SAMPLE LESSON: MATHEMATICS

Class: Form 5

Title of Module: Plane Geometry

Title of Chapter: Coordinate Geometry

Title of Lesson: Distance between two points

Duration of Lesson: 50mins

School: **AIMS – TTP COP** Class: **Form 5** Enrolment: Male:_____ Female:___ Total:_____

Term: **First** Date:_____Duration: **50 minutes** Module Title: **Plane Geometry**

Topic Title: **Coordinate Geometry** Lesson Title: **Distance between two points**

Lesson objectives: At the end of the lesson, the students should be able to:

- Calculate the distance between any two given points.

Pre-requisite knowledge: Students can;

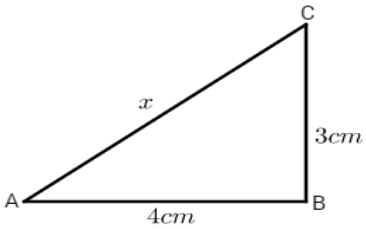
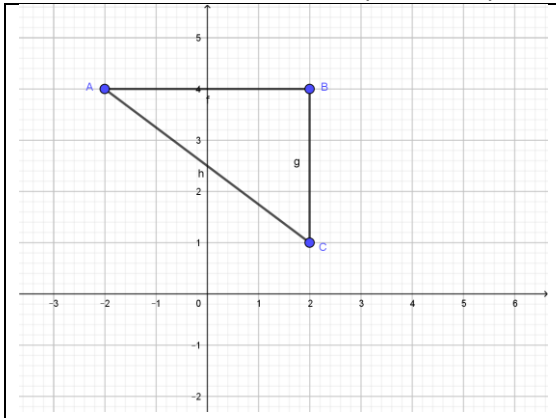
- Draw and label coordinate axes.
- Plot points on the coordinate axes.
- State and use the Pythagoras's Theorem.

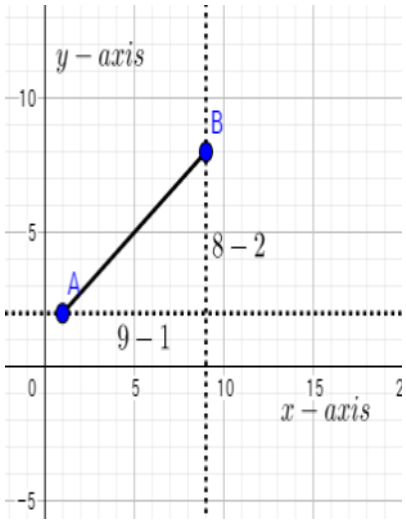
Motivation/Rationale: In real life, we are confronted at times with situations of finding distances. The notion of calculating distance is used in surveying, town planning, sporting activities, navigation building, location of Aero planes map projections, latitudes and longitudes and GPS (Global positioning system) and in many other works of life.

References:

- Internet (www.quora.com),
- Interactions in Mathematics, Andrew T. Tamambang, 2017, First Edition, Cambridge University Press.
- Ordinary level mathematics for Cameroon schools by Numfor Eric and others.

Preparation: Ask learners to bring graph papers and rulers. Prepare graph board for use, if no graph board in school, prepare grid on cardboard paper. Type and print out problem situation to be distributed to students

Stages/Duration	Teaching/learning Activities	Learners' Activities	Learning points	Observations
Introduction (5 minutes)	Tell students some context of use of notion to be taught. **Verification of basic knowledge needed for the lesson: Instructions.** Carry out the following individually**.** 1. Find the value of x for the triangle below  	Learners take out graph papers, pencils rulers as were asked to bring. Learners solve problem 1 individually. Volunteers give their answers that are crossed checked and confirmed by others.	Application of Pythagoras theorem to solving the question. Application of Pythagoras' theorem to real life. 1.The value of x. Triangle ABC is a right triangle with the right angle at B. The side whose length is x is the Hypotenuse. $X^2 = 4^2 + 3^2 = 25 \rightarrow x = 5$	The triangle for this verification of pre-requisite should have been drawn before on a cardboard to avoid time wasting drawing on the board
Problem Situation	**Problem Situation**: Distribute printed copies to students and give then 1mins to read and understand.  	While preparing for the marathon, Joel and Janet decide to run each day from point C along road CB to point A, then take road BA to point A and then straight back to C**.** Both of them accepts that it takes a shorter time for them to run from A back to C. Janet says the distance from AC is shorter than the distance AB plus BC. Joel is not convinced. Help Janet to justify. The GPS gives the coordinates of the points A, B and C as: C(, 2, 1); B(2, 4) and A(-2. 4)		

Lesson **Development** **(20 minutes)**	**Activity in groups:** Put up the graph board or the grid on the cardboard paper. **Instructions.** *Carry out the activities on the worksheet in groups. Assign one member to read your answers.* 1.Draw and label the coordinate axis on your graph papers. 2.Using a scale 1 unit for 1 cm on both axis, plot the points $A(1,2)$ and B$(9,8)$. 3.Draw the line segment AB. 4.Draw a broken line passing through the point A and parallel to the x-axis. 5.Draw a broken line passing through the point B and parallel to the y-axis. 6.Name point of intersection of the two broken lines C. 7. State the coordinates of C 8. Measure $< ACB$ and say what type of angle it is 9. What type of triangle is triangle ACB? Justify 10. Find the distances AC and BC by counting the squares. 11. Subtract the x-coordinate of A from the x-coordinate of C. write it down. Equally subtract the y-coordinate of C from the y-coordinate of B. These two values give you the lengths of segments AC and BC. Should be the same as in 10. 12. Using these values for the length of line segments AC and BC, find the length AB using Pythagoras theorem.	Work in groups -Draw Cartesian axis. -Plot points. -Follow up the activity. -Present group solution to the whole class -Answer questions in their various groups. -Ask questions.	 7. C(9, 2) 8. $< ACB$ = 90°. It is a right angle. 9.Triangle ACB is a right triangle with the rightangle at C 10. by counting squares, AC = 8units and BC = 6units. 11. x-coordinate of A is 1 and x-coordinate of c is 9 so 9 -1 = 8 Similarly y coordinate of C is 2 and y coordinate of B is 8 so 8 – 6 = 6. 12. Pythagoras says:	Allow the learners to say in their own words what they are doing and how they are doing it. Correct their language along the way. Assist them but do not tell them or show them the answers. Ensure the participation of

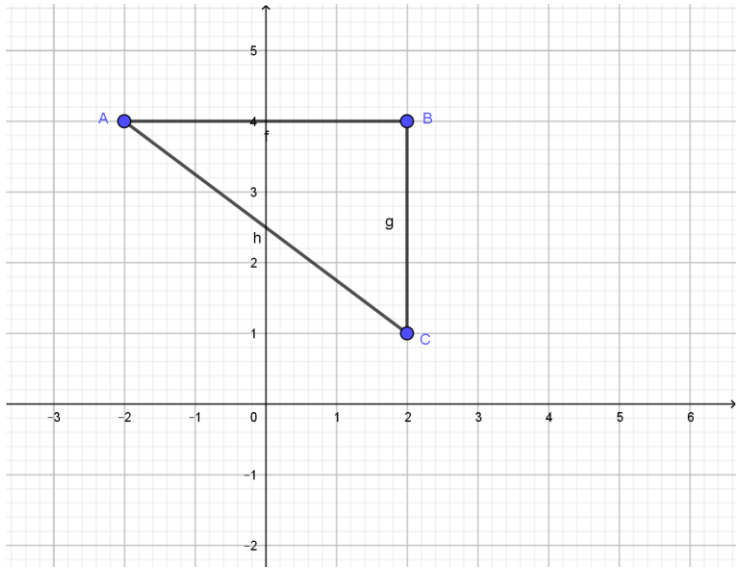
	Wrap - Up From the activity, the distances: $AC = 9 - 1 = 8$ and $BC = 8 - 2 = 6$. Using the Pythagoras's theorem, $AB^2 = 8^2 + 6^2$ $= (9-1)^2 + (8-2)^2$ What we have done to have 8 and 6 is as below: Let the points A and B be A(x_1, y_1) and B(x_2, y_2) so (x_1, y_1) = $(1, 2)$ and (x_2, y_2) = $(9, 8)$ $X_2 - x_1 = 9 - 1 = 8$; $y_2 - y_1 = 8 - 2 = 6$. This implies $AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ Therefore $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.	Copy conclusion in their note books	$(AC)^2 + (BC)^2 = (AB)^2 = (9-1)^2 + (8-2)^2 = 8^2 - 6^2$. AB = $\sqrt{28}$ **Conclusion from activity** From the activity, the distances: AC = 9 – 1 = 8; BC = 8 – 2 = 6 Using the Pythagoras's theorem, $AB^2 = 8^2 + 6^2$ $= (9-1)^2 + (8-2)^2$ What we have done is as below: Let A(x_1, y_1) and B(x_2, y_2), then (x_1, y_1) = $(1, 2)$; (x_2, y_2) = $(9, 8)$ $x_2 - x_1 = 9 - 1 = 8$; $y_2 - y_1 = 8 - 2 = 6$. This implies $AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ Therefore $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.	all members of the group

Application exercise (10 minutes)	<u>Exercise</u> Find the distance between the following points 1) $A(3,-2)$; $B(-4,5)$ 2) $C(0,3)$; $D(4,0)$	- Do exercises individually. Volunteers share their answers	<u>Exercise</u> Find the distance between the following points 1) $A(3,-2)$; $B(-4,5)$ 2) $C(0,3)$; $D(4,0)$	
Conclusion (5 minutes)	<u>Home work</u> 1) Find the distance between the points $A(3,-2)$; $B(-4,5)$ 2)The distance between A and B is $\sqrt{5}$ units where A and B have coordinates $(x,3)$ and $(2,5)$ respectively. Find the values of x. ***NB: Add work from their textbooks and workbooks***	-Copy the assignment.	<u>Home work</u> 1.Find the distance between the points $A(3,-2)$; $B(-4,5)$ 2.The distance between A and B is $\sqrt{5}$ units where A and B have coordinates $(x,3)$ and $(2,5)$ respectively. Find the values of x.	

WORKSHEET FOR ACTIVITY

1. Draw and label the coordinate axis on your graph papers.
2. Using a scale 1 unit for 1 cm on both axis, plot the points $A(1,2)$ and B$(9,8)$.
3. Draw the line segment AB.
4. Draw a broken line passing through the point A and parallel to the x-axis.
5. Draw a broken line passing through the point B and parallel to the y-axis.
6. Name point of intersection of the two broken lines C.
7. State the coordinates of C
8. Measure $< ACB$ and say what type of angle it is
9. What type of triangle is triangle ACBJ Justify
10. Find the distances AC and BC by counting the squares.
11. Subtract the x-coordinate of A from the x-coordinate of C. write it down. Equally subtract the y-coordinate of C from the y-coordinate of B.
    These two values give you the lengths of segments AC and BC. Should be the same as in 10.
12. Using these values for the length of line segments AC and BC, find the length AB using Pythagoras theorem.

PROBLEM SITUATION



While preparing for the marathon, Joel and Janet decide to run each day from point C along road CB to point A, then take road BA to point A and then straight back to C**.** Both of them accepts that it takes a shorter time for them to run from A back to C. Janet says the distance from AC is shorter than the distance AB plus BC. Joel is not convinced. Help Janet to justify. The GPS gives the coordinates of the points A, B and C as: C(, 2, 1); B(2, 4) and A(-2. 4).