Ratios of Right Triangles

RatiosOfRightTriangles.tns

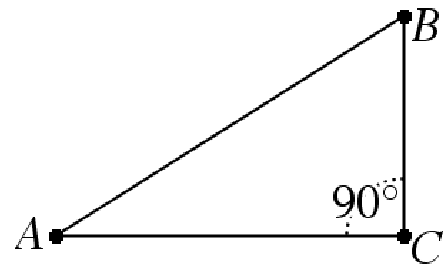
Name ________________________

Class ________________________

Problem 1 – Exploring the Definition of Right Triangle Trigonometry

We will begin this activity by looking at the definition of sine, cosine, and tangent of a right triangle. On pages 1.3, 1.4, and 1.5, you are given the definitions of the *sine, cosine,* and *tangent* of a right triangle, respectively. Copy the definitions on your worksheet.

1. What is the definition of sin *A* for right △*ABC*?



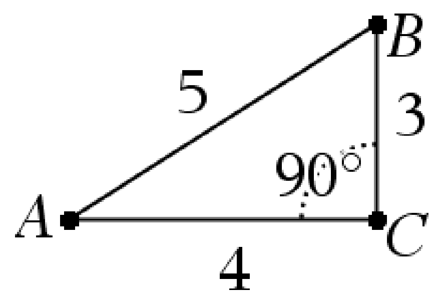
2. What is the definition of cos *A* for right △*ABC*?

3. What is the definition of tan *A* for right △*ABC*?

Answer the following questions about sine, cosine, and tangent for △*ABC*.

4. What is sin *A* for right △*ABC*?

5. What is cos *A* for right △*ABC*?



6. What is tan *A* for right △*ABC*?

7. What is sin *B* for right △*ABC*?

8. What is cos *B* for right △*ABC*?

9. What is tan *B* for right △*ABC*?

Problem 2 – Exploring the Sine Ratio of a Right Triangle

For this problem, we will investigate the sine ratio. On page 2.3, you are given right triangle *ABC*. The spreadsheet on page 2.4 contains 3 columns: **bc_l** (length of $\overline{BC}$), **ab_l** (length of $\overline{AB}$), and **rbc2ab** (ratio of *BC* to *AB*).

10. Grab and drag point *B*, and then press [ctrl] + [.]. Repeat this three more times. This process will collect data in the spreadsheet on page 2.4. Record the data you collected in the table below. Leave the last column blank for now.

Position	*BC*	*AB*	$\frac{BC}{AB}$	$\sin^{-1}\frac{BC}{AB}$
1				
2				
3				
4				

11. What do you notice about the ratio of *BC* to *AB*?

12. Did $\angle A$ change when you moved point *B* in $\triangle ABC$?

Because the ratio remains the same and $\angle A$ remains fixed, we can use the ratio of *BC* to *AB* to find the measurement of $\angle A$. To do this, we will use the definition of sine and the inverse of sine. By definition, $\sin A = \frac{BC}{AB}$, and to find the measurement of $\angle A$ we use the inverse of sine to get the formula $A = \sin^{-1}\left(\frac{BC}{AB}\right)$. On page 2.4 in Column D, enter **=sin^{-1}(rbc2ab)** into the formula bar (the gray row with a diamond on the far left), and then press [enter]. Copy the result into the last column of the table above.

13. What is the measurement of $\angle A$?

14. What is the measurement of $\angle B$?

Problem 3 – Exploring the Cosine Ratio of a Right Triangle

For this problem, we will investigate the cosine ratio. On page 3.3, you are given right triangle *ABC*. The spreadsheet on page 3.4 contains 3 columns: **ac_l** (length of $\overline{AC}$), **ab_l** (length of $\overline{AB}$), and **rac2ab** (ratio of *AC* to *AB*).

15. Collect data for four positions of point *B* as was done in Problem 2.

Position	*AC*	*AB*	$\frac{AC}{AB}$	$\cos^{-1}\frac{AC}{AB}$
1				
2				
3				
4				

Because the ratio remains the same and $\angle A$ remains fixed, we can use the ratio of *AC* to *AB* to find the measurement of $\angle A$. To do this, we will use the definition of cosine and the inverse of cosine. By definition, $\cos A = \frac{AC}{AB}$. To find the measurement of $\angle A$, we use the inverse of cosine to get the formula $A = \cos^{-1}\left(\frac{AC}{AB}\right)$. On page 3.4 in Column D, enter **=cos^{-1}(rac2ab)** into the formula bar, and then press [enter]. Copy the result into the last column of the table above.

16. What is the measurement of $\angle A$?

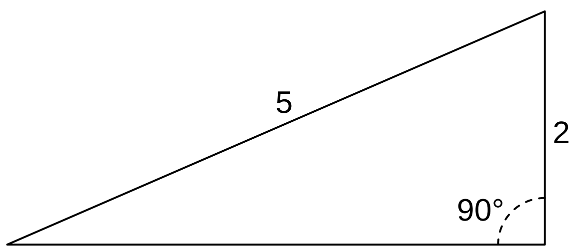
17. What is the measurement of $\angle B$?

18. How would you solve an equation of the form $\tan A = \frac{BC}{AC}$ to find the measure of $\angle A$?

Problem 4 – Applying the Sine, Cosine, and Tangent Ratios of a Right Triangle

Find and label the measure of each angle given two sides of the right triangle.

19.



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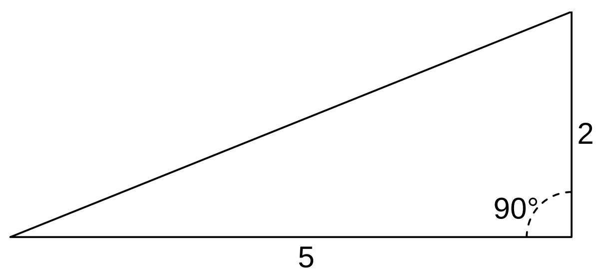

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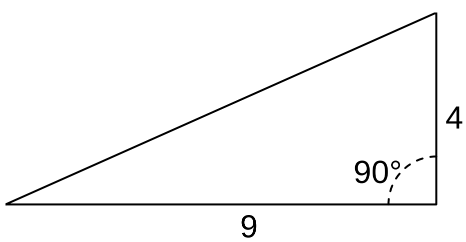

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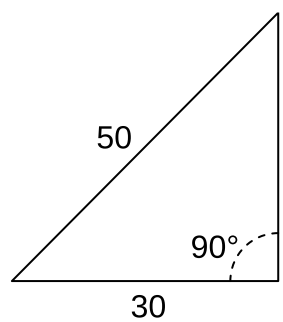

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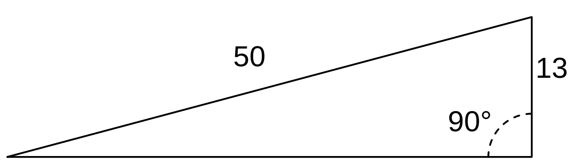

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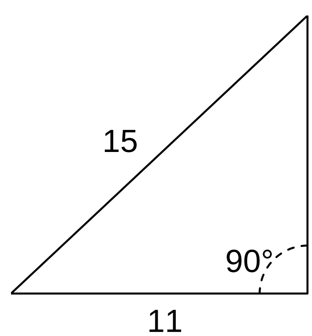

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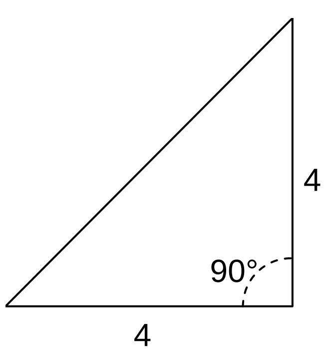

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