

Exact value problems with surds and trigonometry

Grade 9 | Higher | 16 questions, 57 marks

GCSE Maths topic practice



Scan for the solutions

Name: _____ **Date:** _____ **Score:** _____ / 57

- 1** Work out the exact value of $\sin 60^\circ \times \cos 30^\circ$.

Give your answer as a fraction.

(2 marks)

Answer _____

- 2** In triangle ABC, $AB = 8$ cm, $AC = 6$ cm and angle $BAC = 60^\circ$.

Work out the exact area of triangle ABC. Give your answer in the form $a\sqrt{3}$ cm².

(3 marks)

Answer _____

- 3** Work out the exact value of $(\sin 30^\circ + \cos 60^\circ) \times \tan 60^\circ$.

(2 marks)

Answer _____

- 4 In triangle ABC, $AB = 3$ cm, $AC = 5$ cm and $BC = \sqrt{19}$ cm.
Find the size of angle BAC.

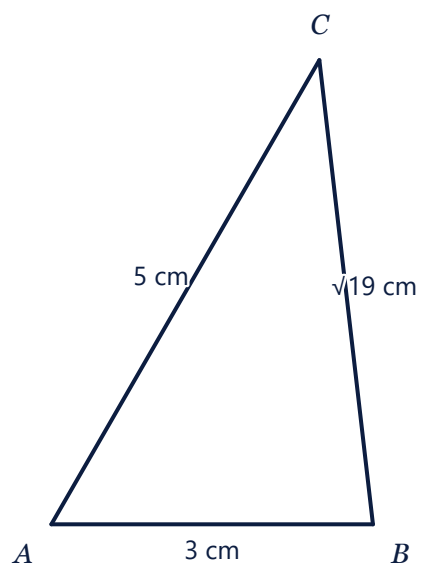


Diagram NOT accurately drawn

(4 marks)

Answer _____

- 5 In triangle ABC, angle ABC = 90° and angle BAC = 30° .
AC = 14 cm.
Without using a calculator, work out the length of BC.
You must show your working.

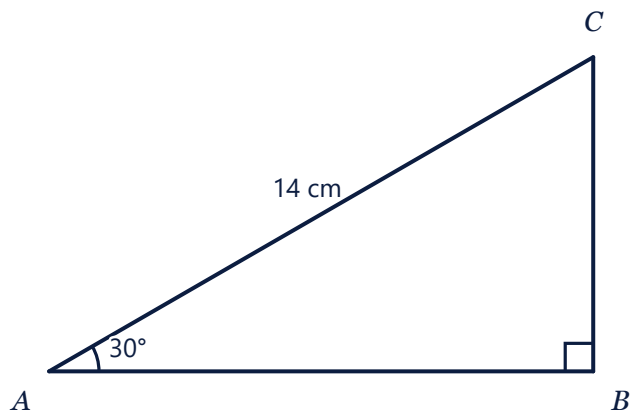


Diagram NOT accurately drawn

(3 marks)

Answer _____

- 6 Work out the exact value of $(\sin 45^\circ + \cos 30^\circ)^2$
Give your answer in the form $a + \frac{b\sqrt{6}}{4}$ where a and b are integers.

(3 marks)

Answer _____

7 In triangle PQR, angle PQR = 90° and angle QPR = 45° .

PQ = 8 cm.

Without using a calculator, work out the exact length of PR.

Give your answer in the form $k\sqrt{2}$.

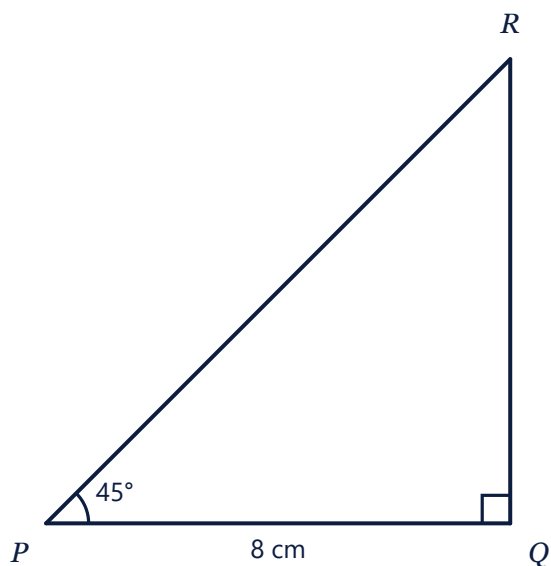


Diagram NOT accurately drawn

(3 marks)

Answer _____

8

In triangle ABC, angle $BAC = 30^\circ$, $BC = 5$ cm and $AB = 8$ cm.

Work out the exact value of $\sin C$.

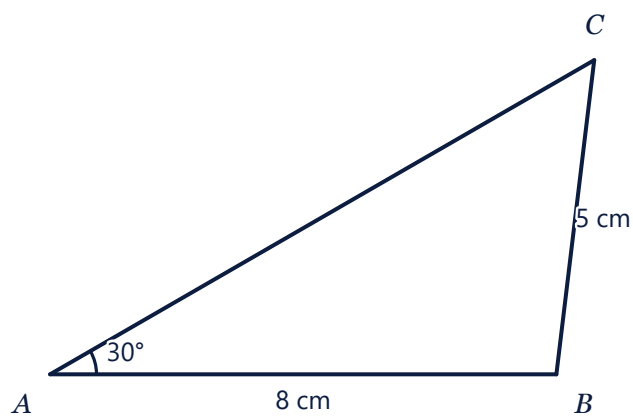


Diagram NOT accurately drawn

(4 marks)

Answer _____

9 In triangle DEF, angle DEF = 90° and angle EDF = 60° .

DE = 5 cm.

Without using a calculator, work out the exact length of EF.

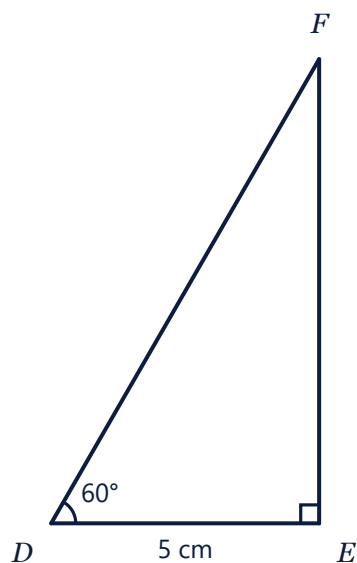


Diagram NOT accurately drawn

(3 marks)

Answer

10 In triangle JKL, angle JKL = 90° .

JK = 6 cm and JL = 12 cm.

Without using a calculator, find the size of angle JLK.

You must show your working.

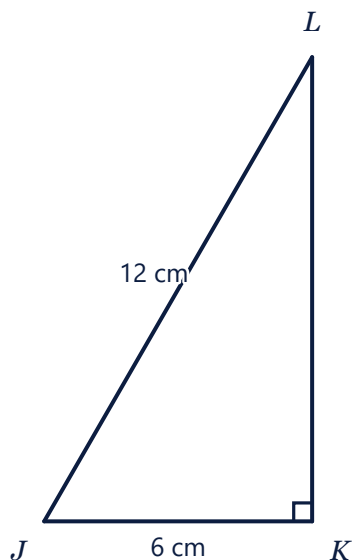


Diagram NOT accurately drawn

(3 marks)

Answer _____

11 In triangle ABC, angle ABC = 90° , AB = $\sqrt{5}$ cm and BC = 2 cm. Angle BAC = x .

a. Work out the exact value of $\sin x$ and of $\cos x$.

b. Hence find the exact value of $\tan x$, giving your answer with a rational denominator.

(4 marks)

Answer _____

- 12** Work out the exact value of
 $\tan 30^\circ \times \tan 60^\circ + \cos 45^\circ \times \sin 45^\circ$
Give your answer as a fraction.

(3 marks)

Answer _____

- 13** In triangle ABC, $AB = 6$ cm, $BC = 4\sqrt{2}$ cm and angle $ABC = 45^\circ$.
Without using a calculator, work out the exact perimeter of triangle ABC. Give your answer
in the form $a + b\sqrt{2} + c\sqrt{5}$.

(5 marks)

Answer _____

- 14** An equilateral triangle has side length $2\sqrt{3}$ cm.
Without using a calculator, work out the exact height and the exact area of the triangle.

(4 marks)

Answer _____

15

ABCD is a trapezium in which AB is parallel to DC.

Angle $ADC = 90^\circ$, angle $BCD = 60^\circ$, $AB = 6\text{ cm}$ and $DC = 10\text{ cm}$.

Without using a calculator, work out the exact area of the trapezium.

Give your answer in the form $k\sqrt{3}\text{ cm}^2$.

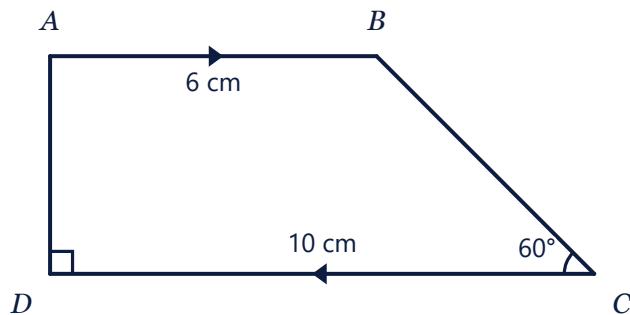


Diagram NOT accurately drawn

(5 marks)

Answer

- 16 A trapezium has parallel sides of length $(3 + \sqrt{2})$ cm and $(5 + 3\sqrt{2})$ cm. The perpendicular distance between the parallel sides is $(4 - \sqrt{2})$ cm. Work out the exact area of the trapezium. Give your answer in the form $(a + b\sqrt{2})$ cm², where a and b are integers.

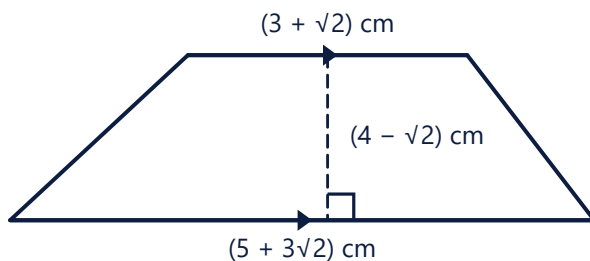


Diagram NOT accurately drawn

(6 marks)

Answer _____

End of questions | Total 57 marks