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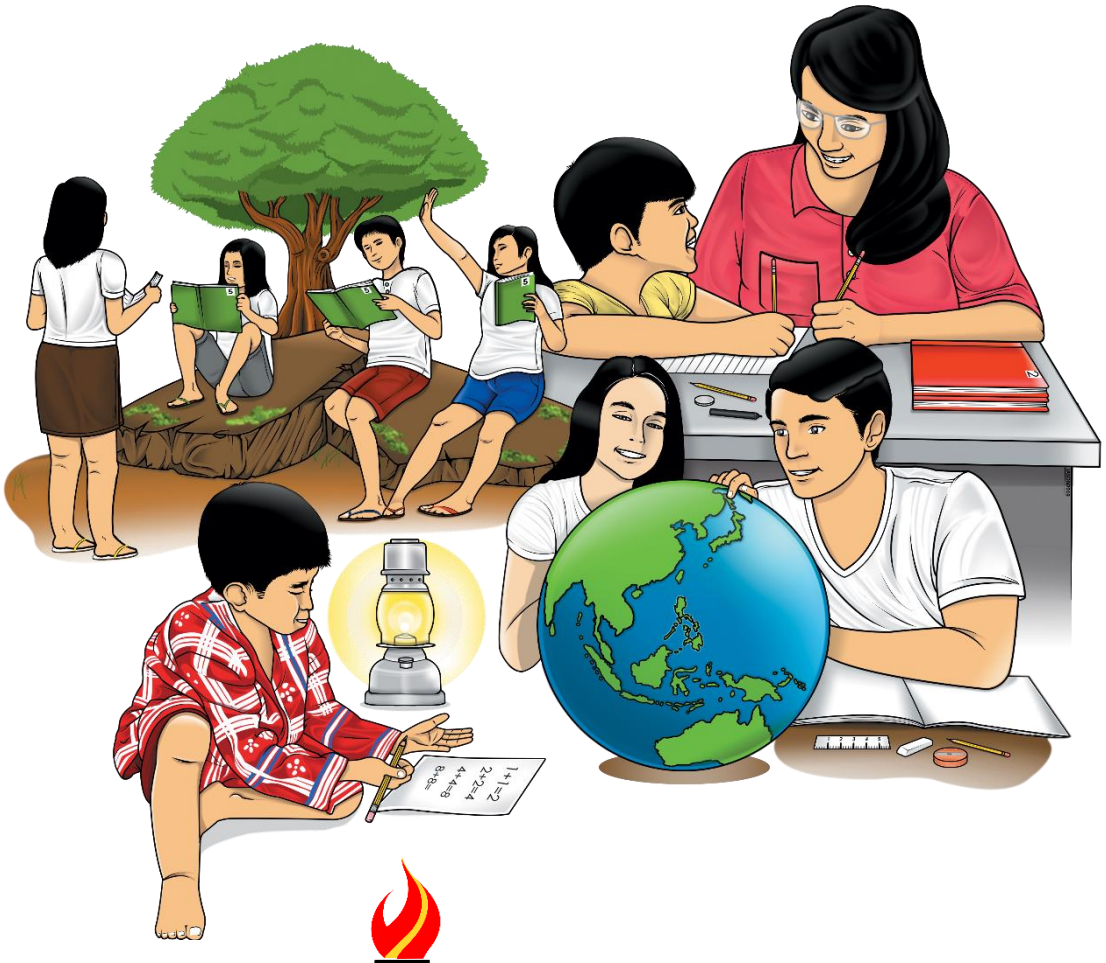
Mathematics

Quarter 3 – Module 3:
Parallel Lines Cut by Transversal



ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 7
Alternative Delivery Mode
Quarter 3 – Module 3: Parallel Lines Cut By a Transversal
First Edition, 2020

Published by the Department of Education
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Undersecretary: Diosdado M. San Antonio

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Printed in the Philippines by_____

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7

Mathematics

Quarter 3 – Module 3:
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by Transversal

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

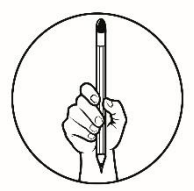
This module was designed and written with you in mind. It is here to help you master –how to derive relationships among angles formed by parallel lines cut by a transversal using measurement and by inductive reasoning . The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is comprised of only one lesson:

- Derives relationships among angles formed by parallel lines cut by a transversal using a measurement and by inductive reasoning.

After going through this module, you are expected to:

1. derive relationships among angles formed by parallel lines cut by a transversal using a measurement and by inductive reasoning.



What I Know

Let us check what you already know about this lesson! Read and understand each item carefully. Write your answer on a separate sheet of paper.

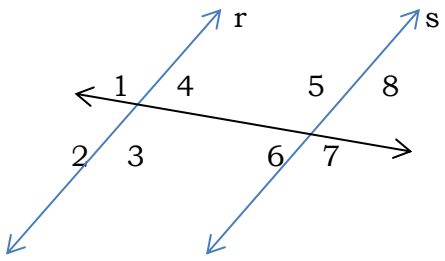
1. A line that intersects two or more coplanar lines in different points.
   A. Transversal
   B. Skew Line
   C. Parallel Line
   D. Perpendicular Line

2. When parallel lines are cut by a transversal, corresponding angles are _____.
   A. Unequal
   B. Congruent
   C. Complementary
   D. Supplementary

3. When parallel lines are cut by a transversal, same side interior angles are _____.
   A. Congruent
   B. Unequal
   C. Complementary
   D. Supplementary

4. When parallel lines are cut by a transversal, alternate interior angles are _____.
   A. Supplementary
   B. Complementary
   C. Congruent
   D. Unequal

For items 5-10, suppose r ∥ s , give what is asked.



5. How many pairs of vertical angles are there?
   A. 4
   B. 6
   C. 8
   D. 10

6. How many linear pairs are there?
   A. 4
   B. 6
   C. 8
   D. 16

7. Which of these angles is congruent to <5?
   A. <1
   B. <4
   C. <6
   D. <7

8. What do you call <4 and <6?
   A. Corresponding Angles
   B. Alternate Interior Angles
   C. Alternate Exterior Angles
   D. Same- Side Interior Angles

9. What do you call <1 and <2?
   A. Linear Pair
   B. Vertical Angles
   C. Corresponding Angles
   D. Same- Side Interior Angles

10. Suppose m<3 =150º, what is the measure of <1?
   A. 30º
   B. 150º
   C. 130º
   D. 170º

Lesson 1

Parallel Lines Cut By Transversal

Parallel lines have various applications in real life. In fact, you can see these lines all around you. Now you will explore the relationships between pairs of angles formed when parallel lines are cut by a transversal.

What's In

Let's review!

Recall that:

Intersecting lines are coplanar lines that have a point in common.

Perpendicular lines are lines that intersect at right angles.

Parallel lines are coplanar lines that do not intersect.

Skew lines are non-coplanar lines that do not intersect.

Angles Formed by Transversal

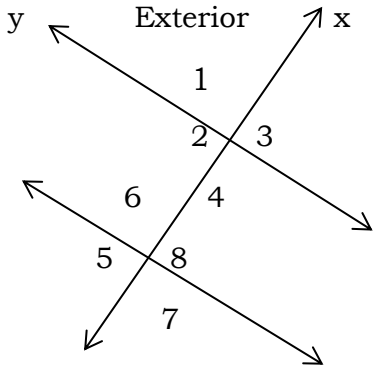
A **transversal** is a line intersecting two or more coplanar lines at different points.

Alternate Interior Angles- a pair of non- adjacent interior angles on opposite sides of a transversal.

Corresponding Angles- a pair of non- adjacent interior and exterior angles on the same- side of transversal.

Same-Side Interior Angles- interior angles on the same- side of transversal.

Transversal creates different types of angle pairs. To illustrate, let x be the transversal of the lines y and z.



The interior angles are: <2, <4, <6 and <8.

The exterior angles are : <1, <3, <5 and <7.

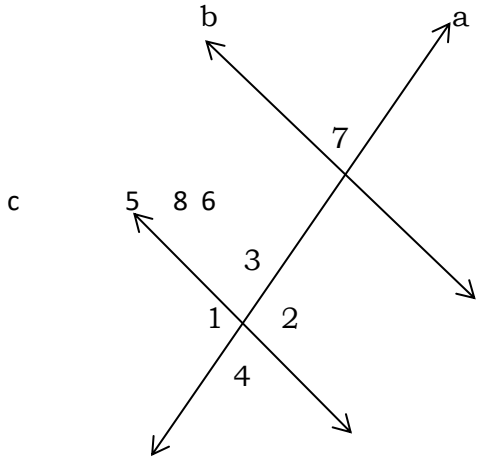
The pairs of corresponding angles are : <1 and <6, <3 and < 8, <2 and <5, <4 and <7.

The pairs of alternate interior angles are : <2 and <8, <4 and <6.

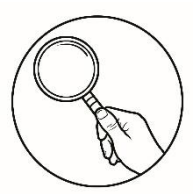
The pairs of alternate exterior angles are : <1 and <7, <3 and <5.

The pairs of same side interior angles are: <2 and <6, <4 and <8.

Activity 1. Identify the following using the given figure.



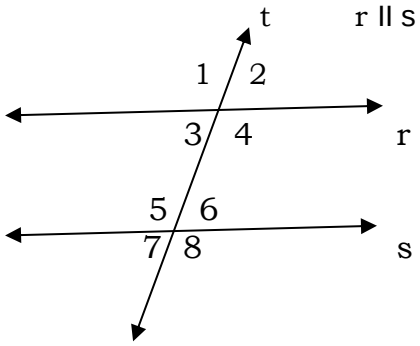
a. the transversal
b. 4 pairs of corresponding angles
c. 2 pairs of alternate interior angles
d. 2 pairs of alternate exterior angles
e. 2 pairs of same side interior angles



What is It

When two parallel lines are cut by transversal;

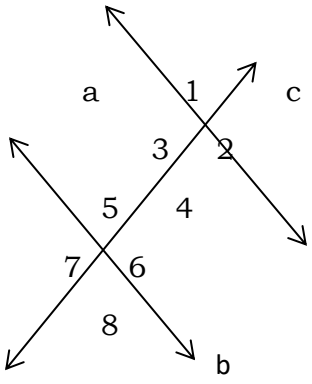
1. The corresponding angles are congruent.
2. The alternate interior angles are congruent.
3. The same side interior angles are supplementary.



<1≅<5
<3≅<6
m<4 + m<6= 180°

Illustrative Examples

1. Lines a and b are cut by a transversal c and m<1 is 60°. Assume that line a is parallel to line b. Find the measures of all the other angles.



Solution:

There are many angle pair relationships that you can use to obtain the measures of the different angles. Here is one way of doing it.

m<2 = 120° since <1 and <2 are supplementary angles

m<3 = 120° since <2 and <3 are vertical angles

m<4 =60° since <1 and <4 are vertical angles

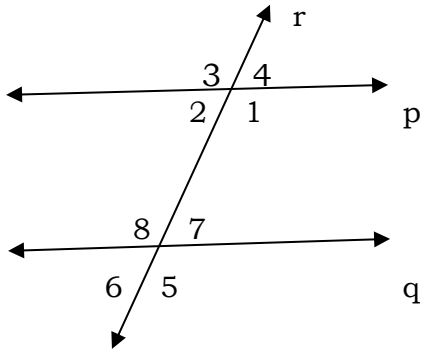
m<5 =60° since <1 and <5 are corresponding angles

m<6 = 120° since <2 and <6 are corresponding angles

m<7 = 120° since <3 and <7 are corresponding angles

m<8 = 60° since <4 and <8 are corresponding angles

2. Lines p and q are cut by transversal r and m< 3 is 125°. Assume that p is parallel to q. Find the measurements of all the other angles.



Solution:

m<1 = 125° since <1 and <3 are vertical angles

m<2 = 55° since <3 and <2 are supplementary angles

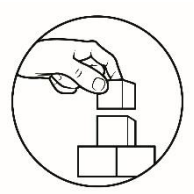
m<4 = 55° since <2 and <4 are vertical angles

m<5 = 125° since <1 and <5 are corresponding angles

m<6 = 55° since <2 and <6 are corresponding angles

m<7 = 55° since <4 and <7 are corresponding angles

m<8 = 125° since <3 and <8 are corresponding angles

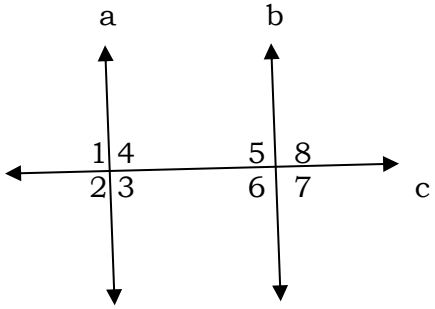


What's More

Activity 2. Find my missing parts.

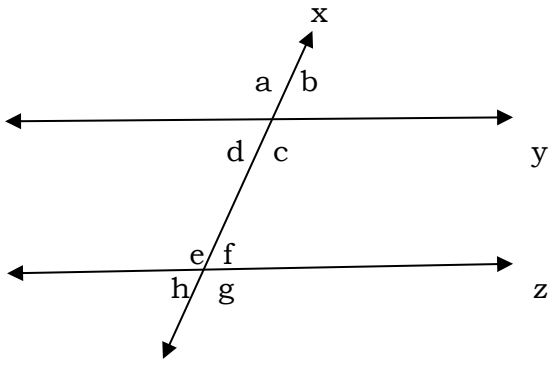
Let's apply what you have just learned!

1. In the diagram, a ∥ b. Complete the following statements.



   a. If m<1 =100°, then m<5 = _____.
   b. If m<2 =85°, then m<6 = _____.
   c. If m<3 =105°, then m<7 = _____.
   d. If m<4 =73°, then m<8= _____.
   e. If m<5 =67°, then m<8= _____.

2. Suppose y ∥ z and m<a =108°. Find the measurements of the other angles and justify your answer.



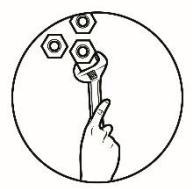
What I Have Learned

Activity 3. Fill Me

Let's recap!

Complete the statements below by expressing your understanding on parallel lines cut by transversal.

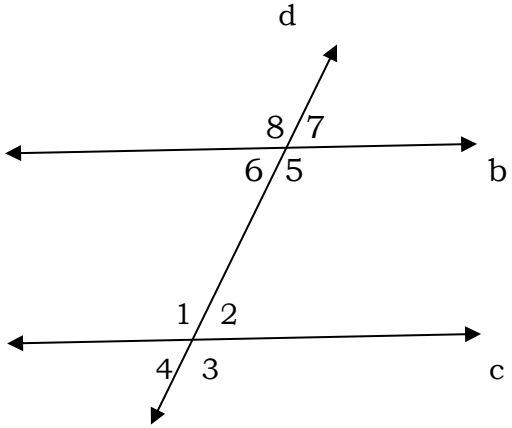
1. If m<4 + m<5 = 180°, then the two angles are _____.
2. If a pair of parallel lines are cut by transversal then the vertical angles are _____.
3. When two parallel lines are cut by transversal then the alternate interior angles are_____.
4. If a pair of parallel lines are cut by transversal then the same side interior angles are _____.
5. Transversal is a _____.



What I Can Do

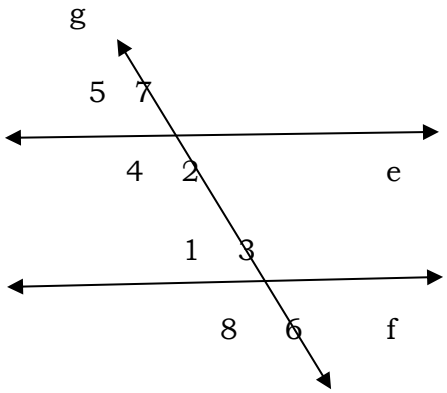
Activity 4. Solve Me.

1. Assume that b ∥ c. Find the following given the figure below.



a. the transversal
b. interior angles
c. exterior angles
d. pairs of vertical angles
e. pairs of alternate interior angles
f. pairs of same side interior angles
g. pairs of corresponding angles

2. Assume that e∥f and g is the transversal. Find the measures of the other angles, given m<3 =135°. Justify your answer.



Assessment

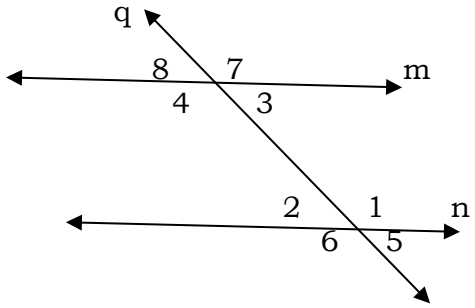
Read and understand each item carefully. Write your answer on a separate sheet of paper.

1. When parallel lines are cut by transversal, vertical angles are _____.
   A. Supplementary Angle
   B. Complementary Angle
   C. Congruent Angle
   D. Unequal Angle

2. When parallel lines are cut by transversal, same side interior angles are_____.
   A. Supplementary Angle
   B. Complementary Angle
   C. Congruent Angle
   D. Unequal Angle

3. A line that intersects two or more coplanar lines in different points.
    A. Perpendicular Line
    B. Parallel Line
    C. Skew Line
    D. Transversal

For numbers 4-10, lines m and n are cut by transversal q. Assume that m∥n. Give what is asked.



4. Which of the following angle pairs is vertical angles?
    A. <1 and <2
    B. <2 and <3
    C. <4 and <5
    D. <3 and <8

5. Which of the following angles pairs are supplementary angles?
    A. <1 and <2
    B. <1 and <4
    C. <1 and <7
    D. <1 and <8

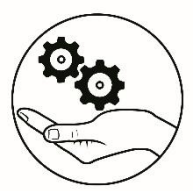
6. If m<3=70°, what is the m<7?
    A. 70°
    B. 80°
    C. 90°
    D. 110°

7. If m<4 =125°, what is the m<7?
    A. 55°
    B. 65°
    C. 115°
    D. 125°

8. Which of the following angle pairs is corresponding angles?
    A. <1 and <3
    B. <2 and<3
    C. <3 and <5
    D. <3 and <7

9. If m<6=105°, what is the m<4?
   A. 65°
   B. 75°
   C. 100°
   D. 105°

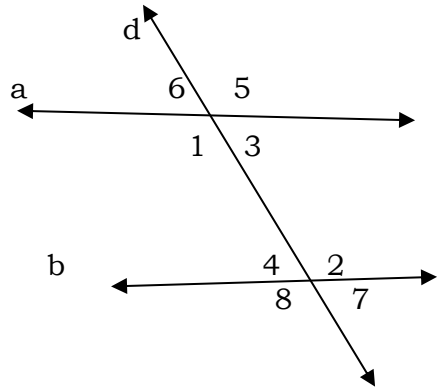
10. If m<3 = (2x+5)°, what is the value of x if m<8 =75°?
   A. 35°
   B. 45°
   C. 65°
   D. 75°



Additional Activities

Let us make use of your newly acquired skill! Given the figure below, give what is asked.

Lines a and b are cut by transversal d. Assume a ∥ b.



1. What is the value of x if m<5 = (2x+10)°and m<1 = (4x-2)°?

2. Given m<1 = (2y-10)° and m<6 =(3y+5)°, what is the value of <1?

Answer Key

WHAT I KNOW!

1. A
2. B
3. D
4. C
5. A
6. C
7. A or D
8. B
9. A
10. B

ACTIVITY 1

A. A
B. <1 and <5, <3 and <7, <4 and <8, <2 and <6.
C. <2 and <5, <3 and <8
D. <1 and <6, <4 and <7
E. <2 and <8, <3 and <5

ACTIVITY 2

1. A.100°
B. 85°
C. 105°
D. 73°
E. 113°

2. <b =72°, <a and <b are supplementary angle
<c =108°, <a and <c are vertical angles
<d = 72°, <b and <d are vertical angles
<e = 108°, <a and <e are corresponding angles
<f = 72°, <b and < f are corresponding angles
<g = 108°, <c and <g are corresponding angles
<h = 72°, <d and <h are corresponding angles

ACTIVITY 3

1.linear pair
2.congruent
3.congruent
4.supplementary
5.line that intersects two or more lines

ACTIVITY 4

1. a. d
b. <1, <2,<5, and <6
c. <3, <4, <7 and <8
d. <1 and <3, <2 and <4, <5 and <8, <6 and <7.
e. <1 and <5, <2 and <6
f. <2 and <5, <1 and <6
g. <1 and <8, <2 and <7, <3 and <5, <4 and <6.

2. m<1 = 45°, <1 and <3 are supplementary angles
m<2 = 45°, <2 and <3 are supplementary angles
m<4 = 135°, <3 and <4 are alternate interior angles
m<5 = 45°, <1 and <5 are corresponding angles
m<6 = 45°, <2 and <6 are corresponding angles
m<7 = 135°, <3 and <7 are corresponding angles
m<8 = 135°, are corresponding angles.

ASSESSMENT

1. C
2. A
3. D
4. D
5. A
6. D
7. D
8. C
9. D
10. A

ADDITIONAL ACTIVITIES

1. x=6
2. m<1 =64°

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