

Solutions

Accept equivalent correct methods and supported interpretations. The marks check reasoning; they are not an official grade.

2.1 A – Midline 4 plus amplitude 2 is 6. B gives amplitude; C gives midline; D double-counts amplitude. Maximum is midline plus one amplitude.

Correct response linked to the given case.

2.2 B – $2\pi/2=\pi$. A gives reciprocal frequency without the full-turn factor; C ignores the input multiplier; D multiplies the old period instead of dividing.

Correct response linked to the given case.

2.3 1 – This follows from the unit-circle equation .

Correct response linked to the given case.

2.4 False – It requires a right angle.

Correct response linked to the given case.

3.1 Amplitude is 4, period $2\pi/2 = \pi$, range $-1 \leq y \leq 7$. At $x = \pi/4$, $y = -4 \sin(\pi/2) + 3 = -1$. The negative coefficient reflects the wave; it does not make amplitude negative.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence . Accurate conditions, checks or qualification.

3.2 $c^2 = a^2 + b^2 - 2ab \cos C = (6 \text{ cm})^2 + (10 \text{ cm})^2 - 2(6 \text{ cm})(10 \text{ cm}) \cos 60^\circ = 76 \text{ cm}^2$, so $c = 2\sqrt{19} \text{ cm}$. $A = ab \sin C/2 = (6 \text{ cm})(10 \text{ cm}) \sin 60^\circ/2 = 15\sqrt{3} \text{ cm}^2$.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.

3.3 Angles are 30 and 150 degrees. Cosines are $\sqrt{3}/2$ and $-\sqrt{3}/2$; tangents are $1/\sqrt{3}$ and $-1/\sqrt{3}$. Sine is positive in quadrants I and II, so one acute answer would be incomplete.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.

3.4 $c = \sqrt{(9 \text{ cm})^2 + (12 \text{ cm})^2} = 15 \text{ cm}$. Thus $\sin \theta = 9/15 = 3/5$ and $\cos \theta = 12/15 = 4/5$; their squares sum to 1. In the second triangle a known opposite side-angle pair permits $b/\sin 45^\circ = (8 \text{ cm})/\sin 30^\circ$. Hence $b = (8 \text{ cm})(\sqrt{2}/2)/(1/2) = 8\sqrt{2} \text{ cm}$. This triangle is not assumed right-angled; its third angle is 105° .

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.