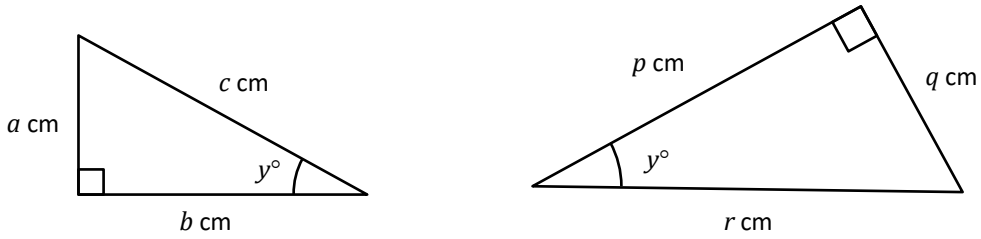
1 Appreciate that the ratio of corresponding sides in similar triangles is constant

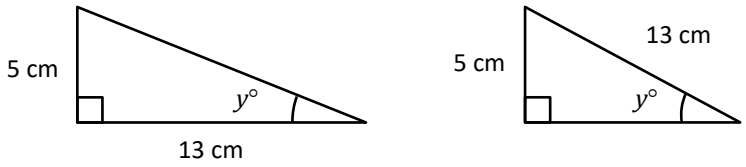
a These two triangles are similar.



Copy and complete the following statement:

$$\frac{a}{c} = \text{—}$$

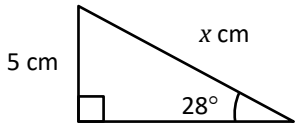
b Felipe thinks that these two triangles are similar.



Do you agree? Explain your answer.

2 Choose an appropriate trigonometric ratio that can be used in a given situation

a Here is a triangle



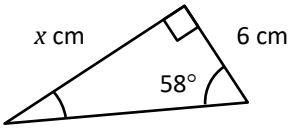
Which of the following statements is correct?

$\sin 28° = \frac{x}{5}$ $\cos 28° = \frac{x}{5}$ $\sin 28° = \frac{5}{x}$ $\cos 28° = \frac{5}{x}$

b Here is a triangle.

Phoebe writes

$$\tan 58° = \frac{6}{x}$$

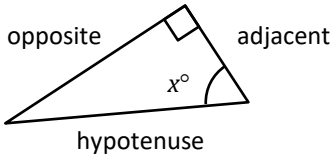


Phoebe is wrong. Explain why.

3 Understand that sine, cosine and tangent are functions of an angle

a Which of the following statements about right-angled triangles is correct?

- As angle x increases, the sine of angle x decreases
- As angle x increases, the cosine of angle x decreases
- As angle x increases, the tangent of angle x decreases



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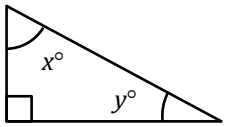
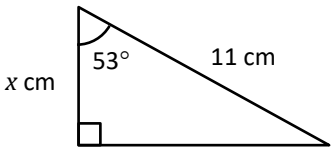
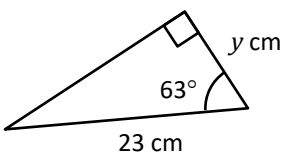
b	Is the following statement always true, sometimes true, or never true? $\sin y° = \cos x°$ Justify your decision.  	

4	**Establish the exact values of sinθ and cosθ for θ = 0°, 30°, 45°, 60° and 90°**	
a	Write down the value of $\sin 30°$	
b	Toby writes $\cos 30° = \frac{2}{\sqrt{3}}$. Do you agree? Explain your answer.	

5	**Establish the exact value of tanθ for θ = 0°, 30°, 45° and 60°**	
a	Write down the value of $\tan 30°$.	
b	Alice writes $\tan 90° = 0$. Alice is wrong. Explain her mistake.	

6	**Use a calculator to find the sine, cosine and tangent of an angle**	
a	Work out $\sin 70°$. Give your answer correct to four significant figures.	
b	Rob works out $\cos 47°$. His answer is -0.9923. Rob is wrong. Explain his mistake.	

7	**Know the trigonometric ratios**	
a	Copy and complete these three facts: $\tan\theta° = —$ $\cos\theta° = —$ $\sin\theta° = —$	
b	Gemma writes $\tan\theta° = \frac{adjacent}{opposite}$ Gemma is wrong. Correct her mistake.	

8	**Set up and solve a trigonometric equation to find a missing side in a right-angled triangle**	
a	Find the value of x in this triangle.  	
b	Joe is finding the value of y in this triangle. Here is his working: $\sin\theta° = \frac{opposite}{hypotenuse}$ $\sin 63° = \frac{y}{23}$ $23 \times \sin 63° = y$ $y = 20.5 \; to \; 1 \; dp$ Do you agree with Joe? Explain your answer.  	

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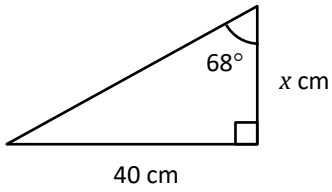
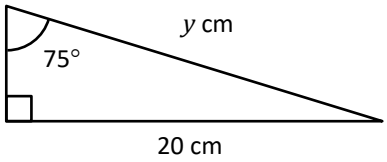
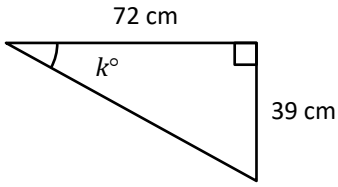
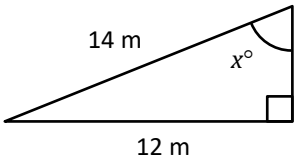
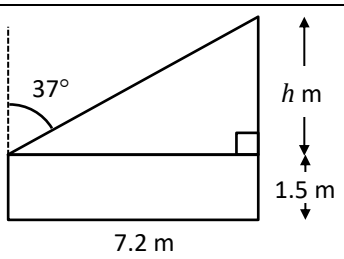
9	**Set up and solve a trigonometric equation when the unknown is in the denominator of a fraction**	
a	Find the value of x in this triangle.  	
b	Anita is finding the value of y in this triangle. She writes: $y = 19.3\ cm\ to\ 1\ dp$ Anita is wrong. Work out the correct solution.  	

10	**Set up and solve a trigonometric equation to find a missing angle in a right-angled triangle**	
a	Find the value of k in this triangle.  	
b	Emmanuel is finding the value of x in this triangle. He writes: $x = 59$ Do you agree with Emmanuel? Explain why.  	

11	**Use trigonometry to solve problems involving bearings**	
a	Caister is 6 kilometres from Martham on a bearing of 145°. How far north of Caister is Martham?	
b	Beyton is 35 km north of Clayton. Clayton is 23 km west of Beyton. Solomon works out that the bearing of Clayton from Beyton is 033°. Solomon is wrong. How can you tell without using trigonometry?	

12	**Use trigonometry to solve problems involving an angle of depression or an angle of elevation**	
a	A radio mast is supported by four cables, each of which is attached to the top of the mast. The angle of depression from the top of the mast to the base of one of the supporting cables is 55°. The height of the mast is 213 metres. Work out the length of the cable.	
b	Keziah is standing 7.2 metres from a tree. She measures the angle of elevation to the top of the tree as 37°. Keziah draws this diagram. She is going to use it to work out the height of the tree. Keziah's diagram is wrong. Explain the mistake she has made.  	

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	Key learning point	☹	😐	😐	☺
1	Appreciate that the ratio of corresponding sides in similar triangles is constant				
2	Choose an appropriate trigonometric ratio that can be used in a given situation				
3	Understand that sine, cosine and tangent are functions of an angle				
4	Establish the exact values of sinθ and cosθ for θ = 0°, 30°, 45°, 60° and 90°				
5	Establish the exact value of tanθ for θ = 0°, 30°, 45° and 60°				
6	Use a calculator to find the sine, cosine and tangent of an angle				
7	Know the trigonometric ratios, sinθ = opp/hyp, cosθ = adj/hyp, tanθ = opp/adj				
8	Set up and solve a trigonometric equation to find a missing side in a right-angled triangle				
9	Set up and solve a trigonometric equation when the unknown is in the denominator of a fraction				
10	Set up and solve a trigonometric equation to find a missing angle in a right-angled triangle				
11	Use trigonometry to solve problems involving bearings				
12	Use trigonometry to solve problems involving an angle of depression or an angle of elevation				

Top three improvements for me to make

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1a	$\frac{a}{c} = \frac{q}{r}$	
1b	No. The sides don't correspond in the required way.	
2a	$\sin 28° = \frac{5}{x}$	
2b	It should be $\tan 58° = \frac{x}{6}$	
3a	As angle x increases, the cosine of angle x decreases	
3b	Always true. Reason; e.g. labels sides with a, b, c, and shows that $\sin y° = \cos x°$	
4a	0.5	
4b	No. It is $\frac{\sqrt{3}}{2}$.	
5a	$\frac{\sqrt{3}}{3}$	
5b	e.g. $\tan 90°$ is undefined	
6a	0.9397	
6b	e.g. the answer is 0.6819… (or, Rob is working in the wrong calculator mode)	
7a	$\tan\theta° = \frac{opp}{adj}$ $\cos\theta° = \frac{adj}{hyp}$ $\sin\theta° = \frac{opp}{hyp}$	
7b	$\tan\theta° = \frac{opp}{adj}$	
8a	6.6199…	
8b	No. Joe should have used cosine.	
9a	16.1610…	
9b	20.7055…	
10a	28.4429…	
10b	Yes. x = 59 to 2, 3 or 4 significant figures.	
11a	4.9149… km	
11b	A sketch diagram will show that the bearing is between 180° and 270°.	
12a	awrt 260 metres	
12b	The angle of elevation should be the angle with the horizontal	

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