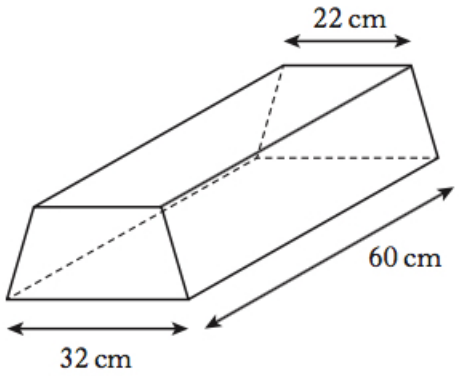
Dr Oliver Mathematics
Mathematics Standard Grade: Credit Level
2013 Paper 2: Calculator
1 hour 20 minutes

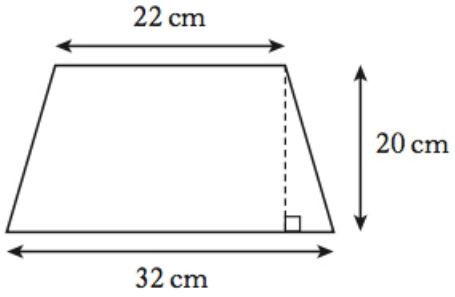
The total number of marks available is 52.
You must write down all the stages in your working.

1. A snail crawls 3 kilometres in 16 days. (4)
   What is the average speed of the snail in metres per second?
   Give your answer **in scientific notation correct to 2 significant figures**.

2. Solve the equation (4)
   $$2x^2 + 7x - 3 = 0.$$
   Give your answers **correct to 1 decimal place**.

3. A concrete block is in the shape of a prism.





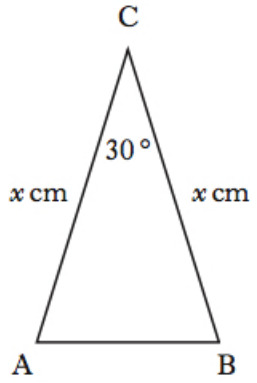
   The cross-section of the prism is a trapezium with dimensions as shown.

   (a) Calculate the area of the cross-section. (3)

   (b) Calculate the volume of the concrete block. (1)

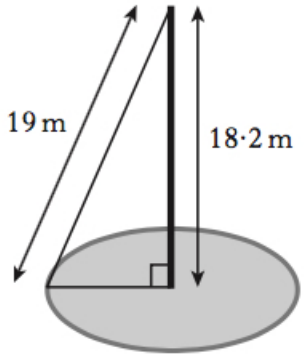
4. Last year, 1 296 learner drivers from "Topflight" school of motoring passed their driving test. (3)
   This was 72% of those who sat their driving test from Topflight.
   How many failed their driving test?

5. ABC is an isosceles triangle with angle $ACB = 30°$. (3)
   $AC = BC = x$ centimetres.



The area of triangle ABC is 9 square centimetres.
Calculate the value of x.

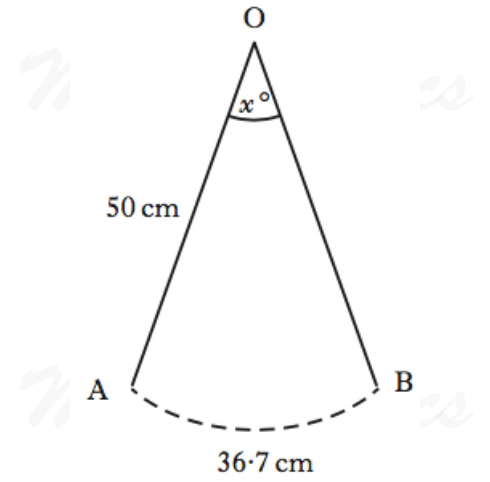
6. A mobile phone mast, 18.2 metres high, stands vertically in the centre of a circle. (3)
It is supported by a wire rope, 19 metres long, attached to the ground at a point on the circumference of the circle, as shown.



Calculate the circumference of the circle.

7. Jack weighs 94 kilograms. (4)
On the 1st of January, he starts a diet which is designed to reduce his weight by 7% per month.
During which month should he achieve his target weight of 73 kilograms?
Show all your working.

8. As the pendulum of a clock swings, its tip moves through an arc of a circle. (3)



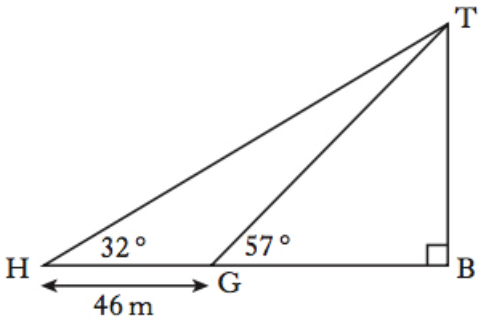
The length of the pendulum is 50 centimetres.
The length of the arc is 36.7 centimetres.
Calculate x°, the angle through which the pendulum swings.

9. In triangle THB: (4)

- angle $TBH = 90^\circ$,
- angle $THB = 32^\circ$.

G is a point on HB:

- angle $TGB = 57^\circ$,
- $GH = 46$ metres.



Calculate the length of TB.

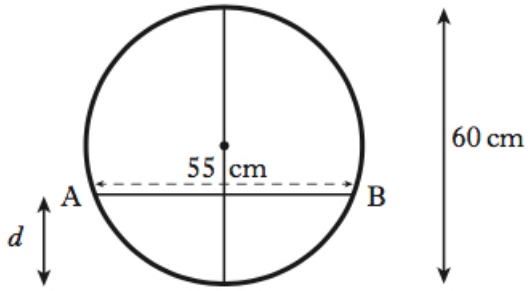
10. A function is given by the formula,

$$\mathrm{f}(x) = 4 \times 2^x.$$

(a) Evaluate f(3). (2)

(b) Given that f(m) = 4, find the value of m. (2)

11. Water flows through a horizontal pipe of diameter 60 centimetres.
The surface width, AB, of the water is 55 centimetres.



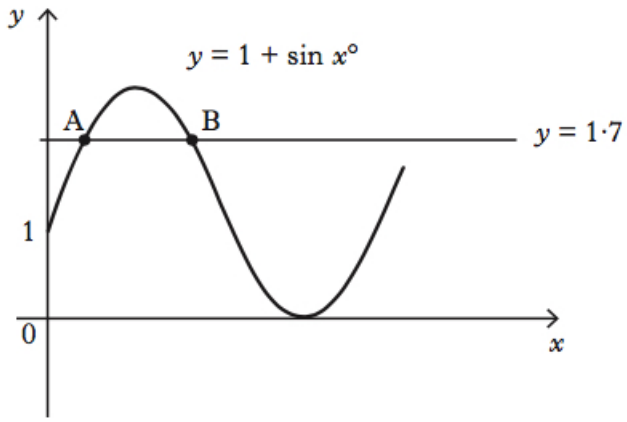
(a) Calculate the depth, d, of the water in the pipe. (4)

(b) What other depth of water would give the same surface width? (1)

12. Part of the graph of (4)

$$y = 1 + \sin x^\circ$$

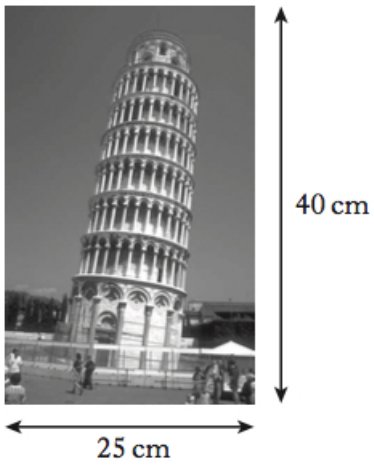
is shown in the diagram below.



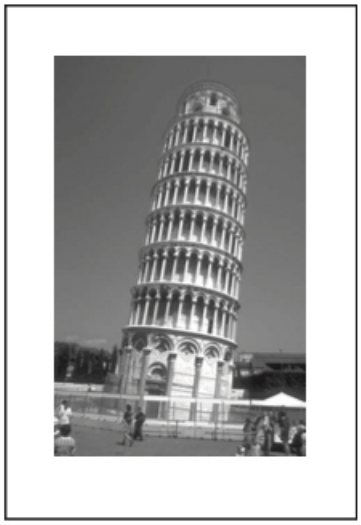
The line $y = 1.7$ is drawn. It cuts the graph of $y = 1 + \sin x^\circ$ at A and B as shown.

Calculate the x-coordinates of A and B.

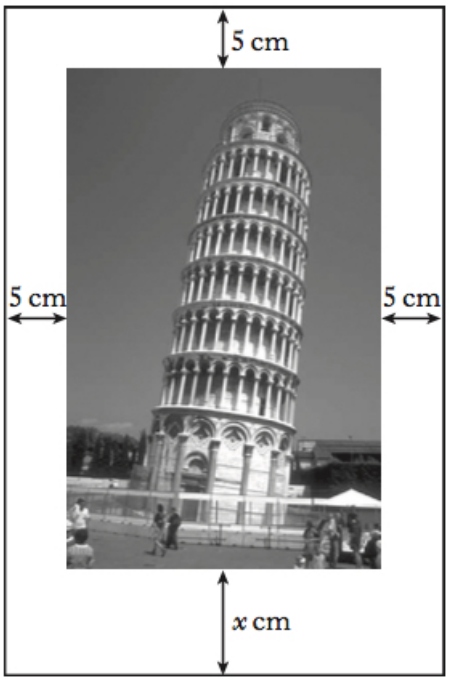
13. Asim has a poster which is 25 centimetres wide and 40 centimetres high. (4)



He decides to place it on a white card. The card and the poster are mathematically similar.



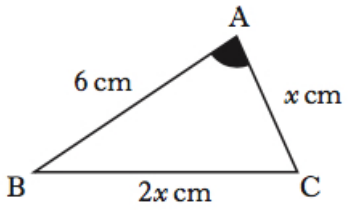
The border is 5 centimetres wide on three sides and x centimetres wide on the fourth side as shown.



Calculate the value of x.

14. In triangle ABC: (3)

- $\cos A = 0.5$,
- $AB = 6$ centimetres,
- $BC = 2x$ centimetres,
- $AC = x$ centimetres.



Show that

$$x^2 + 2x - 12 = 0.$$