11. The diagram shows a loaf of bread which has a uniform cross-section $ABCDE$, in which $ABCE$ is a rectangle. CDE is an arc of a circle centred at the midpoint M of AB. $AB = 10$ cm, $BC = 6$ cm and $BQ = 45$ cm. Find

(a) $\angle CME$ in radians,

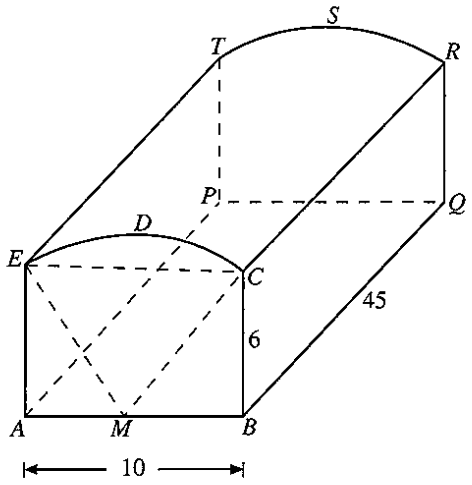
(b) the length of the arc CDE,

(c) the area of the sector $MCDE$,

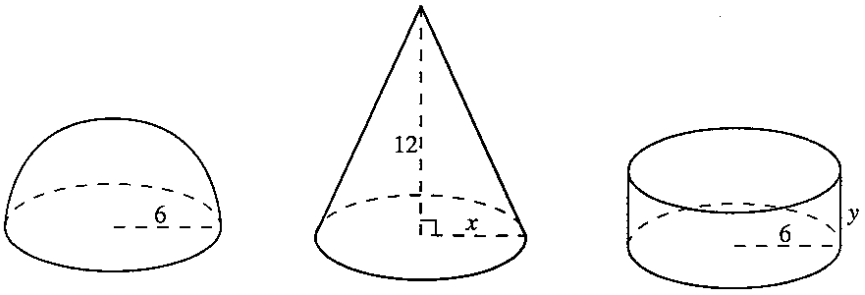
(d) the total surface area of the loaf of bread,

(e) the volume of the loaf of bread.

Give your answers correct to 3 significant figures.



12.



The diagram shows 3 solids. The hemisphere has a radius of 6 cm, the cone has a base radius of x cm and a height of 12 cm, and the cylinder has a base radius of 6 cm and a height of y cm. The volumes of these solids are equal. Find

(a) the value of x,

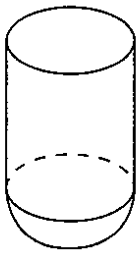
(b) the value of y,

(c) the ratio of the total surface area of the hemisphere to that of the cylinder.

13. The external and internal radii of a hollow metal sphere are 6 cm and 3 cm respectively.

(a) Find the volume of metal in the sphere. Leave your answer in terms of π.

(b) The sphere is melted and recast into a solid with a cylindrical body of radius 3 cm surmounted on a hemisphere (refer to the diagram). Find the height of the cylindrical body.



14. In the diagram, $ABCDEF$ is a regular hexagon of side 4 cm. Another hexagon $PQRSTU$ is formed by joining some diagonals of $ABCDEF$. Find

(a) the area of the hexagon $ABCDEF$,

(b) the length of AC,

(c) the length of QR,

(d) the area of the hexagon $PQRSTU$,

(e) the exact ratio of the area of the hexagon $ABCDEF$ to the area of the hexagon $PQRSTU$.