

Relationships between angles

School Grade: K8/K9

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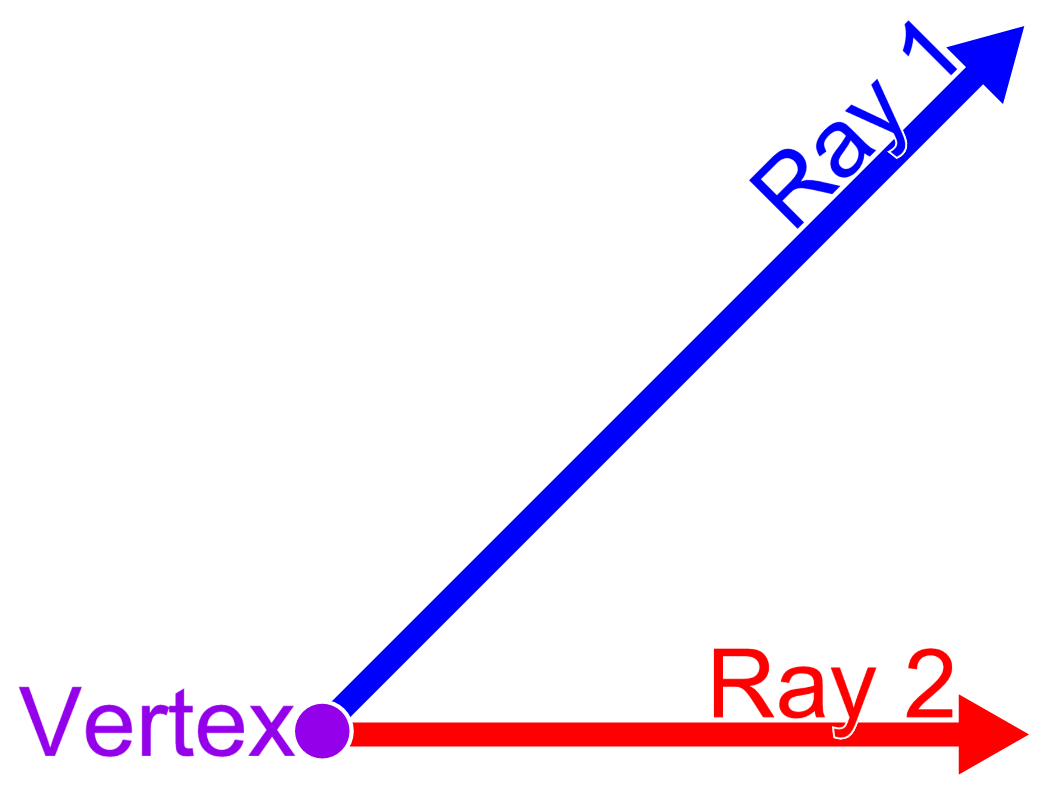
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# Angle

In Euclidean geometry, an angle is the figure formed by two rays, called the sides of the angle, sharing a common endpoint, called the vertex of the angle. Angles formed by two rays lie in the plane that contains the rays.



**Types of angles**

There are seven types of Angles commonly used in Mathematics:

Zero Angle (0° in Measure)

Acute Angle (0 to 90° in Measure)

Right Angle (90° in Measure)

Obtuse Angle (90 to 180° in Measure)

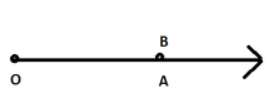
Straight Angle (180° in Measure)

Reflex Angle (180 to 360° in Measure)

Complete Angle (360° in Measure)

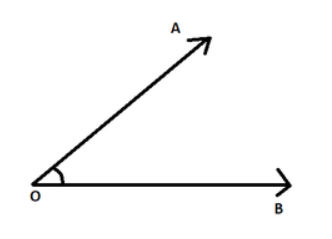
**Zero Angle**

The two rays of the angle make zero degrees inclination with each other. The rays overlap. Here, Angle AOB denotes zero degrees in measure.



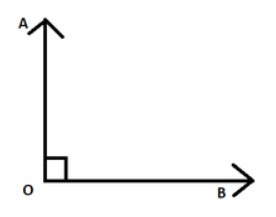
**Acute Angle**

Any angle that is less than 90° is an acute angle. If two rays intersect at a vertex, forming an angle that is less than 90°, an acute angle is formed.



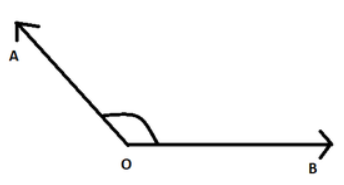
**Right Angle**

If the angle formed between two rays is exactly 90° then it is called a right angle or a 90° angle.



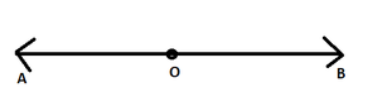
**Obtuse Angle**

Any angle that is greater than 90° but less than 180° is an obtuse angle.



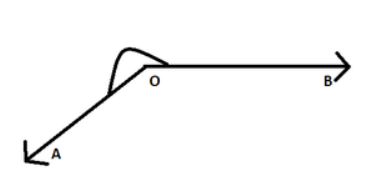
**Straight Angle**

A straight angle is a straight line, and the angle formed between two rays is exactly equal to 180°. At a straight angle, the two rays are opposite to each other.



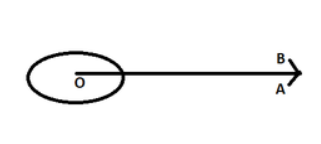
**Reflex Angle**

An angle that is greater than 180° and less than 360° is called a reflex angle.



**Complete Angle**

A complete angle (full rotation angle) is formed when one of the arms of the angle goes on a complete rotation or makes a 360°.



# Relationships between angles

Beyond measuring the degrees or radians, you can also compare angles and consider their relationships to other angles. We talk of angle relationships because we are comparing position, measurement, and congruence between two or more angles.

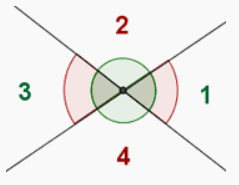
For example, when two lines or line segments intersect, they form two pairs of vertical angles. When two parallel lines are intersected by a transversal, complex angle relationships form, such as alternating interior angles, corresponding angles, and so on.

## Congruent angles

Two angles are said to be congruent if their corresponding sides and angles are of equal measure. Two angles are also congruent if they coincide when superimposed. That is, if by turning it and/or moving it, they coincide with each other. The diagonals of a parallelogram also set up congruent vertex angles. Simply, Congruent angles are angles that have the same measure.

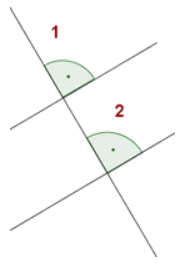
**Vertical Angles**

The angles opposite each other when two lines cross. In the figure, the 1 and 3 are vertically opposite angles and they are always equals. Same goes for angles 2 and 4.



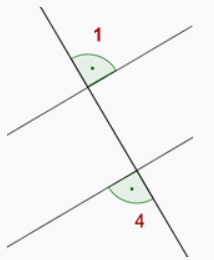
## Corresponding Angles

The angles in matching corners when two lines are crossed by another line, called the transversal. One is internal and the other external. They are equals if the two intersected lines by the transversal are parallel. In the figure, angles 1 and 2 are corresponding. The 1 is external and the 2 is internal.



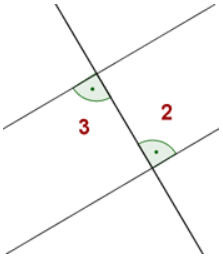
**Alternate Exterior Angles**

Angles that are on opposite sides of the transversal of two other lines. Both are external. They are equals if the two intersected lines by the transversal are parallel. In the figure, angles 1 and 4 are alternate exterior angles.



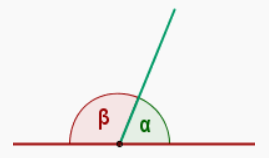
**Alternate Interior Angles**

Angles that are on opposite sides of the transversal of two other lines. Both are internal. They are equals if the two intersected lines by the transversal are parallel. In the figure, angles 2 and 3 are alternate interior angles.



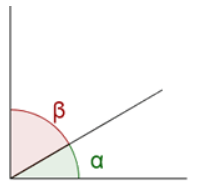
**Adjacent Angles**

Two angles which share a common vertex and side, but have no common interior points. In the figure, the α and β are adjacent angles.



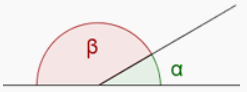
**Complementary Angles**

Two angles are called complementary when their sum is 90º. In the figure, the α and β angles together form a right angle.



**Supplementary Angles**

Two angles are called supplementary when their sum is 180º. In the figure, the α and β angles together form a straight angle.

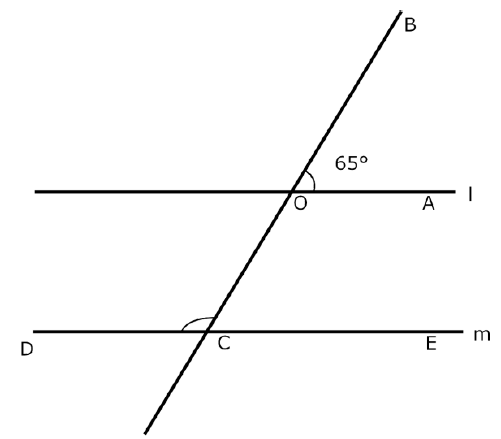


**Examples**

**Angle Relationships – Meet the Skill**

Find the measures of the marked ∠DCO. Do not measure them. Line l and m are

parallel.

****

When two parallel lines are crossed by another line (which is called the

Transversal), the angles in matching corners are called corresponding angles.

Here line l is parallel to line m and line BC is angle bisector of both these parallel

lines.

So ∠OCE will be of 65°.

Two angles are supplementary if they add up to 180 degrees.

Here ∠DCO and ∠OCE are supplementary because they both lie on a same point of a

line and made by transversal line.

∠DCO + ∠OCE = 180°

∠DCO + 65° = 180°

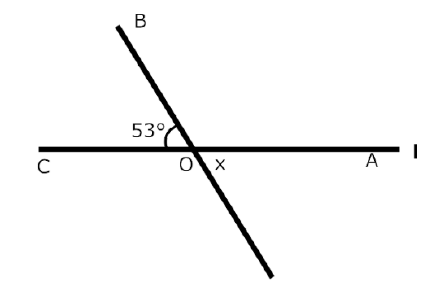
∠DCO = 180° - 65°

∠DCO = 115°

Answer: 115°

**Angle Relationships – Try the Skill**

Find the measures of the marked ∠BXA. Do not measure them.



Here a line l is intersected by another line that makes four angles on point O.

On the upper portion of line l the ∠BOC and ∠BOA are supplementary angles. So their

total will be equal to 180°.

∠BOC + ∠BOA =180°

53° + ∠BOA =180°

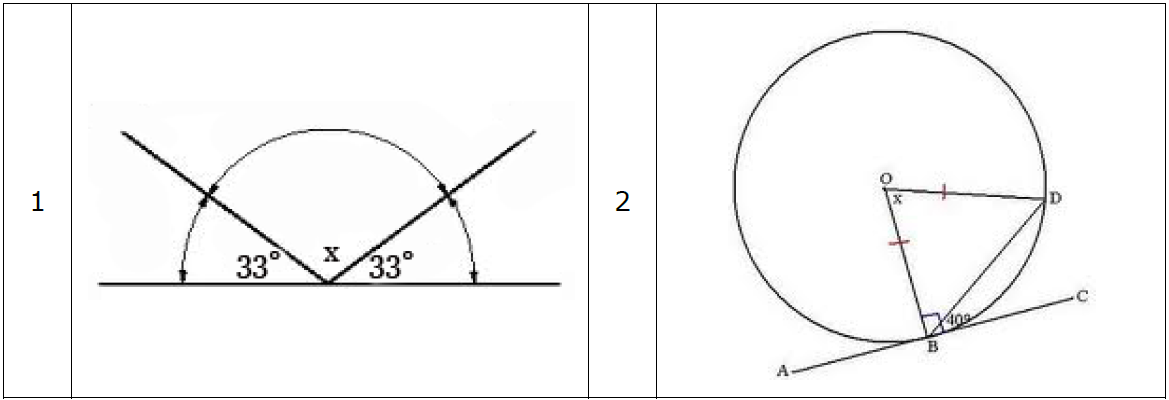
∠BOA =180° - 53°

∠BOA =127°

Answer: 127°

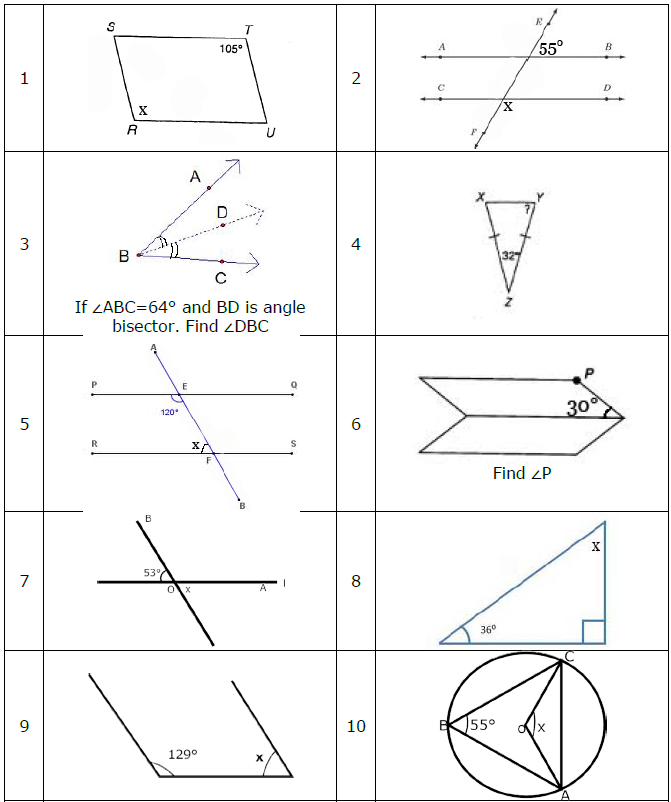
Practice Problems.

Find ∠x



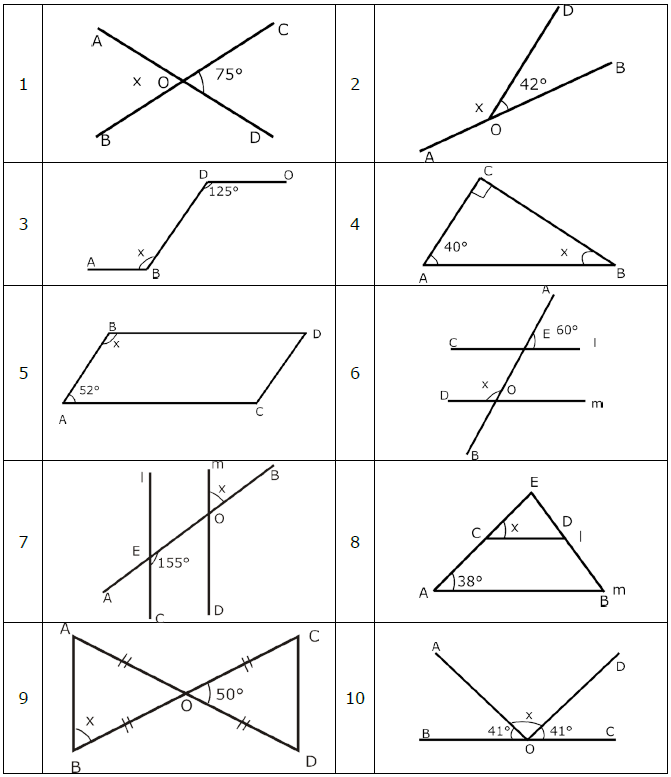
**Angle Relationships – Practice the Skill**

Find the measures of the marked angle x. Do not measure them.



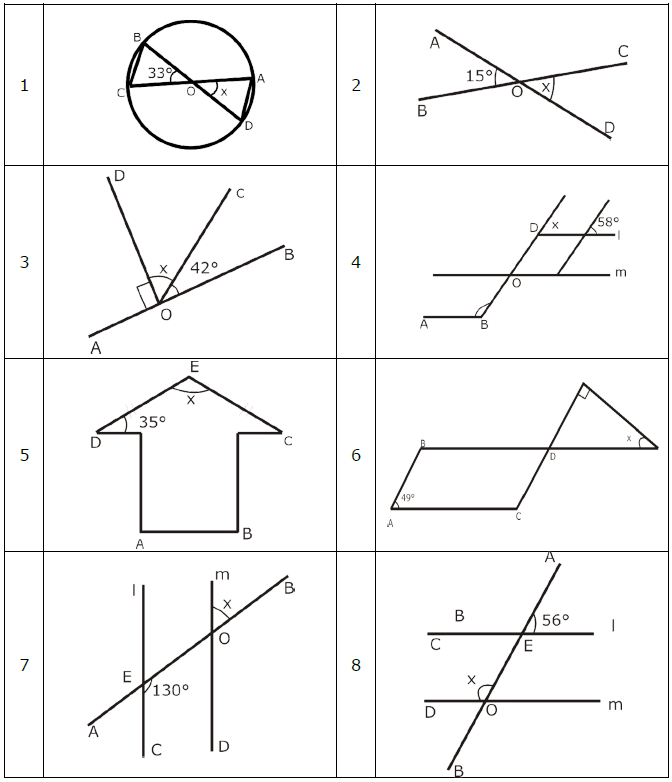
**Angle Relationships – Practice the Skill Twice**

Find the measures of the marked angle x. Do not measure them.



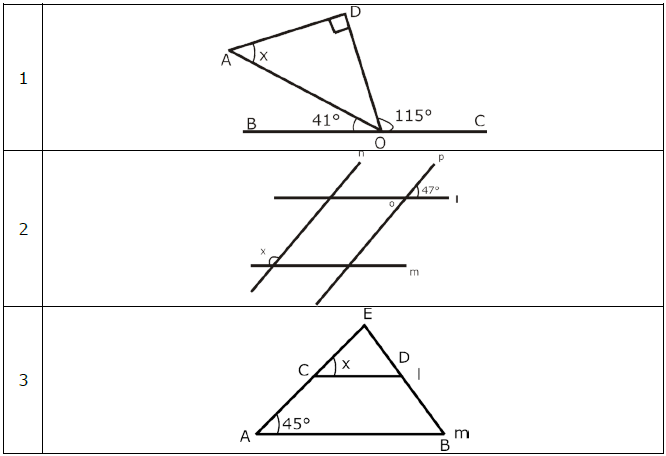
**Angle Relationships – Show the Skill**

Find the measures of the marked angle x. Do not measure them.



**Angle Relationships – Warm Up**

Find the measures of the marked angle x. Do not measure them.



**Angle Relationships – Answer Key**

**Obrázok, na ktorom je text

Automaticky generovaný popis**

# References

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