7

# Lesson Exemplar for Science

Quarter 3
Week
5

**Lesson Exemplar for Science Grade 7**
**Quarter 3: Lesson 5 (Week 5)**
**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.<br>2. Vectors differentiate the concepts of speed and velocity.<br>3. Graphing motion provides more accurate predictions about speed and velocity.<br>4. The particle model explains natural systems and processes.<br>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***<br>1. Explain the difference between distance and displacement in everyday situations in relation to a reference point;<br>*Lesson Objective 1:* Describe the motion of an object in terms of distance and displacement<br>2. Distinguish between speed and velocity using the concept of vectors;<br>*Lesson Objective 1:* Differentiate speed from velocity and solve problems involving speed and velocity<br>3. Describe uniform velocity and represent it using distance-time graphs; |
| **D. Content** | Motion: Displacement and Velocity<br>Displacement-Time Graph<br><br>Distance, Displacement, Speed, and Velocity:<br>a. Distance: The total length of the path traveled by an object, regardless of direction.<br>b. Displacement: The change in position of an object in a particular direction. It has both magnitude and direction.<br>c. Velocity: The rate of change of displacement concerning time. It is a vector quantity, indicating both speed and direction.<br>Uniform velocity |

| | |
|---|---|
| **E. Integration** | GIS Mapping in distance and displacement<br>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=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** | **1. Short Review (DAY 1)**<br>Which of the following animals: dog, cheetah, and lion, travel the fastest? | To begin the lesson, ask this question: Which of the following animals: dog, cheetah, and lion, travel the fastest? Explain. |

| | | |
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| |    <br>What is the fastest animal in the Philippines?<br>  <br>Peregrine Falcon Photo courtesy: CENRO Belison, Antique<br>  <br>https://ayej.org/2021/06/29/undying-legend-of-kalibasib-the-worlds-last-captive-bred-tamaraw/<br>  <br>©Alaz/Shutterstock.com | Answer:<br>The fastest animal among the options is the cheetah. It can accelerate from 0 to 60 miles per hour in less than three seconds and reach speeds of up to 75 miles per hour.<br><br>You can ask a question which is local in the Philippines.<br>The fastest animal found in the Philippines is the peregrine falcon (Falco peregrinus). The peregrine falcon is considered the fastest member of the animal kingdom and can reach speeds of up to 390 kilometers per hour (242 miles per hour) when diving after prey. This migratory bird was recently spotted for the first time in a wetland in San Jose de Buenavista, Antique province. The sighting indicates that the wetland provides a healthy habitat and abundant food sources for the peregrine falcon in the Philippines.<br><br>While the Philippines is home to many unique and endangered species, it does not have any native land animals that can match the incredible speed of the peregrine falcon.<br><br>Other fast animals found in the country include the Philippine eagle, the national bird, and the Tamaraw, a small hoofed mammal, but neither can reach the top speeds of the peregrine falcon. |
| **B. Establishing Lesson Purpose** | **1. Establishing Reason for the Lesson**<br>**THINK OF THIS!**<br>How do you usually describe motion and movement of an object? | Raise this question to the entire class. |

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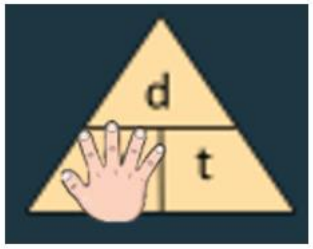
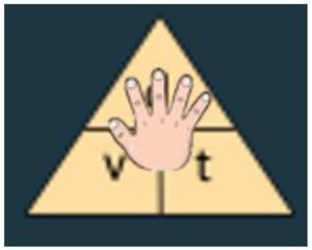
| | *An object's motion is usually described in terms of **how fast or how slow it is moving**. If a person is jogging, we can say that the motion is slow, but if the person is running, the motion is fast.* | |
| | **2. Unlocking Vocabulary Content**<br>Using the given clues, determine the following terms:<br>1. DEEPS<br>2. EAEVAGR DPSEE<br>3. TCLVEOIY<br>4. VAGREAE VEOIYTCL<br>5. ETNTNISAANOUS TCLVEOIY<br><br>**CLUES:**<br>**1.** Measure of how fast an object is moving<br>**2.** the total distance traveled by the object in a particular time interval.<br>**3.** Speed in a particular direction<br>**4.** The ratio of displacement and time<br>**5.** How fast an object is moving at a moment. | |
| **C. Developing and Deepening Understanding** | **SUBTOPIC: Speed and Velocity**<br>**1. Explicitation (DAY 2)**<br>**Activity 5.1 How fast can you run?**<br><br>*Use the worksheet for this activity (see page 1 and 2).*<br><br>**KEY to Guide Questions:**<br>1. The winning team is the group with the greatest average speed.<br>2. (a) Yes<br>(b) Yes / No (depends on the students understanding)<br>(c) to determine the appropriate average speed<br><br>**2. Worked Example (60 mins) (Day 3)**<br>  | *There are different types of speed. An object that is moving in a specific direction at a constant speed is called **Uniform Motion***<br><br>After the short introduction of the lesson, the students can do Activity 5.1.<br><br>The teacher should require his/her students to wear PE uniform and rubber shoes during the conduct of this activity.<br><br>The proper warm-up (stretching, joint mobility exercises, etc.) of about 5 minutes should be done by each group before they participate in the activity.<br><br>**Activity data may vary.** |

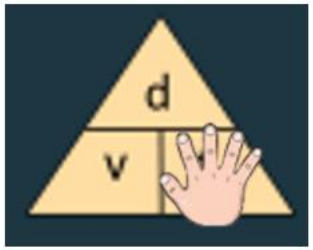
**THINK OF THIS!**

Is it possible for two objects to have an equal magnitude of speed and velocity?
**Note:** Magnitude – numerical value and unit

Speed is a measure of how fast something is moving. It is the rate at which distance is covered. The word rate is a clue that something is being divided by time. Speed is defined as the distance covered per unit time. Speed is also a scalar quantity.

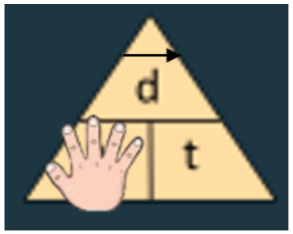


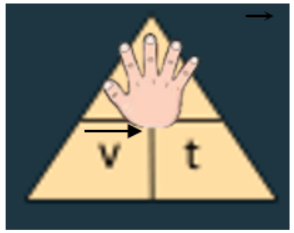



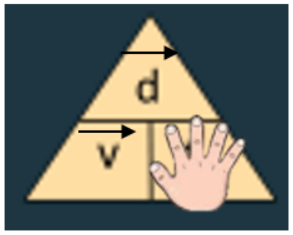




| $speed = \frac{distance}{time}$ | $distance = speed \times time$ | $time = \frac{distance}{speed}$ |
|---|---|---|

Velocity is a vector quantity. It describes how fast and in which way *(speed + direction)* an object is moving. It can be negative or positive depending on the direction of motion.



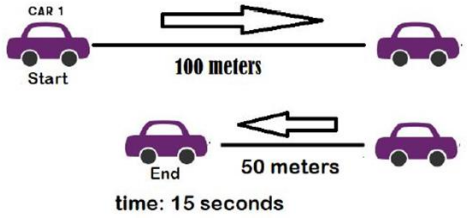




| $velocity = \frac{displacement}{time}$ | $displacement = velocity \times time$ | $time = \frac{displacement}{velocity}$ |
|---|---|---|

**Differentiate Speed from Velocity**

**KEY:**
Yes, it is possible if both objects are traveling in a straight path. For example, two balls are rolling. Ball A travels at a speed of **7 km/hr** while Ball B travels at a velocity of **7 km/hr**, North. Looking at the values, both have the same magnitude, which is 7 km/hr.

*The formula for speed and velocity is almost the same; they only differ in terms of direction. So, instead of using distance, you use displacement.*




| *Speed (v)* | *velocity ($\vec{v}$)* |
|---|---|
| $v = d/t$<br>$= 150\ m\ /\ 15\ s$<br>$= 10\ m/s$ | $\vec{v} = \vec{d}/t$<br>$= 50\ m, E/\ 15\ s$<br>$= 3.33\ m/s, E$ |

**Put your Thinking Caps On!**

*Scenario: Two cars travelling.*

*A. Same distance but different time.*

1. Which of these two cars travels faster? Explain.

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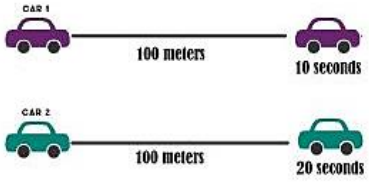


*B. Same time but different distance*

1. Which of these two cars travels faster? Explain.

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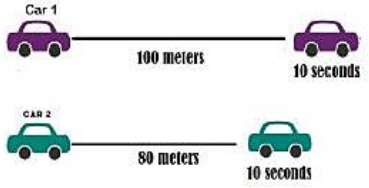


**Sample Problem:**

1. A car moves at a velocity of 60 km/hr, West for 5 hours, how far will it go?

**Given:**
velocity - 60 km/hr, W
time – 5 hrs

**Required**:
displacement

**Formula**:
displacement
= velocity x time
= velocity x time

**Solution:**

displacement=60 km/hr,West x 5 hrs
displacement = 300 km/ West

**The car will reach 300 km, West at a velocity of 60 km/hr.**

**KEY:**

1. Car 1 because it has a speed of 10m/s compared to car 2 with 50m/s speed.

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| | 2. A train needs to travel a distance of 30 miles at a speed of 10 mi/hr. How long will it take the train to reach its destination?<br>**Given:** distance – 30 mi; speed – 10 mi/hr<br>**Required**: time<br>**Formula**: Time = (distance/speed)<br>**Solution:**<br>Time = 30 mi/ 10 mi/hr<br>**It will take 3 hrs for the train to travel a distance of 30 miles**<br><br>**3. Lesson Activity**<br>**Activity 5.2 Speed/ Velocity Calculations**<br><br>*Use the worksheet for this activity (see pages 3 and 4).*<br><br>**SUBTOPIC 2: Average Speed/Velocity, and Instantaneous Speed & Velocity**<br><br>**1. Explicitation (DAY 4)**<br><br>*Use the worksheet for this activity (see pages 5 and 6).*<br><br>**2. Worked Example (10 mins)**<br>  <br>THINK OF THIS!<br>Is having a constant speed while travelling possible?<br>  <br>In planning a trip by car, the driver often wants to know how long it will take to cover a certain distance. The car will certainly not travel at the same speed during the trip. The driver cares only about the **average speed** for the trip as a whole. The average speed is defined as follows: | 2. Car 1 is (10m/s) faster than car 2 (8m/s).<br><br>The data on the table may vary depending on the record of each group.<br><br>Give the worksheet to your students. Please make sure you will supervise each group. If jeepney or tricycle is not available in your area, you can select the local transportation in your area. |

**THINK OF THIS!**

Imagine two birds leave the same tree at the same time. They both fly at 10 km/hr for 5 minutes. Why don't they end up at the same place?

**Average speed** can be calculated rather easily. For example, if we drive a distance of 60 kilometers during a time of 1 hour, we say our average speed is 60 kilometers per hour (60km/h). Or, if we travel 240 kilometers in 4 hours.

$$average\ speed\ (v_{ave}) = \frac{total\ distance\ (d_T)}{total\ elapsed\ time\ (t_T)}$$

$$60\frac{km}{hr} = \frac{240\ km}{4\ hrs}$$

*Note that when a distance if in kilometers (km) is divided by a time in hours (h), the answer is in kilometer per hour (km/h)*

**Average Velocity** is the ratio of the displacement and total elapsed time. For example, if we drive a distance of 60 kilometers, East during a time of 1 hour, we say our average speed is 60 kilometers per hour (60km/h). Or, if we travel 240 kilometers, East in 4 hours,

$$average\ velocity\ (\vec{v}_{ave}) = \frac{displacement\ (\vec{\Delta d})}{total\ elapsed\ time\ (t_T)}$$

$$60\frac{km}{hr}.E = \frac{240\ km, E}{4\ hrs}$$

If the car returned to its initial position, traveling 240 m, Wes, the displacement becomes zero, thus the average velocity is also zero.

$$average\ velocity\ (\vec{v}_{ave}) = \frac{0\ m}{4\ hrs}$$

$$average\ velocity\ (\vec{v}_{ave}) = 0$$

**Sample Problem:**
A runner does one lap around a 200 m track in a time of 25 s. What was the runner's average speed?

**Given:** **Required**: **Formula**:

1. The speed of different vehicle varies.
2. Vehicle can have greater or lesser average speed depending on the data gathered.
3. Answer may vary depending on the gathered data.
4. Answer may vary depending on the gathered data.

*Experience tells you that a vehicle* ***rarely travels at a constant speed,*** *especially in heavy traffic. You can tell the speed of a vehicle at any instant by looking at the vehicle's speedometer.* The speed at any instant is called ***instantaneous speed.*** You will notice that a vehicle may travel down a street at 50 km/hr in open stretches while overtaking other vehicles, slow down at 30 km/h because of traffic, or come to a stop at the red light. **The instantaneous**

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| | total distance – 200 m<br>total time time – 25 s<br>**Solution:**<br>Average Speed = (200 m)/(25 s)<br>Average Speed= 8 m/s<br>**The runner's average speed is 8 m/s.**<br><br>**3. Lesson Activity (30 mins)**<br>**Activity No.5.3: Average Speed and Average Velocity** (30mins)<br><br>*Use the worksheet for this activity (see pages 7 and 8).*<br><br>**KEY to Activity 5.3**<br>1*a.* $v = d/t$<br>$= 7.6km / .6\ h$<br>$= 12.67km/h$<br>1*b.* $v = d/t$<br>$= 3.5km / .5\ h$<br>$= 7km/h$<br><br>1c. $v_{ave} = d_T / t_T$<br>$= (7.6km + 3.5km) / (0.6h+0.5\ h)$<br>$= 11.1km/1.1h$<br>$= 10.09km/h$<br><br>*2. average velocity*<br>$\vec{v}_{ave} = \overrightarrow{\Delta d}/t_T$<br>$= 8.4km / 0.7\ h$<br>$= 12km/h, SE$<br><br>*Average speed is the ratio of the total distance traveled and total elapsed time* while average velocity is displacement divided by total elapsed time.<br><br>**PROBLEM SOLVING Activity:**<br>1. The speedometer in every car also has an odometer that records the distance traveled. | Average speed<br><br>Average speed =<br>Total distance/ Total time | **velocity** is the speed at any instant in a particular direction.<br><br>The vehicle travels at a different speed during its entire trip. For the entire trip, you must only consider one speed, which is the average speed. ***Average speed*** is the total distance traveled divided by the total time elapsed in traveling that distance.<br><br>The birds may have traveled the same speed but did not end up at the same place because they may have differed in terms of direction. It can be inferred that Bird A went to East while Bird B went to West, which caused them not to see each other in the same place.<br><br>The teacher should print the actual size in the Worksheet so that the measurement will be uniform in terms of the distance of each point. |

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| | a. If the odometer reads zero at the beginning of a trip and 35km a half hour later, what is the average speed?<br>b. Would it be possible to attain this average speed and never exceed a reading of 70km/h on the speedometer?<br>c. If a cheetah can maintain a constant speed of 25m/s, it will cover 25 meters every second. At this rate, how far will it travel in 10 seconds? In 1 minute?<br><br>**KEY to Probem Solving Activity**<br>**Problem 1**<br>a. $v_{ave}$ = 35km/0.5h = 70km/h<br>b. NO, not if the trip started from rest and ended at rest, because any intervals with an instantaneous speed less than 70km/h would have to be compensated with instantaneous speeds greater than 70km/h to yield an average of 70km/h. In practice, average speeds are usually appreciably less than peak instantaneous speeds.<br><br>**Problem 2**<br>In 10s the cheetah will cover 250 m, and in 1 minute (60 s) it will cover 1500m, more than 15 football fields. If we know the average speed and the time of travel, then the distance covered is:<br><br>d = $v_{ave}$ x time interval<br>d = (25m/s) x (10s) = 250m<br>d = (25 m/s) x (60s) = 1500m | |
| **C. Making Generalizations** | **1. Learners' Takeaways**<br>Color or box the emoji that describes your emotion during your journey in this lesson. In the space provided below, briefly explain what made you feel that way.<br>  | Answers may vary regarding the given question about Life's Journey to different destinations. |

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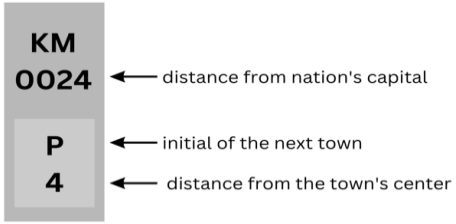
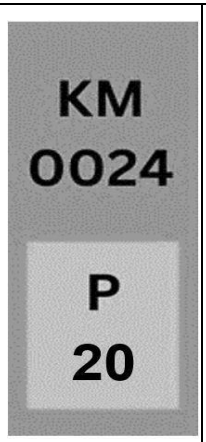
| |  <br><br>**Reflection on Learning**<br>Answer the given question below in not more than three (3) sentences. Life is a journey full of different destinations. How do you want to reach your destinations, fast or slow? Explain.<br><br>_____<br>_____<br>_____<br>_____<br>_____ | |

<table>
<tr><th colspan="2">IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION</th><th>NOTES TO TEACHERS</th></tr>
<tr><td>A. Evaluating Learning</td><td colspan="2">1. Formative Assessment<br><br>Kilometer markers are the upright cement poles (usually yellow) at the side of the road that have numbers and letters written on them. We often see them in the provinces, specifically on national roads—also known as the Pan-Philippine Highway—that stretch across the Philippines.<br>  <br>Source: https://www.autodeal.com.ph/articles/car-features/what-do-kilometer-markers-mean<br><br><table><tr><td>You and your family are travelling to San Benon Hot Spring in Irosin, Sorsogon. Then, suddenly you saw the kilometer marker below. If your car is travelling at 80 km/hr, how long before you reach the town center of San Benon?<br>  </td><td>Given:<br><br>Required:</td><td>Formula:<br><br>Solution:</td></tr></table></td><td>Formative Assessment for Speed and Velocity<br><br>Given: v = 80km/hr<br>d = 20km<br>Required: t?<br>Formula = t=d/v<br>= 20km / 80km/hr<br>= 0.25hr</td></tr>
<tr><td>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="2">The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies,</td></tr>
<tr><td></td><td>strategies explored</td><td></td><td></td></tr>
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| | ***materials used*** | | | materials used, learner engagement and other related stuff. He/she may also suggest ways to improve the different activities explored/ lesson exemplar. |
| | ***learner engagement/ interaction*** | | | |
| | ***Others*** | | | |
| **C. Teacher's Reflection** | *Reflection guide or prompt can be on:*<br><br>▪ *principles behind the teaching*<br>*What principles and beliefs informed my lesson?*<br>*Why did I teach the lesson the way I did?*<br><br>▪ *students*<br>*What roles did my students play in my lesson?*<br>*What did my students learn? How did they learn?*<br><br>▪ *ways forward*<br>*What could I have done differently?*<br>*What can I explore in the next lesson?* | | | 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. |