

Name: _____

Date: _____

Similarity: Problems Involving Right Angles

Special Right Triangles

A right triangle is any triangle composed of a 90 degree angle and two complimentary angles. As you have most likely learned, the sides of a triangle can be compared using trigonometric ratios (sine, cosine, tangent). For special right triangles, we can predict these constant ratios based on the following data:

Special Triangle	$\sin A$	$\cos A$
45-45-90	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
30-60-90	$\sin 30 = \frac{1}{2}$ $\sin 60 = \frac{\sqrt{3}}{2}$	$\cos 30 = \frac{\sqrt{3}}{2}$ $\cos 60 = \frac{1}{2}$

If the angle is unknown, use the inverse trigonometric function, listed here:

Inverse Trigonometric Functions

If $\sin A = x$, then $\sin^{-1}x = m\angle A$

If $\cos A = x$, then $\cos^{-1}x = m\angle A$

If $\tan A = x$, then $\tan^{-1}x = m\angle A$

Example: Find the unknown measures. Round to the nearest tenth degree or angle.

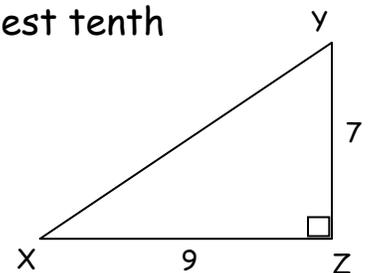
Step 1: Use the Pythagorean Theorem.

$$XY^2 = XZ^2 + YZ^2$$

$$XY^2 = 7^2 + 9^2$$

$$XY^2 = 130$$

$$XY \approx 11.4$$



Step 2: Use trigonometric ratios to find $m\angle X$ and $m\angle Y$

$$m\angle X = \tan^{-1}(7/9) \approx 37.9$$

$$m\angle Y = 90 - 37.9 = 52.1$$

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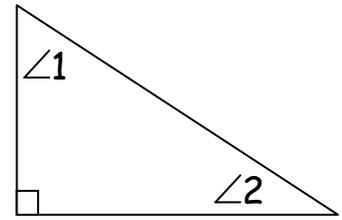
1-4. Given the trigonometric ratios, identify which is $\angle A$.

1. $\sin A = \frac{12}{13}$

2. $\cos A = \frac{5}{13}$

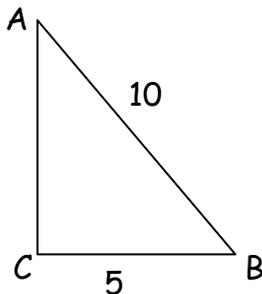
3. $\tan A = \frac{5}{12}$

4. $\cos A = \frac{12}{13}$

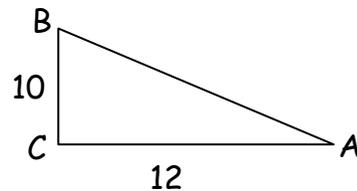


5-8. Identify the missing measurements.

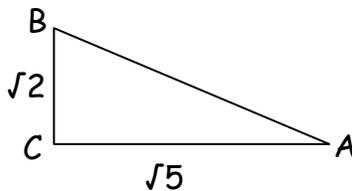
5.



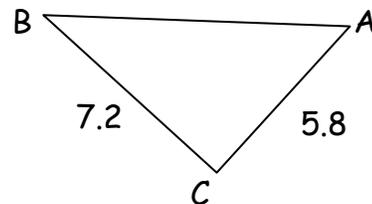
6.



7.



8.



9-11. Complete each statement.

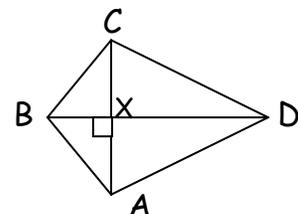
9. $\cos^{-1}(\underline{\hspace{1cm}}) \approx 12^\circ$

10. $\sin \underline{\hspace{1cm}} \approx \frac{2}{3}$

11. $\underline{\hspace{1cm}} 60 = \frac{1}{2}$

12. A kite maker is assembling kite X so that the height of triangle ABC is half the length of XD. Determine whether $\triangle ABC \sim \triangle BCD$.

Defend your answer.



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Answer Key

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1. $\angle 1$

2. $\angle 2$

3. $\angle 2$

4. $\angle 2$

5. $5\sqrt{3}$; $\angle A = 30$; $\angle B = 60$

6. $5\sqrt{61}$; $\angle A = 39.8$; $\angle B = 50.2$

7. $\sqrt{7}$; $\angle A = 32.3$; $\angle B = 57.7$

8. $\sqrt{85.48}$; $\angle A = 38.9$; $\angle B = 51.9$

9. 0.98

10. 42°

11. \cos

12. No. Because no information is given that indicates they have similar side or angle measures.