

Lines and Planes in 3D Shapes – Section Test

(Answers)

1) The correct answer is x . The angle marked x is the angle between two lines, FC and FD , both of which are perpendicular to the line of intersection of the two planes (which is EF).

2) Let h = height of pyramid.
 Volume of pyramid = volume of cone.
 Therefore

$$\cos 42^\circ = \frac{y}{15}$$

$$y = 15 \cos 42^\circ$$

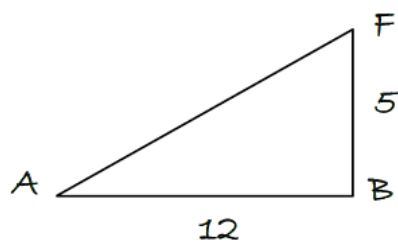
$$y = 11.1 \text{ (3 s.f.)}$$

$$\frac{1 \times (2\pi)^2 \times h}{3} = \frac{1}{3} \pi \times 2^2 \times 3\pi$$

$$\Rightarrow \frac{4\pi^2 h}{3} = \frac{12\pi^2}{3}$$

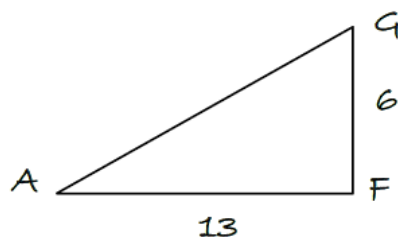
$$\Rightarrow h = 3.$$

3)



$$AF^2 = 12^2 + 5^2 = 169$$

$$AF = 13 \text{ cm}$$

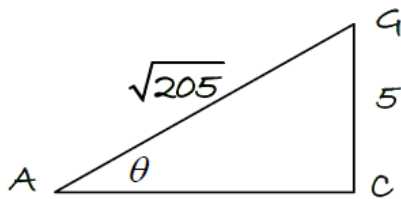


$$AQ^2 = 13^2 + 6^2$$

$$AQ = \sqrt{205} = 14.3 \text{ cm (3 s.f.)}$$

4)

The angle between the line GA and the plane $ABCD$ is the angle between the line GA and the line AC .

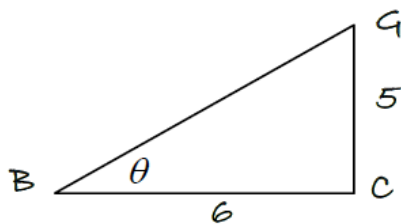


$$\sin \theta = \frac{5}{\sqrt{205}}$$

$$\theta = 20.4^\circ$$

5)

The angle between the planes $ABGH$ and $ABCD$ is the angle between the lines BG and BC .



$$\tan \theta = \frac{5}{6}$$

$$\theta = 39.8^\circ$$

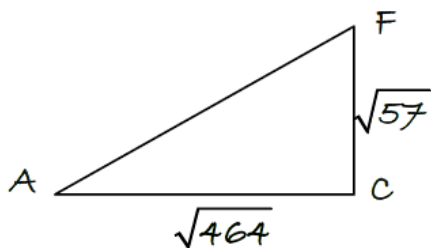
6)

$$AC^2 = 20^2 + 8^2 = 464$$

$$AC = \sqrt{464}$$

$$8^2 + FC^2 = 11^2$$

$$FC = \sqrt{57}$$

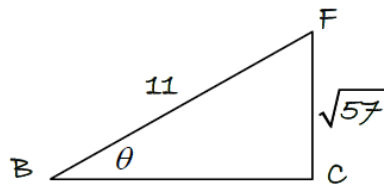


$$AF^2 = 464 + 57 = 521$$

$$AC = \sqrt{521} = 22.8 \text{ cm}$$

7)

The angle between the two planes is the angle between the line FB and the line BC.

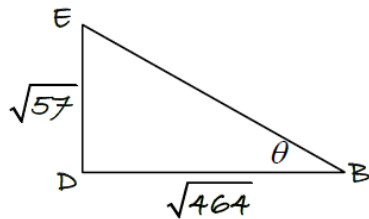


$$\sin \theta = \frac{\sqrt{57}}{11}$$

$$\theta = 43.3^\circ$$

8)

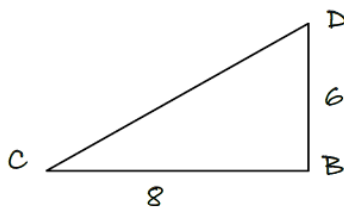
The angle between the line EB and the plane ABCD is the angle between the line EB and the line BD.



$$\tan \theta = \frac{\sqrt{57}}{\sqrt{464}}$$

$$\theta = 19.3^\circ$$

9)

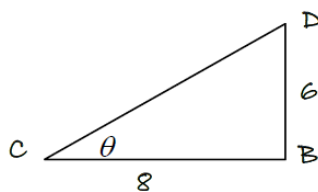


$$CD^2 = 6^2 + 8^2 = 100$$

$$CD = 10 \text{ cm}$$

10)

The angle between the line CD and the plane ABC is the angle between the line CD and the line BC.



$$\tan \theta = \frac{6}{8}$$

$$\theta = 36.9^\circ$$