

7



Mathematics

Quarter 3: Week 2 - Module 2 Relationships of Geometric Figures: Angle Pairs



AIRs - LM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics Grade 7

Quarter 3: Week 2 - Module 2: **Relationships of Geometric Figures: Angle Pairs**

First Edition, 2021

COPYRIGHT 2021
La Union Schools Division
Region I

All rights reserved. No part of this module may be reproduced in any form without written permission from the copyright owners.

Development Team of the Module

Writer: Richard O. Dizo

Editor: SDO La Union, Learning Resource Quality Assurance Team

Layout Artist: Ernesto F. Ramos Jr., *P II*

Management Team:

Atty. Donato D. Balderas, Jr.
Schools Division Superintendent

Vivian Luz S. Pagatpatan, PhD
Assistant Schools Division Superintendent

German E. Flora, PhD, *CID Chief*

Virgilio C. Boado, PhD, *EPS in Charge of LRMS*

Erlinda M. Dela Peña, EdD, *EPS in Charge of Mathematics*

Michael Jason D. Morales, *PDO II*

Claire P. Toluyen, *Librarian II*



Target

Many objects around us show relationships of geometric figures. Nature provides different shapes that suggest ideas in architectural designs and engineering constructions. The advancement of such depends on the relationships of the basic concepts in Geometry.

The theoretical and practical knowledge of simple geometric shapes and their properties and relationships will contribute to the development of student's critical thinking skills. This module will provide you with information and activities that will help you to improve this skill.

After going through this module, you are expected to:

Learning Competencies:

- derives relationships of geometric figures using measurements and by inductive reasoning: supplementary angles, complementary angles, vertical angles, adjacent angles, linear pair, perpendicular lines, and parallel lines. **(M7GE-IIIb-1)**
- derives relationships among angles formed by parallel lines cut by a transversal using measurements and by inductive reasoning. **(M7GE-IIIc-1)**

Before going on, check how much you know about this topic.

PRE – ASSESSMENT

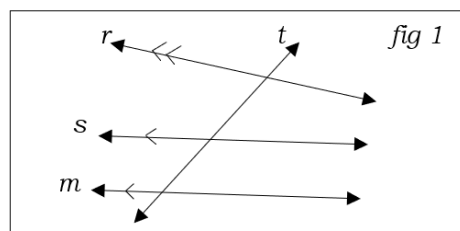
Directions: Select the letter of the correct answer. Write your answer on a separate sheet of paper.

- Which pair of angles whose sum is 90° ?

A. adjacent angles	B. supplementary angles
C. complementary angles	D. vertical angles
- Which pair of angles are adjacent and supplementary angles?

A. complementary angles	B. corresponding angles
C. linear pair	D. vertical angles
- Which two lines are parallel in figure 1?

A. r and s	
B. r and m	
C. s and m	
D. m and t	

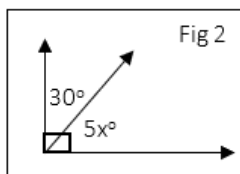


4. Which line in figure 1, is a transversal line?

- A. t B. s C. r D. m

5. What is the value of x in figure 2?

- A. 6 B. 10
C. 12 D. 15



6. What is the measure of the supplement of an angle whose measure is 115° ?

- A. 55° B. 65° C. 75° D. 85°

7. Two congruent angles are complementary to each other. What is the measure of each angle?

- A. 35° B. 40° C. 45° D. 50°

For 8-10, refer to figure 3.

8. How many vertical angle pairs are formed?

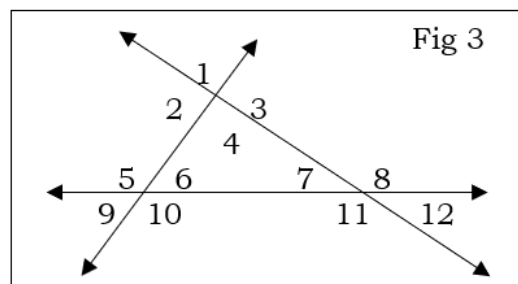
- A. 3 B. 4
C. 5 D. 6

9. If $m\angle 6 = 72^\circ$, what is $m\angle 5$?

- A. 108° B. 98°
C. 68° D. 18°

10. What is $m\angle 4$ if $m\angle 1 = 36^\circ$?

- A. 36° B. 54°
C. 134° D. 154°



For 11-15, refer to figure 4.

11. Which of these angles is congruent to $\angle 5$?

- A. $\angle 1$ B. $\angle 4$
C. $\angle 6$ D. $\angle 8$

12. What pair of angles are $\angle 1$ & $\angle 8$ in figure 4?

- A. Alternate – exterior
B. Alternate – interior
C. Corresponding
D. Same – side interior

13. Using figure 4, which of the following pairs is supplementary?

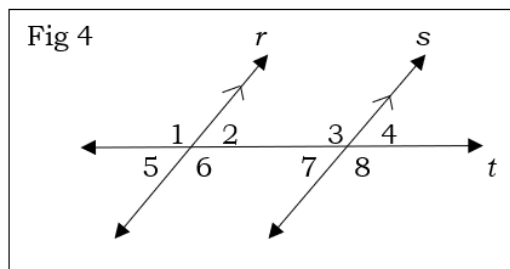
- A. $\angle 1$ and $\angle 5$ B. $\angle 5$ and $\angle 7$ C. $\angle 3$ and $\angle 6$ D. $\angle 3$ and $\angle 8$

14. If the measure of angle 1 is twice as much as the measure of angle 2, what is $m\angle 1$?

- A. 120° B. 90° C. 60° D. 30°

15. If $m\angle 3 = 125^\circ$, what is $m\angle 6$?

- A. 55° B. 75° C. 105° D. 125°



For you to understand the lesson well, do the following activities.

Have fun and good luck!

Lesson 1

Relationships of Geometric Figures: Angle Pairs

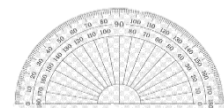
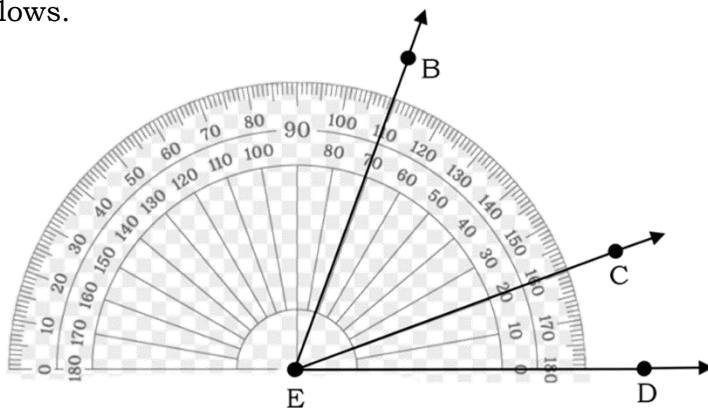
You already know the different kinds of angles. In this lesson you will learn angle pairs. You will also explore the relationship between pair of angles formed when parallel lines are cut by a transversal line.

Pairs of angles may be classified in different ways. For some angle pairs, you will need to sum up their angle measures.



Jumpstart

Observe the complex angles and you must answer the questions that follows.



<https://pngimage.net/protractor-png-3/>

Questions:

1. Does C lie on the interior of $\angle BED$?
2. Find the measure of the three angles.

$$m\angle BED = \underline{\hspace{2cm}} \quad m\angle BEC = \underline{\hspace{2cm}} \quad m\angle CED = \underline{\hspace{2cm}}$$

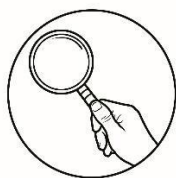
3. Compare the measure $m\angle BED$ to the sum of $m\angle BEC$ and $m\angle CED$.

Your answers will lead to Angle Addition Postulate.

Angle Addition Postulate

If point C lies in the interior of $\angle BED$, then $m\angle BEC + m\angle CED = m\angle BED$

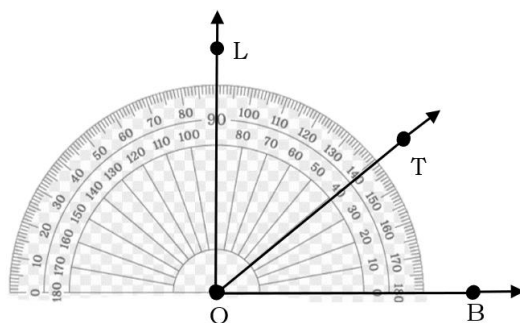
Adding angles is useful in studying pairs of angles.



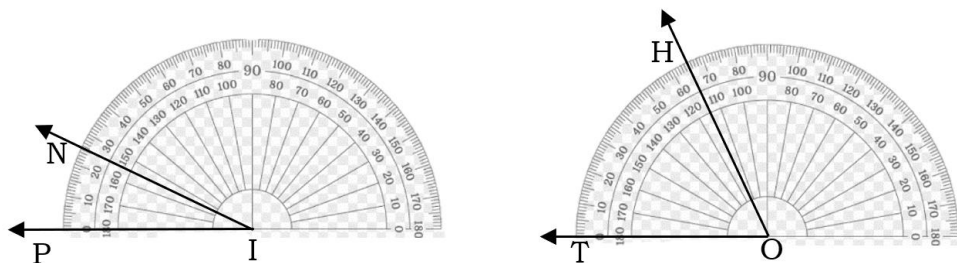
Discover

Now, we shall see how pairs of angles may be related based on the sum of angle measures and by their position.

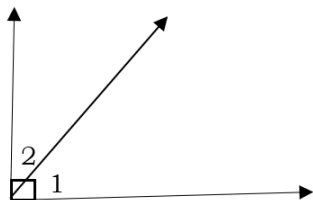
Consider the angles that follows.



What is the sum of $m\angle LOT$ and $m\angle BOT$?



What is the sum of $m\angle PIN$ and $m\angle TOH$?

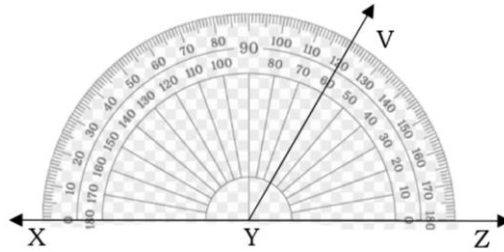


What is the sum of $m\angle 1$ and $m\angle 2$?

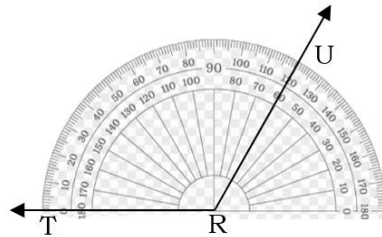
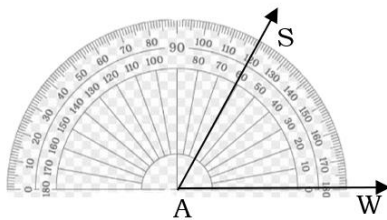
The pairs of angles are called complementary angles

Complementary angles are two angles whose sum measure is 90° .

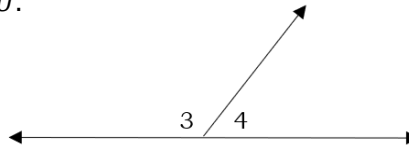
Also consider the set of angles.



Find the sum of $m\angle VYX$ and $m\angle VYZ$.



Find the sum of $m\angle SAW$ and $m\angle TRU$.



Find the sum of $m\angle 3$ and $m\angle 4$.

The pairs of angles are called supplementary angles.

Supplementary angles are two angles whose sum measure is 180° .

Illustrative Example 1.1

$\angle Q$ is 48° . Find the measure of the angles that are complementary and supplementary to $\angle Q$.

Solutions:

The measure of the complement of $\angle Q$ is 42° , since $90^\circ - 48^\circ = 42^\circ$.

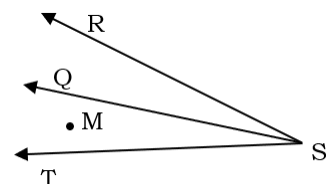
The measure of the supplement of $\angle Q$ is 132° , since $180^\circ - 48^\circ = 132^\circ$.

Consider the next figures.

In this figure:

Name the common side of $\angle TSQ$ and $\angle TSR$.

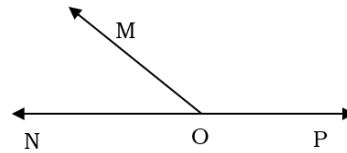
Name the common interior point of $\angle RSQ$ and $\angle RST$.



The common side of $\angle TSQ$ and $\angle TSR$ is ray SQ. They are called adjacent angles. However, $\angle RSQ$ and $\angle RST$ are not adjacent angles even though they have a common side ray ST because they contain a common interior point M.

Adjacent angles which have a common side and a common vertex but no interior point in common

In this figure:
 Name the opposite rays.
 Are $\angle MON$ and $\angle MOP$ adjacent angles?
 Are $\angle MON$ and $\angle MOP$ supplementary?



In the figure above, the opposite rays are \overrightarrow{ON} and \overrightarrow{OP} , and $\angle MON$ and $\angle MOP$ are adjacent and supplementary. The angles formed a linear pair.

Two angles form a **linear pair** when they are adjacent and supplementary.

Linear Pair Postulate

If two angles form a linear pair, then they are supplementary.

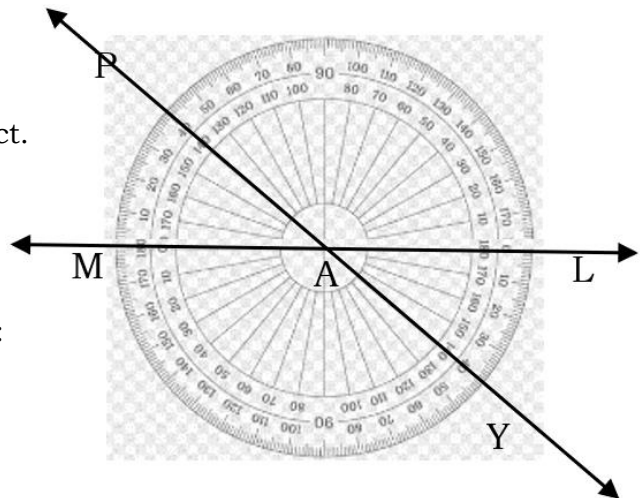
Observe the next figure.

Name the two lines which intersect.

Name the common point of the intersecting lines.

How many angles were formed?

Give the measure of the following:



- a. $m\angle MAP =$ _____
- b. $m\angle LAY =$ _____
- c. $m\angle YAM =$ _____
- d. $m\angle PAL =$ _____

Which angles have equal measure?

The measures of $\angle MAP$ and $\angle LAY$ are both 40° . These angles are congruent. Two angles are **congruent** if their measures are equal. So, we write $\angle MAP \cong \angle LAY$, which is read as " $\angle MAP$ is congruent to $\angle LAY$." We may also write $m\angle MAP = m\angle LAY$, which is read as "the measure of $\angle MAP$ is equal to the measure of $\angle LAY$." Likewise, $\angle YAM$ and $\angle PAL$ are both 140° . So, $\angle YAM \cong \angle PAL$, or $m\angle YAM = m\angle PAL$.

Line PY and line ML intersect at point P. They formed two pairs of nonadjacent congruent angles. These angles are called **vertical angles**. $\angle MAP$ and $\angle LAY$ are vertical angles, and $\angle YAM$ and $\angle PAL$ are vertical angles.

Vertical angles are two nonadjacent angles formed by two intersecting lines.

Now let us state the theorem with the measurements of the vertical angles above as a proof.

Vertical Angle Theorem
Vertical angles are congruent

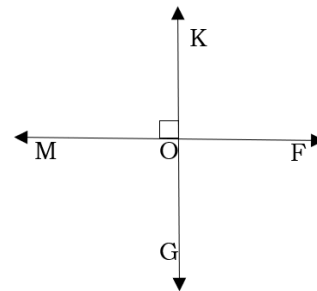
Consider the accompanying figure at the right.

Line MF intersects line KG at O.

Name the four angles formed.

What kind of angles are these?

What is the angle measure of each?



The intersecting lines formed four right angles, namely; $\angle MOG$, $\angle GOF$, $\angle FOK$, and $\angle KOM$. Their measure is 90° . Each angle is supplement to each other. The adjacent angles are also linear pair.

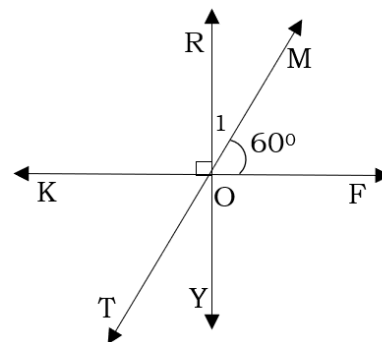
Since the intersecting lines form right angles, then the two lines are said to be perpendicular to each other. So, line MF is perpendicular to line KG. we write this as $\overrightarrow{MF} \perp \overrightarrow{KG}$, in symbol.

When two lines intersect to form right angles, the two lines are said to be ***perpendicular*** to each other.

Illustrative Example 1.2

Using the figure in at the right, answer the following.

1. Name the perpendicular lines.
2. Find the measure of the following.
 - a. $\angle ROF$
 - b. $\angle 1$
 - c. $\angle KOT$
 - d. $\angle TOY$
 - e. $\angle FOY$
3. Name all pair of angles which are complementary.
4. Name two pairs of vertical angles.
5. Name two pairs of adjacent angles.
6. Name two pairs of linear pair.

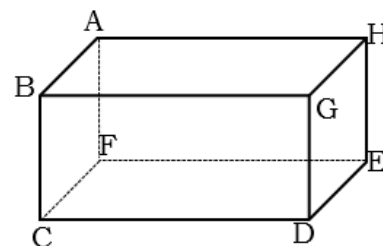


Solutions:

1. $\overrightarrow{KF} \perp \overrightarrow{RY}$
2. a. $\angle ROF = 90^\circ$, it is an angle made by perpendicular lines
b. $\angle 1 = 30^\circ$, it is a complement of $\angle ROF$
c. $\angle KOT = 60^\circ$, it is vertical angle pair of $\angle MOF$
d. $\angle TOY = 30^\circ$, it is vertical angle pair of $\angle 1$
e. $\angle FOY = 90^\circ$, it is an angle made by perpendicular lines
3. $\angle MOF$ and $\angle MOR$ are complementary angles
 $\angle TOY$ and $\angle KOT$ are complementary angles
4. $\angle KOT$ and $\angle MOF$ are vertical angles
 $\angle TOY$ and $\angle MOR$ are vertical angles
5. $\angle KOR$ and $\angle MOR$ are adjacent angles
 $\angle TOY$ and $\angle FOY$ are adjacent angles
6. $\angle TOF$ and $\angle MOF$ are linear pairs
 $\angle ROK$ and $\angle YOK$ are linear pairs

Can you name other related angles?

Lines do not always intersect. The box shows many line segments which do not intersect no matter how far they are extended. \overline{AB} and \overline{GH} are on the same plane but do not intersect. \overline{AB} and \overline{GH} are said to be parallel. It is written in symbol as, $\overline{AB} \parallel \overline{GH}$ can you name other parallel segments in the figure?

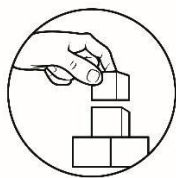


\overline{CF} and \overline{HE} are not coplanar and will not meet no matter how far they are extended. The lines containing these segments are called skew lines. Name other skew lines in the figure.

Two lines are **parallel** if and only if they are coplanar and do not intersect no matter how far they are extended.

Skew lines are line which are non-coplanar and will not meet no matter how far they are extended.

There is no pair of angles form in parallel lines. However, if another line on the same plane will intersect them, then angles are formed. This will be discussed in lesson 2 of this module.



Explore

Now, you are ready apply the concepts of angle pairs.

Exercise 1.1

State whether each of the following is *true* or *false*.

1. Two adjacent right angles are supplementary.
2. The supplement of an obtuse angle is another obtuse angle.
3. Two vertical angles are always congruent.
4. If two angles form a linear pair, then they are supplementary.
5. An angle formed by two perpendicular lines is acute.
6. Complementary angles are both acute angles.

Exercise 1.2

Find the measure of the complementary angle of each of the following angles.

- | | | |
|---------------|---------------|---------------|
| 1. 35° | 3. 58° | 5. 80° |
| 2. 73° | 4. 50° | 6. 22° |

Exercise 1.3

Find the measure of the supplementary angle of each of the following angles.

- | | | |
|----------------|---------------|----------------|
| 1. 100° | 3. 90° | 5. 35° |
| 2. 47° | 4. 86° | 6. 138° |

Illustrative Example 1.3

$\angle 1$ and $\angle 2$ are complementary angles. If $\angle 1 = 7x$ and $\angle 2 = 11x$, find the measure of the two angles.

Solution:

Complementary angles have a sum of 90° . So, $\angle 1 + \angle 2 = 90^\circ$

Substitute $\angle 1$ and $\angle 2$, then solve algebraically.

$$7x + 11x = 90^\circ$$

$$18x = 90^\circ$$

$$\frac{18x}{18} = \frac{90^\circ}{18}$$

$$x = 5^\circ$$

$$\begin{aligned}\text{thus, } m\angle 1 &= 7(5^\circ) \\ &= 35^\circ\end{aligned}$$

$$\begin{aligned}\text{and } m\angle 2 &= 11(5^\circ) \\ &= 55^\circ\end{aligned}$$

Exercise 1.4

$\angle 3$ and $\angle 4$ are supplementary angles. If $\angle 3 = 2x + 30$ and $\angle 4 = x$, find the measure of the two angles.

Illustrative Example 1.4

$\angle TOY$ and $\angle MOR$ are vertical angles. Find the angle measure of each angle if $m\angle TOY = 9x - 15$ and $m\angle MOR = 7x + 5$.

Solution:

Equate the two expressions since vertical angles are congruent. Then, solve algebraically.

$$m\angle TOY = m\angle MOR$$

$$9x - 15 = 7x + 5$$

$$9x - 7x = 5 + 15$$

$$2x = 20$$

$$\frac{2x}{2} = \frac{20}{2}$$

$$x = 10^0$$

substitute

addition property of equality

perform the operation

division property of equality

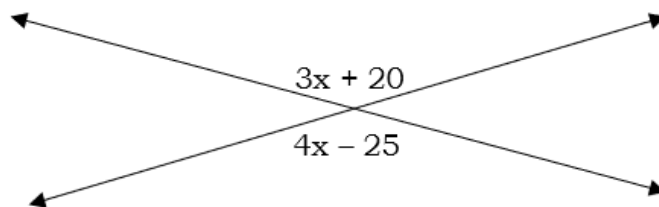
divide

thus, $m\angle TOY = 9x - 15$;	and	$m\angle MOR = 7x + 5$	given
$= 9(10) - 15$		$= 7(10) + 5$	substitute the
			value of x
$= 90 - 15$		$= 70 + 5$	perform the
			operation
$m\angle TOY = 75^0$		$m\angle MOR = 75^0$	

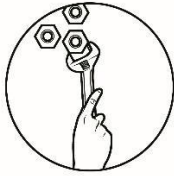
The two angles are congruent.

Exercise 1.5

Find the measure of the vertical angles in the figure.



*Great job! You have understood the lesson.
Are you now ready to summarize?*



Deepen

Let us enrich your knowledge.

Exercise 1.6

State whether the statement is always true (AT), sometimes true (ST), or never true (NT)

1. Angles with a common side are adjacent.
2. The supplement of an angle is acute.
3. Angles that form a linear pair are supplementary.
4. Vertical angles share a common side.
5. The complementary angles are both acute angles.
6. Parallel lines intersect at a certain point when extended infinitely.

Exercise 1.7

Answer the problems below.

1. The measure of an angle is 28° more than the measure of its supplement.
Find the measure of both angles.
2. What is the measure of the angle if the measure of its complement is 12° more than twice its measure?

**Lesson
2**

**Angles Formed by Parallel
Lines
Cut by A Transversal**

In the previous lesson, we have illustrated what a parallel line is. What will happen when another line will pass through these lines?



Jumpstart

Let us recall terms that we can use in this topic.

Directions:

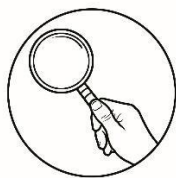
Match the description in column A with what is being describe in column B.

COLUMN A

1. Lines in the same plane and has exactly one point in common
2. Pair of angles whose sum is equal to 180°
3. Angles formed by intersecting lines but non-adjacent angles
4. Coplanar lines that do not intersect
5. These are supplementary angles which are adjacent
6. Angles with equal measure
7. Lines that intersect at right angles

COLUMN B

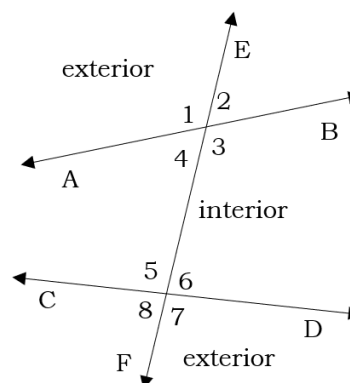
- A. Parallel lines
- B. Perpendicular lines
- C. Intersecting lines
- D. Congruent angles
- E. Supplementary angles
- F. Vertical angles
- G. Linear pair
- H. Skew lines



Discover

In the figure at the right are three coplanar lines, \overleftrightarrow{AB} , \overleftrightarrow{CD} , and \overleftrightarrow{EF} . Notice that \overleftrightarrow{EF} intersect \overleftrightarrow{AB} and \overleftrightarrow{CD} at two different points and forms angles. \overleftrightarrow{EF} is the transversal line of \overleftrightarrow{AB} and \overleftrightarrow{CD} .

A line that intersect two or more lines at different points is called **transversal**.



The angles formed by the transversal with the other two lines can be identified as follows.

The exterior angles are $\angle 1$, $\angle 2$, $\angle 7$, and $\angle 8$.

The interior angles are $\angle 3$, $\angle 4$, $\angle 5$, and $\angle 6$.

The pairs of corresponding angles are: $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, and $\angle 4$ and $\angle 8$.

The pairs of alternate interior angles are: $\angle 3$ and $\angle 5$; and $\angle 4$ and $\angle 6$.

The pairs of alternate exterior angles are: $\angle 1$ and $\angle 7$; and $\angle 2$ and $\angle 8$.

Corresponding angles is a pair of angles in which they are on the same side of transversal but one is in the interior while the other is in the exterior.

Alternate interior angles is a pair of angles which are on the opposite side of the transversal but both interior angles.

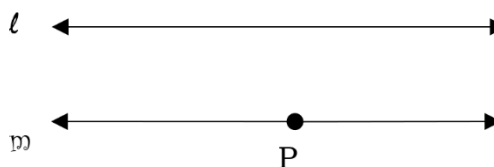
Alternate exterior angles is a pair of angles which are on the opposite side of the transversal but both exterior angles.

We will now describe the pair of angles formed when two parallel lines are cut by transversal. To start, let at start from the basic assumption with the following postulate and then we will prove theorems regarding the relationships of the angles made by a parallel line cut by a transversal.

Parallel Postulate

Given a line and a point not on the line there is only one line that passes through the point parallel to the given line.

Given a line ℓ and a point P not on ℓ , the parallel postulate assumes that there

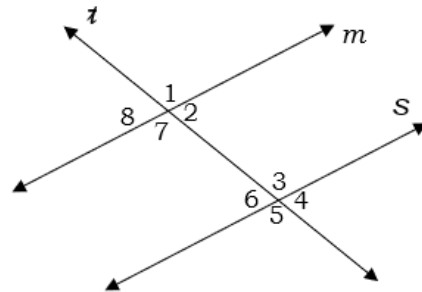


is exactly one line, say line m , containing the point P and parallel to l .

Corresponding angles Postulate

If two parallel lines are cut by a transversal, then the corresponding angles are congruent.

The figure at the right shows that line m and line s are parallel lines cut by a transversal t . The pairs of corresponding angles that are congruent according to the postulate are as follows:
 $\angle 1 \cong \angle 3$; $\angle 2 \cong \angle 4$; $\angle 5 \cong \angle 7$; and $\angle 6 \cong \angle 8$.



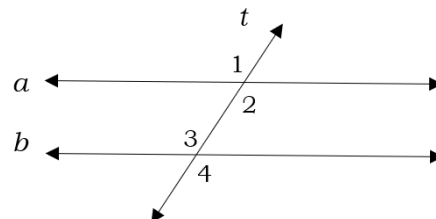
Theorem

If two parallel lines are cut by a transversal, then the **alternate interior angles** are congruent.

Given: $a \parallel b$

Transversal t cuts lines a and b

Prove: $\angle 2 \cong \angle 3$



Proof:

Statement	Reason
1. $a \parallel b$	1. Given
2. $\angle 1 \cong \angle 2$	2. Vertical angles are congruent
3. $\angle 1 \cong \angle 3$	3. If two parallel lines are cut by a transversal, then the corresponding angles are congruent
4. $\angle 2 \cong \angle 3$	4. Transitive property

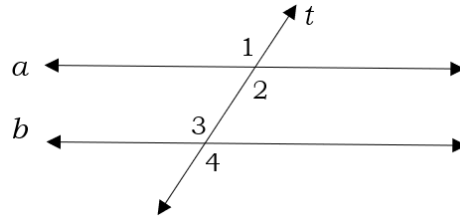
Theorem

If two parallel lines are cut by a transversal, then the **alternate exterior angles** are congruent.

Given: $a \parallel b$

Transversal t cuts lines a and b

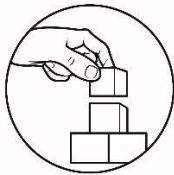
Prove: $\angle 1 \cong \angle 4$



Proof:

Statement	Reason
1. $a \parallel b$	1. Given
2. $\angle 1 \cong \angle 2$	2. Vertical angles are congruent
3. $\angle 2 \cong \angle 4$	3. If two parallel lines are cut by a transversal, then the corresponding angles are congruent
4. $\angle 1 \cong \angle 4$	4. Transitive property

When two parallel lines are cut by a transversal, you can also name other pairs of angles such vertical angles, linear pair, and supplementary angles. The **exterior angles** on the same side of the transversal are supplementary. Likewise, the **interior angles** are also supplementary if they are on the same side of the transversal.



Explore

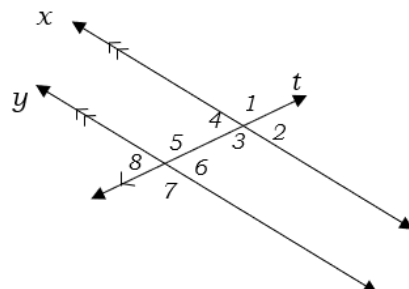
The relationships you observed among the angle pairs formed when two parallel lines are cut by transversal is best understood when applied.

Illustrative Example 2.1

In the figure, lines x and y are parallel lines cut by a transversal line t .

Name the indicated pair of angles.

1. 4 pairs of corresponding angles
2. 2 pairs of alternate interior angles
3. 2 pairs of alternate exterior angles
4. 2 pairs of supplementary angles in exterior same side of the transversal



5. 2 pairs of supplementary angles in interior same side of the transversal
6. 4 pairs of vertical angles

Solutions:

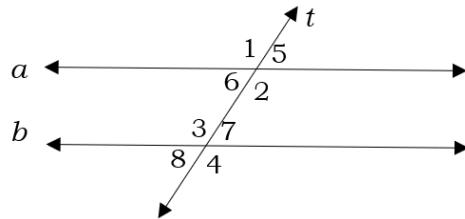
1. $\angle 1 \cong \angle 5$; $\angle 2 \cong \angle 6$; $\angle 3 \cong \angle 7$; and $\angle 4 \cong \angle 8$
2. $\angle 3 \cong \angle 5$; and $\angle 4 \cong \angle 6$
3. $\angle 1 \cong \angle 7$; and $\angle 2 \cong \angle 8$
4. $\angle 1$ and $\angle 8$ are supplementary angles;
and $\angle 2$ and $\angle 7$ are supplementary angles
5. $\angle 3$ and $\angle 6$ are supplementary angles;
and $\angle 4$ and $\angle 5$ are supplementary angles
6. $\angle 1 \cong \angle 3$; $\angle 2 \cong \angle 4$; $\angle 5 \cong \angle 7$; and $\angle 6 \cong \angle 8$

Exercise 2.1

In the figure, lines a and b are parallel lines cut by a transversal line t .

Name the indicated pair of angles.

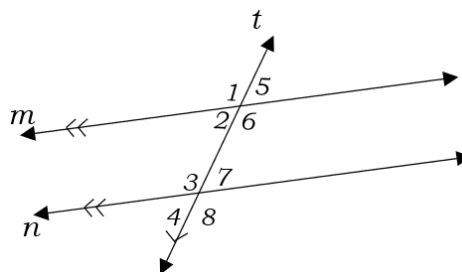
1. 4 pairs of corresponding angles
2. 2 pairs of alternate interior angles
3. 2 pairs of alternate exterior angles
4. 2 pairs of supplementary angles in exterior same side of the transversal
5. 2 pairs of supplementary angles in interior same side of the transversal
6. 4 pairs of vertical angles



Illustrative Example 2.2

In the figure, $m \parallel n$ and $\angle 1 = 100^\circ$. Find the measure of the other angles and give your reason.

1. $\angle 2 =$ _____
2. $\angle 3 =$ _____
3. $\angle 4 =$ _____
4. $\angle 5 =$ _____
5. $\angle 6 =$ _____
6. $\angle 7 =$ _____
7. $\angle 8 =$ _____



Solutions:

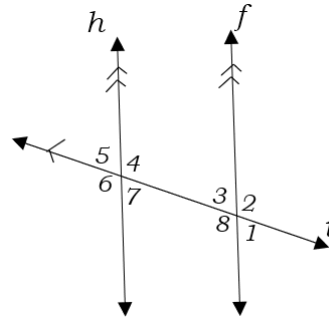
1. $\angle 2 = 80^\circ$; the angle is supplement of $\angle 1$
2. $\angle 3 = 100^\circ$; the angle is corresponding angle pair of $\angle 1$
3. $\angle 4 = 80^\circ$; the angle is supplement of $\angle 1$
4. $\angle 5 = 80^\circ$; the angle is supplement of $\angle 1$
5. $\angle 6 = 100^\circ$; the angle is vertical angle pair of $\angle 1$
6. $\angle 7 = 80^\circ$; the angle is alternate interior angle pair of $\angle 2$

7. $\angle 8 = 100^\circ$; the angle is alternate exterior angle pair of $\angle 1$

Exercise 2.2

In the figure, $h \parallel f$ and $\angle 1 = 74^\circ$
Find the measure of the other angles
and give your reason.

- | | |
|-----------------------|-----------------------|
| 1. $\angle 2 =$ _____ | 5. $\angle 6 =$ _____ |
| 2. $\angle 3 =$ _____ | 6. $\angle 7 =$ _____ |
| 3. $\angle 4 =$ _____ | 7. $\angle 8 =$ _____ |
| 4. $\angle 5 =$ _____ | |



Deepen

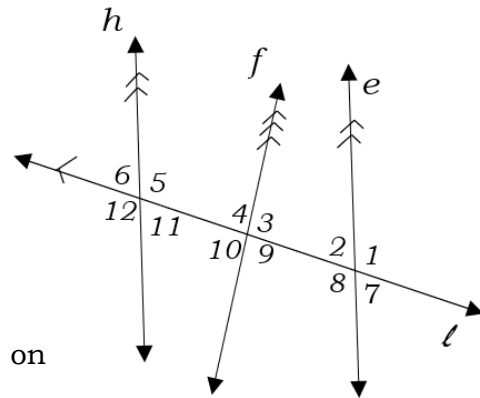
Let us apply this in a more challenging figure.

Exercise 2.3

Use the plane figure the right.

A. Name what is indicated.

1. Name the parallel lines.
2. Name the transversal line.
3. Name the vertical angle pair of $\angle 9$
4. Name the supplement of $\angle 7$ which is on the same side of the transversal.
5. Name the supplement of $\angle 5$ which is on the same side of the transversal.

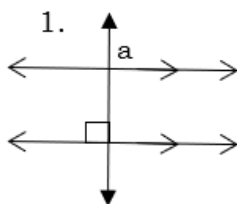


B. Determine whether the statement is TRUE or FALSE.

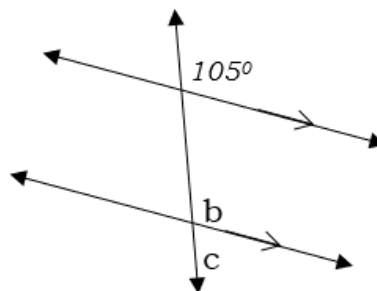
- | | |
|-------------------------------|---|
| 1. $\angle 1 \cong \angle 12$ | 6. $\angle 11$ and $\angle 2$ are supplementary |
| 2. $\angle 2 \cong \angle 7$ | 7. $\angle 1$ and $\angle 6$ are supplementary |
| 3. $\angle 9 \cong \angle 5$ | 8. $\angle 10$ and $\angle 8$ are supplementary |
| 4. $\angle 7 \cong \angle 11$ | 9. $\angle 11$ and $\angle 2$ are supplementary |
| 5. $\angle 4 \cong \angle 7$ | 10. $\angle 3$ and $\angle 9$ are supplementary |

Exercise 2.4

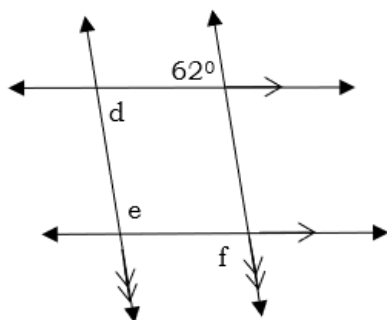
Calculate the lettered angle.



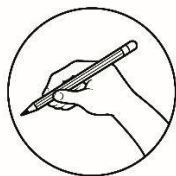
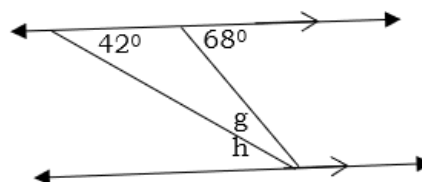
3.



2.



4.



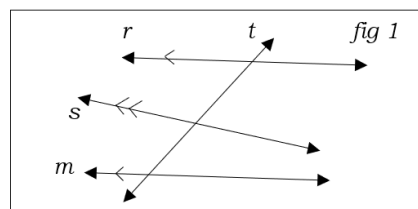
Gauge

Answer what is asked, describe or defined and write the letter of your choice in your answer sheet.

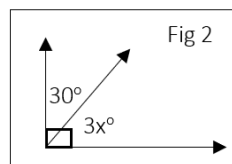
1. Which pair of angles whose sum is 180° ?
 - A. adjacent
 - B. complementary
 - C. supplementary
 - D. vertical
2. Which pair of angles formed by two intersecting lines and nonadjacent?
 - A. complementary angles
 - B. corresponding angles
 - C. linear pair
 - D. vertical angles

16

3. Which two lines are parallel in figure 1?
 - A. r and s
 - B. r and m
 - C. s and m
 - D. m and t
4. Which line in figure 1, is a transversal line?
 - A. m
 - B. r



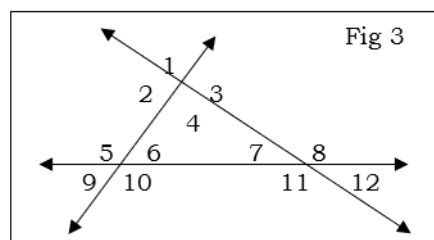
- C. s D. t
5. What is the value of x in figure 2?
- A. 6 B. 10
C. 15 D. 20



6. What is the measure of the supplement of an angle whose measure is 95° ?
- A. 55° B. 65° C. 75° D. 85°
7. Two congruent angles are supplementary to each other. What is the measure of each angle?
- A. 30° B. 60° C. 90° D. 120°

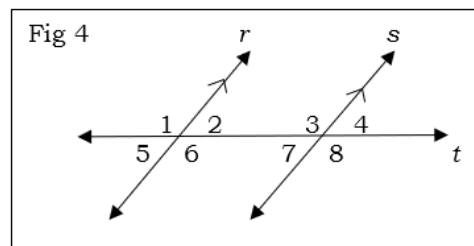
For 8-10, refer to figure 3.

8. How many vertical angle pairs are formed?
- A. 6 B. 5
C. 4 D. 3
9. If $m\angle 10 = 108^\circ$, what is $m\angle 6$?
- A. 62° B. 72°
C. 92° D. 102°
10. What is $m\angle 5$ if $m\angle 10 = 134^\circ$?
- A. 36° B. 54°
C. 134° D. 154°



For 11-15, refer to figure 4.

11. Which of these angles is congruent to $\angle 1$?
- A. $\angle 4$ B. $\angle 5$
C. $\angle 6$ D. $\angle 7$
12. What pair of angles are $\angle 2$ and $\angle 7$ in figure 4?
- A. Same – side interior
B. Corresponding
C. Alternate – interior
D. Alternate – exterior
13. Using figure 4, which of the following pairs is supplementary and on the same side of the transversal?
- A. $\angle 1$ and $\angle 5$ B. $\angle 5$ and $\angle 7$ C. $\angle 3$ and $\angle 6$ D. $\angle 3$ and $\angle 2$
14. If the measure of angle 8 is twice as much as the measure of angle 7, what is $m\angle 7$?
- A. 30° B. 60° C. 90° D. 120°
15. If $m\angle 6 = 118^\circ$, what is $m\angle 3$?
- A. 62° B. 75° C. 118° D. 125°



REFERENCES

Dilao, Soledad J. and Bernabe, Julieta G.(2009), Geometry, Quezon City, SD Publication Inc.

Villano, Ma. Luisa V., et. al.,(2012), 21st Century Mathematics: Grade 7,Quezon City, Phoenix Publishing House, Inc.

Nivera, Gladys C.(2013), Grade 7 Mathematics Patterns and Practicalities, Makati City, Don Bosco Press

Links

<https://www.mathsisfun.com/geometry/parallel-lines.html>

<https://www.math-only-math.com/pairs-of-angles.html>