1. (a) The internal angles, in degrees, of a quadrilateral are $12x + 15$, $17x - 10$, $x + 50$ and $15x + 35$.
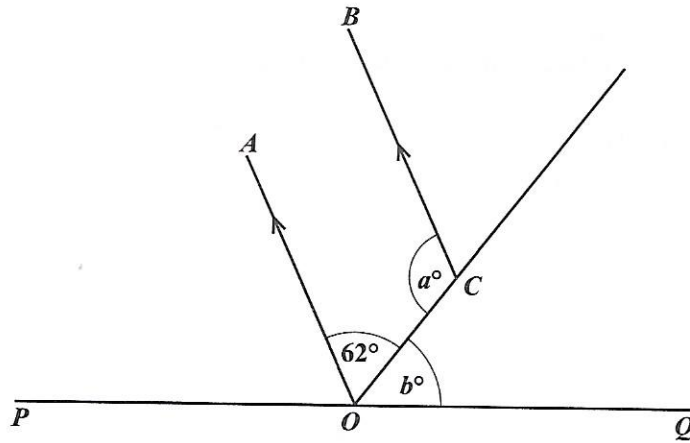
Find the value of x.

....

(1 mark)

(b)   The diagram below, **not drawn to scale**, shows four straight lines *POQ, OA, OC* and *CB*. *OA* is parallel to *CB*.

Given that *OA* **bisects** $P\hat{O}C$ and that $A\hat{O}C = 62°$, find the value of

(i)   *a*

....

(1 mark)

(ii)   *b*.

....

(1 mark)
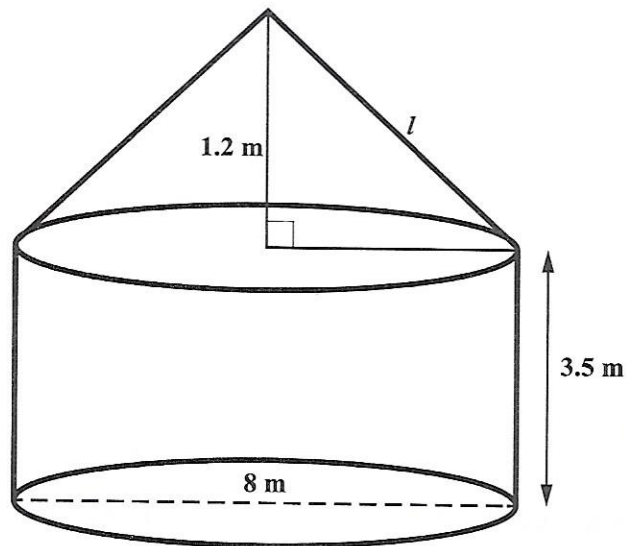
(c)   For this question, you may find the following formulas, related to a cone, useful:

Volume = $\frac{1}{3}$ (base area) × (perpendicular height)

Curved surface area = πr × (slant height)

A farmer constructs a storage tank as shown in the diagram below. The shape of the tank consists of a cylindrical body of height 3.5 m and diameter 8 m, and a conical roof of vertical height 1.2 m.

Use π = 3.14

(i)   Calculate the slanted height, l, of the roof of the tank.

....

(1 mark)

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(ii) Assume that the storage tank is completely sealed and is to be filled with diesel from an opening at the top. Find the capacity, in m³, of the tank, inclusive of the conical roof.

....

(2 marks)

(iii) Show that the TOTAL curved surface area of the tank, to the nearest square metre, is 140 m².

....

(2 marks)

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(iv) The farmer wishes to paint the **exterior** of the tank. Given that 1 gallon (1 gallon $\approx$ 3.79 litres) of paint covers 30 m² of the surface, determine the amount of paint needed, in litres, to completely paint the exterior of the tank.

....

(2 marks)

Total 10 marks

2. (a) A toy rocket is projected upwards from a point, O, on level ground and the vertical height it travels can be modelled by the quadratic function

$$h(x) = 40x - 8x^2,$$

where x is the horizontal distance travelled from the point O.

(i) Find the vertical height of the rocket when it is 1 metre away from O.

....

(1 mark)

(ii) Determine the distance from O when the rocket returns to the ground.

....

(2 marks)

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(b) P is the point with coordinates $(-2, 3)$ and Q is the point with coordinates $(-5, -1)$.

        (i)   Show that the gradient (slope), m, of the straight line that passes through the points P and Q is $m = \dfrac{4}{3}$.

....

(2 marks)

(iii) What is the value of x when h is greatest? Calculate the value of this greatest height.

....

(2 marks)