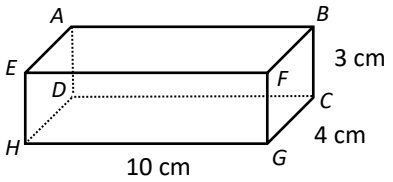
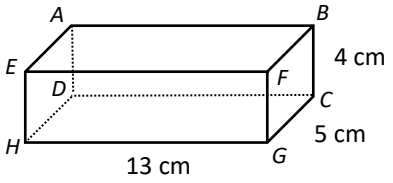
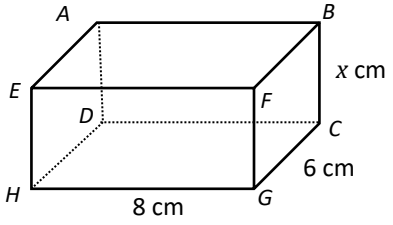
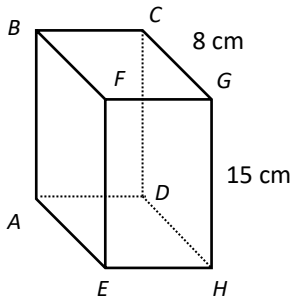
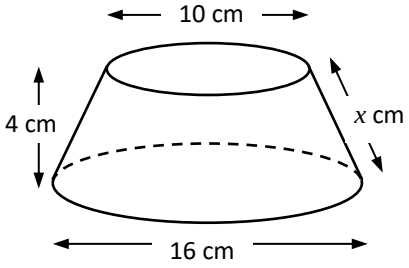
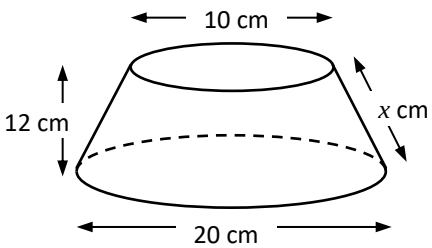
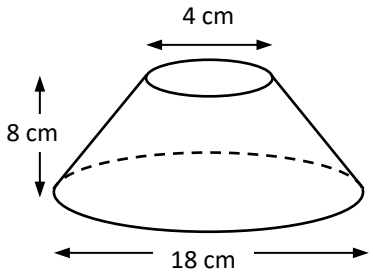
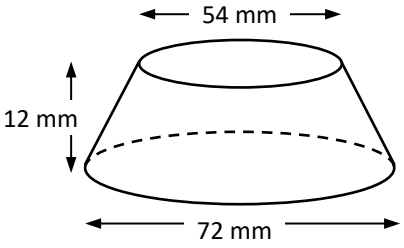
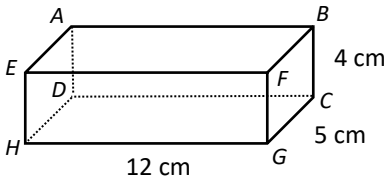
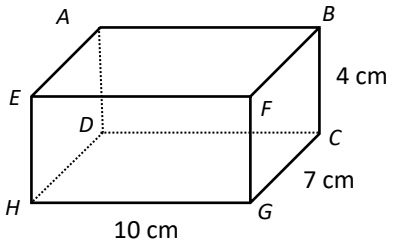
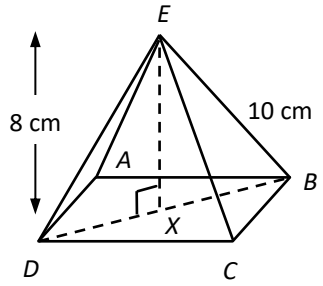
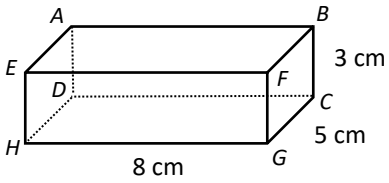
1	**Use Pythagoras' theorem to find the length of a given diagonal in a cuboid**	
a	Calculate the length of *AC* 	
b	Jemima is asked to calculate the length of *BH*. Her answer is 12.6 to 1 decimal place. Do you agree with Jemima? Explain your answer. 	

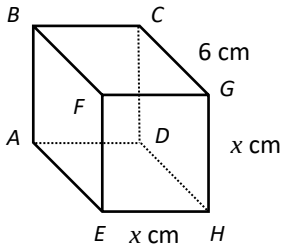
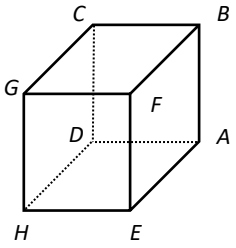
2	**Use Pythagoras' theorem to find any length in a cuboid**	
a	In this cuboid, $BH = 5\sqrt{5}$ Calculate the length of *BC* 	
b	In this cuboid, $CE = \sqrt{314}$ Glenn works out the length of *FG* as follows: $\sqrt{314 - 15^2} = \sqrt{314 - 225} = \sqrt{89}$ Glenn is wrong. Explain why. 	

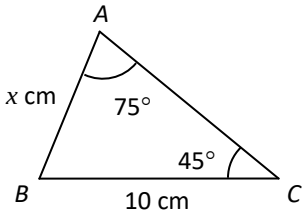
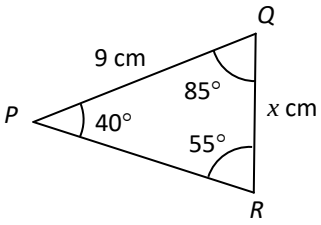
3	**Use Pythagoras' theorem to find missing lengths in other three dimensional figures**	
a	Find the length of x in this frustum of a cone. 	
b	Miles is asked to find the length of x in this frustum of a cone. He gives the answer 15.6 Do you agree with Miles? Explain why. 	

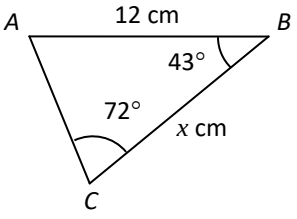
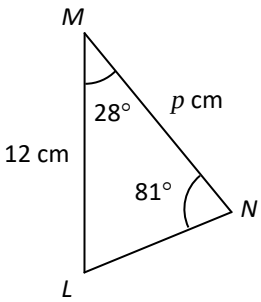
4	**Use Pythagoras' theorem to solve problems involving three dimensional figures**	
a	Find the exact volume of this frustum of a cone. 	
b	Alison is asked to find the surface are of this frustum of a cone.  She works out that the slant height of the frustum is 15 mm. She uses this to find the surface area as follows: $\pi \times 36 \times 60 - \pi \times 27 \times 45 = 2968.80\ldots$ Alison is wrong. Explain why.	

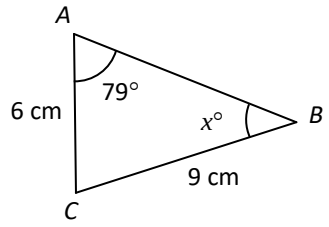
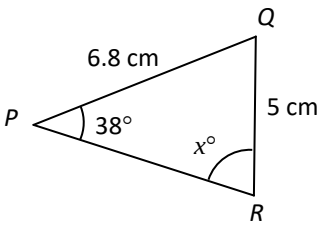
5	**Use trigonometry to find the angle between a line and a plane**	
a	Calculate angle *AGD*. Give your answer to 1 decimal place. 	
b	Michael is asked to calculate angle *EBH* He gives the answer 71.9° to 3 significant figures. Do you agree with Michael? Explain why. 	

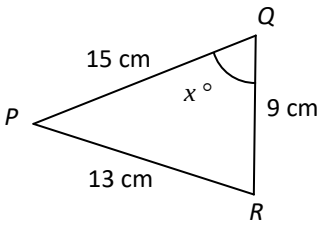
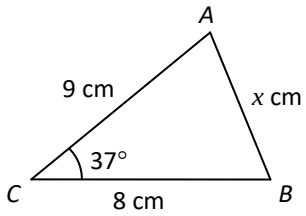
6	**Solve simple problems involving missing lengths and angles in three dimensional figures**	
a	*ABCD* is a square *X* is the midpoint of *BD* *EX* = 8 cm *BE* = 10 cm Calculate the angle *BED*. Give your answer to 1 decimal place. 	
b	Milly is told that angle *AGD* = 17.6° to 1 decimal place. She works out that AD = 29.7 cm Milly is wrong. Explain why. 	

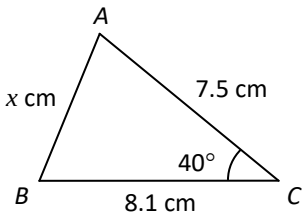
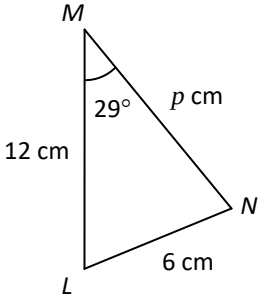
7	**Solve more complex problems involving missing lengths and angles in three dimensional figures**	
a	In this cuboid, angle *AGH* = 59°. Calculate the value of x.  	
b	*ABCDEFGH* is a cube. Phil is asked to work out the size of angle *ABH*. He says, '*This is not possible as I need to know the length of the sides of the cube*' Do you agree with Phil? Explain why.  	

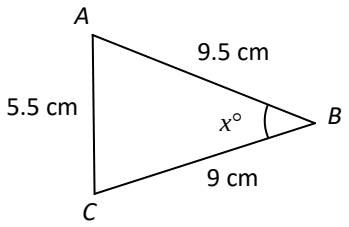
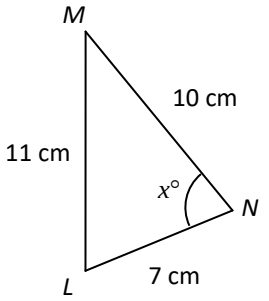
8	**Know and use the sine rule in simple cases**	
a	Calculate the value of x. Give your answer correct to 3 significant figures.  	
b	Isha is asked to calculate the value of x. She writes $$\frac{9}{\sin 55°} = \frac{x}{\sin 85°}$$ Isha is wrong. Explain why.  	

9	**Use the sine rule to find a missing side in a non-right angled triangle**	
a	Calculate the value of x. Give your answer correct to 3 significant figures.  	
b	Anton is asked to calculate the value of p. He writes: $$\frac{p}{\sin 71°} = \frac{12}{\sin 81°}$$ $$p = \frac{12 \sin 71°}{\sin 71°}$$ $$p = \frac{12 \times 71}{81} = 10.5$$ Do you agree with Anton? Explain why.  	

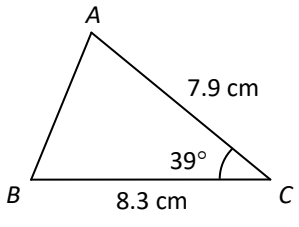
10	**Use the sine rule to find a missing angle(s) in a non-right angled triangle**	
a	Calculate the value of x. Give your answer correct to 3 significant figures.	
b	Jim is asked to calculate the value of x. He gives the answer 2.21. Jim is wrong. Explain why.	

11	**Know and use the cosine rule in simple cases**	
a	Complete the following statement about triangle PQR. $\_\_\_^2 = \_\_\_^2 + \_\_\_^2 - 2 \times \_\_\_ \times \_\_\_ \times \cos x°$	
b	Vicki is asked to calculate the value of x. She writes $x^2 = 8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 37°$ $x^2 = 64 + 81 - 144 \times \cos 37°$ $x^2 = 64 + 81 - 144 \times \cos 37°$ $x^2 = 1 \times \cos 37°$ Do you agree with Vicki? Explain why.	

12	**Use the cosine rule to find a missing side in a non-right angled triangle**	
a	Calculate the value of x. Give your answer correct to 3 significant figures.	
b	Andy is asked to calculate the value of p. He writes: $p^2 = 6^2 + 12^2 - 2 \times 6 \times 12 \times \cos 29°$ Andy is wrong. Explain why.	

13	**Use the cosine rule to find a missing angle in a non-right angled triangle**	
a	Calculate the value of x. Give your answer correct to 3 significant figures.  	
b	Pat is asked to calculate the value of x. She writes: $11^2 = 10^2 + 7^2 - 2 \times 10 \times 7 \times \cos x°$ $121 = 100 + 49 - 140 \times \cos x°$ $121 = 9 \times \cos x°$ $0.074 \ldots = \cos x°$ $x = 85.7°$ Do you agree with Pat? Explain why.  	

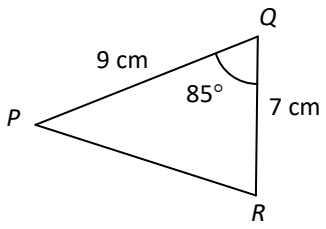
14	**Solve complex problems involving bearings**	
a	A boat leaves a port and sails on a bearing of 060° for 200 kilometres. It then turns and sails on a bearing of 160° for 300 kilometres. The boat then returns directly to the port. What is the distance travelled on the final part of the journey? Give your answer to the nearest kilometre.	
b	Jos is given the following problem: A drone flies on a bearing of 075° for 250 metres. It then turns and flies on a bearing of 135° for 350 metres. The drone then lands. What is the bearing of the drone from its start point? He gives the answer is 070°. Jos is wrong. Explain why.	

15	**Know and use area = ½ab sinC to calculate the area of any triangle**	
a	Calculate the area of the triangle *ABC*. Give your answer correct to 3 significant figures.  	

b Roy is asked to find the area of triangle *PQR*.

He works out the answer -5.55 cm^2 to two decimal places.

Roy knows he has made a mistake as the answer cannot be negative.
Explain the mistake he has made.

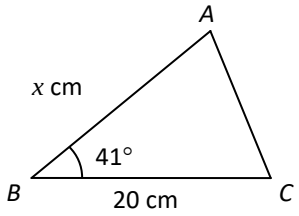


16 Know and use area = ½ab sinC to calculate sides or angles of any triangle

a The area of triangle *ABC* is 118 cm^2.

Find the value of x.

Give your answer correct to 3 significant figures.



b Pete is told that the area of triangle *LMN* is 59.1 cm^2.

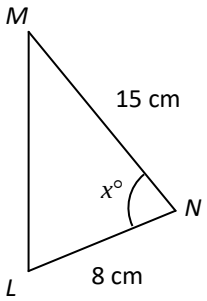
He is asked to calculate the value of x. Pete writes:

$$59.1 = \frac{1}{2} \times 8 \times 15 \times \cos x$$

$$0.985 = \cos x$$

$$x = 9.94$$

Do you agree with Pete? Explain why.



	Key learning point	☹	😐	😐	☺
1	Use Pythagoras' theorem to find the length of a given diagonal in a cuboid				
2	Use Pythagoras' theorem to find any length in a cuboid				
3	Use Pythagoras' theorem to find missing lengths in other three dimensional figures				
4	Use Pythagoras' theorem to solve problems involving three dimensional figures				
5	Use trigonometry to find the angle between a line and a plane				
6	Solve simple problems involving missing lengths and angles in three dimensional figures				
7	Solve more complex problems involving missing lengths and angles in three dimensional figures				
8	Know and use the sine rule in simple cases				
9	Use the sine rule to find a missing side in a non-right angled triangle				
10	Use the sine rule to find a missing angle(s) in a non-right angled triangle				
11	Know and use the cosine rule in simple cases				
12	Use the cosine rule to find a missing side in a non-right angled triangle				
13	Use the cosine rule to find a missing angle in a non-right angled triangle				
14	Solve complex problems involving bearings				
15	Know and use area = ½ab sinC to calculate the area of any triangle				
16	Know and use area = ½ab sinC to calculate sides or angles of any triangle				

Top three improvements for me to make

1a	awrt 10.4	
1b	No, she has misused a Pythagorean triple (CH ≠ 12)	
2a	5	
2b	e.g. the correct answer is 5	
3a	5	
3b	No, the answer is 13	
4a	312π	
4b	She has not included the circular faces	
5a	awrt 17.1°	
5b	No, this is angle *EHB*	
6a	73.7°	
6b	Correct explanation. AD = 3 cm.	
7a	4.5	
7b	No. The answer would be the same for any side length.	
8a	7.32	
8b	$\frac{9}{sin55°} = \frac{x}{sin40°}$	
9a	11.4	
9b	No, you cannot cancel 'sin'	
10a	40.9	
10b	The correct answer is 56.9	
11a	$13^2 = 9^2 + 15^2 - 2 \times 9 \times 15 \times \cos x°$ or $13^2 = 15^2 + 9^2 - 2 \times 15 \times 9 \times \cos x°$	
11b	Order of operations applied incorrectly	
12a	5.37	
12b	It should be $6^2 = \ldots$	
13a	34.5	
13b	Order of operations applied incorrectly	
14a	330 km	
14b	The correct answer is 110°. He has given the bearing of the start point from the current position.	
15a	20.6 cm^2	
15b	The answer is 31.4 (calculator is in radians mode)	
16a	18	
16b	No, he has used 'cos' when it should have been 'sin'	