## 3D Trigonometry


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The diagram shows a triangular prism of length 12 cm .
Triangle $A B C$ is a cross section of the prism.
Angle $B A C=90^{\circ}, A C=6 \mathrm{~cm}$ and $A B=5 \mathrm{~cm}$.
Calculate the angle between the line $C E$ and the base $A B E D$.


EFGHIJ is a solid metal prism of length 40 cm .
The cross section $E F G$ is a right-angled triangle.
$E F=7 \mathrm{~cm}$ and $E G=22 \mathrm{~cm}$.
(a) Calculate the volume of the prism.

Answer(a) $\qquad$ $\mathrm{cm}^{3}$ [2]
(b) Calculate the length $F J$.
(b)


NOT TO SCALE

A cuboid has length 45 cm , width 22 cm and height 12 cm .
Calculate the length of the straight line $X Y$.


NOT TO
SCALE
$A B C D E F G H$ is a cuboid.
$A B=4 \mathrm{~cm}, B C=3 \mathrm{~cm}$ and $A G=12 \mathrm{~cm}$.
Calculate the angle that $A G$ makes with the base $A B C D$.


NOT TO
SCALE

The diagram shows a cuboid.
$H D=3 \mathrm{~cm}, E H=5 \mathrm{~cm}$ and $E F=7 \mathrm{~cm}$.
Calculate
(a) the length $C E$,

$$
C E=
$$

cm [4]
(b) the angle between $C E$ and the base $C D H G$. reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

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NOT TO
SCALE

The diagram shows a cube of side length 8 cm .
(a) Calculate the length of the diagonal $B S$.

$$
B S=
$$

$\qquad$ cm [3]
(b) Calculate angle $S B D$.

$$
\begin{equation*}
\text { Angle } S B D= \tag{2}
\end{equation*}
$$

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The diagram shows a pyramid with a square base $A B C D$ of side 6 cm .
The height of the pyramid, $P M$, is 4 cm , where $M$ is the centre of the base.
Calculate the total surface area of the pyramid.
(b) The diagram shows a pyramid with a horizontal rectangular base.


The rectangular base has length 4.8 m and width 3 m and the height of the pyramid is 4 m .

## Calculate

(i) $y$, the length of a sloping edge of the pyramid,

$$
\begin{equation*}
\text { Answer(b)(i) } y= \tag{4}
\end{equation*}
$$

(ii) the angle between a sloping edge and the rectangular base of the pyramid.


The diagram shows a pyramid on a square base $A B C D$ with diagonals, $A C$ and $B D$, of length 8 cm . $A C$ and $B D$ meet at $M$ and the vertex, $P$, of the pyramid is vertically above $M$. The sloping edges of the pyramid are of length 6 cm .

Calculate
(a) the perpendicular height, $P M$, of the pyramid,

Answer(a) $P M=$ $\qquad$
(b) the angle between a sloping edge and the base of the pyramid.


The diagram shows a solid pyramid on a square horizontal base $A B C D$.
The diagonals $A C$ and $B D$ intersect at $M$.
$P$ is vertically above $M$.
$A B=20 \mathrm{~cm}$ and $P M=8 \mathrm{~cm}$.
Calculate the total surface area of the pyramid.

