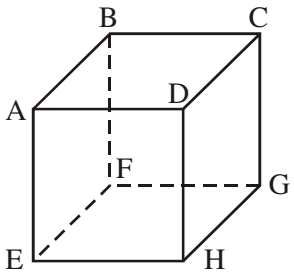
IB 3D Geometry Questions

1. The following diagram shows a carton in the shape of a cube 8 cm long on each side:



(a) The longest rod that will fit on the bottom of the carton would go from E to G. Find the length l of this rod.

(b) Find the length L of the longest rod that would fit inside the carton.

Working:

Answers:

(a) ……..

(b) ……..

(Total 4 marks)

2. OABCD is a square based pyramid of side 4 cm as shown in the diagram.
The vertex D is 3 cm directly above X, the centre of square OABC.
M is the midpoint of AB.

(a) Find the length of XM.

(b) Calculate the length of DM.

(c) Calculate the angle between the face ABD and the base OABC.

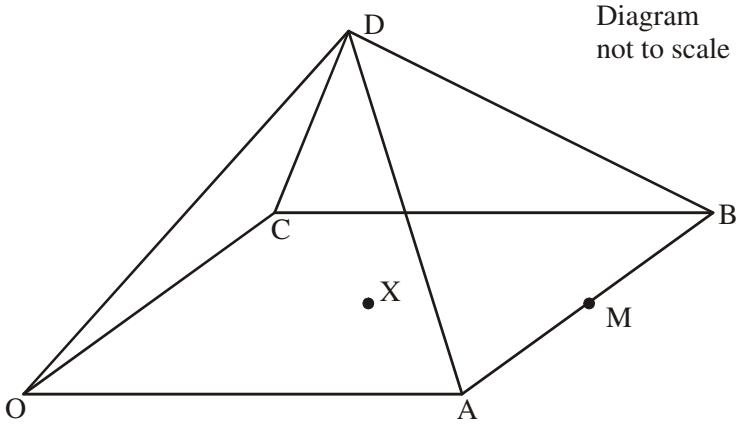


Diagram
not to scale

Working:

Answers:

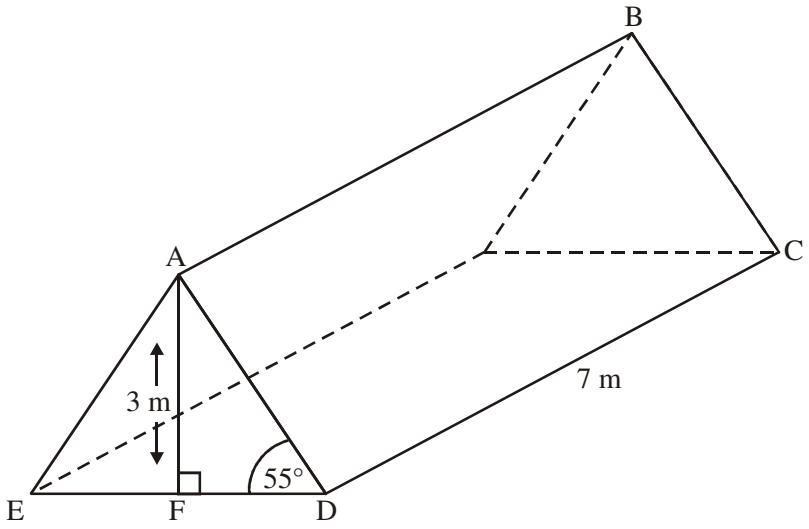
(a) .....

(b) .....

(c) .....

(Total 8 marks)

3. The following diagram shows a sloping roof. The surface ABCD is a rectangle. The angle ADE is 55°. The vertical height, AF, of the roof is 3 m and the length DC is 7 m.



(a) Calculate AD.

(b) Calculate the length of the diagonal DB.

Working:

Answers:

(a) .....

(b) .....

(Total 8 marks)

4. The diagram below shows a child's toy which is made up of a circular hoop, centre O, radius 7 cm. The hoop is suspended in a horizontal plane by three equal strings XA, XB, and XC. Each string is of length 25 cm. The points A, B and C are equally spaced round the circumference of the hoop and X is vertically above the point O.

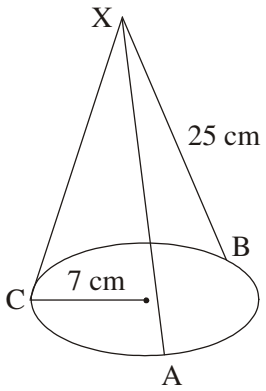


diagram not to scale

(a) Calculate the length of XO.

(2)

(b) Find the angle, in degrees, between any string and the horizontal plane.

(2)

(c) Write down the size of angle $A\hat{O}B$.

(1)

(d) Calculate the length of AB.

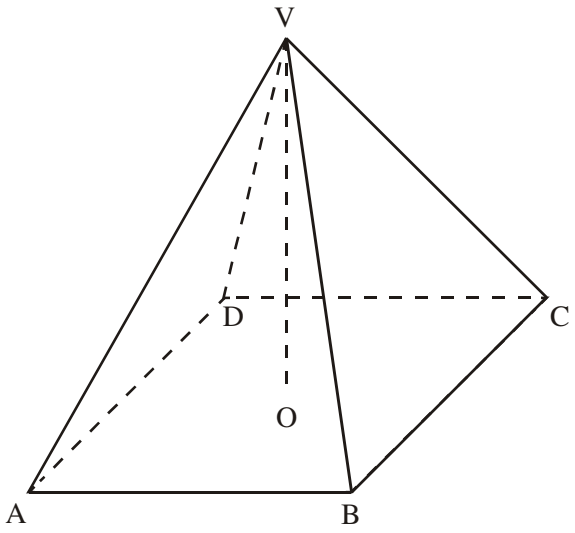
(3)

(e) Find the angle between strings XA and XB.

(3)

(Total 11 marks)

5. ABCDV is a solid glass pyramid. The base of the pyramid is a square of side 3.2 cm. The vertical height is 2.8 cm. The vertex V is directly above the centre O of the base.



(a) Calculate the volume of the pyramid.

(2)

(b) The glass weighs 9.3 grams per cm^3. Calculate the weight of the pyramid.

(2)

(c) Show that the length of the sloping edge VC of the pyramid is 3.6 cm.

(4)

(d) Calculate the angle at the vertex, $B\hat{V}C$.

(3)

(e) Calculate the total surface area of the pyramid.

(4)

(Total 15 marks)