

## (A) Lesson Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> <li>mastery with algebraic skills to be used in our work with co-ordinate geometry (midpoint, length, slope)</li> <li>understanding various geometric properties of quadrilaterals &amp; triangles</li> <li>how do you really prove that something is “true”?</li> </ul>		
CONTEXT of this LESSON:	Where we've been  You know about geometric figures and now you know how to find a midpoint	Where we are  Becoming proficient with another analytical tool that we can use in co-ordinate geometry → length	Where we are heading  How can I prove various geometric properties of quadrilaterals and triangles?

## (B) Lesson Objectives:

- Exploring the midpoint of a line segment through dynamic geometry software (geogebra)
- Develop proficiency in analytic/algebraic determination of midpoints of line segments
- Apply the use of midpoints to problem solving questions

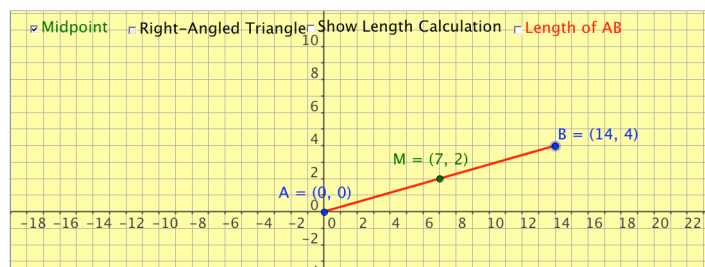
## (C) Exploring Length – through dynamic geometry software: geogebra

Open Firefox, Explorer, Safari (but NOT CHROME) → Using the following dynamic geometry applet (<http://www.geogebra.org/student/m12412>), (you may have to download JAVA) let's explore the length of a line segment

- Point A is fixed at (0,0) and move Point B (the first three B coordinates have been given to you. Record position of Point B and then also record the length of the segment → Q? how can you determine the length of segment?

### Midpoint and Length of a Line Segment

Drag the points A and B to the desired Coordinates. Try to work out the midpoint and length of the line segment AB before using the check boxes to reveal the answers.



Point A	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)	(0,0)
Point B	(8,6)	(-15,8)	(-12,-5)			
Length						

Q? how can you determine the length of segment?

## Lesson 2: Length of a Line Segment | Unit 2 – Co-ordinate Geometry

- ii. Now Point A will also move and you will also move Point B → Record position of Points A and B and then also record the length of the segment → Q? how can you determine the length of segment?

Point A	(2,5)	(3,6)	(-5,-4)	(-2,-8)	(3,7)	(0,-7)
Point B	(4,7)	(0,-2)	(7,-1)	(-8,6)	(-4,2)	(5,0)
Length						

Q? how can you determine the length of segment?

### **(D) Working with the Formula**

- a. The formula to find the length of a line segment between two points on a graph is

$$l = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

- i. Determine the length of the line segment between  $A(1,1)$  and  $B(5,9)$
  - ii. Determine the length of the line segment between  $A(-1,1)$  and  $B(5,5)$
  - iii. Determine the length of the line segment between  $A(-2,6)$  and  $B(3,-4)$
  - iv. Determine the length of the line segment between  $A(1,-2)$  and  $B(8,-2)$
- b. A helicopter is travelling from Town A to Town B. A grid is overlaid on the map of this region and Town A is at  $(-70,770)$  and Town B is at  $(220,490)$  & Town C is the origin.
1. Draw a diagram that shows the three towns.
  2. Approximately how far did the helicopter travel?
  3. What assumption did you make about the route of the helicopter?

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- c. Triangles can be classified according to the lengths of their sides (scalene, isosceles, equilateral). A given triangle has vertices at  $A(4,5)$ ,  $B(1,2)$  &  $C(6,1)$ .

1. Determine the lengths of all three sides and then classify the triangle type.
2. Construct the triangle on GEOGEBRA.
3. Where would you move point C such that you now had an isosceles triangle?

- iii. CHALLENGE: Now Point A will be fixed at  $(16,-8)$  and you will have to move Point B to get to the requested length → Record the final position B → Q? how can you predict where Point B should be?

Point A	$(16,-8)$	$(16,-8)$	$(16,-8)$	$(16,-8)$	$(16,-8)$	$(16,-8)$	$(16,-8)$
Length	10	13	17	5	21.9	28.2	30
Point B							

- d. A line segment has an endpoint at  $A(5,2)$  and has a length of 13 units. Determine the co-ordinate(s) of the other endpoint. Show the algebraic reasoning/work that leads to your conclusion.

### (E) Homework/Resources