THIRD SPACE LEARNING

GCSE Exam Questions

3D Trigonometry | Geometry & Measure

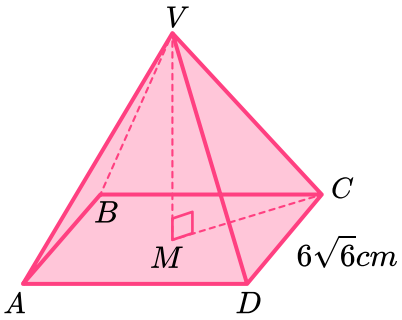
GCSE Exam Questions: 3D Trigonometry

1) $VABCD$ is a square based pyramid.

Angle $VMC = 90°$

Angle $VCM = 60°$

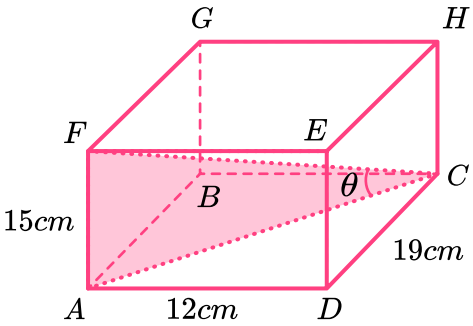
CD = $6\sqrt{6}$



Calculate the vertical height of the pyramid VM.

(5 marks)

2) Shape $ABCDEFGH$ is a cuboid.



Using the information on the diagram, calculate the size of angle ACF labelled θ. Show all your working.

(4 marks)

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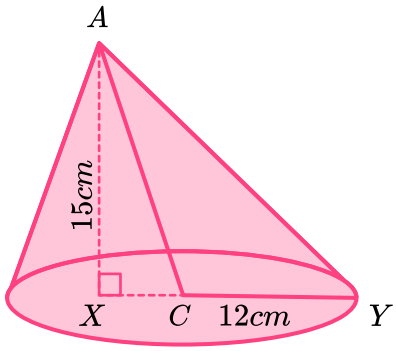
3) The diagram below shows a cone with the apex A, $15cm$ directly above X. The radius of the base is $12cm$. XY is a straight line through the centre C, and the displacement of X from C is $8cm$.



(a) Using this information, calculate the angle XCA correct to 3 significant figures.

(3)

(b) Calculate the length AY.

(3)

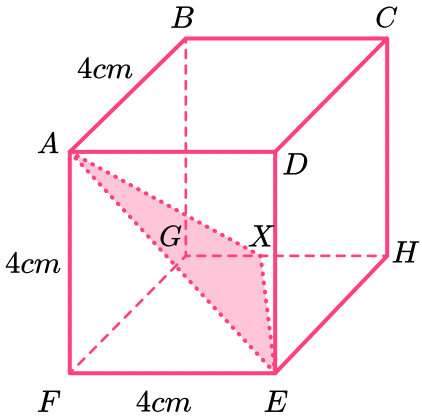
(c) Use your answers to part (a) and (b) to find the angle CAY.

(3)

(9 marks)

GCSE Exam Questions: 3D Trigonometry

4) $ABCDEFGH$ is a cube with side length 4 cm. The point X lies on the line GH where $GX:XH = 1:3$.



(a) Calculate the length of EX.

(3)

(b) Calculate the length of AX.

(6)

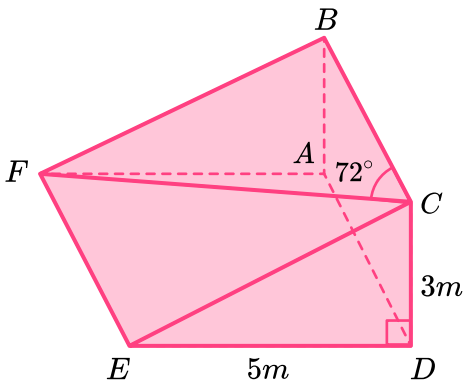
(c) Given that the length of $AE = 4\sqrt{2}\,cm$, use your answers to part a) and b) to calculate the size of the angle AEX to 3 significant figures

(4)

(13 marks)

GCSE Exam Questions: 3D Trigonometry

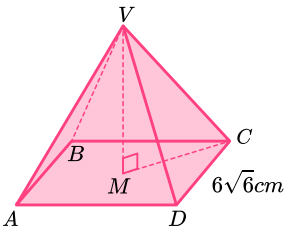
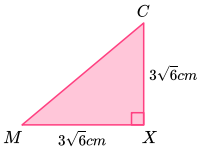
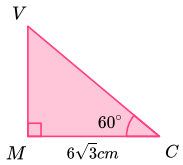
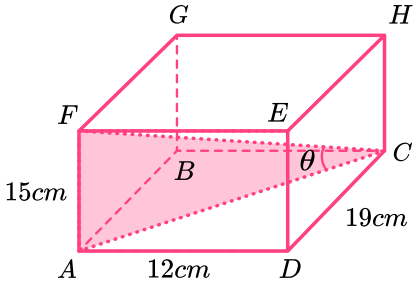
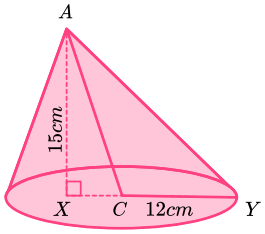
5) The ramp $ABCDEF$ is a triangular prism. $BCEF$ is a rectangle.



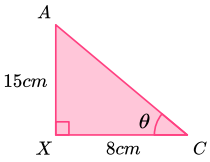
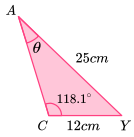
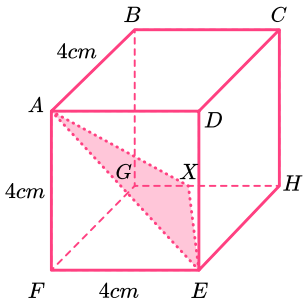
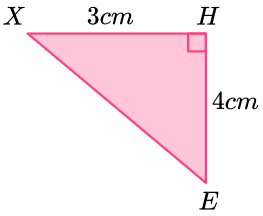
Calculate the length of the line CF.

(5 marks)

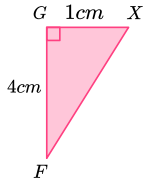
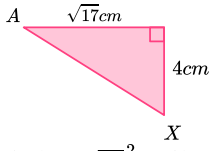
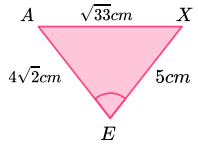
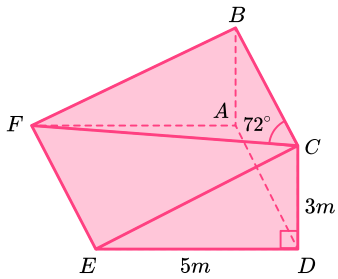
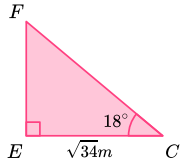
GCSE Exam Questions: 3D Trigonometry Answers

	Question	Answer	Marks
1)	$VABCD$ is a square based pyramid. Angle $VMC = 90°$ Angle $VCM = 60°$ $CD = 6\sqrt{6}$  Calculate the vertical height of the pyramid VM	Right angle triangle drawn:  Find the hypotenuse (CM): $(3\sqrt{6})^2 + (3\sqrt{6})^2 = CM^2$ $CM = \sqrt{108}$ or $6\sqrt{3}$ New triangle drawn:  or $\tan(60) = \frac{VM}{6\sqrt{3}}$ $VM = 18cm$	**(1)** **(1)** **(1)** **(1)** **(1)**
2)	Shape $ABCDEFGH$ is a cuboid.  Using the information on the diagram, calculate the size of angle ACF labelled θ. Show all your working.	$19^2 + 12^2 = 505$ $AC = \sqrt{505}$ $\theta = \tan^{-1}\left(\frac{15}{\sqrt{505}}\right)$ $\theta = 33.72°$	**(1)** **(1)** **(1)** **(1)**
3)	The diagram below shows a cone with the apex A, 15 cm directly above X. The radius of the base is 12 cm. XY is a straight line through the centre C, and the displacement of X from C is 8 cm.  		

GCSE Exam Questions: 3D Trigonometry Answers

	Question	Answer	Marks
(a)	Using this information, calculate the angle *XCA* correct to 3 significant figures.	Right angle triangle drawn:  $\tan^{-1}(\frac{15}{8}) = \theta$ $\theta = 61.9^{o}$ (3sf)	**(1)** **(1)** **(1)**
(b)	Calculate the length *AY*.	$AY^2 = 20^2 + 15^2$ $AY^2 = 625$ $AY = 25\ cm$	**(1)** **(1)** **(1)**
(c)	Use your answers to part a) and b) to find the angle *CAY*.	Triangle drawn:  $\frac{sin(118.1)}{25} = \frac{sin(\theta)}{12}$ $\theta = 25.1^{o}$	**(1)** **(1)** **(1)**
4) **(a)**	*ABCDEFGH* is a cube with side length 4 cm. The point *X* lies on the line *GH* where *GX*:*XH* = 1:3.  Calculate the length of *EX*.	Triangle drawn:  $EX^2 = 3^2 + 4^2$ $EX = 5\ cm$	**(1)** **(1)** **(1)**

GCSE Exam Questions: 3D Trigonometry Answers

	Question	Answer	Marks
(b)	Calculate the length of AX.	Triangle drawn:  $FX^2 = 1^2 + 4^2$ $FX = \sqrt{17}cm$ Triangle drawn:  $AX^2 = \sqrt{17}^2 + 4^2$ $AX = \sqrt{33}\ cm$	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**
(c)	Given that the length of $AE = 4\sqrt{2}\ cm$, use your answers to part a) and b) to calculate the size of the angle AEX to 3 significant figures.	Triangle drawn:  Cosine rule stated: $A = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$ $= \cos^{-1}\left(\frac{32 + 25 - 33}{2 \times 5 \times 4\sqrt{2}}\right) = \cos^{-1}(0.424...)$ $= 64.9^{o}$ (3sf)	**(1)** **(1)** **(1)** **(1)**
5)	The ramp $ABCDEF$ is a triangular prism. $BCEF$ is a rectangle.  Calculate the length of the line CF.	$BD^2 = 3^2 + 5^2$ $BD = \sqrt{34}$ Triangle drawn:  $CF = \frac{\sqrt{34}}{cos(18)}$ $CF = 6.13\ m$	**(1)** **(1)** **(1)** **(1)** **(1)**

Where to go next?

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