

Trigonometric Relations

Solution

1. D

$$\begin{aligned}\sin 60^\circ - \frac{\cos 30^\circ}{\sin 30^\circ} &= \frac{\sqrt{3}}{2} - \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} \\ &= \frac{\sqrt{3}}{2} - \sqrt{3} \\ &= -\frac{\sqrt{3}}{2}\end{aligned}$$

2. A

3. C

$$\begin{aligned}\sin 45^\circ \cos 45^\circ + \tan 45^\circ - \cos 45^\circ \\ &= \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} + 1 - \frac{\sqrt{2}}{2} \\ &= \frac{1}{2} + 1 - \frac{\sqrt{2}}{2} \\ &= \frac{3 - \sqrt{2}}{2}\end{aligned}$$

4. B

$$\begin{aligned}\cos 45^\circ &= \frac{AB}{AC} \\ AC &= 2\sqrt{3} \times \frac{2}{\sqrt{2}} \\ &= 2\sqrt{6}\end{aligned}$$

$$\begin{aligned}\cos 45^\circ &= \frac{AC}{AD} \\ AD &= 2\sqrt{6} \times \frac{2}{\sqrt{2}} \\ &= 4\sqrt{3}\end{aligned}$$

$$\begin{aligned}BD &= AD - AB \\ &= 4\sqrt{3} - 2\sqrt{3} \\ &= 2\sqrt{3}\end{aligned}$$