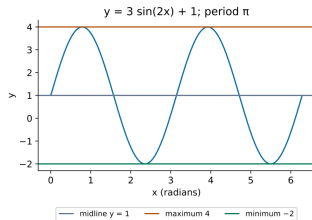


Trigonometric graphs, identities and general triangles

Original skill preparation; versioned source scope

Method and conditions



- Amplitude is half the peak-to-trough distance.
- Radians; right-triangle ratios; unit-circle coordinates.

Worked method 1

Read and reason

Amplitude is half the peak-to-trough distance. In $y = A \sin(Bx) + D$, it is $|A|$;
radian period is $2\pi/|B|$. For a non-right triangle, match known sides and
included angle before selecting the cosine rule . $c^2 = a^2 + b^2 - 2ab \cos C$.

Original context 1

Read and reason

Task context

Read and reason

Each task below states its own complete data. Values may differ from the worked example.

Attempt 1.1

Read and reason

For radian input $y = -4 \sin(2x) + 3$, give amplitude, period, range and value at $x = \pi/4$.

Reasoning 1.1

Read and reason

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.

Attempt 2.1

Read and reason

A triangle has sides 6 cm and 10 cm enclosing 60° . Find its third side and area without assuming it is right-angled.

Reasoning 2.1

Read and reason

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

Attempt 3.1

Read and reason

Find every angle in $0^\circ \leq \theta < 360^\circ$ with $\sin \theta = 1/2$. For each, give cosine and tangent.

Reasoning 3.1

Read and reason

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.

Attempt 4.1

Read and reason

A right triangle has legs 9 and 12 cm. Find the hypotenuse and sine/cosine of the angle opposite 9 cm. A different triangle has angles 30° and 45° and side 8 cm opposite 30° . Find the side opposite 45° , explaining why the sine rule fits.

Reasoning 4.1

Read and reason

$c = \sqrt{(9 \text{ cm})^2 + (12 \text{ cm})^2} = 15 \text{ cm}$. 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 $b = (8 \text{ cm})(\sqrt{2}/2)/(1/2) = 8\sqrt{2} \text{ cm}$.

Reasoning 4.2

Read and reason

This triangle is not assumed right-angled; its third angle is 105° .

Transfer and limits

Read and reason

Radians; right-triangle ratios; unit-circle coordinates.

Check yourself

Read and reason

Close the worked reasoning. Explain why the method fits the final transfer task, reconstruct its conclusion, and state a condition that would change your answer. Then check the full reasoning in the reference.