EXPLORATIONS

Activity 8

Midsegment of a Triangle

Construct the geometric object by following the instructions below, and then answer the questions about the object.

1. From the Lines Toolbar, select **Triangle**.

2. Create a triangle and label it $\triangle ABC$.

3. Create the midpoint of a side of the triangle.

   a. From the Construct Toolbar, select **Midpoint**.

   b. Move the cursor toward side $\overline{AB}$ until the message *Midpoint of this side of the triangle* appears. Click once.

   c. Label this point X.

4. Create the midpoint of $\overline{BC}$ and label it Y.

5. Create the midpoint of CA and label it Z.

6. From the Lines Toolbar, select **Triangle** and create triangle $\triangle XYZ$.

   The sides that created triangle $\triangle XYZ$ are the $midsegments$ of triangle $\triangle ABC$. They connect the midpoints of the sides of a triangle.
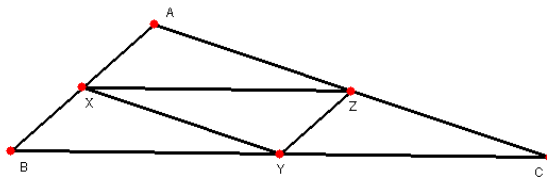

Figure 8.1

7. From the Check Property Toolbar, select **Parallel**.

8. Move the cursor toward $\overline{XY}$ until the message *Is this side of the triangle* appears. Click once.

9. Move the cursor toward $\overline{AC}$ until the message *Parallel to this side of the triangle* appears. Click once.

10. Drag to the upper right corner and click.

11. Are the two segments parallel?

_____

12. Check to see if $\overline{ZY}$ and $\overline{XZ}$ are parallel to their opposite sides.

13. Alter the triangle by dragging a vertex of triangle $\triangle ABC$.

14. Are all the midsegments still parallel to their opposite side?

_____

15. What can you conclude about the relationship between the midsegment and its opposite side?

_____

16. Measure and record the following lengths in the table below.

Side Length	Midsegment Length
$AB =$	$ZY =$
$BC =$	$ZX =$
$AC =$	$XY =$

17. How does the side length compare to the length of the midsegment opposite the side?

_____

18. Alter the triangle by dragging one of its vertices.

19. Record the new measurements in the table below.

Side Length	Midsegment Length
$AB =$	$ZY =$
$BC =$	$ZX =$
$AC =$	$XY =$

20. Alter the triangle by dragging one of its vertices.

21. Record the new measurements in the table below.

Side Length	Midsegment Length
$AB=$	$ZY =$
$BC =$	$ZX =$
$AC =$	$XY =$

22. What can you conclude about the length of the midsegment compared to its opposite side?

_____

23. Find the perimeter of triangle $\triangle ABC$.

    a. From the Measure Toolbar, select **Distance and Length**.

    b. Move the cursor toward triangle $\triangle ABC$ until the message ***Perimeter of this triangle*** appears. Click once.

    c. Label this the perimeter of ABC.

24. Find and label the perimeter of triangle $\triangle XYZ$.

25. Find the area of triangle $\triangle ABC$.

    a. From the Measure Toolbar, select **Area**.

    b. Move the cursor toward triangle $\triangle ABC$ until the message ***This triangle*** appears. Click once.

    c. Label this the area of $\triangle ABC$.

26. Find and label the area of triangle $\triangle XYZ$.

perimeter ABC = 26.22 cm
perimeter XYZ = 13.11 cm
AB = 8.09 cm
AC = 7.43 cm
XZ = 5.35 cm
YZ = 4.04 cm
XY = 3.71 cm
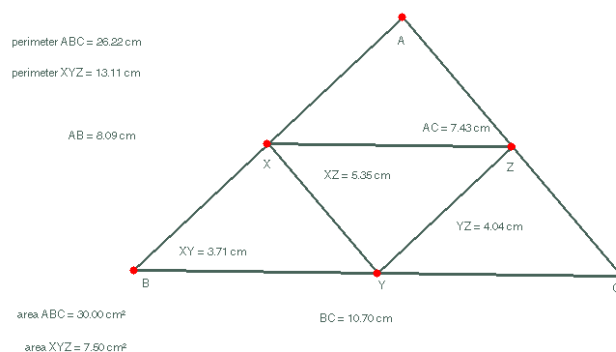area ABC = 30.00 cm²
area XYZ = 7.50 cm²
BC = 10.70 cm

Figure 8.2

27. Record your measurements in the table below. Alter your triangle two more times by dragging one of the vertices, then complete the table.

Perimeter △ABC	Perimeter △XYZ	Area △ABC	Area △XYZ

28. What is the relationship between the perimeter of $\triangle ABC$ and the perimeter of $\triangle XYZ$?

_____

_____

29. What is the relationship between the area of $\triangle ABC$ and the area of $\triangle XYZ$?

_____

_____

30. Delete all of your measurements.

31. Measure and label the angles in $\triangle ABC$ and $\triangle XYZ$.

32. Drag the vertices of $\triangle ABC$ so that it is an acute triangle.

33. What type of triangle is $\triangle XYZ$?

_____

34. Drag one of the vertices of $\triangle ABC$ so that it is an obtuse triangle.

35. What type of triangle is $\triangle XYZ$?

_____

36. Open a new figure.

37. Create an isosceles triangle.

    a. Create and label segment $\overline{AB}$.

    b. Measure the length of $\overline{AB}$.

    c. From the Construct Toolbar, select **Measurement Transfer**.

    d. Click on the length of $\overline{AB}$ and then point B.

    e. A dotted line will appear. Click once and a point will appear. Label this C.

    f. Create segment $\overline{AC}$ and $\overline{BC}$.

38. Measure and label the length of $\overline{AC}$ and $\overline{BC}$.

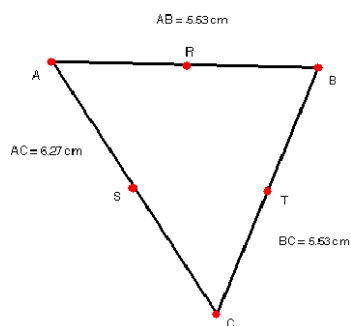**39.** Construct the three midpoints of the sides of triangle $\triangle ABC$, labeling them as shown in Figure 8.3.

Figure 8.3

40. From the Lines Toolbar, select **Triangle** and create triangle $\triangle RST$.

41. Measure the lengths of the sides of $\triangle RST$.

42. What type of triangle is $\triangle RST$?

_____

43. Alter the triangle two more times by dragging a vertex of $\triangle ABC$.

44. What type of triangle is $\triangle ABC$? _____ $\triangle RST$? _____.

45. Clear the screen.

46. Create an equilateral triangle and label it △*EFG*.

    a. From the Lines Toolbar, select **Regular Polygon**.

    b. Click once and drag to form a dotted circle. Click to deselect the circle.

    c. Click and hold the mouse button and drag until a triangle appears. Release the mouse button.

47. Measure and label the lengths of the sides of △*EFG*.

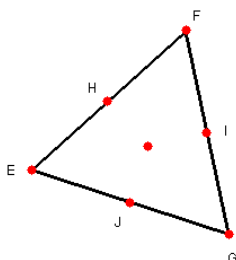**48.** Create the midpoints of the three sides of △*EFG*, labeling them as shown in Figure 8.4.

Figure 8.4

49. From the Lines Toolbar, select **Triangle** and create △*HIJ*.

50. Measure and label the lengths of the sides of △*HIJ*.

51. What type of triangle is △*HIJ* ?

_____

52. Alter the triangle two more times by dragging one of the vertices of △*EFG*.

53. What type of triangle is △*EFG*? _____ △*HIJ*? _____

54. What is the relationship between the original triangle and the triangle created by the midsegments of the original triangle?

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