

7

Lesson Exemplar for Science

Quarter 3

Lesson

4

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Lesson Exemplar for Science Grade 7
Quarter 3: Lesson 4 (Week 4)
SY 2024-2025

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SCIENCE (PHYSICS) /QUARTER 3/ GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	1. Scientists and engineers analyze forces to predict their effects on movement. 2. Vectors differentiate the concepts of speed and velocity. 3. Graphing motion provides more accurate predictions about speed and velocity. 4. The particle model explains natural systems and processes. 5. Scientists and engineers conduct innovative research to find solutions to the current global energy crisis by seeking renewable energy
B. Performance Standards	<i>By the end of the Quarter, learners employ scientific techniques, concepts, and models to investigate forces and motion and represent their understanding using scientific language, force diagrams, and distance-time graphs. They use their curiosity, knowledge and understanding, and skills to propose solutions to problems related to motion and energy. They explore how modern technologies might be used to overcome current global energy concerns.</i>
C. Learning Competencies and Objectives	<i>Learning Competency</i> 1. Explain the difference between distance and displacement in everyday situations in relation to a reference point; <i>Lesson Objective 1: Describe the motion of an object in terms of distance and displacement</i> 2. Distinguish between speed and velocity using the concept of vectors; <i>Lesson Objective 1: Differentiate speed from velocity and solve problems involving speed and velocity</i>
D. Content	Motion: Displacement and Velocity Displacement-Time Graph Distance, Displacement, Speed, and Velocity: a. Distance: The total length of the path traveled by an object, regardless of direction. b. Displacement: The change in position of an object in a particular direction. It has both magnitude and direction. c. Velocity: The rate of change of displacement concerning time. It is a vector quantity, indicating both speed and direction.
E. Integration	GIS Mapping in distance and displacement Values Education to follow the road regulations by not taking shortcut (displacement)

II. LEARNING RESOURCES

FuseSchool - Global Education. (2019, November 17). Displacement Time Graphs | Forces & Motion | Physics | FuseSchool [Video]. YouTube.
<https://www.youtube.com/watch?v=TG2Y2MDx-zE>

Infinity Learn NEET. (2017, May 4). Motion | Distance and Displacement | Physics | Infinity Learn [Video]. YouTube.
<https://www.youtube.com/watch?v=21BwUNDOQno>

Infinity Learn NEET. (2017b, May 11). What is Velocity? - Full Concept of Velocity - Physics | Infinity Learn [Video]. YouTube.
<https://www.youtube.com/watch?v=apewLkLAR-U>

Infinity Learn NEET. (2017c, May 18). Physics - What is Acceleration | Motion | Velocity | Infinity Learn NEET [Video]. YouTube.
<https://www.youtube.com/watch?v=vxFYfumAAIY>

Infinity Learn NEET. (2018, November 8). What is Speed? | Motion and Time | Don't Memorise [Video]. YouTube.
<https://www.youtube.com/watch?v=S9Z1a3sZfHY>

Ltd, I. B. J. E. (n.d.). The displacement-time graph game. eChalk.
<https://www.echalk.co.uk/Science/physics/motion/dispGame/displacementGame.html>

Speed velocity acceleration wild taxi. (n.d.).
https://reviewgamezone.com/games4/taxi.php?test_id=14406&title=Speed%20Velocity%20%20Acceleration

III. TEACHING AND LEARNING PROCEDURE	NOTES TO TEACHERS
A. Activating Prior Knowledge 1. Short Review (DAY 1) Tell whether the statement is scalar (a quantity with magnitude only) or vector (a quantity with magnitude and direction) and provide your reason. Activity 4.1 Guide questions: - What are the commonalities among situations 1, 2, 3 and 5? - Why is situation 4 different from the other situations? - What is the main difference between a scalar and a vector quantity?	Option 1: The lesson will start with a presentation of a simple situation then the students will tell whether the situation is scalar or vector and they will provide why they say so. Please refer to Worksheet Number 4.1. ANSWERS: (1) This is a scalar value because you don't know which direction the tricycle is going. (2) This is a scalar. There is no direction. (3) This is a vector because you have both a magnitude and a direction. (4) Time is an example of scalar. (5) The situation needs to be carefully analyzed. "Mass" was mentioned in the situation, therefore the statement is scalar. You can make a table to compare the scalar and vector quantity. Allow your students to provide their answers.
B. Establishing Lesson Purpose 1. Lesson Purpose Locale Mapping: Activity 4.2a Study the map below by familiarizing the location of your HOME and SCHOOL. In the map, there are two roads from your home to school.   QUESTION OF THE DAY! How far is your house to school? What means of transportation do you use? How long does it take you to reach the school?	Raise this question to your students: <i>How far is your house to the school?</i> <i>What means of transportation do you use?</i> <i>How long does it take you to reach the school?</i> Ask them one by one since their experience going to school might be different from their classmates. We can also know the experience of our students why they are late. Present this map via projector or television. You can also print in a used bond paper or photocopy this (depending on your school capacity).

Use the worksheet for this activity (see pages 2 – 3).

Unlocking of Content Vocabulary

What is the difference between scalar and vector quantities?

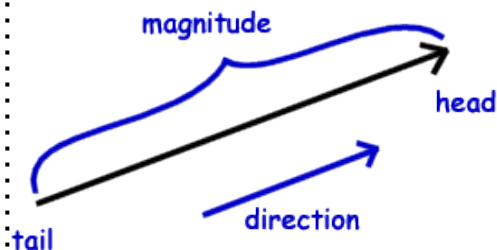
Scalar quantity - a quantity that is described by **magnitude only**

Magnitude – numerical value and a unit i.e. 30 meters (*the number is 30, the unit is meters*)

Examples of Scalar Quantities: 10 km (distance), 50 kg (mass), 27°C (temperature), 80 mL (volume), 30 mins (time)

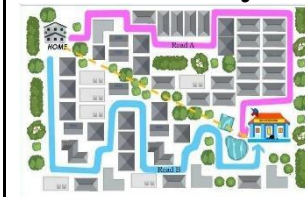
Vector quantity - a quantity that is completely described by **magnitude and direction**.

Examples of Vector Quantities: 80 km/hr East, which describes the velocity of a vehicle (*the magnitude is 80 km/hr and the direction is East*)
20 N upward, which describes a force of 20 N (magnitude) directed upward
2 m/s² to the right, which expresses the acceleration of a moving object with a magnitude of 2 m/s² directed to the right.



You can modify this map or you can create your own map.

KEY to Activity 4.2a



1. sample answers:

Road A is approximately 290 cm
Road B is approximately 297cm
Road B is longer than Road A

2. Possible answer, but answer of student may vary.



3. The new road will be straight from the home to school. The length of the new road is 130 cm.

4. For practicality, students will take the new route. Two answers might arise: First might be NO because of consciousness as private property, YES because of rushing.

There are so many physical quantities that are used to explain various everyday phenomena. Each of these quantities is described as either a scalar or a vector quantity.

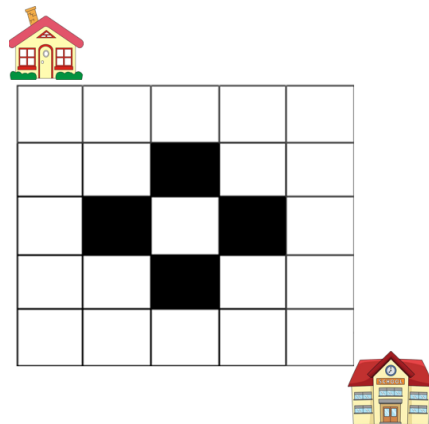
C. Developing and Deepening Understanding

SUB-TOPIC 1: Distance vs Displacement (DAY 2)

1. Explicitation

Use the worksheet for this activity (see pages 4 – 5).

Using the diagram, in how many ways can you go to the school from your house in a straight path using the white squares? Each box is 2 meters



Answer the following questions:

1. How many ways can you go to the school from your house on a straight path using the white squares?
2. How many white squares are the longest paths?
3. How about the shortest path?

2. Worked Example



Example:

You walked from your house going to school. If the **reference point is your house**, **you are in motion** because you moved away from your house covering a particular distance in a given time period. However, if your **reference point is your shoes**, **you are at rest** (*not moving*) because you did not move away from your shoes even if you walked from your house to the school.

Let the students analyze the illustration on the left side and let them answer the three questions.

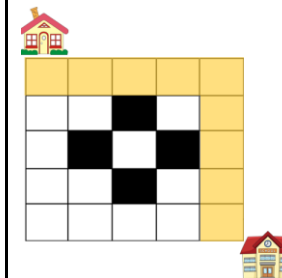
Important to Remember:

Motion is relative. An object is moving or in **motion, depending on the reference point**. When the object's position **changes with respect to a particular reference point within a given time period, the object is in motion**.

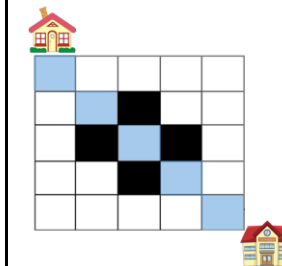
Provide this example to your students by using a PowerPoint presentation. If a projector or TV is not available you can write this in manila paper and post it in the chalkboard for them to remember this example.

The answer is 3 ways/paths.
Answer for the activity:

Path A: 18 meters



Path B: 10 meters, SE



KEY to Activity 4.2b

1. HOUSE TO SCHOOL

Distance: 70 meters

Displacement: 70 meters, East

2. SCHOOL TO HOUSE

Distance: 70 meters

Displacement: 70 meters, West

3. HOUSE TO SCHOOL and SCHOOL TO HOUSE

Distance: 70 meters + 70 meters = 140 meters

Displacement:

70 meters, **East** - 70 meters, **West** = 0 meters

In Situation C, notice that East and West are in opposite directions. So instead of adding the two, you subtract the distances. Even without computing, you should know that the displacement is zero because the **initial and final point is the same**.

3 CONDITIONS OF MOTION

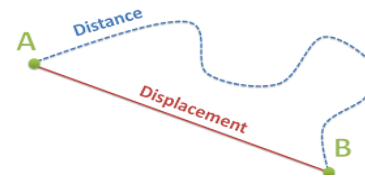
1. Reference point (*fixed position/ starting position*)
2. Change in position (*a certain distance must be covered*)
3. Time interval (*time needed to cover the distance*)

DISTANCE

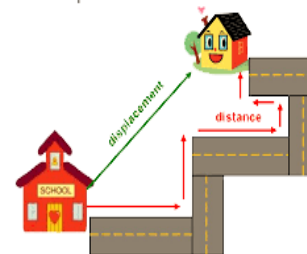
- Scalar quantity (*magnitude only*)
- denoted by “d”.
- Actual length of the path covered

DISPLACEMENT

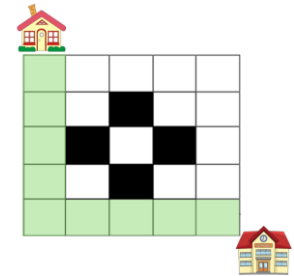
- Vector quantity (*magnitude + direction*)
- Denoted by “**d**” or d (*Note: the arrow indicates direction*)
- Shortest distance from the initial to the final position of an object



Displacement Vs distance

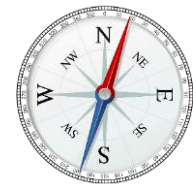


Path C: 18 meters



Paths A and C are distances, while Path B is displacement.

Don't forget to post this to the students:
The **4 primary directions** are North, South, East and West





THINK OF THIS!

Can a person travel a distance of 200 meters but still have zero displacement? How?

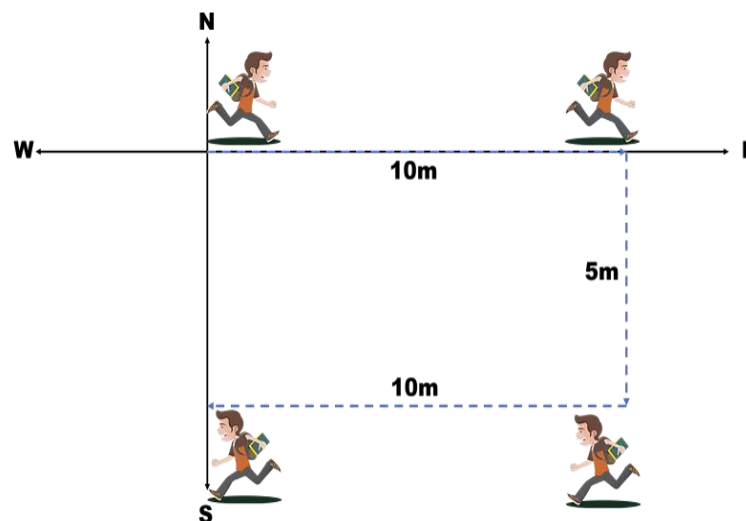
3. Lesson Activity (DAY 3)



REMEMBER THIS!

Distance – a scalar quantity that quantifies the actual length of the path covered

Displacement – a vector quantity that quantifies the distance from the initial to the final position of an object.



Illustrating distance and displacement

4. Lesson Activity (DAY 3)

Activity No. 4.3c: Distance and Displacement

Use the worksheet for this activity (see pages 6 – 7).

Yes, a person can travel a distance of 200 meters but still have **zero displacement** if the person's **initial point and final points are the same**. For example, the person traveled 100 meters, East then traveled 100 meters, West. This only means that the person returned to its original position; thus, having zero displacement.

Present the illustration in class and raise the question.

When you were asked this question, “How far did the object travel?” we are actually describing the object’s change in position with respect to the reference point. In this case, how far did the boy travel?

There are two ways to answer this question:

1. Get the total length of the path traveled by the boy. **25 meters**
2. Measure the distance between the initial position and final position of the boy. **5 meters South**

The map shows the direction of each motorized boat from the different island barangays. Let your students plot the

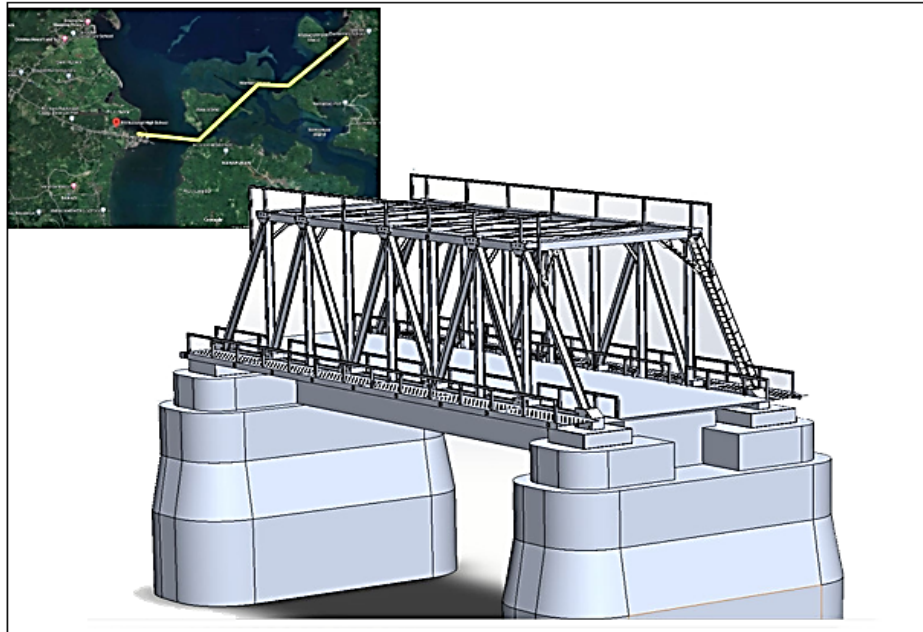
Sample Answers:

Comprehensive community plan in island school:

Sustainable Community Plan in Island School

1. **Education and Awareness:** Implement environmental education programs to raise awareness about the importance of preserving the environment and promoting sustainable practices.
2. **Waste Management:** Establish a comprehensive waste management system, including recycling and composting, to minimize waste and promote a circular economy.
3. **Renewable Energy:** Invest in renewable energy sources, such as solar panels and wind turbines, to reduce reliance on fossil fuels and promote energy efficiency.
4. **Sustainable Agriculture:** Encourage the cultivation of organic and sustainable agriculture practices, such as permaculture and agroforestry, to provide food security and support local livelihoods.
5. **Community Involvement:** Foster a sense of community by involving residents in decision-making processes and promoting collaboration and cooperation among different sectors.
6. **Strengthen the Local DRR:** Far-flung community are hard to reach by the government officials, that's why it is better to train local community in DRR.

Design of bridges to connect the islets:



Activity 4.D (DAY 4)

displacement from Manaet and Namantao Port going to Pili Port. Then raise the question below the map.

This question encourages the student to consider the practical, environmental, and social aspects of bridge construction, fostering critical thinking and problem-solving skills. It also prompts the student to integrate knowledge of forces, materials, and environmental impact, as well as to prioritize the well-being of the community and the preservation of the natural surroundings.

Here is the answer:

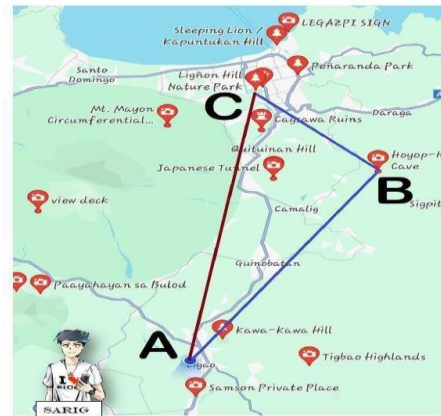


The first challenge for Sarig and Gayon was to differentiate distance from displacement in terms of magnitude and direction and then calculate the distance and displacement of a moving object.

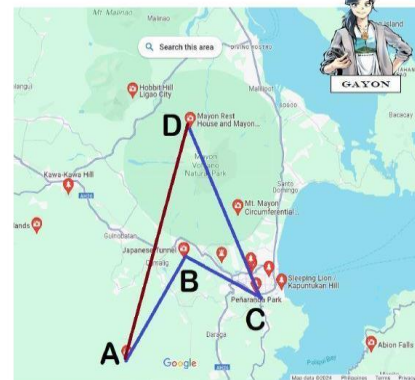
Once they reached Albay, *Sarig* and *Gayon* each acquired a device called a “smart phone” and located all the tourist destinations in Albay by using Google Maps. However, being a powerless human, they found it hard to compute the distance they will travel from one tourist spot to another. They were sad and clueless!

Sarig and *Gayon* must be able to travel to Albay safely and accurately. They need your help. Are you ready to travel with them all around Albay? Let’s go!

SARIG's Task Sarig decided to visit the following tourist spots: He started his journey in Ligao City Proper to Hoyop-hoyopan Cave to the Lignon Hill Natural Park and finally back to Ligao City Proper. For the first challenge, he would like to know how far he needs to travel in the entire course of his journey.



GAYON's Task Meanwhile, Gayon planned to go to three (3) different tourist destinations in Albay. She wanted to know how far she will travel from Ligao City (Point A) to Japanese Tunnel (point B) then to Peñaranda Park (point C) and finally to Mayon Rest House (point D). Gayon learned through Google the following distances from one tourist destination to another (See the map below):



GUIDE QUESTIONS:

(Note: Use a ruler in measuring the length of path traveled by Sarig and Gayon. Then, convert the measured length using a scale: 1cm = 2km.)

A. SARIG's Task

1. Using the map of the path traveled by Sarig, how far do you think will travel from point A to B to C in kilometers?
2. What about his travel from point A to C in kilometers?

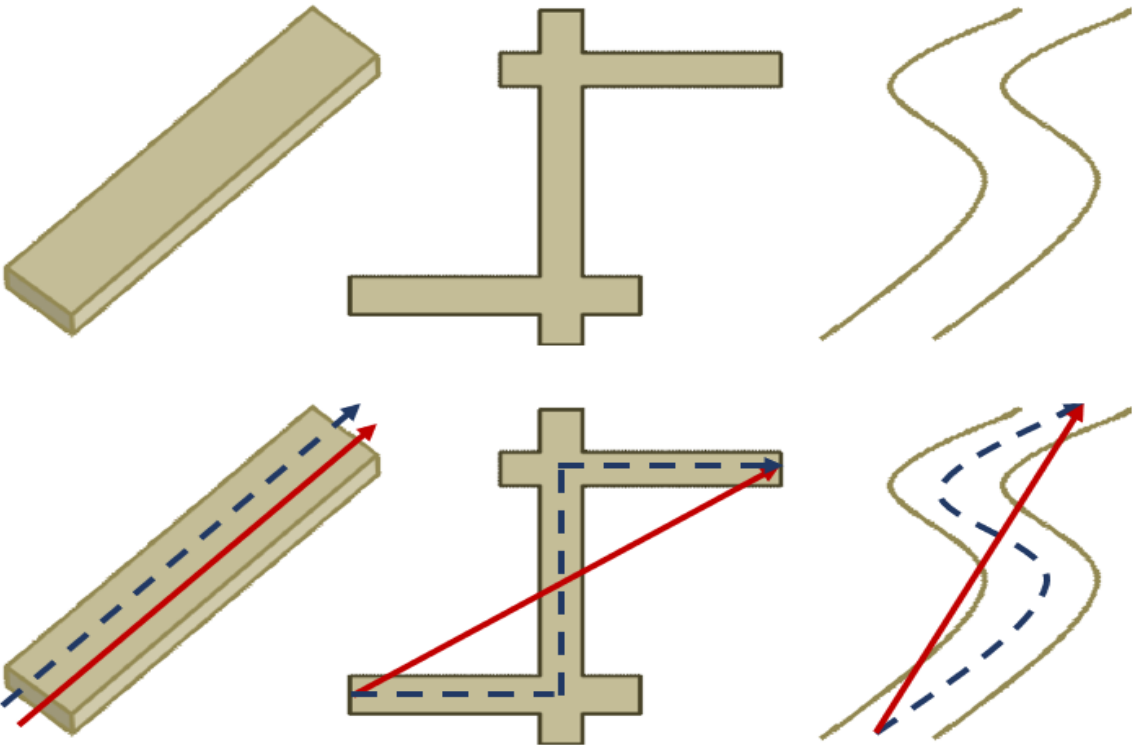
Discuss this story to your students. Sarig means strong while Gayon means beautiful in bicol.

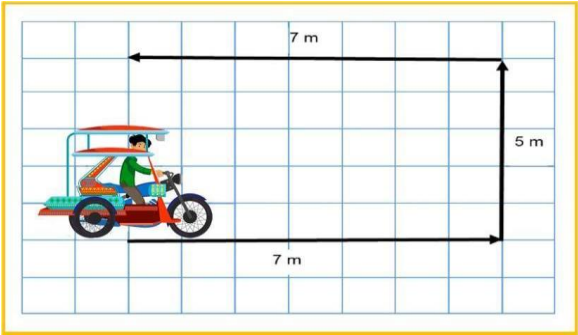
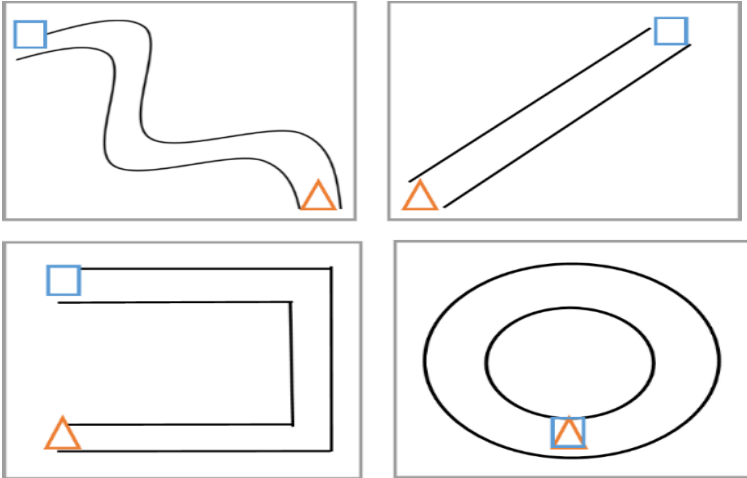
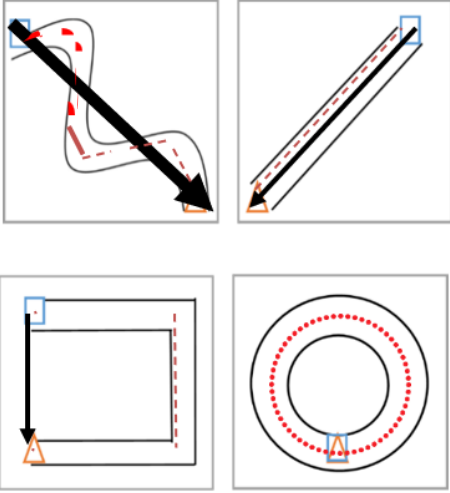
SARIG and **GAYON** were two immortal siblings living from the faraway place called the **Liway-un**. To prove their abilities, their parents, **Makusog** and **Dawani** decided to send them to a place named **ALBAY** and challenged them to solve five different tasks related to energy and motion. Sarig and Gayon were transformed into human forms and each of them was also given an **amulet** to communicate and return home to Liway-un. The two soon set off on their journey to visit the wonderful locations in Albay in one day.

Please refer to activity number 4.D to understand the activity.

- A.
1. A to B = 10.5km and B to C = 5.5km
 2. A to C = 12.0km

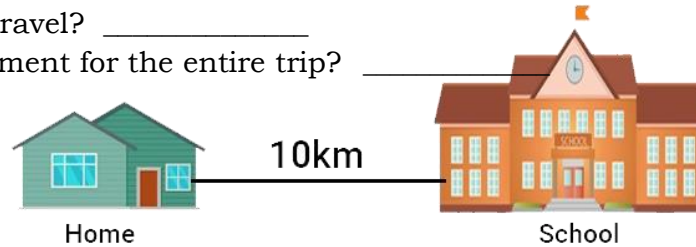
B.

	B. GAYON's Task - Using the map of the path traveled by Gayon, how far do you think will travel from point A to B to C to D in kilometers? - What about her travel from point A to D in kilometers? C. Additional Questions - How did you find the distance traveled between Sarig and Gayon? - How about their displacement?	- A to B = 5.3 , B to C = 3.5 , and C to D = 8.2 - A to D = 10.7 By simply locating the original point to the end point. C. - By adding the distances traveled by Sarig and Gayon - By measuring the shortest path from the initial to final positions.
D. Making Generalizations	1. Learners' Takeaways Activity No. 4.F 	Give one difference between distance and displacement based on the given illustrations. <i>(Answer may vary)</i> Can the distance traveled ever be greater than the displacement? <i>(Yes, the distance traveled can be greater than the displacement if the path taken is not straight.)</i> When is the displacement equal to the distance traveled? <i>(The displacement is equal to the distance traveled only when the motion is along a straight line.)</i> These pictures are the answer to the illustration above. Broken lines represent the distance, while the solid line represent the displacement

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION	NOTES TO TEACHERS
A. Evaluating Learning 1. Formative Assessment (DAY 4) 1. A tricycle travels 7m east, then goes 5m south and turns west and travels 7m as shown below. (a) What is the total distance traveled by the tricycle? (b) What is its displacement?  2. Draw the following on your papers. Using your pens, trace the distance with a red dashed line and the displacement with a black arrow. Box as starting point, triangle as end. 	1. a. 19m b. 5m, North (The teacher can still add questions). 2. Answers: 

3. You drive from your house to your school, which is 10 km away. Afterward, you went home.

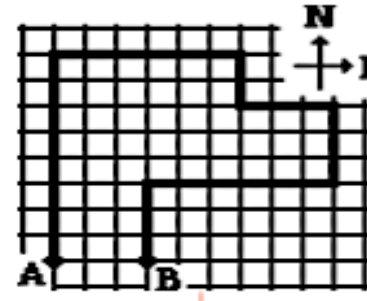
- a. What distance did you travel? _____
b. What was your displacement for the entire trip? _____



4. Observe the diagram on the right and answer the questions that follow.

A person starts at A, walks along the bold path, and finishes at B. Each square is 1 km along its edge. Use the diagram in answering the next two questions.

- a. This person walks a distance of _____ km.
b. This person has a displacement of _____.



3. a: 20km
b: 0 km

4. a. Distance: 31Km
b. Displacement: 3km, E

B. Teacher's Remarks

Note observations on any of the following areas:

strategies explored

materials used

learner engagement/ interaction

Effective Practices

Problems Encountered

The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement and other related stuff. He/she may also suggest ways to improve the different activities explored/ lesson exemplar.

	Others			
C. Teacher's Reflection	<i>Reflection guide or prompt can be on:</i> ▪ <u>principles behind the teaching</u> <i>What principles and beliefs informed my lesson?</i> <i>Why did I teach the lesson the way I did?</i> ▪ <u>students</u> <i>What roles did my students play in my lesson?</i> <i>What did my students learn? How did they learn?</i> ▪ <u>ways forward</u> <i>What could I have done differently?</i> <i>What can I explore in the next lesson?</i>			Teacher's reflection in every lesson conducted/ facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC sessions.