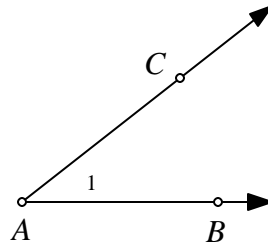


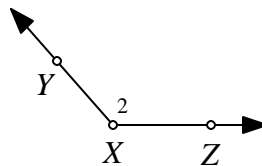
TOPIC 9: Angles

An **angle** is a set of point consisting of two rays (or line segments) with a common endpoint called the **vertex**. The rays (or segments) are the **sides** of the angle. In the figure shown below, we can label the angle with vertex A as $\angle A$, $\angle BAC$, $\angle CAB$, or $\angle 1$.



The two most common ways of measuring angles are **degrees** and **radians**. Recall that 180 degrees (180°) is equivalent to π radians. We write the measure of angle A as $m\angle A$. A **right angle** has a measure of 90° .

1. Label the angle with vertex X shown below in four different ways.



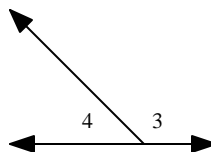
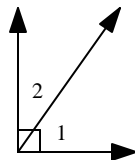
For exercises 2-5, convert the radian measure to degrees.

2. $2p$ 3. $\frac{p}{6}$ 4. $\frac{3p}{4}$ 5. $\frac{5p}{3}$

For exercises 6-9, convert the degree measure to radians.

6. 90° 7. 120° 8. 225° 9. 390°

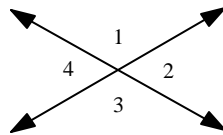
In the figures shown below, $\angle 1$ and $\angle 2$ are a pair of **complementary angles**, and $\angle 3$ and $\angle 4$ are a pair of **supplementary angles**.



10. What is the sum of the measures of complementary angles? Write a definition of **complementary angles**. Compare your definition with other students.

11. What is the sum of the measures of supplementary angles? Write a definition of *supplementary angles*. Compare your definition with other students.
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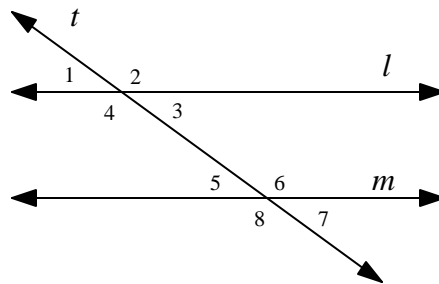
Several angles are formed when two lines intersect. In the figure shown below, $\angle 1$ and $\angle 3$ are a pair of *vertical angles*.



If two angles have the same measure we say the angles are *congruent*. The symbol “ \cong ” means “is congruent to.” Therefore, $m\angle A = m\angle B$ if and only if $\angle A \cong \angle B$.

12. In the figure shown above, what is another pair of vertical angles?
13. Write a definition of *vertical angles*. Compare your definition with other students.
14. What can you conclude about vertical angles? Prove your conclusion.
(*Hint*: Find an angle that is supplementary to both $\angle 1$ and $\angle 3$.)
15. Suppose in the figure above $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$.
a. What is the measure of each angle?
b. What are the lines called?
-

Two lines that do not intersect are *parallel*. A line that intersects parallel lines is a *transversal*. In the figure shown below, l and m are parallel lines and t is a transversal.

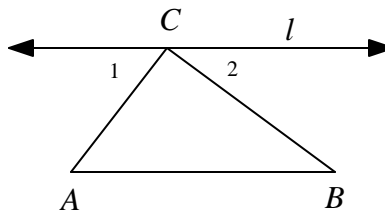


In the figure above, $\angle 1$ and $\angle 5$ are a pair of *corresponding angles*, $\angle 4$ and $\angle 6$ are a pair of *alternate interior angles*, and $\angle 2$ and $\angle 8$ are a pair of *alternate exterior angles*.

16. In the figure shown above, find three other pairs of corresponding angles.
17. If two parallel lines are cut by a transversal, what can you conclude about corresponding angles?

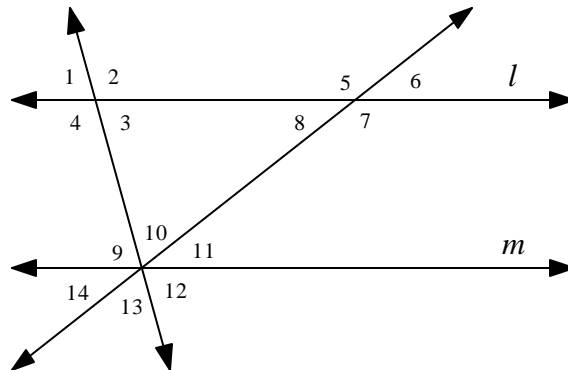
18. In the figure shown above, find another pair of alternate interior angles.
19. If two parallel lines are cut by a transversal, what can you conclude about alternate interior angles?
20. In the figure shown above, find another pair of alternate exterior angles.
21. If two parallel lines are cut by a transversal, what can you conclude about alternate exterior angles.
22. Prove: In the figure shown above, $\angle 3$ and $\angle 6$ are supplementary.

For exercises 23 and 24, refer to the figure shown below. Assume that l is parallel to \overline{AB} .



23. Prove: $\angle 1 \cong \angle A$ and $\angle 2 \cong \angle B$.
24. Prove: The sum of the measures of the interior angles of $\triangle ABC$ is 180° .

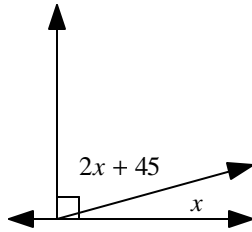
For exercises 25-28, refer to the figure shown below. Assume that l is parallel to m and that $m\angle 10 = 70^\circ$ and $m\angle 11 = 30^\circ$.



25. What is $m\angle 4$?
26. What is $m\angle 3$?
27. What is $m\angle 7$?
28. What is the sum of the measures of all the numbered angles?

For exercises 29 and 30, find x .

29.



30.

