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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 3
Week
6

Lesson Exemplar for Science Grade 7
Quarter 3: Week 6
SY 2024-2025

Development Team

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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	*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.
C. Learning Competencies and Objectives	***Learning Competency*** **1.** Explain the difference between distance and displacement in everyday situations in relation to a reference point; *Lesson Objective 1:* Describe the motion of an object in terms of distance and displacement **2.** Distinguish between speed and velocity using the concept of vectors; *Lesson Objective 1:* Differentiate speed from velocity and solve problems involving speed and velocity **3.** Describe uniform velocity and represent it using distance-time graphs;
D. Content	Motion: Displacement and Velocity Displacement-Time Graph Graphical representation of motion. a. Slope of the d-t graph is the object's speed, b. Analyzing and interpreting graphs
E. Integration	GIS Mapping in distance and displacement Values Education to follow the road regulations by not taking shortcut (displacement)

II. LEARNING RESOURCES

Ateneo de Naga University Junior High School Physics Module

Pabellon, J. and Tubal, G. (2000). *Science and technology for a better life*. Makati City: Diwa Scholastica Press Inc.

Padua and Crisostomo, (1999). *Science and technology 4(Physics)*. Manila: SD.Publications.

Narvaza and Valdez. (1996). *Physics, 2nd edition*. Manila: Phoenix Publishing House, Inc.

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

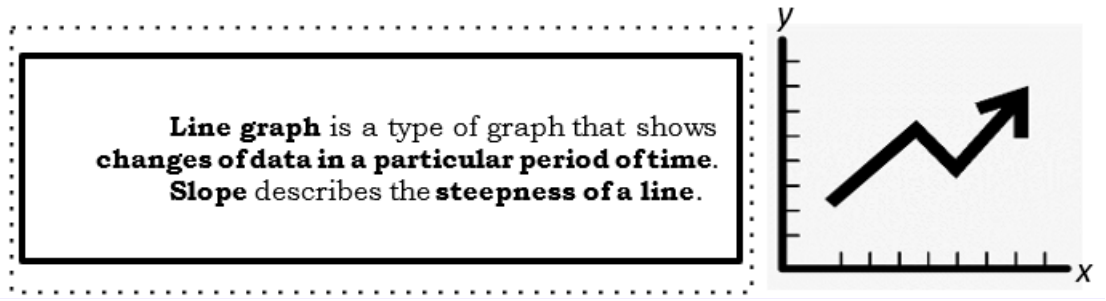
Infinity Learn NEET. (2017b, May 11). What is Velocity? - Full Concept of Velocity - Physics | Infinity Learn [Video]. YouTube. https://www.youtube.com/watch?v=apewLkLAR-U

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

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	**DAY 1** **1. Short Review** (15 minutes) Draw and describe a line graph. Define a slope and give its formula.  **Line graph** consists of x and y-axis, each representing a distinct variable. In this case/lesson, one axis will represent values for distance, and the other for time. **Slope** describes the steepness of a graph. It shows the change in the y and x coordinates of plotted points in the graph. It is usually represented by the mathematical expression slope of line (m) is equal to rise over run wherein the rise is the change in the y-coordinates and the run is the change in the x-coordinates. $$slope = m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$	Ask volunteers some concepts related to distance-time graph. Before doing Activity 6.1, you may consider to give a short discussion about the line graph and its slope in case they did not tackle it yet in Mathematics.
B. Establishing Lesson Purpose	**1. Lesson Purpose** **Describe the motion of a car** (10 minutes) 	**KEY:** 1. the distances are the same. 2. As time increases, distance also increases uniformly. 3. The car is moving at constant. 4. d-t graph:

Based on the above illustration, answer the following questions:

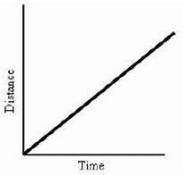
1. What can you say about the distances between the dots that represent the covered distance per unit time?
2. What happens to the distance as time increases?
3. What can you say about the motion of the car?
4. Sketch the distance-time graph.

2. Unlocking Content Vocabulary (10 minutes)

Activity 6.1 Word Search

Instruction: Search for words that can be formed by the scrambled letters inside the box below. There are a total of 6 words that you must find in the box. Clue: All of the words can be related to motion. Once you identify the words, write anything you know about it.

Q	N	U	C	C	P	I	Q	J	O	E	F	L	J	Z	H	K	E
I	N	M	E	T	E	R	P	E	R	S	E	C	O	N	D	X	B
O	S	L	O	P	E	B	B	N	O	D	E	G	R	E	C	B	P
U	I	I	C	C	L	H	J	O	Y	M	S	P	E	E	D	F	U
W	S	R	O	N	B	I	W	L	I	N	E	G	R	A	P	H	K
A	H	R	B	R	O	D	Q	Q	L	D	Z	N	F	M	U	N	A
Z	A	K	O	Z	S	R	C	S	H	D	T	F	P	L	C	U	B
T	E	F	C	S	Q	K	Y	R	N	G	M	Y	X	H	P	Y	R
T	F	B	C	M	D	M	A	T	D	I	S	T	A	N	C	E	A
C	P	I	T	N	R	S	L	U	R	N	Y	E	W	X	X	O	H
I	D	L	V	E	L	O	C	I	T	Y	N	L	W	W	W	L	D
S	N	N	I	L	T	I	N	Z	O	M	V	U	R	H	X	R	Y



KEY:

Words that can be found in the box are:
1. DISTANCE
2. LINEGRAPH
3. METERPERSECOND
4. SLOPE
5. SPEED
6. VELOCITY

Distance – The change in position done by a person or object relative to its initial and final position.

Line graph – a type of graph that shows changes of data in a particular period of time.

Meter per second – a unit of measurement for speed and velocity

Slope – the steepness of a line.

Speed – a scalar quantity showing the magnitude of the distance covered by an object per unit time or simply how fast an object reached its final destination.

Velocity - a vector quantity which consists of both the magnitude of the distance covered per unit time and the direction it is headed.

C. Developing and Deepening Understanding

GRAPHICAL ANALYSIS OF MOTION (DAY 2)

Motion of objects can be described using a graph particularly, the speed and velocity can be depicted using a distance vs. time graph/ position vs. time graph. Let us describe the motion of objects in real life in terms of speed or velocity using line graphs.

1. Explicitation

Activity 6.2. Graphing Uniform Motion

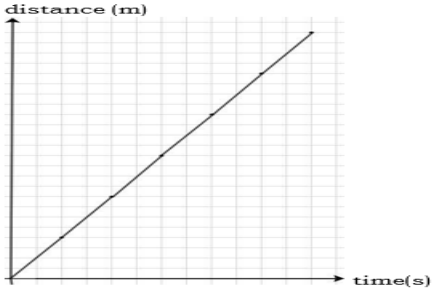
Use the worksheet for this activity (see pages 2 – 4).

KEY for Activity 6.2

Part A.

1. As time increases, the distance of the walking person increases uniformly.

Part B.

1. 

2. The distance increases uniformly with time.
3. Slope of the graph for different time intervals

Interval	Solution	Slope/Velocity
a. t = 0s to t = 2s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{2m - 0m}{1s - 0s}$ $\frac{2m}{1s}$	2 m/s

What is a line graph?

What is a slope?

Determine the slope if the line is:
a. sloping upward
b. sloping downward
c. horizontal
d. vertical

Show other examples of distance-time graphs with different slopes. Ask the students: What do these lines tell us? How do you describe the lines? What does a steeper line indicate regarding the object's motion?

Learners will answer the provided worksheet (Activity 6.1) before the short interactive discussion facilitated by the teacher to assess their understanding about the topic.

Divide the class into 4 groups. Each group will plot the data in cartolina or manila paper.

Go around the groups and check if the students are plotting the data properly.

b. t = 2s to t = 4s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{4m - 2m}{2s - 1s}$ $\frac{2m}{1s}$	2 m/s
c. t = 4s to t = 6s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{6m - 4m}{3s - 2s}$ $\frac{2m}{1s}$	2 m/s
d. t = 6s to t = 8s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{8m - 6m}{4s - 3s}$ $\frac{2m}{1s}$	2 m/s
e. t = 8s to t = 10s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{10m - 8m}{5s - 4s}$ $\frac{2m}{1s}$	2 m/s

Guide Questions:

1. The distance increases uniformly with time.
2. The slope represents the speed
3. 24 m
4. 12 s
5. Average speed
   = total distance/ total time =24 m/ 12s
   = 2m/s
6. The average speed is the same as the calculated slopes of the graph. This means that the bicycle has uniform motion.

Each group must solve the slope and answer the questionnaire available in the worksheet.

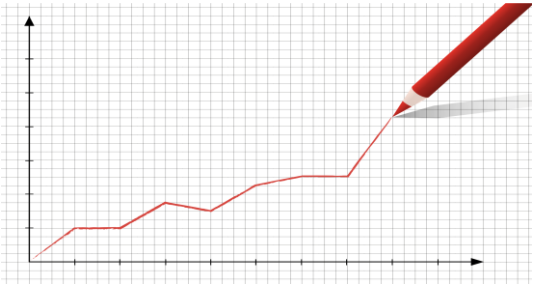
Each group will post their graphs on the blackboard. One group's representative will explain their graphs.

In this lesson, you will learn about Graphical Analysis of

Discussion

MOTION GRAPHS

1. Distance –Time graph
2. Displacement - Time graph

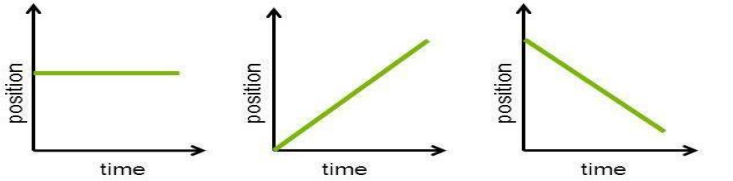


1. DISTANCE-TIME GRAPH

- An object's motion can be described by **plotting the distance moved by the object against the time it moved.** This kind of graph **only represents the total distance traveled by a body over time but it does not specify the direction.**
- The slope of the graph represents the speed.

2. DISPLACEMENT-TIME GRAPH

- An object's motion can be described by **plotting the position of the object against the time it moved.**
  - The **slope of the graph** represents the **velocity of the object.**



Slope is zero
∴velocity is zero
(object at rest)

Slope is positive
∴velocity is
constant, positive

Slope is negative
∴velocity is
constant, negative

2. Worked Example (DAY 3)

Motion, which is often helpful in understanding motion of a body.

Explain the importance of graphs.

Graph is a visual representation of the object's motion. It shows how far the object has traveled at a given time or how fast the object moves. The direction can also be specified if the graph is displacement vs. time graph (or position vs. time graph).

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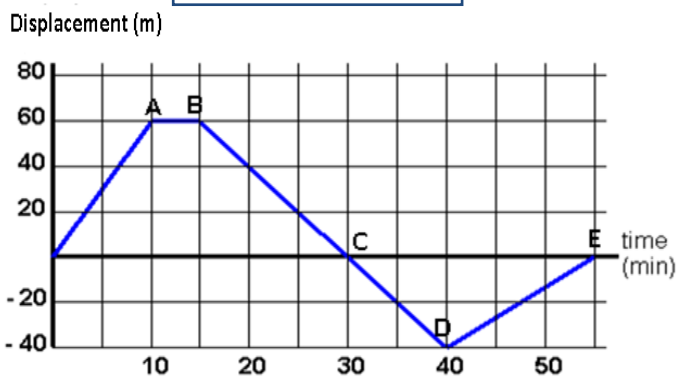
The teacher will show the sample slope in Juan's travel from the origin to point A.
Then, the teacher will ask volunteers to solve on the board and explain the slope of each section.

Juan's Travel



Displacement-Time Graph

$$Slope = velocity = \frac{displacement}{time}$$

$$velocity = \frac{60\ m - 0\ m}{10\ s - 0\ s}$$

$$velocity = 6\ m/s$$

Observe the given graphs below and fill in the boxes with the missing information.

Section	**Slope** *(positive, negative or zero)*	**Velocity**	**Type of Motion** *(at rest, positive constant velocity or negative constant velocity)*
AB			
BC			
CD			
DE			

KEY:

Slope	**Velocity**	**Type of Motion**
zero	0 m/s	At rest
Negative	-4 m/s	Velocity is constant, negative
Negative	-4 m/s	Velocity is constant, negative
Positive	2.67 m/s	Velocity is constant, positive

Learners will answer the provided worksheet (Activity 6.3) before the short interactive discussion facilitated by the teacher to assess their understanding about the topic.

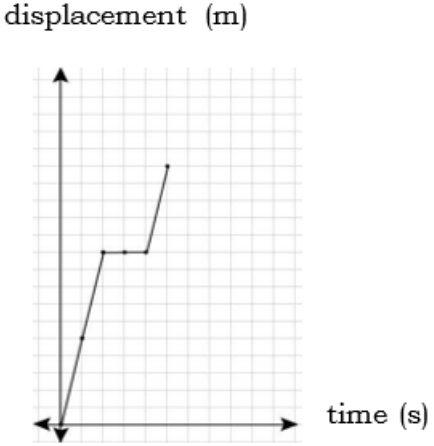
Divide the class into 4 groups. Each group will plot the data in cartolina or manila paper.

3. Lesson Activities

Activity 6.3. Wheels on the Jeep Go Round and Round

Use the worksheet for this activity (see pages 5 – 6).

KEY for Activity 6.3

1. 

2. The graph has varying slopes. The jeepney has varying motions.
3. Slope of the graph:

Interval	Solution	Slope/Velocity
a. t = 0s to t = 1s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{5m - 0m}{1s - 0s}$ $\frac{5m}{1s}$	5 m/s
b. t = 1s to t = 2s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{10m - 5m}{2s - 1s}$ $\frac{5m}{1s}$	5 m/s
c. t = 2s to t = 3s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{10m - 10m}{3s - 2s}$ $\frac{0m}{1s}$	0 m/s

Go around the groups and check if the students are plotting the data properly.

Each group must solve the slope and answer the questionnaire available in the worksheet.

Each group will post their graphs on the blackboard. One group's representative will explain their graphs.

KEY:

zero	At rest
Negative	Velocity is constant, negative
Negative	Velocity is constant, negative
Positive	Velocity is constant, positive

The teacher may consider any of these enrichment activities.

d. t = 3s to t = 4s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{10m - 10m}{4s - 3s}$ $\frac{0m}{1s}$	0 m/s
e. t = 4s to t = 5s	$\frac{d_2 - d_1}{t_2 - t_1}$ $\frac{15m - 10m}{5s - 4s}$ $\frac{5m}{1s}$	5 m/s

Guide Questions:

1. The jeepney has non-uniform motion.
2. The slope represents velocity.
3. The jeepney has changing velocities.
4. The jeepney has positive constant velocity (0s-2s), then it stops (2s-4s) and finally it moves at positive constant velocity (4s-5s).
5. In the displacement-time graph, positive slope means positive velocity, zero slope means zero velocity (at rest) and negative slope means negative velocity.

Answers will vary depending on the recorded time of the timers and the runner. Teachers should monitor and give feedback to the students during the presentation.

(DAY 4)

Activity 6.4. 40-Meter Dash Race (Graphing Activity)

Use the worksheet for this activity (see pages 7 – 8).

Activity 6.5. My Distance-Time Graph Story

Use the worksheet for this activity (see page 9).

D. Making Generalizations

1. Learners' Takeaways (ACTIVITY 6.6)
Use the worksheet for this activity (see pages 10 -11).

2. Reflection on Learning (ACTIVITY 6.6)
Use the worksheet for this activity (see pages 10 -11).

The answer of the student may vary depending on their personal experiences. Please make sure you will read and provide feedback to the students so that you can guide them.

		This is a must activity for you to determine the affective domain of your students. By this, you can reflect on your teaching strategy and personality in teaching. Answer of the students may vary. Please make sure you will check the answers of your students and provide feedback one at a time, and do it in a one-is-to-one setup.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment**  Let the students generalize the concepts and skills learned in today's lesson by answering the following questions: 1. What information can be obtained from the distance-time graph? *Distance-time graph gives a visual representation of the object's motion. From the graph, we can obtain how far the object has traveled at a given time and the speed of the object.* 2. What does the slope of a d-t graph represent? *It represents average speed.* 3. How do we interpret the motion of an object from the shape of its distance-time graph? *A displacement-time graph that slants to the right has a constant positive slope. It shows that the body is moving away from its original position at constant speed.* *A straight-line graph that slants to the left has a constant negative slope and it shows that the body is moving back to its original position at a constant speed.*	

<table>
<tr><td></td><td colspan="3">A line graph that has a zero slope shows that the body is at rest.

4. What is the difference between average speed and instantaneous speed? How do we calculate instantaneous speed from a distance-time graph?
Instantaneous speed is the speed of an object at a particular instant or time, while average speed is the ratio of total distance traveled and total time of travel.
Instantaneous speed can be determined by drawing a tangent line at a particular point on the curve and calculating the slope of this tangent line. The slope of this tangent line is the object's instantaneous speed at that particular point.

The speedometer reading in a vehicle gives the instantaneous speed.</td><td></td></tr>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">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.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:
▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td>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.</td></tr>
</table>