AMDG

Name_____ Ms. Kresovic

Adv Geo - _____ **2.8: Vertical Angles** Date: _____

Objectives

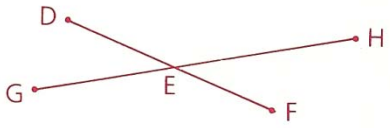
After studying this section, you should be able to

- Recognize opposite rays
- Recognize vertical angles

Opposite Rays

$\overrightarrow{AB}$ and $\overrightarrow{AC}$ are ***opposite rays.***

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

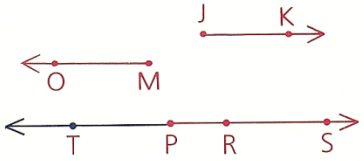


Definition Two collinear rays that have a common endpoint and extend in different directions are called ***opposite rays.***

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

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

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



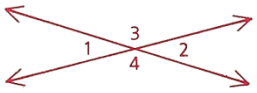
Vertical Angles

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.

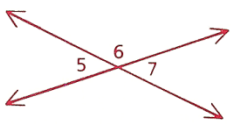


Are $\angle 3$ and $\angle 2$ vertical angles? How do vertical angles compare in size?

Theorem 18 ***Vertical angles are congruent.***

Given: Diagram as shown

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



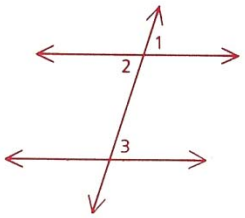
We proved Theorem 18 in Section 2.4, sample problem 3.

Part Two: Sample Problems

Problem 1

Given: $\angle 2 \cong \angle 3$

Prove: $\angle 1 \cong \angle 3$



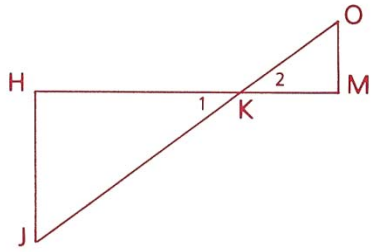
Proof

Statements	Reasons
1 $\angle 2 \cong \angle 3$	1 Given
2 $\angle 1 \cong \angle 2$	2
3 $\angle 1 \cong \angle 3$	3

Problem 2

Given: $\angle O$ *is comp. to* $\angle 2$.
$\angle J$ *is comp. to* $\angle 1$.

Conclusion: $\angle O \cong \angle J$



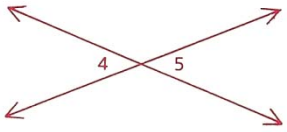
Proof

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
4 $\angle O \cong \angle J$	4

Problem 3

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

Find: $m\angle 4$



Solution

$2x + 5 = x + 30$

$x = 25$

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

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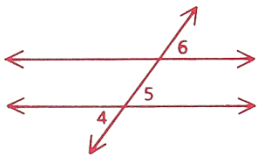
Problem 4

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

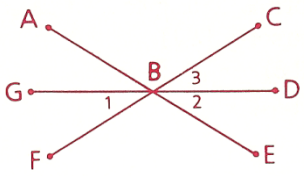
Prove: $\angle 5 \cong \angle 6$



Problem 5

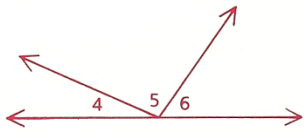
Given: $\overleftrightarrow{GD}$ bisects $\angle CBE$.

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



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?

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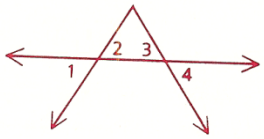
Homework

5 Given: $\angle 1 \cong \angle 4$

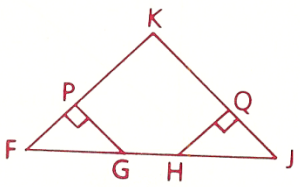
Conclusion: $\angle 2 \cong \angle 3$



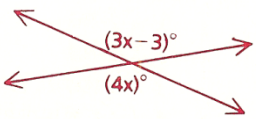
Statements	Reasons
1. $\angle 1 \cong \angle 4$	1.
2. $\angle 1 \cong \angle 2$ & 3. $\angle 4 \cong \angle 3$	2.
4. $\angle 2 \cong \angle 3$	3.

6 Given: $\overline{FH} \cong \overline{GJ}$

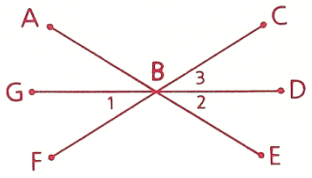
Prove: $\overline{FG} \cong \overline{HJ}$



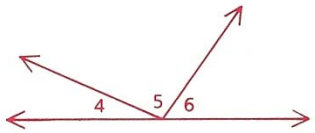
7 Is this possible?



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 $m\angle 1$.