Dr Oliver Mathematics
Mathematics: National Qualifications N5
2022 Paper 1: Non-Calculator
1 hour

The total number of marks available is 40.
You must write down all the stages in your working.

1. Evaluate (2)

$$\tfrac{2}{3}(\tfrac{1}{5}+\tfrac{3}{4}).$$

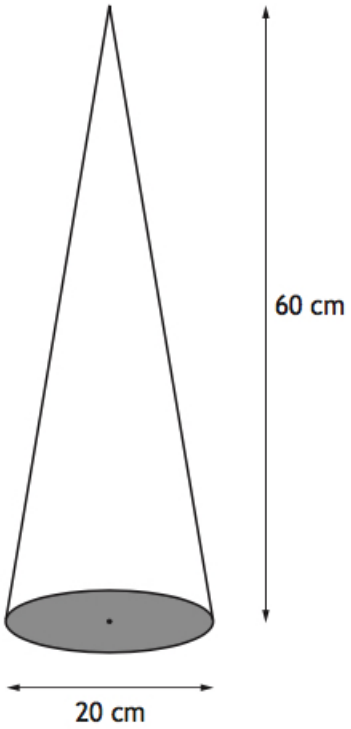
Give your answer in its simplest form.

2. Given that (2)

$$\mathrm{f}(x) = x^3 - 2,$$

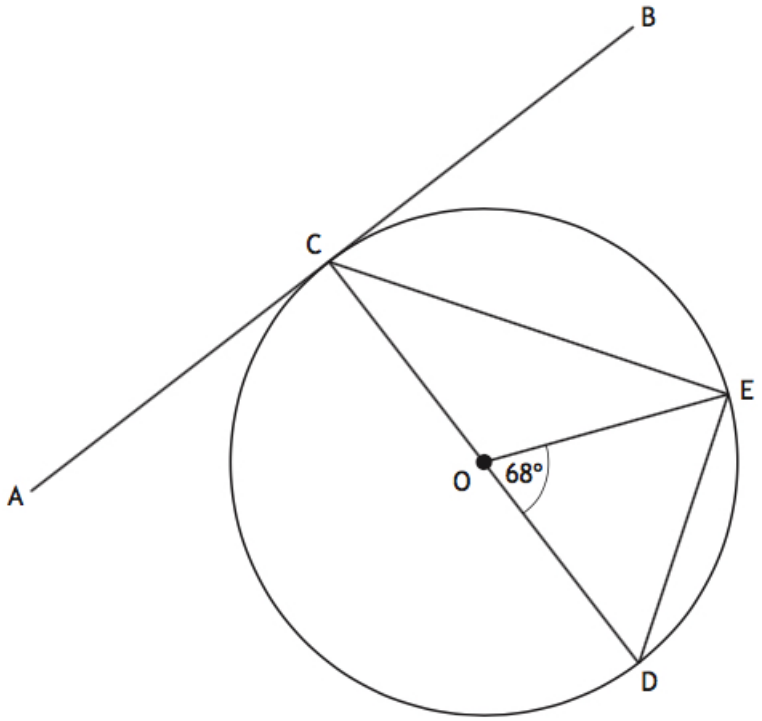
evaluate $\mathrm{f}(-3)$.

3. The diagram below shows a cone with diameter 20 centimetres and height 60 centimetres. (2)



Calculate the volume of the cone.
Take $\pi = 3.14$.

4. The diagram below shows a circle with centre O. (3)



AB is a tangent to the circle at the point C.
CD is a diameter of the circle.
Angle EOD is $68°$.

Calculate the size of angle ACE.

5. (a) Express (2)

$$x^2 + 8x + 15$$

in the form

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

(b) Hence, or otherwise, state the coordinates of the turning point of the graph of (1)

$$\mathrm{f}(x) = x^2 + 8x + 15.$$

6. Find the equation of the line passing through the points $(-3, -1)$ and $(-5, 7)$. (3)

Give the equation in its simplest form.

7. Change the subject of the formula (2)

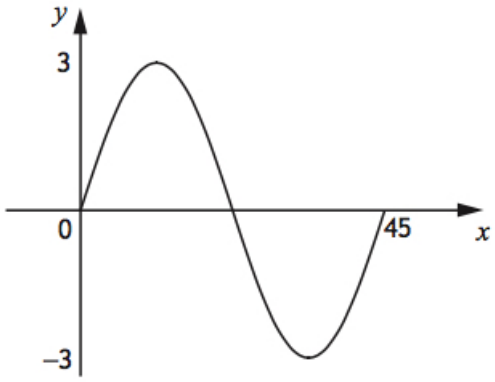
$$D = \frac{B + 4}{C^2}$$

to B.

8. Part of the graph of

$$y = a \sin bx^\circ$$

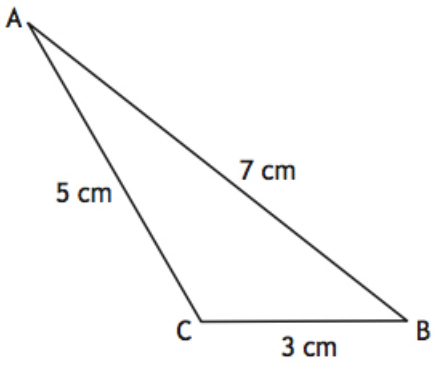
is shown in the diagram.



(a) State the value of a. (1)

(b) State the value of b. (1)

9. The diagram shows triangle ABC. (2)



- $AB = 7$ centimetres.
- $BC = 3$ centimetres.
- $AC = 5$ centimetres.

Calculate the value of $\cos B$.
Give your answer in its simplest form.

10. Tommy buys flower seeds from a website. (3)

Tommy is given a 30% discount.
He pays £16.10 for the seeds.

Calculate the cost of the flower seeds without the discount.

11. Simplify (3)

$$(m^{-2})^4 \times m^{-5}.$$

Give your answer with a **positive** power.

12. Express (2)

$$\frac{4}{x+2} \div \frac{5}{(x+2)^2},\ x \neq -2,$$

as a single fraction in its simplest form.

13. Expand and simplify (3)

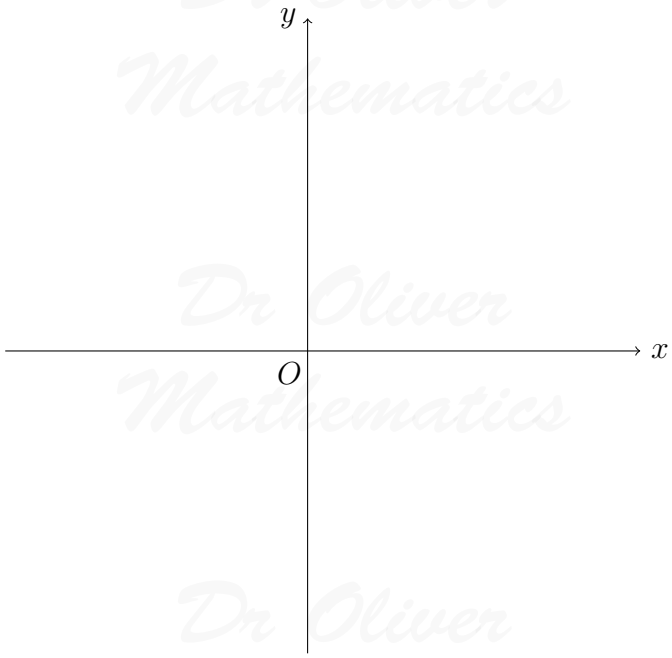
$$\sqrt{10}(\sqrt{10} - \sqrt{2}) + 8\sqrt{5}.$$

14. Sketch the graph of (3)

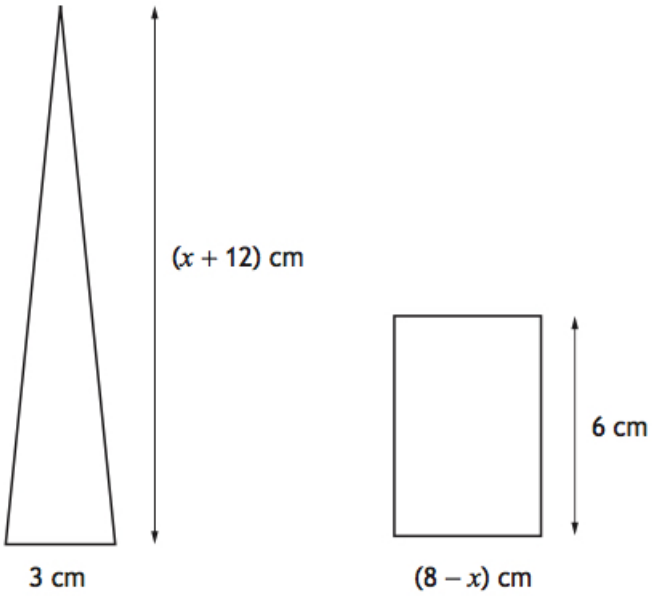
$$y = (x+1)(x-3)$$

using the axes provided below.

On your sketch, show clearly the points of intersection with the x-axis and the y-axis, and the coordinates of the turning point.



15. A triangle and rectangle are shown in the diagram.



(a) Find an expression for the area of the triangle. (1)

(b) Given that the area of the triangle is equal to the area of the rectangle, find algebraically the value of x. (4)