GS.MGSR.5.2

E-Learning DAY 4

Standard

Apply the attributes of triangles in mathematical and real-world situations, including the Midsegment Theorem and the fact that the three medians of a triangle meet at a point.

Define angle, perpendicular line, parallel line, line segment, ray, circle, and skew using point, line, and plane.

Use physical figures and geometry software to model real-world objects.

https://youtu.be/ojMemmYifxM

Learning Objectives

- Use the Midsegment Theorem: a segment joining two side midpoints is parallel to the third side and half its length.
- Identify medians and the centroid; use the 2:1 centroid ratio.
- Define basic geometric terms from point, line, and plane.
- Apply triangle properties to mathematical and real-world situations.

- Use a ruler, physical models, or GeoGebra to explore geometric relationships.

Self-Learning / E-Learning Sequence

Engage — 5 min: Look at bridges, tents, roof trusses, wheels, and road markings. Find triangles, parallel lines, perpendicular lines, and circles.

Learn — 20 min: Study the Midsegment Theorem, medians, centroid, and geometric definitions below.

Explore — 10 min: Construct a triangle in GeoGebra; mark two midpoints and draw the midsegment. Then draw all three medians.

Practice — 25–30 min: Complete 15 MCQs and 5 descriptive questions. Show work.

Reflect — 5 min: Explain how triangle properties help engineers, architects, builders, and designers.

Key Concepts & Formula Reference

Concept	Rule / Definition	Example
Midsegment	Joins midpoints of two sides; parallel to third side and half its length.	BC=20 → DE=10
Median	Segment from a vertex to midpoint of opposite side.	Three medians meet at centroid G.
Centroid	Common point of the three medians.	AG:GD=2:1
Parallel	Coplanar lines that never intersect.	Railroad tracks

Perpendicular	Lines intersecting at 90°.	Wall and floor
Segment	Part of a line with two endpoints.	AB
Ray	Part of a line with one endpoint.	Ray AB
Circle	Points in a plane equidistant from a center.	Wheel
Skew	Noncoplanar lines that do not intersect and are not parallel.	Some box edges

Worked Examples

- Midsegment: If D and E are midpoints and BC=18, then DE=9 and DE ∥ BC.
- Centroid: If median AD=15 and G is the centroid, AG=10 and GD=5.
- Real world: A triangular roof or tent can use medians to locate a central support point.

SC MATH LESSON PLAN (SELF LEARNING / E LEARNING) – GRADE 9–10

Standard: GS.MGSR.5.2

Apply the attributes of triangles in mathematical and real-world situations.
Apply in mathematical and real-world situations including, but not limited to:

- **segment joining midpoints of two sides of a triangle is parallel to the third side and half the length.**
- **medians of a triangle meet at a point.**

Define angle, perpendicular line, parallel line, line segment, ray, circle, and skew in terms of the undefined notions of point, line, and plane.
Use geometric figures, both physical and within geometry software, to model, represent, and describe real-world objects.

LEARNING OBJECTIVES

You will be able to:

- Use the Midsegment Theorem in triangles.
- Use the Median Theorem to find the centroid.
- Define and identify basic geometric terms using undefined notions.
- Apply these ideas in mathematical and real-world situations.
- Use physical models or geometry software to represent and describe real-world objects.

MATERIALS / RESOURCES

- Notebook / Paper
- Pencil / Ruler / Protractor
- Internet / Learning Platform
- GeoGebra (free) or other geometry software (optional)
- Real objects or pictures (bridges, ramps, tents, wheels, signs, etc.)

VOCABULARY (DEFINED USING UNDEFINED NOTIONS)

- **Point**: An exact location. (No size)
- **Line**: Straight path extending forever in both directions.
- **Plane**: Flat surface extending forever.

All other terms are defined using these undefined notions.

LESSON SEQUENCE (SELF PACED)

1 ENGAGE (5 min)

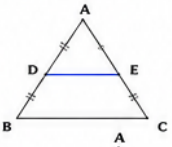
Look around you. Bridges, tents, wheels, and signs all have triangles. How do we use properties of triangles to build and measure things in real life?



2 LEARN (20–25 min)

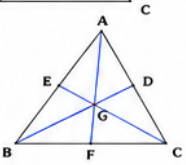
A. Key Triangle Attributes

1) Midsegment Theorem:
In △ABC, if D and E are midpoints of two sides, then DE ∥ BC and DE = $\frac{1}{2}$ BC.

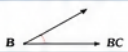
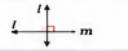
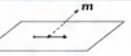


2) Medians of a Triangle

- A median is a segment from a vertex to the midpoint of the opposite side.
- The three medians of a triangle meet at a point called the centroid (G).
- The centroid divides each median in a 2:1 ratio.



B. Basic Geometric Terms (Defined using point, line, plane)

Angle		Formed by two rays with a common endpoint.
Perpendicular Lines		Two lines that intersect to form right angles (90°).
Parallel Lines		Two lines in the same plane that never intersect.
Line Segment		Part of a line with two endpoints.
Ray		Part of a line with one endpoint that extends forever in one direction.
Circle		Set of all points in a plane equidistant from a center point.
Skew Lines		Two lines that do not intersect and are not parallel. (They are not in the same plane.)

C. Real-World Applications

- Bridge Support: Triangles give strength. The midsegment helps in design and measurement.



- Tent or Roof Frame: Medians meet at a point to support the structure.



- Ramps and Roads: Parallel and perpendicular lines help in safe construction.



- Wheels and Circles: Used in bikes, clocks, and machines.



3 PRACTICE (20 min)

Complete the worksheet (15 MCQs + 5 Descriptive).
Use notes, examples, or a calculator if needed.

4 REFLECT (5–10 min)

- What did you learn today?
- How do triangle properties help in real life?
- Why are medians important in design?
- Check your answers using the answer key.

Assessment: Worksheet (15 MCQs + 5 Descriptive)

Mastery Goal: I can apply triangle properties and define geometric terms using point, line, and plane in math and real-world situations.

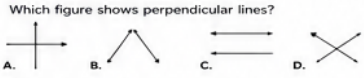
PRACTICE WORKSHEET – GS.MGSR.5.2

(Apply the attributes of triangles and define basic geometric terms)

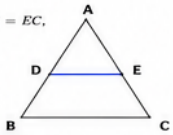
PART A: MULTIPLE CHOICE QUESTIONS (15)

Choose the best answer.

1. In △ABC, D and E are midpoints of AB and AC. Which statement is true?
   A. $DE \parallel BC$ and $DE = BC$
   B. $DE \parallel BC$ and $DE = \frac{1}{2} BC$
   C. $DE \perp BC$ and $DE = \frac{1}{2} BC$
   D. $DE \perp BC$ and $DE = BC$
2. In △XYZ, the length of the midsegment joining midpoints of $\overline{XY}$ and $\overline{YZ}$ is 6 cm. What is the length of $\overline{XZ}$?
   A. 3 cm B. 6 cm C. 12 cm D. 18 cm
3. The medians of a triangle always meet at which point?
   A. Circumcenter B. Incenter
   C. Centroid D. Orthocenter
4. The centroid of a triangle divides a median in the ratio:
   A. 1:1 B. 1:2 C. 2:1 D. 3:1
5. Which of the following is an example of parallel lines?
   A. The sides of a ladder
   B. The hands of a clock at 3:00
   C. The edges of a door frame
   D. The spokes of a bicycle wheel
6. Which of the following is a perpendicular pair?
   A. A ramp and the ground
   B. A railway track and the ground
   C. The corner of a book and the floor
   D. Two sides of a triangle
7. Which figure shows perpendicular lines?



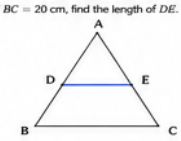
8. A line segment has:
   A. one endpoint B. two endpoints
   C. no endpoints D. infinite endpoints
9. A ray has:
   A. two endpoints B. one endpoint
   C. no endpoints D. three endpoints
10. A circle is defined as:
    A. A line with no endpoints
    B. A closed curve made of line segments
    C. The set of all points in a plane equidistant from a center point
    D. A polygon with many sides
11. Which of the following pairs of lines are skew?
    A. Two sides of a square
    B. Opposite edges of a cube
    C. The arms of a letter "T"
    D. Two lines that intersect
12. In the diagram, if $AD = DB$ and $AE = EC$, then which statement is true?
    A. $DE \parallel BC$ and $DE = BC$
    B. $DE \parallel BC$ and $DE = \frac{1}{2} BC$
    C. $DE \perp BC$ and $DE = \frac{1}{2} BC$
    D. $DE \perp BC$ and $DE = BC$



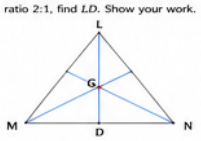
13. The three medians of △PQR meet at point G. Point G is called the:
    A. Circumcenter B. Incenter
    C. Centroid D. Orthocenter
14. Which real-world object best represents the shape of a triangle?
    A. Stop sign B. Coin C. Bangle D. CD
15. Which tool is used to construct or measure angles?
    A. Ruler B. Protractor C. Compass D. Eraser

PART B: DESCRIPTIVE QUESTIONS (5)

1. In △ABC, D and E are midpoints of $\overline{AB}$ and AC. If $BC = 20$ cm, find the length of DE. Show your work.



2. In △LMN, the medians meet at G. If $LG = 8$ and G divides median LD in the ratio 2:1, find LD. Show your work.



3. Define each of the following terms using the undefined notions of point, line, and plane.
   a) Angle
   b) Perpendicular lines
   c) Parallel lines
   d) Line segment
   e) Ray
4. **Real-World Application:**
   A tent is designed in the shape of a triangle. The medians meet at the centroid to hold the tent pole. Explain how the centroid helps in balancing the tent.



5. Use the grid to draw a triangle ABC. Mark the midpoints of two sides and draw the midsegment. Verify that it is parallel to the third side and half the length. Use any coordinates.

ANSWER KEY (Provided separately for self-check) 😊

EXTENSION ACTIVITY (Optional)
Use GeoGebra to construct a triangle, draw its medians, and find the centroid. Then, draw the midsegments and verify their lengths.

GeoGebra

GS.MGSR.5.2 PRACTICE WORKSHEET

Name: _____ Date: _____ Class: _____

Part A — Multiple Choice. Choose the best answer.

1. D and E are midpoints of AB and AC. If BC=20, DE is:

- A. 5
- B. 10
- C. 20
- D. 40

2. If a triangle's midsegment is 6 cm, the third side is:

- A. 3
- B. 6
- C. 12
- D. 18

3. The three medians meet at the:

- A. Circumcenter
- B. Incenter
- C. Centroid
- D. Orthocenter

4. A centroid divides a median, vertex-to-midpoint, in the ratio:

- A. 1:1
- B. 1:2
- C. 2:1
- D. 3:1

5. Which is an example of parallel lines?

- A. Crossing ladder rails
- B. Clock hands at 3:00
- C. Nonintersecting door-frame edges
- D. Two sides meeting in a triangle

6. Which pair is perpendicular?

- A. Ramp and ground
- B. Two parallel tracks
- C. Wall and floor
- D. Two rays at 30°

7. Perpendicular lines intersect at:

- A. 0°
- B. 45°
- C. 90°
- D. 180°

8. A line segment has:

- A. one endpoint
- B. two endpoints
- C. no endpoints
- D. infinite endpoints

9. A ray has:

- A. two endpoints
- B. one endpoint
- C. no endpoints
- D. three endpoints

10. A circle is:

- A. a line
- B. a polygon
- C. points in a plane equidistant from a center
- D. two parallel lines

11. Which pair can be skew?

- A. Opposite noncoplanar edges of a box
- B. Two parallel lines in a plane
- C. Two intersecting lines
- D. Two sides of a triangle

12. If D and E are side midpoints, which is always true?

- A. $DE \parallel BC$ and $DE=BC$
- B. $DE \perp BC$ and $DE=BC/2$
- C. $DE \parallel BC$ and $DE=BC/2$
- D. $DE \perp BC$ and $DE=BC$

13. If median AD=18 cm, AG is:

- A. 6
- B. 9
- C. 12
- D. 15

14. Which real-world object is naturally modeled by a triangle?

- A. Coin
- B. Wheel
- C. Roof truss
- D. CD

15. Which tool measures angles?

- A. Ruler
- B. Protractor
- C. Eraser
- D. Pencil

Part B — Descriptive Questions (5)

1. In △ABC, D and E are the midpoints of AB and AC. If BC=20 cm, find DE and state the theorem.

Work: _____

_____

2. In △LMN, G is the centroid. If LG=8 cm on median LD, find LD using the 2:1 ratio.

Work: _____

_____

3. Define angle, perpendicular lines, parallel lines, line segment, and ray using point, line, and plane.

Work: _____

_____

4. A triangular tent has three median-like supports meeting at a central point. Explain why this point is useful for balancing the structure.

Work: _____

_____

5. Draw or describe △ABC. Mark midpoints of AB and AC, connect them, and explain the relationship of the new segment to BC. Then explain what happens when all three medians are drawn.

Work: _____

_____