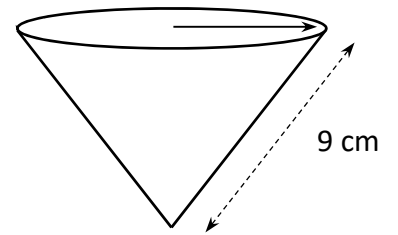


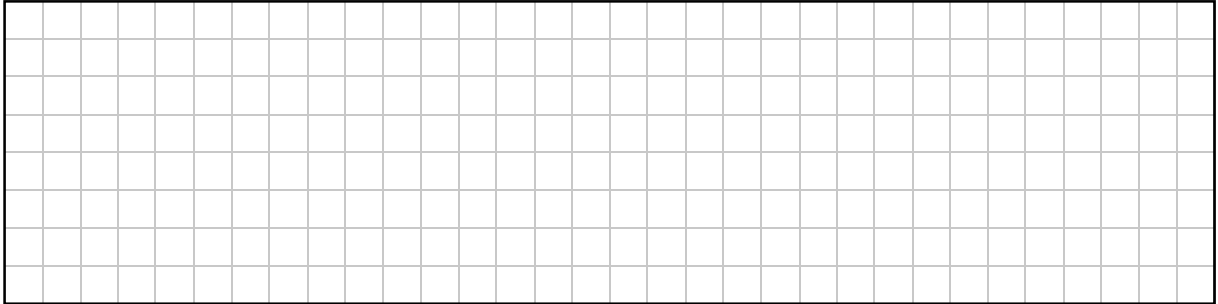
Question 7

(55 marks)

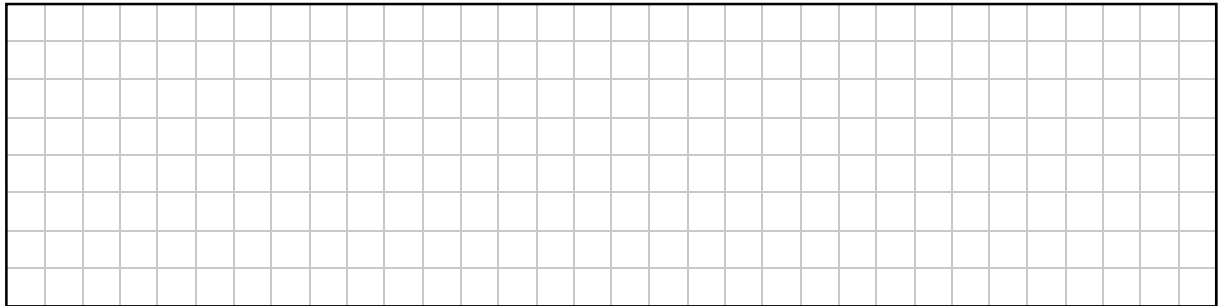
- (a) A company makes biodegradable paper cups in the shape of a right circular cone. Each cup has a radius of 3.3 cm and a slant height of 9 cm, as shown.



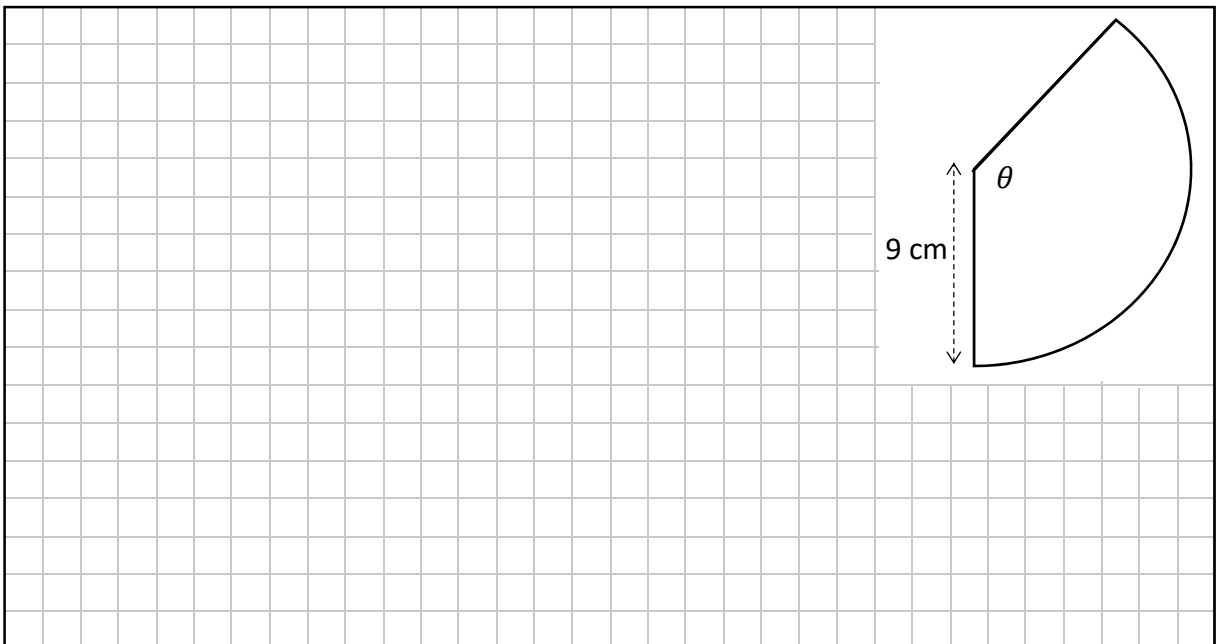
- (i) Show that the vertical height of the cup is 8.37 cm, correct to 2 decimal places.



- (ii) Find the curved surface area of the cup correct to 2 decimal places.



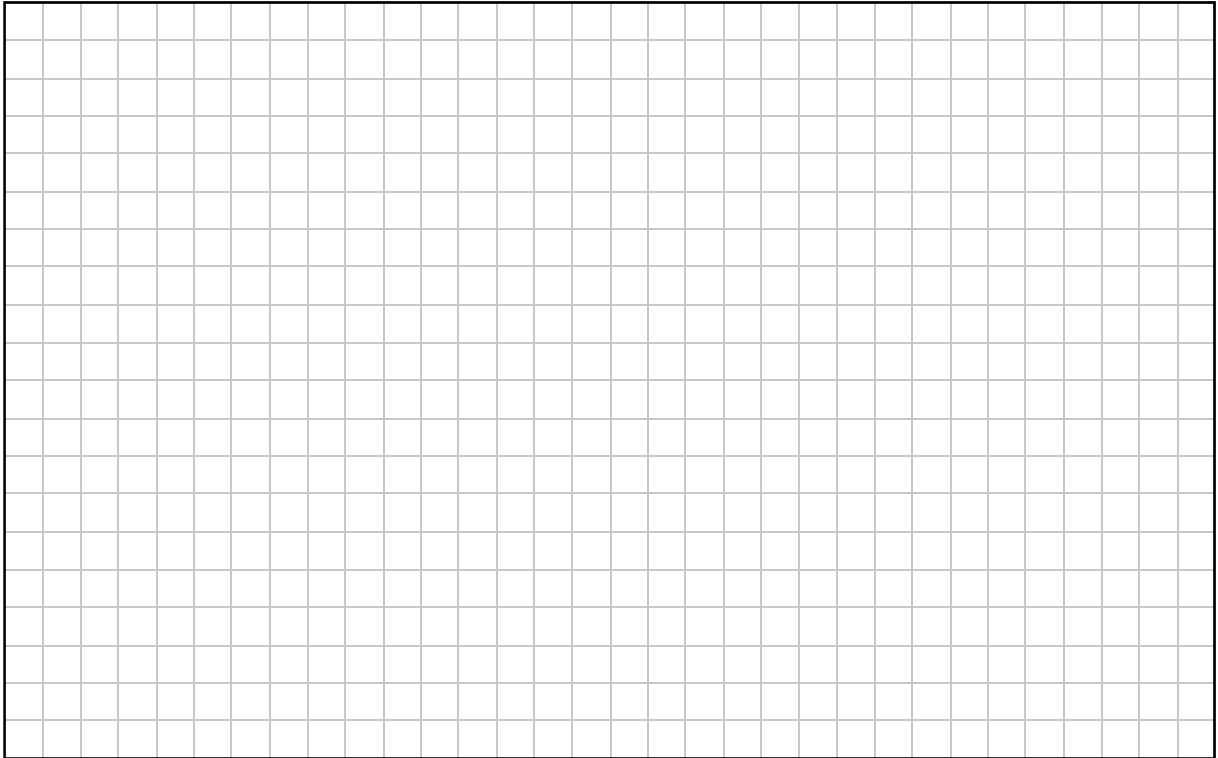
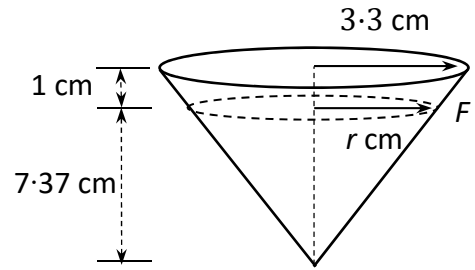
- (iii) The diagram shows the net of the cup. Find, in degrees, the size of the angle θ .



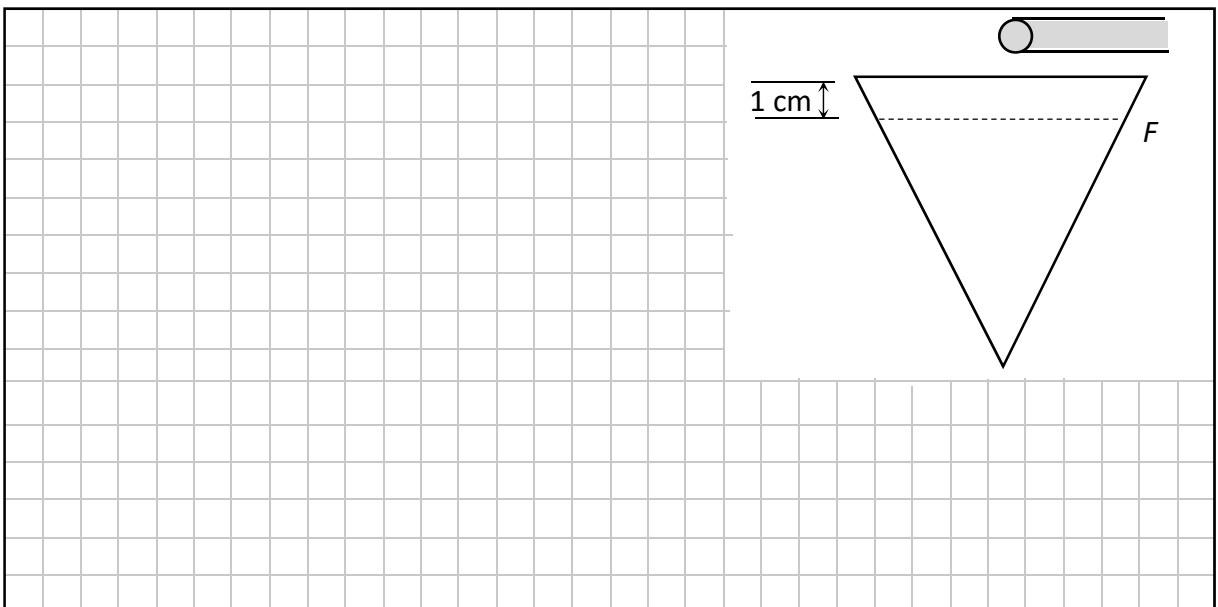
- (b) In order to avoid spillages each cup is marked with a dotted line at F which is 1 cm vertically below the top of the cup, as shown.

Find the volume of water in the cup when it is filled as far as the dotted line.

Give your answer correct to 1 decimal place.



- (c) Water flows into one of these cups through a cylindrical pipe of radius 0.8 cm at a flow rate of 2.5 cm³/sec. Find, to the nearest second, how long it will take to fill the cup to the line at F .



This question continues on the next page.

- (d) The company decides to change the position of the line F in order to limit the capacity of the cup to 60 cm^3 .
How far, vertically below the rim of the cup, should the line F be drawn?
Give your answer, in cm, correct to 1 decimal place.

