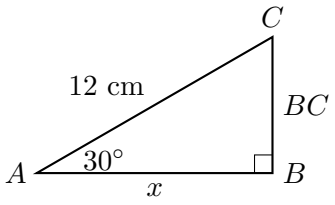
Exact Trig Values and Right Triangles

Core Worksheet

Worked Examples & Guided Practice

I Do (Teacher Model) In right-angled triangle ABC, angle $ABC = 90°$, angle $BAC = 30°$, and hypotenuse $AC = 12$ cm. Calculate the exact length of BC.



We Do (Guided Practice) In right-angled triangle PQR, angle $Q = 90°$, angle $P = 45°$, and adjacent side $PQ = 8$ cm. Find the exact length of hypotenuse PR.

You Do (Independent Practice) Find the exact value of $\sin(60°) + \cos(30°) + \tan(45°)$.

Challenge (Extension) An equilateral triangle XYZ has side length $2a$ cm. Show using exact trigonometry that its height is $a\sqrt{3}$ cm and its exact area is $a^2\sqrt{3}$ cm^2.

Practice Perfect Questions

Q1. State the exact values of $\sin(30°)$, $\cos(60°)$, and $\tan(45°)$.

Q2. A right-angled triangle has angle $60°$ and hypotenuse 10 cm. Find the exact length of the opposite side.

Q3. In a right triangle with angle $45°$ and opposite side 6 cm, find the exact length of the hypotenuse.

Q4. Calculate the exact value of $\cos(60°) \times \sin(60°)$.

Q5. Calculate the exact value of $\tan(60°) + \tan(30°)$.

Q6. Show that $\sin^2(30°) + \cos^2(30°) = 1$ using exact values.

Answers & Worked Solutions

Model Solutions

- **I Do:** $\sin(30°) = \dfrac{BC}{12} \implies \dfrac{1}{2} = \dfrac{BC}{12} \implies BC = 6$ cm
- **We Do:** $\cos(45°) = \dfrac{8}{PR} \implies \dfrac{\sqrt{2}}{2} = \dfrac{8}{PR} \implies PR = \dfrac{16}{\sqrt{2}} = 8\sqrt{2}$ cm
- **You Do:** $\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} + 1 = \sqrt{3} + 1$
- **Challenge:** Split into $30° - 60° - 90°$ triangle with base a, hyp $2a$. $h = 2a\sin(60°) = 2a\left(\frac{\sqrt{3}}{2}\right) = a\sqrt{3}$ cm. Area $= \frac{1}{2}(2a)(a\sqrt{3}) = a^2\sqrt{3}$ cm^2 ■

Practice Perfect Questions Solutions

Q1. $\sin(30°) = \frac{1}{2}$, $\cos(60°) = \frac{1}{2}$, $\tan(45°) = 1$

Q2. Opp $= 10\sin(60°) = 10\left(\frac{\sqrt{3}}{2}\right) = 5\sqrt{3}$ cm

Q3. Hyp $= \dfrac{6}{\sin(45°)} = \dfrac{6}{1/\sqrt{2}} = 6\sqrt{2}$ cm

Q4. $\frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$

Q5. $\sqrt{3} + \frac{1}{\sqrt{3}} = \sqrt{3} + \frac{\sqrt{3}}{3} = \frac{4\sqrt{3}}{3}$

Q6. $\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{1}{4} + \frac{3}{4} = 1$ ■