JC Trigonometry - HL

Pythagoras Theorem

Question 1

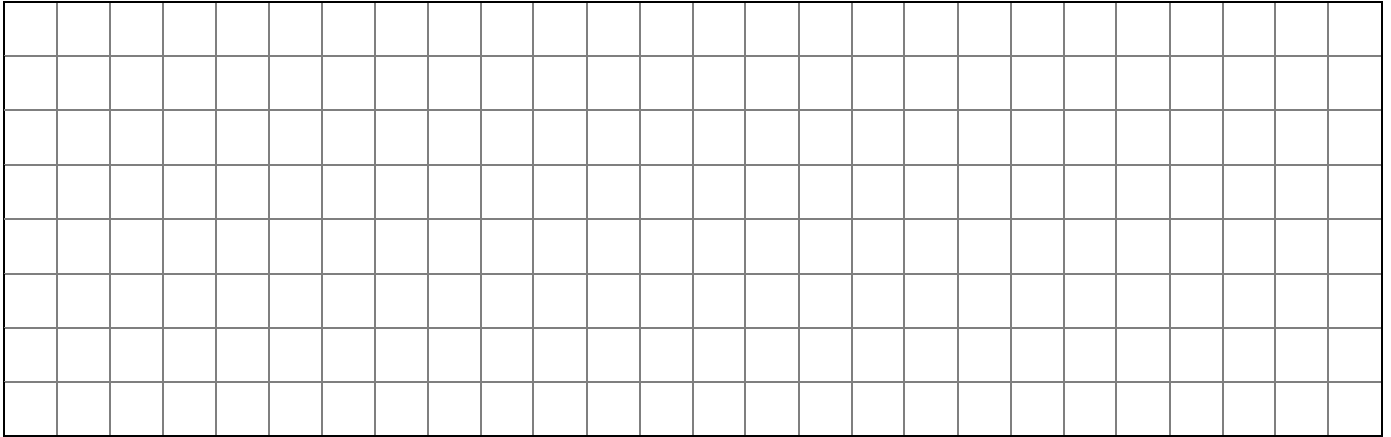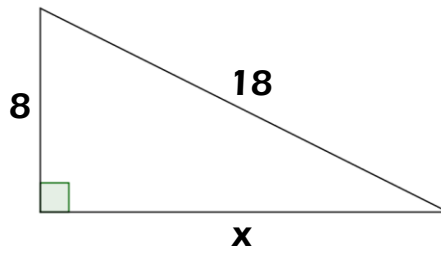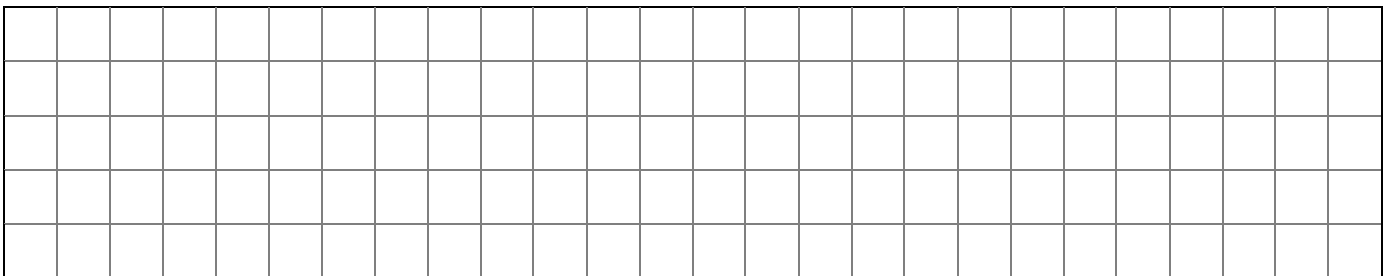**Find the length of the side marked x in the triangle below.**

9

x

12

Question 2

Find the length of the side marked x in the triangle below (to one decimal place).

18

8

x

Question 3

Find the length of the side marked x in the triangle below.

x $\sqrt{32}$

Question 4

In the diagram below, a square with sides 6 cm long is inscribed in a circle.

(i) Find the diameter of the circle.
(ii) Hence find the area of the shaded region (to one decimal place).

6 cm

Trig Ratios

You need to be familiar with the three trigonometry ratios…sin, cos and tan.

Triantánacht an triantáin		Trigonometry of the triangle
achar	$\frac{1}{2}ab\sin C$	area
riail an tsínis	$\dfrac{a}{\sin A}=\dfrac{b}{\sin B}=\dfrac{c}{\sin C}$	sine rule
riail an chomhshínis	$a^2=b^2+c^2-2bc\cos A$	cosine rule
Triantán dronuilleach		Right-angled triangle
	$\sin A=\dfrac{a}{c}$ $\cos A=\dfrac{b}{c}$ $\tan A=\dfrac{a}{b}$	
teoirim Phíotagaráis	$c^2=a^2+b^2$	Pythagoras' theorem

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Procedure

1. Name the side(s) you are given and/or asked to find…opp, adj or hyp.
2. Work out which of the three ratios you need to use…sin, cos or tan.
3. Identify the angle you are given or asked to find.
4. Write an equation
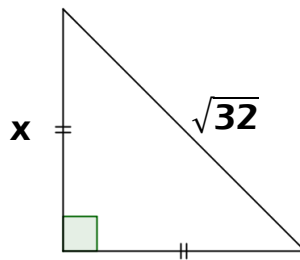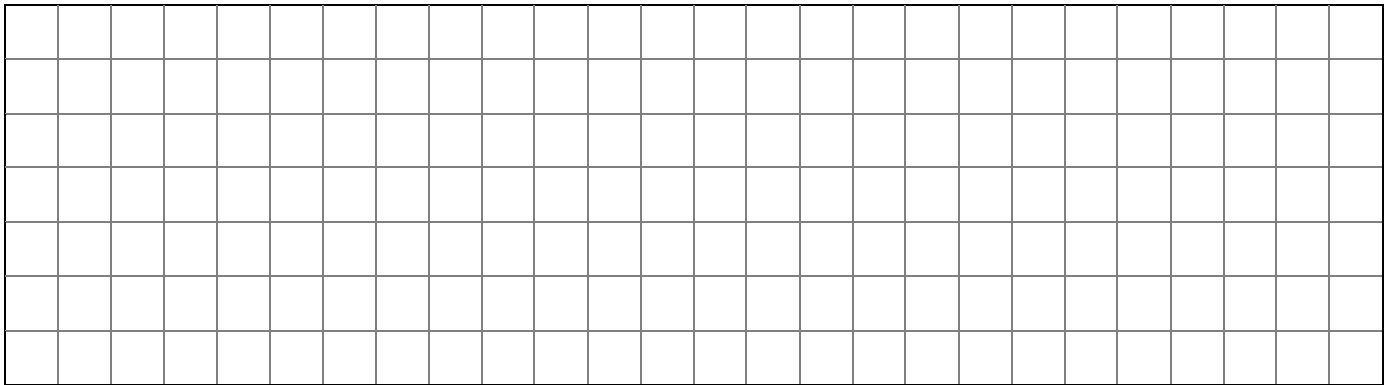5. Solve this equation to find the missing side or angle you are looking for.

Question 5

Find the length of the side marked x in the triangle below (to two decimal places).

Question 6

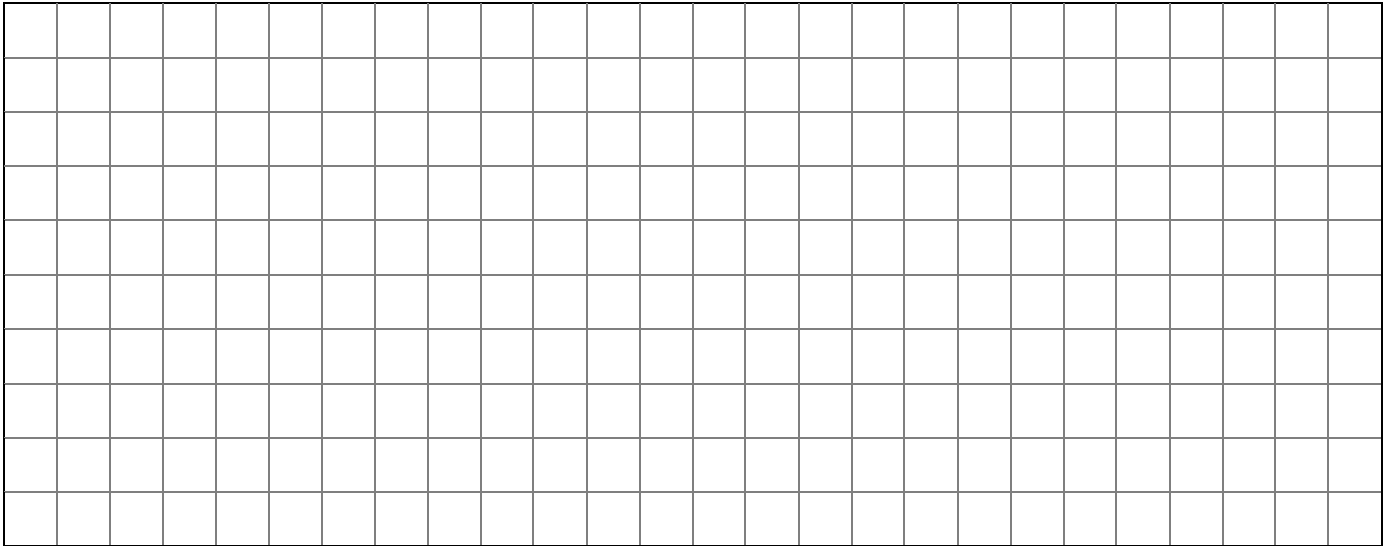Find the length of the side marked *x* in the triangle below (to one decimal place).

40° 18′

12

x

Question 7

Find the length of the side marked *x* in the triangle below.
Give your answer to the nearest whole number.

8

x

38°

Question 8

Find the length of the side marked *x* in the triangle below (to one decimal place).

8

70·8°

x

Question 9

Find the size of the angle marked X in the triangle below (to one decimal place).

8

11

X

Question 10

Find the size of the angle marked X in the triangle below (to two decimal places).

10·5

18

X

Practical Questions

Question 11

Gary is climbing a ladder which is leaning against a vertical wall as shown in the diagram opposite.

The ladder is 10·5 m long.
The base of the ladder is 5·5 m from the base of the wall.

(i)   How far up the wall will Gary's ladder reach?
      Give your answer to one place of decimals.

(ii)   Gary needs the ladder to reach exactly 10 m up the wall.
How close to the base of the wall will the base of his ladder need to be?
Again, give your answer to one place of decimals.

Question 12

A man intends to build a garage beside his house as shown in the diagram.
The wall of his house is 4 m high and the sheet of roofing material he intends to
use is 6·5 m wide as shown. The angle of the roof needs to be 10°.

How far will he have to build the garage wall (marked x on the diagram)?
Give your answer correct to two decimal places.

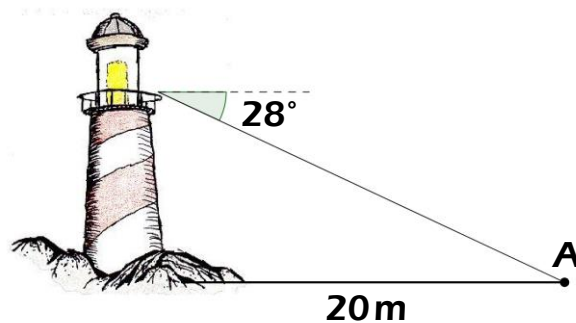## Angles of Elevation/Depression

*It is important that angles of elevation and depression always come from rotating **horizontal** lines!*

angle of elevation
angle of depression

Question 13

From the balcony of a lighthouse, the angle of depression of a point A on level ground is 28°. The point A is 20 m from the base of the lighthouse.

28°

A

20 m

Find the height of the lighthouse (to two decimal places).

Question 14

A tree 32 m high casts a shadow 63 m long as shown in the diagram below.

Find the angle of elevation of the sun.
Give your answer in degrees and minutes.