



Exact Trigonometric Values Exam Practice

Q1. Write down the exact value of $\sin(45^\circ)$.

Answer: $\frac{\sqrt{2}}{2}$ (1 mark)

Q2. Write down the exact value of $\cos(90^\circ)$.

Answer: 0 (1 mark)

Q3. Write down the exact value of $\tan(60^\circ)$.

Answer: $\sqrt{3}$ (1 mark)



Q4. Write down the exact value of $\sin(30^\circ)$.

Answer: $\frac{1}{2}$
(1 mark)

Q5. Work out the exact value and simplify $8 \cos(60^\circ) - 2 \tan(45^\circ)$.

$$\begin{aligned} &8\left(\frac{1}{2}\right) - 2(1) \\ &= 4 - 2 \\ &= 2 \end{aligned}$$

Answer: 2
(2 marks)

Q6. Work out the exact value and simplify $4 \cos(30^\circ) - \tan(60^\circ)$.

$$\begin{aligned} &4\frac{\sqrt{3}}{2} - \sqrt{3} \\ &= 2\sqrt{3} - \sqrt{3} \\ &= \sqrt{3} \end{aligned}$$

Answer: $\sqrt{3}$
(3 marks)



Q7. Work out the exact value and simplify $4 \cos(30^\circ) \tan(60^\circ)$.

$$\begin{aligned} & \frac{4\sqrt{3}\sqrt{3}}{2} \\ &= 2\sqrt{3}\sqrt{3} \\ &= 6 \end{aligned}$$

Answer: 6
(2 marks)

Q8. (i) Find the value of $\cos(0^\circ) + \sin(0^\circ) + \tan(0^\circ)$.

$$1 + 0 + 0$$

Answer: 1
(2 marks)

(ii) State which of $\cos(90^\circ)$, $\tan(90^\circ)$ and $\sin(90^\circ)$ is undefined.

$$\tan(90^\circ)$$

Answer: $\tan(90^\circ)$
(1 mark)



Q9. Work out the exact value and simplify $\frac{8 \sin(30^\circ) - 2 \tan(45^\circ)}{3 \tan(45^\circ)}$

$$\begin{aligned} & \frac{8\left(\frac{1}{2}\right) - 2(1)}{3(1)} \\ &= \frac{4 - 2}{3} \\ &= \frac{2}{3} \end{aligned}$$

Answer: $\frac{2}{3}$
(2 marks)

Q10. Work out the value of $(\cos(60^\circ) - 7 \tan(45^\circ)) \cos(90^\circ)$

$$\begin{aligned} & \left(\frac{1}{2} - 7(1)\right) 0 \\ &= 0 \end{aligned}$$

Answer: 0
(2 marks)



Q11. Work out the exact value of $\frac{8 \tan(30^\circ) \cos(45^\circ)}{3 \tan(45^\circ) - 4 \sin(90^\circ)}$, giving your answer in the form $\frac{a\sqrt{b}}{c}$ where a, b and c are whole numbers.

$$\begin{aligned} & \frac{8 \left(\frac{\sqrt{3}}{3}\right) \frac{\sqrt{2}}{2}}{3(1) - 4(1)} \\ &= \frac{\frac{4\sqrt{6}}{3}}{-1} \\ &= \frac{-4\sqrt{6}}{3} \end{aligned}$$

Answer: $\frac{-4\sqrt{6}}{3}$
(3 marks)

Q12. Solve the equation, $\frac{\sin(30^\circ)x}{3 \tan(60^\circ)} + \sin(45^\circ) = \frac{8\sqrt{2}}{12}$

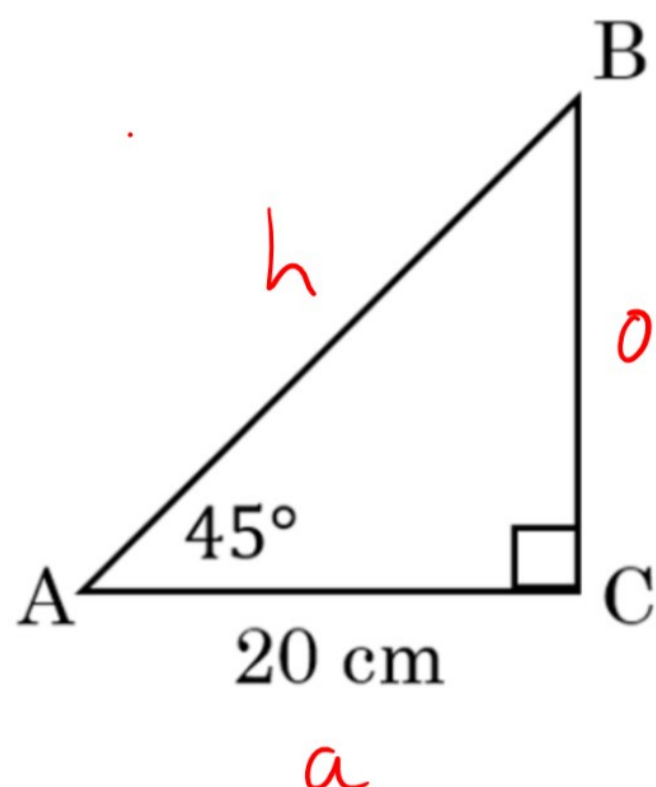
$$\begin{aligned} & \frac{\frac{1}{2}x}{3\sqrt{3}} + \frac{\sqrt{2}}{2} = \frac{8\sqrt{2}}{12} \\ (\times 12\sqrt{3}) \quad & \frac{x}{6\sqrt{3}} + \frac{\sqrt{2}}{2} = \frac{8\sqrt{2}}{12} \quad (\times 12\sqrt{3}) \\ & 2x + 6\sqrt{2}\sqrt{3} = 8\sqrt{2}\sqrt{3} \\ & 2x = 2\sqrt{2}\sqrt{3} \\ & x = \sqrt{2}\sqrt{3} \end{aligned}$$

Answer: $\sqrt{6}$
(3 marks)



Applied Mixed Practice Problems

Q13. ABC is a right-angled triangle. Work out and fully simplify the exact length of side AB.



$$\cos(45) = \frac{20}{h}$$

$$h = \frac{20}{\cos(45)}$$

$$h = \frac{20}{\frac{\sqrt{2}}{2}}$$

$$h = \frac{40}{\sqrt{2}} \Rightarrow h = \frac{40\sqrt{2}}{2}$$

Answer: $20\sqrt{2}$
(3 marks)

Q14. a) Tom claims that $\sin(x) + \cos(x) = 1$, whilst Ralph says that $\frac{\sin(x)}{\cos(x)} = \tan(x)$. Taking $x = 30^\circ$, decide who is correct.

$$\bullet \quad \sin(30) + \cos(30) = \frac{1}{2} + \frac{\sqrt{3}}{2} \neq 1$$

$$\bullet \quad \frac{\sin(30)}{\cos(30)} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} \quad \text{and} \quad \tan(30) = \frac{1}{\sqrt{3}}$$

$$= \frac{1}{2} \times \frac{2}{\sqrt{3}} \\ = \frac{1}{\sqrt{3}}$$

Answer: Ralph is correct
(3 marks)

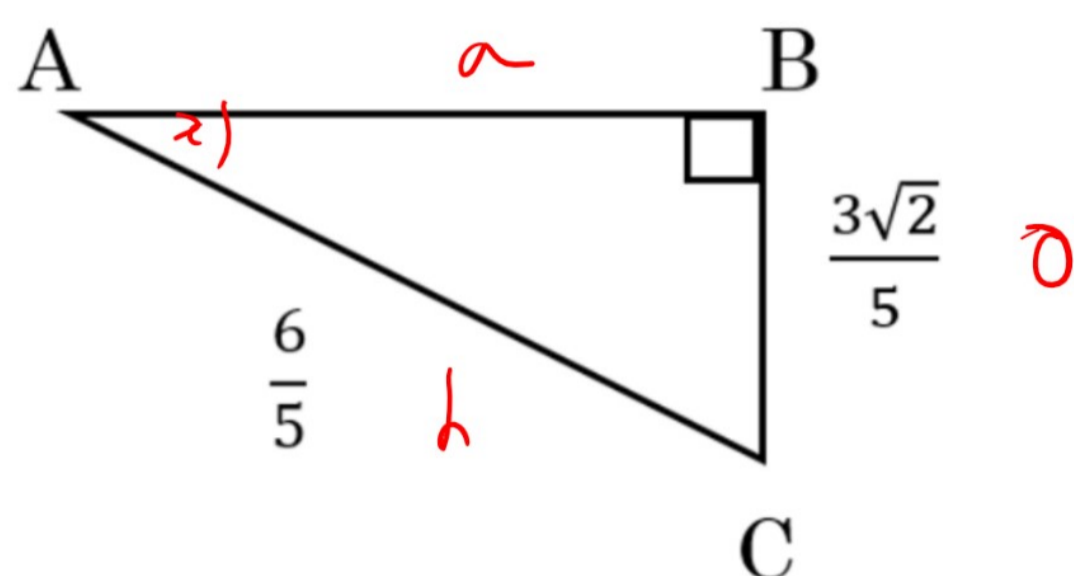
b) Explain why choosing $x = 90^\circ$ would have not helped you to decide the answer to part (a).

$\tan(90)$ is not defined.

Answer: _____
(1 mark)



Q15. Work out the size of angle A in the right-angled triangle below:



$$x = \sin^{-1} \left(\frac{\frac{3\sqrt{2}}{5}}{\frac{6}{5}} \right)$$

$$x = \sin^{-1} \left(\frac{\sqrt{2}}{2} \right)$$

$$x = 45^\circ$$

Answer: 45°
(3 marks)

Q16. You are given that $\cos(A - B) = \cos(A)\cos(B) + \sin(A)\sin(B)$

Use this formula with $A = 45^\circ$ and $B = 30^\circ$ to find an exact value for $\cos(15^\circ)$. Express your answer as a single fraction.

$$\cos(45 - 30) = \cos(45)\cos(30) + \sin(45)\sin(30)$$

$$\cos(15) = \frac{\sqrt{2}}{2} \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \frac{1}{2}$$

$$= \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

$$= \frac{\sqrt{6} + \sqrt{2}}{4}$$

Answer: $\frac{\sqrt{6} + \sqrt{2}}{4}$
(3 marks)



Q17. At a fairground game, a spinner has the angles, 0, 30, 45, 60 and 90 marked on it. There is also a bag containing 3 balls marked sin, cos and tan.

John spins the wheel once. He then chooses a ball from the bag, and applies that function to the result from spinning the wheel. He wins a prize if he obtains a surd, or an expression containing a surd.

What is the probability he wins a prize?

	0	30	45	60
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

for a prize: $\frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}, \frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{3}, \sqrt{3}$

$$\Rightarrow \frac{6}{12} = \frac{1}{2}$$

Answer: $\frac{1}{2}$
(3 marks)