Finding the Center of Mass of a Triangle

Lesson Summary:
Students will investigate how to find the center of mass by using medians of a triangle. The first activity has students find the center of mass using pencil and straight edge. The second part has students find the center of mass by using Cabri.

Key Words:
median, center of mass, midpoint, centroid

Background knowledge:
Students need to be familiar with the basic tools of Geometry software. They must also understand midpoint and medians of a triangle.

Lesson Objectives:
1. To use the medians of a triangle to construct the center of mass
2. To understand center of mass and its basic characteristics

Materials:
cardboard cut into the shape of a triangle, scissors, ruler, pen or pencil, string

Suggested Procedure:
Divide the class into two large groups. One group can work on the first activity (pencil and paper) and the other group can work on the software activity. Before sending the students to the separate activities, hold up a cardboard triangle and ask students to find the balancing point. Students can brainstorm then try balancing the triangle on a pencil. After some discussion, have students complete the following worksheets.

Assessments:
Collect the worksheets and evaluate the students’ responses.
Finding the Center of Mass of a Triangle
Activity One

Team Members’ Names: __________________________________________________

File name: ______________________________________________________________

Lab goals: Get ready to investigate how to find the center of mass, or balancing point, of a triangle. You will need a cardboard triangle, scissors, ruler, and string.

1. Use ruler to mark the midpoint of all three sides of the triangle and label them X, Y, and Z.
2. Take the ruler and draw a straight line from each midpoint to the opposite vertex

3. Cut a tiny hole at the intersection of all three segments and tie a string through the hole. Then tie a knot at the end of the string so that it does not pull back through the hole.
4. Lift the triangle by this string. What do you notice about the balance of the triangle? __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
Finding the Center of Mass of a Triangle
Activity Two

Team Members’ Names: __________________________________________________

File name: ______________________________________________________________

Lab goals:
1. To use the medians of a triangle to construct the center of mass using Geometry software.
2. To understand center of mass and its basic characteristics.

Activity:
1. Construct triangle \( \triangle ABC \) (use triangle tool)

2. Find the midpoint of sides \( AB \), \( AC \), and \( BC \) (use midpoint tool)

3. Construct the medians, that is the segments \( AZ \), \( BY \), and \( CX \). (using segment tool)

4. Drag vertices \( A \), \( B \), or \( C \). Is there ever a time when the medians \( BY \), \( CX \), and \( AZ \) do not intersect? ________________________________

5. What do you notice about the midpoints \( X \), \( Y \), and \( Z \) when the lengths of the sides are changed? ________________________________

6. What do you notice about point \( M \) when dragging the three vertices? ________

__________________________________________

__________________________________________
The point M where the medians of a triangle meet is called the center of masses or centroid of the triangle.

7. Create segments from BM, ZM, CM, YM, XM, and AM. (use segment tool)
8. Measure each new segment. (using measure tool)

9. Calculate BM/BY, CM/CX, and AM/AZ. (use calculate tool)

What are the results?

BM/BY = __________  CM/CX = __________  AM/AZ = __________

10. What do you notice about these results? ________________________________

11. What can you conclude about the center of mass? ___________________________

* If you are not familiar with Cabri’s tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.
Journal Activity
Finding the Center of Mass of a Triangle

1. What was your favorite thing about this activity?

2. What was the most challenging thing?

3. What did you gain the most confidence about through completing this lesson?

4. Where do you possibly see yourself using this knowledge in the future?