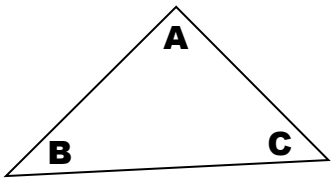
Materials:
Scissors
Paper
Rulers
Protractors
Instruction Sheets

Investigation – Geometric Constructions

Activity #1 – Midpoints of a Triangle



1. Using a ruler, **draw a large triangle** on a sheet of paper and **cut it out**.

2. Label the vertices (corners) of the triangle A, B and C (as shown).

3. Measure the **length of side AB**. Determine the **midpoint** (half way point) of side **AB** and mark this as point **D**.

   Length of AB = _____ (Measure) **Length of AD = _____** (Calculate Half of AB)

4. Measure the length of side **AC**. Determine the **midpoint** of side **AC** and mark this as point **E**.

   Length of AC = _____ (Measure) **Length of AE = _____** (Calculate Half of AC)

5. Draw a **line segment** between points **D** and **E**.

6. Measure the length of **DE**, and the length of side **BC**. How do they compare?

   Length of DE = _____ **Length of BC = _____**

   Comparison:

7. If you wanted to determine whether **DE** and **BC** are parallel, which angles should you measure? What should you notice about those angles if they are parallel?

8. Use your strategy above to determine whether or not DE and BC are parallel.

   YES / NO

9. Fold the triangle along the line segment **DE**.

10. Does vertex **A** touch line segment **BC**?

YES / NO

11. What does this tell you about the **height of triangle ADE** compared to the **height of triangle ABC**?

12. Look at your answer in # 6 and #11. What hypothesis can you make about areas of triangle ADE and triangle ABC?

13. Draw all three midsegments on this triangle. Does your hypothesis in #12 look true?

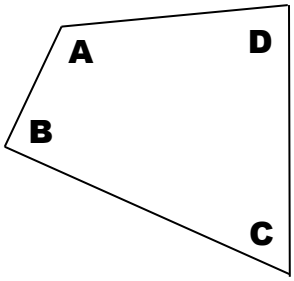
Conclusion

The line segment drawn between the midpoints of two of the sides in a triangle is

_____ and _____ the third side of the triangle.

When a line segment is drawn between the midpoints of two of the sides in a triangle, the new triangle formed _____ as the original triangle.

Investigation – Geometric Constructions
Activity #2 – Midpoints of a Quadrilateral



1. Draw a large **quadrilateral** on a sheet of paper (use a ruler).

2. Label the vertices (corners) of the quadrilateral **A**, **B**, **C** and **D**.

3. Measure the **length** of side **AB**. Determine the **midpoint** (half way point) of side **AB** and mark this as point **E**.

   Length of AB = _____ (Measure) **Length of AE = _____** (Calculate Half of AB)

4. Measure the **length** of side **BC**. Determine the **midpoint** of **BC** and mark this as point **F**.

   Length of BC = _____ (Measure) **Length of BF = _____** (Calculate Half of BC)

5. Measure the **length** of side **CD**. Determine the **midpoint** of **CD** and mark this as point **G**.

   Length of CD = _____ (Measure) **Length of CG = _____** (Calculate Half of CD)

6. Measure the **length** of side **AD**. Determine the **midpoint** of **AD** and mark this as point **H**.

   Length of AD = _____ (Measure) **Length of AH = _____** (Calculate Half of AD)

7. Draw a line segment between points **E** and **F**.

8. Draw a line segment between points **F** and **G**.

9. Draw a line segment between points **G** and **H**.

10. Draw a line segment between points **E** and **H**.

11. Measure the lengths of sides **EF**, **FG**, **GH**, and **HE**. What do you notice about the lengths of these line segments?

    Length of EF: _____ **FG: _____** **GH: _____** **HE: _____**

    Comparison:

12. Measure **<EFG**, **<FGH**, **<GHE**, and **<HEF** with a protractor. What do you notice about these angles?

Angle <EFG: _____ <FGH: _____ <GHE: _____ <HEF: _____

Comparison:

13. Are any of the sides of quadrilateral EFGH **parallel**? Explain.

YES / NO

Explanation:

14. What kind of **shape** is quadrilateral **EFGH**? Explain.

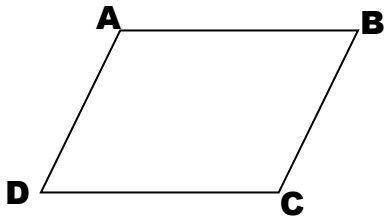
15. Compare your results with the other people at your table. Did they get the same result?

Conclusion

The line segments drawn between the midpoints of the sides in a quadrilateral form a

_____.

Investigation – Geometric Constructions
Activity #3 – Diagonals of a Quadrilateral



1. Choose one of the **parallelograms** provided.
2. Label the vertices (corners) of the parallelogram **A**, **B**, **C** and **D**.
3. Draw a line segment from **point A** to **point C**. This is called a **diagonal**.
4. Draw another **diagonal** from **point B** to **point D**.
5. Measure the lengths of **AC** and **BD**. How do their lengths compare?

   Length of AC: _____ **Length of BD: _____**

   Comparison:

6. Label the point where AC and BD cross as **point E**.
7. Measure the distance from point E to points A, B, C, and D. What do you notice about these lengths?

   Length of AE: _____ **BE: _____** **CE: _____** **DE: _____**

   Comparison:

8. Measure all four angles around point E. What do you notice? *Record this on your response sheet.*

   Angle <AEB: _____ **<BEC: _____** **<CED: _____** **<DEA: _____**

   Comparison:

Conclusion

When the diagonals of a parallelogram cross, the lengths of the diagonals are

_____.

When the diagonals of a parallelogram cross, the angles on the opposite sides are _____.