

Name Stu Dent
 Adv Geo - 8

AMDG

2.8: Vertical Angles

Ms. Kresovic
 Date: 29 Sep 15

Objectives

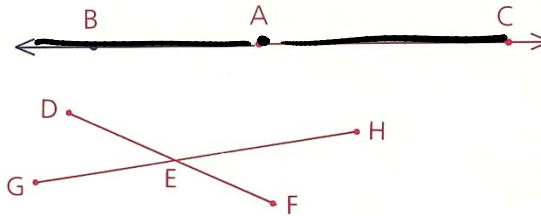
After studying this section, you should be able to

- Recognize opposite rays
- Recognize vertical angles

Opposite Rays

\vec{AB} and \vec{AC} are **opposite rays**.

\vec{ED} and \vec{EF} are also opposite rays,
 as are \vec{EG} and \vec{EH} .



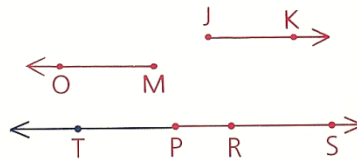
term not used in proof as reason.

Definition Two collinear rays that have a common endpoint and extend in different directions are called **opposite rays**.

Some pairs of rays that are not opposite rays are shown below.

\vec{JK} and \vec{MO} are not parts of the same line.

\vec{PT} and \vec{RS} are not opposite, since they do not have a common endpoint.



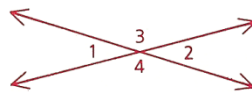
Vertical Angles

Whenever two lines intersect, two pairs of **vertical angles** are formed.

Definition Two angles are **vertical angles** if the rays forming the sides of one and the rays forming the sides of the other are opposite rays.

$\angle 1$ and $\angle 2$ are vertical angles.

$\angle 3$ and $\angle 4$ are vertical angles.

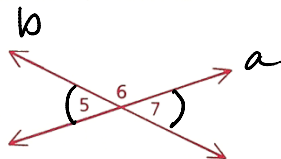


Are $\angle 3$ and $\angle 2$ vertical angles? How do vertical angles compare in size?

Theorem 18 *Vertical angles are congruent.*

Given: Diagram as shown

Prove: $\angle 5 \cong \angle 7$



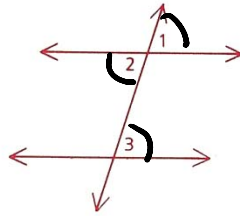
We proved Theorem 18 in Section 2.4, sample problem 3.

$$\text{Vert } \angle s \Rightarrow \cong \angle s$$

Statements	Reasons
1. Diag	1. given
2. a & b are stls	2. Diag \Rightarrow stl
3. $\angle 5$ supp $\angle 6$ $\angle 7$ supp $\angle 6$	3. stl \Rightarrow supp's
4. $\angle 5 \cong \angle 7$	4. $\angle s$ supp to same $\angle \Rightarrow \cong \angle s$

Part Two: Sample Problems

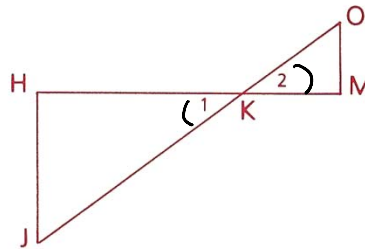
Problem 1 Given: $\angle 2 \cong \angle 3$
 Prove: $\angle 1 \cong \angle 3$



Proof

Statements	Reasons
1 $\angle 2 \cong \angle 3$	1 Given
2 $\angle 1 \cong \angle 2$	2 Vert \angle s $\Rightarrow \cong \angle$ s
3 $\angle 1 \cong \angle 3$	3 Trans (1, 2)

Problem 2 Given: $\angle O$ is comp. to $\angle 2$.
 $\angle J$ is comp. to $\angle 1$.
 Conclusion: $\angle O \cong \angle J$

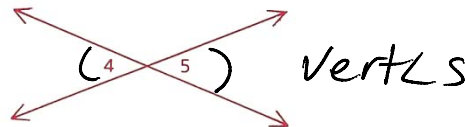


Proof

Statements	Reasons
1 $\angle O$ is comp. to $\angle 2$.	1 Given
2 $\angle J$ is comp. to $\angle 1$.	2 Given
3 $\angle 1 \cong \angle 2$	3 Vert \angle s $\Rightarrow \cong \angle$ s
4 $\angle O \cong \angle J$	4 \angle s comp to $\cong \angle$ s $\Rightarrow \cong \angle$ s

Problem 3 Given: $m\angle 4 = 2x + 5$,
 $m\angle 5 = x + 30$

Find: $m\angle 4$
 $\angle 4 = \angle 5$
 $2x + 5 = x + 30$
 $x = 25$



Solution

Therefore, $m\angle 4 = 2(25) + 5$, or 55.

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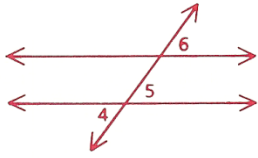
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Problem 4

Given: $\angle 4 \cong \angle 6$

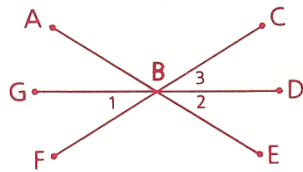
Prove: $\angle 5 \cong \angle 6$



Problem 5

Given: \overleftrightarrow{GD} bisects $\angle CBE$.

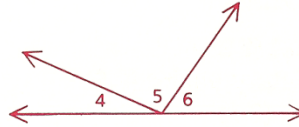
Conclusion: $\angle 1 \cong \angle 2$



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Problem 6

Angles 4, 5, and 6 are in the ratio 2:5:3.
Find the measure of each angle.

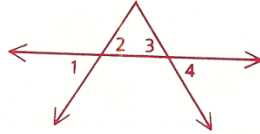


Problem 7

If a pair of vertical angles are supp., what can we conclude about the angles?

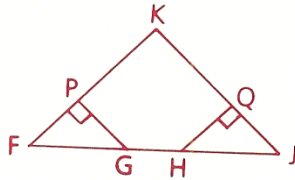
Homework

- 5 Given: $\angle 1 \cong \angle 4$
 Conclusion: $\angle 2 \cong \angle 3$

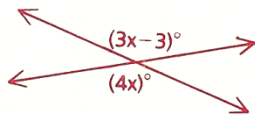


Statements	Reasons
1. $\angle 1 \cong \angle 4$	1.
2. $\angle 1 \cong \angle 2$ & 3. $\angle 4 \cong \angle 3$	2.
4. $\angle 2 \cong \angle 3$	3.

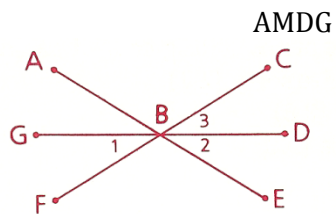
- 6 Given: $\overline{FH} \cong \overline{GJ}$
 Prove: $\overline{FG} \cong \overline{HJ}$



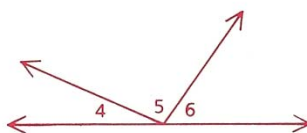
- 7 Is this possible?



- 11 Given: \overleftrightarrow{GD} bisects $\angle CBE$.
 Conclusion: $\angle 1 \cong \angle 2$



- 12 Angles 4, 5, and 6 are in the ratio 2:5:3.
 Find the measure of each angle.



- 15 Find $m\angle 1$.

