

Law of Sines and Law of Cosines: math test solutions, Grade 12 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Law of Sines

/ 4 pts

$$C = 180^\circ - 38^\circ - 64^\circ = 78^\circ \text{ (1 pt).}$$

$$b = \frac{11 \sin 64^\circ}{\sin 38^\circ} \approx 16.1 \text{ cm (1.5 pts).}$$

$$c = \frac{11 \sin 78^\circ}{\sin 38^\circ} \approx 17.5 \text{ cm (1.5 pts).}$$

2 The ambiguous case

/ 4 pts

(a) $h = 18 \sin 25^\circ \approx 7.61 < 9 < 18$: two triangles (1 pt).

(b) $\sin B = \frac{18 \sin 25^\circ}{9} \approx 0.845$, so $B_1 \approx 57.7^\circ$ and $B_2 \approx 122.3^\circ$ (1 pt).

Triangle 1: $C_1 = 180^\circ - 25^\circ - 57.7^\circ = 97.3^\circ$ and $c_1 = \frac{9 \sin 97.3^\circ}{\sin 25^\circ} \approx 21.1$ (1 pt).

Triangle 2: $C_2 = 180^\circ - 25^\circ - 122.3^\circ = 32.7^\circ$ and $c_2 = \frac{9 \sin 32.7^\circ}{\sin 25^\circ} \approx 11.5$ (1 pt).

3 Three sides

/ 4 pts

(a) $\cos C = \frac{81 + 144 - 256}{2 \cdot 9 \cdot 12} = -\frac{31}{216}$, so $C \approx 98.3^\circ$ (1.5 pts).

(b) $\cos B = \frac{81 + 256 - 144}{2 \cdot 9 \cdot 16} \approx 0.670$, so $B \approx 47.9^\circ$; then
 $A = 180^\circ - 98.3^\circ - 47.9^\circ \approx 33.8^\circ$ (1 pt).

(c) $s = 18.5$, $K = \sqrt{18.5 \cdot 9.5 \cdot 6.5 \cdot 2.5} \approx 53.44$ (1.5 pts).

4 Two sides and the included angle

/ 4 pts

$c^2 = 225 + 484 - 660 \cos 57^\circ \approx 349.5$, so $c \approx 18.7$ (1.5 pts).

$K = \frac{1}{2}(15)(22) \sin 57^\circ \approx 138.4$ (1 pt).

$\sin A = \frac{15 \sin 57^\circ}{18.7} \approx 0.673$, so $A \approx 42.3^\circ$ (acute, since a is not the longest side) (1.5 pts).

5 Two ships

/ 4 pts

(a) $\angle AHB = 100^\circ - 20^\circ = 80^\circ$ (1 pt). $AB^2 = 60^2 + 85^2 - 2(60)(85) \cos 80^\circ \approx 9053.8$, so $AB \approx 95.2$ km (1 pt).

(b) $\cos A = \frac{60^2 + 95.15^2 - 85^2}{2(60)(95.15)} \approx 0.475$, so $\angle HAB \approx 61.6^\circ$ (1 pt). The direction from A back to H is 200° ; ship B lies 61.6° counterclockwise from it, so the bearing is $200^\circ - 61.6^\circ = 138.4^\circ$ (1 pt).



Test yourself: quick challenge for Grade 12

Change level

Level : Grade 12

6 random questions, instant feedback.

 **Start the challenge**

 Keep exploring with Zyro

 Math tests

Law of Sines and Law of Cosines: math test, Grade 12

 Math lessons

Law of Sines and Law of Cosines: math lesson, Grade 12

 Math quizzes

Law of Sines and Law of Cosines: math quiz, Grade 12

 Math tests

Vectors, Polar Coordinates, and Complex Numbers: math test, Grade 12

 Math tests

Conic Sections and Parametric Equations:
math test, Grade 12

 Math lessons

Vectors, Polar Coordinates, and Complex
Numbers: math lesson, Grade 12

Zyro takes you to our partner sites

Blast off to other planets of knowledge and their apps.

Lift off