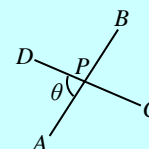


Lesson Worksheet 7.5A(I)

Objective: To solve three-dimensional problems involving angle between two straight lines / a straight line and a plane.

Angle between Two Straight Lines

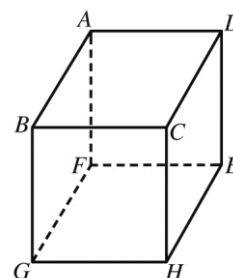
In the figure, AB and CD are two non-parallel lines lying on the same plane. They intersect at a point P , which is called the point of intersection. The acute angle θ formed is the angle between AB and CD .



1. In the figure, $ABCDEFGH$ is a cube. Name the angles between the following two lines.

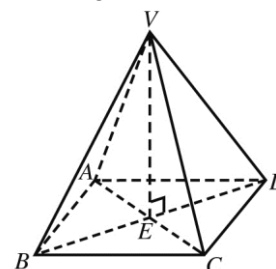
- (a) AD and CD . _____
- (b) AC and CH . _____
- (c) FH and DH . _____
- (d) AH and FH . _____

Join the points on the figure if necessary. Then find the point of intersection of the two lines.



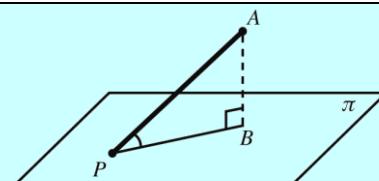
2. In the figure, $VABCD$ is a right pyramid with a rectangular base $ABCD$. Name the angles between the following two lines.

- (a) VC and AC . _____
- (b) VB and VD . _____
- (c) VC and VD . _____



Angle between a Straight Line and a Plane

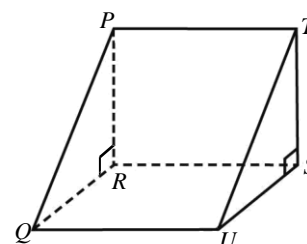
In the figure, BP is the projection of the line AP on the plane π . The angle between AP and the plane π is $\angle APB$.



3. In the figure, $PQRSTU$ is a triangular prism whose base is a right-angled triangle. Name the angles between the following lines and planes.

- (a) TU and the plane $PRST$. _____
- (b) PU and the plane $RQUS$. _____
- (c) PU and the plane $PRST$. _____

Find the projection of a line on the required plane first.

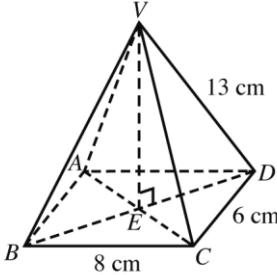


4. In the figure, $VABCD$ is a right pyramid with a rectangular base $ABCD$.

$BC = 8 \text{ cm}$, $CD = 6 \text{ cm}$ and $VD = 13 \text{ cm}$.

- (a) Find the angle between VB and VC .
- (b) (i) Find ED .
- (ii) Find the angle between VD and the plane $ABCD$.

(Give the answers correct to 3 significant figures if necessary.)



→Exercise 7.5: 5, 6

(a)

When three sides of a triangle are known, which formula can be used to find an angle of the triangle?

The angle between VB and VC is

_____.

(b) (i) In $\triangle BCD$,

$$BD^2 = (\quad)^2 + (\quad)^2$$

$$BD =$$

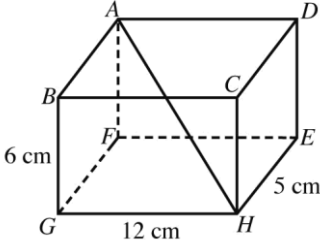
$\therefore E$ is the mid-point of BD .

$$\therefore ED =$$

(ii) The angle between VD and the plane $ABCD$ is _____.

Try More

5. In the figure, $ABCDEFGH$ is a rectangular block of dimensions $12 \text{ cm} \times 5 \text{ cm} \times 6 \text{ cm}$. Find the angle between AH and the plane $EFGH$.
(Give the answer correct to 3 significant figures.)



Lesson Worksheet 7.5B(I)

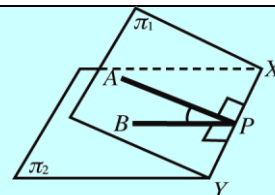
Objective: To solve three-dimensional problems involving angle between two planes.

In this worksheet, give the answers correct to 3 significant figures if necessary.

Angle between Two Planes

In the figure, the planes π_1 and π_2 intersect along XY . P is a point on XY .

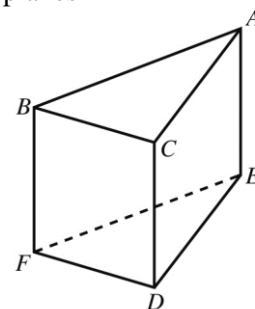
If AP and BP are lines on π_1 and π_2 respectively such that $AP \perp XY$ and $BP \perp XY$, the acute angle $\angle APB$ is the angle between the two planes.



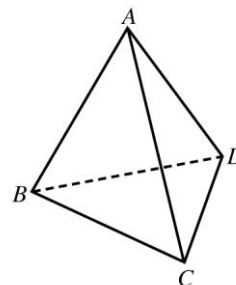
1. The figure shows a triangular prism $ABCDEF$. Mark the angles between the planes

- ABC and $ACDE$,
- $BCDF$ and $ABFE$.

- ①: Identify the line of intersection of the two planes.
 ②: Find a line on each plane such that it is perpendicular to the line in ①.

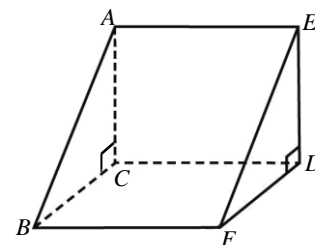


2. The figure shows a right pyramid $ABCD$. Mark the angle between the planes ABC and BCD .



3. In the figure, $ABCDEF$ is a triangular prism whose base is a right-angled triangle. Mark the angles between the planes

- $ABFE$ and $BFDC$,
- ACF and ACB .



4. The figure shows a triangular prism $ABCDEF$. $AB = 7$ cm, $AC = 10$ cm and $\angle ABC = 85^\circ$. Find the angle between the planes $ACDE$ and $BCDF$.

The planes $ACDE$ and $BCDF$ intersect along _____.

In the prism, $AC \perp CD$ and $BC \perp CD$.

\therefore The angle between the planes $ACDE$ and $BCDF$ is _____.

In $\triangle ABC$, by the sine formula,

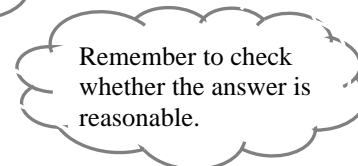
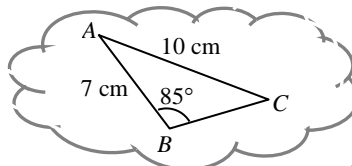
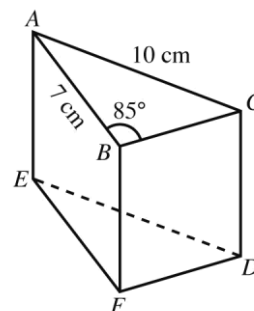
$$\frac{(\quad)}{\sin(\quad)} = \frac{(\quad)}{\sin \angle ACB}$$

$$\sin(\quad) = \frac{(\quad) \sin(\quad)}{(\quad)}$$

$$\angle \quad = \quad \text{ or } 180^\circ - \quad$$

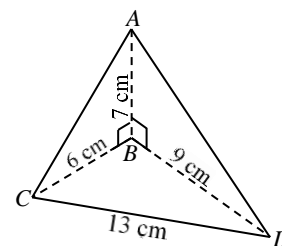
$$= \quad, \text{ cor. to 3 sig. fig. or } \quad \text{ (rejected)}$$

\therefore The angle between the planes $ACDE$ and $BCDF$ is _____.



5. The figure shows a pyramid $ABCD$. $AB = 7$ cm, $BC = 6$ cm, $BD = 9$ cm and $CD = 13$ cm. Find the angle between the planes ABC and ABD .

→ Exercise 7.5: 7



Try More

6. In the figure, $ABCDEFGH$ is a rectangular block of dimensions 8 cm \times 5 cm \times 6 cm. Find the angle between the planes $AGHD$ and $EFGH$.

