

**Level 3: Determining a Missing Measurement Using the Laws of Sines & Cosines**

Match each problem to an answer found in the list of solutions.

1.  $A=58^\circ$ ,  $C = 94^\circ$ ,  $b = 17$ . Find  $a$ .

2.  $B=107.2^\circ$ ,  $b=17.2$ ,  $c=12.2$ . Find  $C$ .

3.  $A=65^\circ$ ,  $a = 55$ ,  $b = 57$ . Find  $B$ .

4.  $a=15$ ,  $b=28$ ,  $c=17$ . Find  $B$ .

5.  $A=51^\circ$ ,  $b=15$ ,  $c=22$ . Find  $a$ .

6.  $B=47^\circ$ ,  $b=10$ ,  $c=16$  Find  $C$

**Solutions:**

A No Triangle Exists

B  $122^\circ$ 

C 17.1

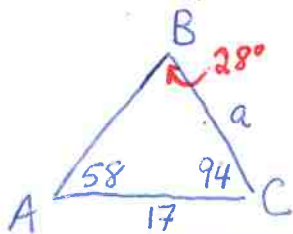
D 30.7

E  $42.7^\circ$ F  $69.9^\circ$  or  $110.1^\circ$

Level 3: Determining a Missing Measurement Using the Laws of Sines & Cosines

Match each problem to an answer found in the list of solutions.

1.  $A=58^\circ, C=94^\circ, b=17$ . Find  $a$ .



$$\frac{a}{\sin 58} = \frac{17}{\sin 28}$$

$$a \sin 28 = 17 \sin 58$$

$$a = \frac{17 \sin 58}{\sin 28}$$

$$a = 30.709$$

**D**

Solutions:

A No Triangle Exists

B  $122^\circ$

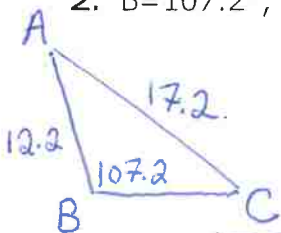
C 17.1

D 30.7

E  $42.7^\circ$

F  $69.9^\circ$  or  $110.1^\circ$

2.  $B=107.2^\circ, b=17.2, c=12.2$ . Find  $C$ .



$$\frac{17.2}{\sin 107.2} = \frac{12.2}{\sin C}$$

$$17.2 \sin C = 12.2 \sin 107.2$$

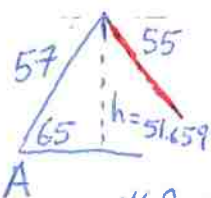
$$\sin C = \frac{12.2 \sin 107.2}{17.2}$$

$$C = \sin^{-1}(0.67758)$$

$$C = 42.655^\circ$$

**E**

3.  $A=65^\circ, a=55, b=57$ . Find  $B$

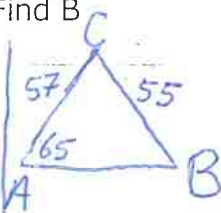


$$\sin 65 = \frac{h}{57}$$

$$h = 57 \sin 65$$

$$h = 51.659$$

\* 2 possible triangles \*

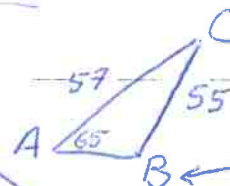


$$\frac{55}{\sin 65} = \frac{57}{\sin B}$$

$$55 \sin B = 57 \sin 65$$

$$\sin B = \frac{57 \sin 65}{55}$$

$$B = \sin^{-1}(0.93926) = 69.928^\circ$$

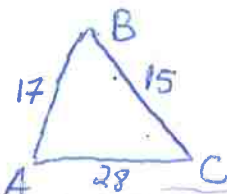


$$\angle B = 110.072^\circ$$

**F**

4.  $a=15, b=28, c=17$ . Find  $B$ .

\* SSS  $\rightarrow$  Law of Cosines. \* start with largest angle \*



$$b^2 = a^2 + c^2 - (2ac \cos B)$$

$$28^2 = 15^2 + 17^2 - (2(15)(17) \cos B)$$

$$270 = -510 \cos B$$

$$\frac{270}{-510} = \cos B$$

$$-0.5294 = \cos B$$

$$\cos^{-1}(-0.5294) = B$$

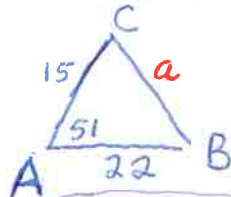
$$121.9657^\circ = B$$

$$B = 121.966^\circ$$

**B**

5.  $A=51^\circ, b=15, c=22$ . Find  $a$ .

\* SAS  $\rightarrow$  Law of Cosines.



$$a^2 = b^2 + c^2 - (2bc \cos A)$$

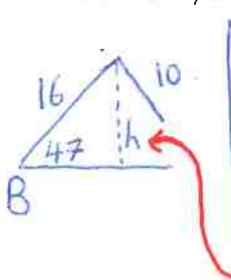
$$a^2 = 15^2 + 22^2 - (2(15)(22) \cos 51)$$

$$a^2 = 293.6485$$

$$a = 17.136$$

**C**

6.  $B=47^\circ, b=10, c=16$  Find  $C$



$$\sin 47 = \frac{h}{16}$$

$$h = 16 \sin 47$$

$$h = 11.701$$

side b is too short, no triangle is possible.

**A**