103 99 105 88 106 92

- (a) Calculate the mean and standard deviation of these weights. (4)

A sample of rugby players in France has a mean weight of 105 kilograms and a standard deviation of 5.9 kilograms.

- (b) Make two valid comments comparing the weights of the rugby players in the samples from Scotland and France. (2)

5. Express (2)

$$x^2 + 10x + 19$$

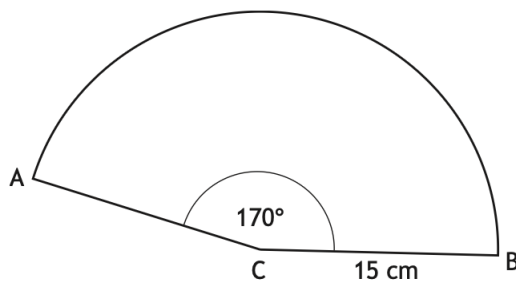
in the form

$$(x + a)^2 + b.$$

6. A party hat is made in the shape of a cone, as shown. (3)



The piece of card used for making the hat is a sector of a circle, centre C .

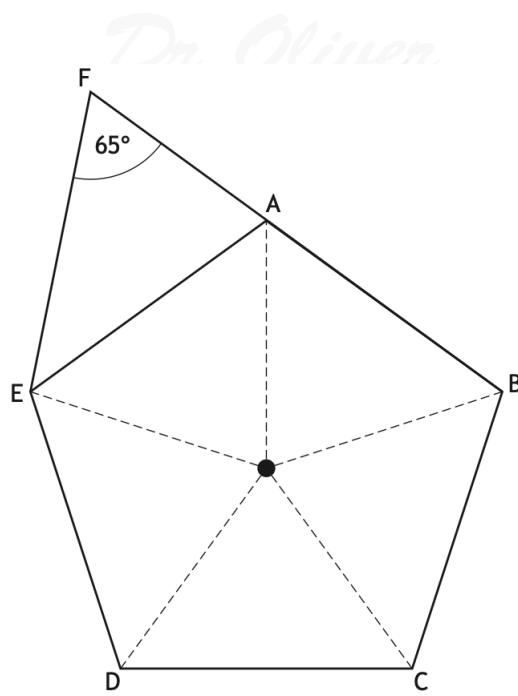


The radius of the circle is 15 centimetres and angle ACB is 170° .

Calculate the area of the sector.

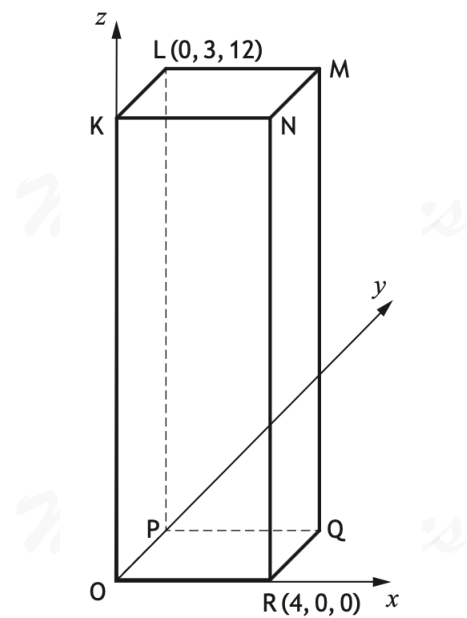
7. In the diagram, $ABCDE$ is a regular pentagon. (2)

- Angle EFA is 65° .
- FAB is a straight line.



Calculate the size of angle FEA .

8. The diagram shows a cuboid, $KLMNOPQR$, relative to the coordinate axes.



- L has coordinates $(0, 3, 12)$.
- R has coordinates $(4, 0, 0)$.

(a) Write down the coordinates of M .

(1)

(b) Calculate the length of the space diagonal OM . (3)

9. Change the subject of the formula (3)

$$B = \frac{1}{4}kc^2 - 3c$$

to k .

10. On Bob's lorry there are 7 stacks of paving slabs and 3 stacks of edging blocks.

The total weight of these stacks is 2 400 kilograms.

Let p be the weight of a stack of paving slabs and e be the weight of a stack of edging blocks.

(a) Write down an equation in p and e to illustrate this information. (1)

Imran has 3 stacks of paving slabs and 4 stacks of edging blocks on his lorry.

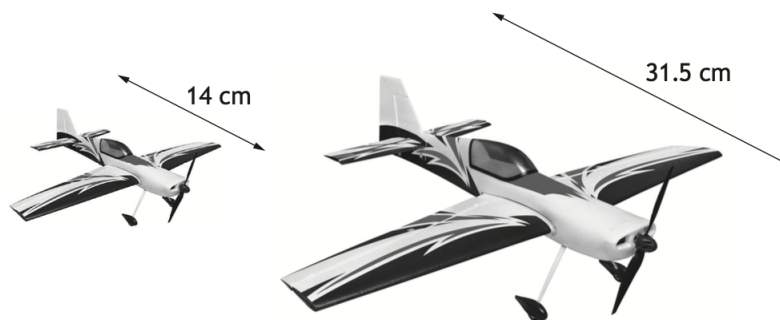
The total weight of these stacks is 1 300 kilograms.

(b) Write down an equation in p and e to illustrate this information. (1)

Beth has 6 stacks of paving slabs and 5 stacks of edging blocks on her lorry.

(c) Calculate the **total weight** of the stacks of paving slabs and edging blocks on Beth's lorry. (4)

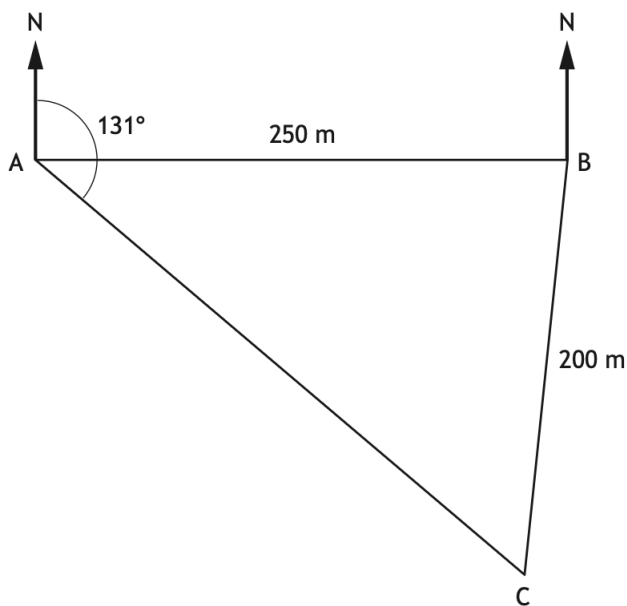
11. Two model aircraft are mathematically similar. (3)



- The small model is 14 centimetres long, and the area of one wing is 24 square centimetres.
- The large model is 31.5 centimetres long.

Calculate the **area** of one wing of the large model.

12. In the diagram A , B , and C represent the positions of three checkpoints in an orienteering course. (4)



- B is 250 metres east of A .
- The bearing of C from A is 131° .
- C is 200 metres from B .

Calculate the bearing of C from B .
Do not use a scale drawing.

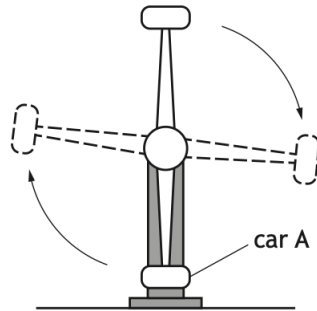
13. Solve the equation (3)

$$\frac{5x + 1}{2} = \frac{4x}{3} + 1.$$

14. A ride at a theme park has a car attached to each end of a rotating arm. (4)



The starting position of car A is shown in the diagram.



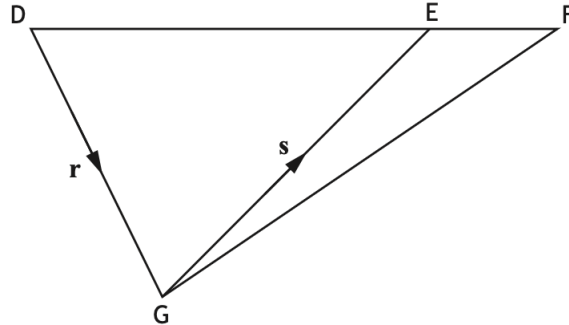
As the arm rotates clockwise, the height, h metres, of car A above the ground in each rotation is given by

$$h = 10 - 8 \cos x^\circ, \quad 0 \leq x < 360,$$

where x° is the angle the arm has turned from car A 's starting position.

Calculate the two values of x for which the height of car A is 13 metres above the ground.

15. In the diagram, $\overrightarrow{DG}$ and $\overrightarrow{GE}$ are represented by the vectors $\mathbf{r}$ and $\mathbf{s}$ respectively, and $\overrightarrow{DE} = 3\overrightarrow{EF}$. (2)



Express $\overrightarrow{GF}$ in terms of $\mathbf{r}$ and $\mathbf{s}$.

Give your answer in its simplest form.