

GCSE Maths: Exact values of sin, cos and tan (Higher): answers

GCSE Maths - Pythagoras and Trigonometry - Higher - Lesson 20.7

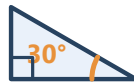
Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch20-pythagoras-trigonometry/higher/exact-values-of-sin-cos-and-tan/

Exercise 20I Exact values of trigonometric ratios

Non-calculator

1 Write down the exact value of each of these. Do not use a calculator.

(a) $\sin 30^\circ$



Answer: $\frac{1}{2}$

(b) $\cos 60^\circ$



Answer: $\frac{1}{2}$

(c) $\tan 45^\circ$



Answer: 1

(d) $\sin 90^\circ$

Answer: 1

(e) $\cos 0^\circ$

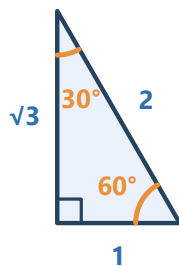
Answer: 1

(f) $\tan 0^\circ$

Answer: 0

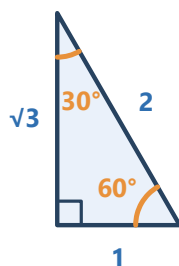
2 Write down the exact value of each of these. Use the special triangles to help if you need to. Give fractions with rational denominators.

(a) $\sin 60^\circ$



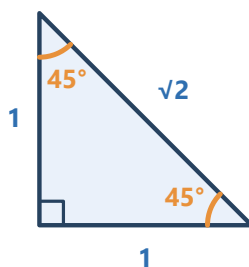
Answer: $\frac{\sqrt{3}}{2}$

(b) $\cos 30^\circ$



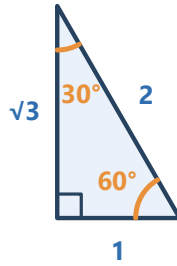
Answer: $\frac{\sqrt{3}}{2}$

(c) $\sin 45^\circ$



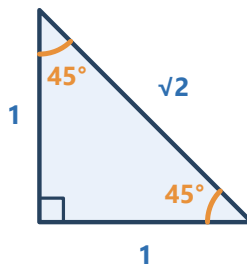
Answer: $\frac{\sqrt{2}}{2}$

(d) $\tan 60^\circ$



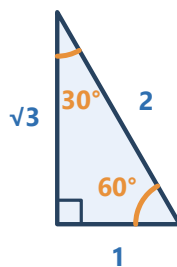
Answer: $\sqrt{3}$

(e) $\cos 45^\circ$



Answer: $\frac{\sqrt{2}}{2}$

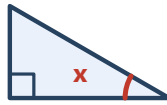
(f) $\tan 30^\circ$



Answer: $\frac{\sqrt{3}}{3}$

3 Work out the size of the acute angle x in each case.

(a) $\sin x = \frac{1}{2}$



Answer: 30°

(b) $\cos x = \frac{\sqrt{2}}{2}$



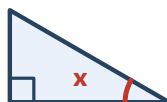
Answer: 45°

(c) $\tan x = \sqrt{3}$



Answer: 60°

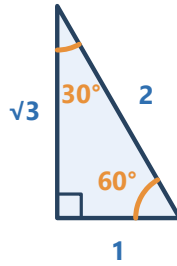
(d) $\tan x = \frac{\sqrt{3}}{3}$



Answer: 30°

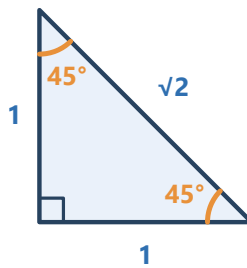
4 Work out the exact value of each expression. Show your working.

(a) $\sin 30^\circ + \cos 60^\circ$



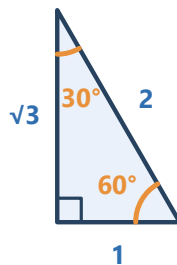
Answer: 1

(b) $\cos 45^\circ \times \sin 45^\circ$



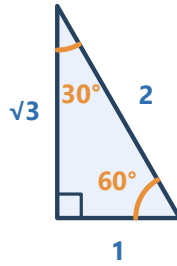
Answer: $\frac{1}{2}$

(c) $\tan 45^\circ - \sin 30^\circ$



Answer: $\frac{1}{2}$

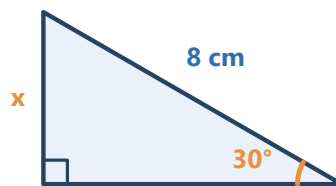
(d) $\sin 60^\circ \div \cos 60^\circ$



Answer: $\sqrt{3}$

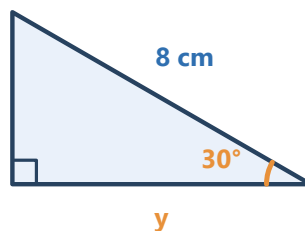
- 5 A right-angled triangle has a hypotenuse of 8 cm and a 30° angle. Work out the exact lengths of the other two sides.

- (a) The side x (opposite the 30° angle)



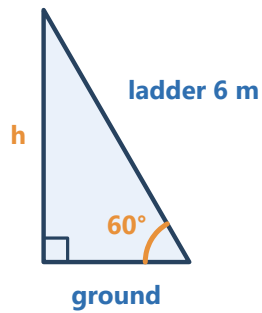
Answer: 4 cm

- (b) The side y (next to the 30° angle)



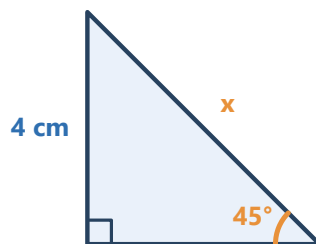
Answer: $4\sqrt{3}$ cm

- 6 A ladder 6 m long leans against a vertical wall and makes an angle of 60° with the horizontal ground. Work out the exact height that the ladder reaches up the wall.



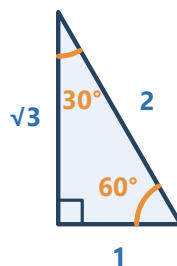
Answer: $3\sqrt{3}$ m

- 7 A right-angled triangle has a 45° angle. The side opposite the 45° angle is 4 cm. Work out the exact length of the hypotenuse.



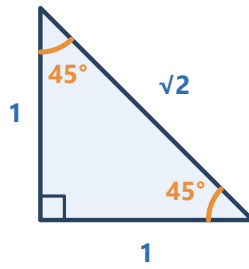
Answer: $4\sqrt{2}$ cm

- 8 Eve says that $\sin 60^\circ$ is double $\sin 30^\circ$, because 60 is double 30. Use exact values to show that Eve is wrong.



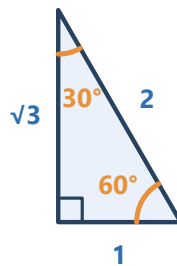
Answer: $\sin 60^\circ = \sqrt{3}/2$ but $2 \sin 30^\circ = 1$, so Eve is wrong

- 9 Is it true that $\sin 45^\circ + \cos 45^\circ = \sin 90^\circ$? Show your working.



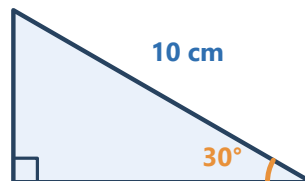
Answer: No: $\sin 45^\circ + \cos 45^\circ = \sqrt{2}$, but $\sin 90^\circ = 1$

10 Challenge. Show that $\sin 60^\circ = 2 \sin 30^\circ \cos 30^\circ$.



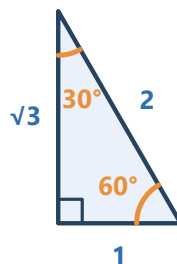
Answer: Both sides equal $\sqrt{3} \div 2$

11 A right-angled triangle has a hypotenuse of 10 cm and an angle of 30° . Work out the exact area of the triangle.



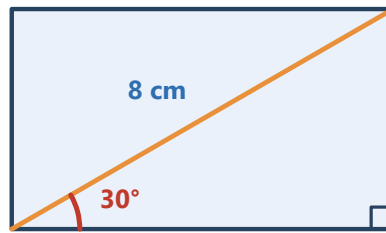
Answer: $\frac{25\sqrt{3}}{2} \text{ cm}^2$

12 Show that $(\sin 60^\circ)^2 + (\cos 60^\circ)^2 = 1$.



Answer: $\frac{3}{4} + \frac{1}{4} = 1$

- 13** A rectangle has a diagonal of length 8 cm. The diagonal makes an angle of 30° with the longer side of the rectangle. Work out the exact area of the rectangle.



Answer: $16\sqrt{3} \text{ cm}^2$