

Name: _____

Date: _____

Page 1

LAW OF COSINES

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

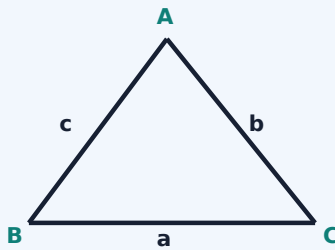
$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

LEVEL 1 - CHOOSE THE CORRECT FORMULA

1 MATCH THE OPPOSITE PAIR

In triangle ABC, which angle is opposite side c?



2 CHOOSE THE FORMULA

Which formula should you use if you are trying to find side b?

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

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

$$c^2 = a^2 + b^2 - 2ab \cos C$$

3 CHOOSE THE METHOD

A triangle has two known sides and the included angle between them. Which method should you use first?

SOH-CAH-TOA Law of Sines Law of Cosines

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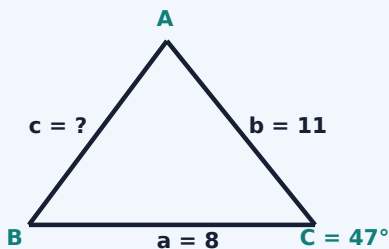
Date: _____

Page 2

LEVEL 2 - FIND MISSING SIDES

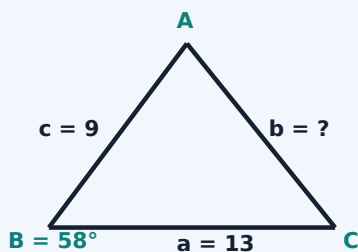
4 FIND A MISSING SIDE

In triangle ABC, $a = 8$, $b = 11$, and $C = 47^\circ$. Find side c to the nearest hundredth.



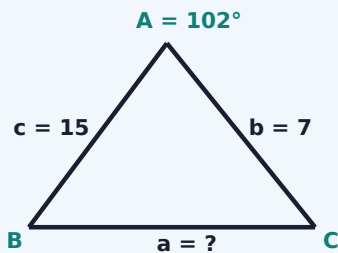
5 FIND A MISSING SIDE

In triangle ABC, $a = 13$, $c = 9$, and $B = 58^\circ$. Find side b to the nearest hundredth.



6 FIND A MISSING SIDE

In triangle ABC, $b = 7$, $c = 15$, and $A = 102^\circ$. Find side a to the nearest hundredth.



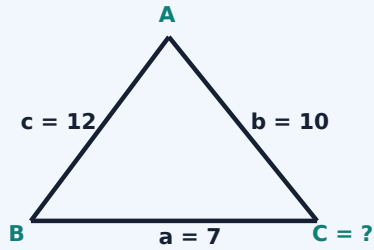
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Date: _____

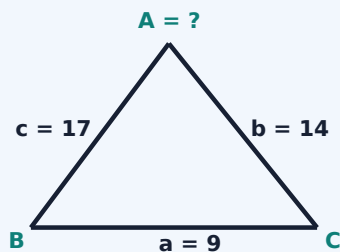
Page 3

LEVEL 3 - FIND MISSING ANGLES

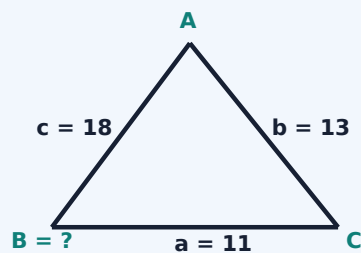
7 FIND A MISSING ANGLE

In triangle ABC, $a = 7$, $b = 10$, and $c = 12$. Find angle C to the nearest tenth.

8 FIND A MISSING ANGLE

In triangle ABC, $a = 9$, $b = 14$, and $c = 17$. Find angle A to the nearest tenth.

9 FIND A MISSING ANGLE

In triangle ABC, $a = 11$, $b = 13$, and $c = 18$. Find angle B to the nearest tenth.

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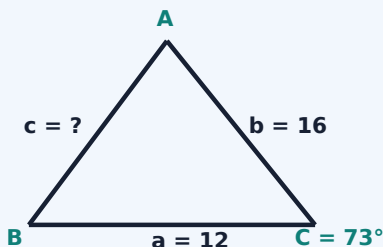
Date: _____

Page 4

LEVEL 4 - MIXED LAW OF COSINES PROBLEMS

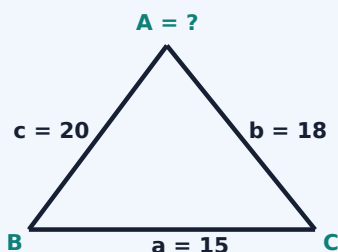
10 MIXED PRACTICE

In triangle ABC, $a = 12$, $b = 16$, and $C = 73^\circ$. Find side c to the nearest hundredth.



11 MIXED PRACTICE

In triangle ABC, $a = 15$, $b = 18$, and $c = 20$. Find angle A to the nearest tenth.



12 METHOD SELECTION

A triangle has side lengths 9, 12, and 14. You want to find its largest angle. Which angle should you find first, and why?

REMEMBER

The largest angle is opposite the longest side.

1 Match the opposite pair

Side c is opposite angle C.

Answer: C

2 Choose the formula

To find side b, use the form with b^2 on the left.

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

3 Choose the method

Two known sides and the included angle form SAS.

Answer: Law of Cosines

4 Find a missing side

$$c^2 = 8^2 + 11^2 - 2(8)(11) \cos 47^\circ$$

$$c^2 \approx 64.97$$

$$c \approx \sqrt{64.97} \approx 8.06$$

5 Find a missing side

$$b^2 = 13^2 + 9^2 - 2(13)(9) \cos 58^\circ$$

$$b^2 \approx 126.00$$

$$b \approx \sqrt{126.00} \approx 11.22$$

6 Find a missing side

$$a^2 = 7^2 + 15^2 - 2(7)(15) \cos 102^\circ$$

$$a^2 \approx 317.66$$

$$a \approx \sqrt{317.66} \approx 17.82$$

7 Find a missing angle

$$12^2 = 7^2 + 10^2 - 2(7)(10) \cos C$$

$$\cos C = 5/140 = 1/28$$

$$C = \cos^{-1}(1/28) \approx 88.0^\circ$$

8 Find a missing angle

$$9^2 = 14^2 + 17^2 - 2(14)(17) \cos A$$

$$\cos A = 404/476$$

$$A = \cos^{-1}(404/476) \approx 32.0^\circ$$

9 Find a missing angle

$$13^2 = 11^2 + 18^2 - 2(11)(18) \cos B$$

$$\cos B = 276/396$$

$$B = \cos^{-1}(276/396) \approx 45.8^\circ$$

10 Mixed practice

$$c^2 = 12^2 + 16^2 - 2(12)(16) \cos 73^\circ$$

$$c^2 \approx 287.73$$

$$c \approx \sqrt{287.73} \approx 16.96$$

11 Mixed practice

$$15^2 = 18^2 + 20^2 - 2(18)(20) \cos A$$

$$\cos A = 499/720$$

$$A = \cos^{-1}(499/720) \approx 46.1^\circ$$

12 Method selection

The longest side is 14.

The largest angle is opposite the longest side.

Find the angle opposite side 14 first using the Law of Cosines.