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DepED
DEPARTMENT OF EDUCATION

Learning Activity Sheet for Science

Quarter 3

Lesson

2

Worksheet for Science Grade 7
Quarter 3: Lesson 2 (Week 2)
SY 2024-2025

Development Team

Writer: Arnel Lorenzana (Bicol University)

Validator: Alfons Jayson Pelgone (PNU Manila)

Management Team

Philippine Normal University
Research Institute for Teacher Quality
SiMERR National Research Centre

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 2. Vector Diagram using Simulation (20 Minutes)

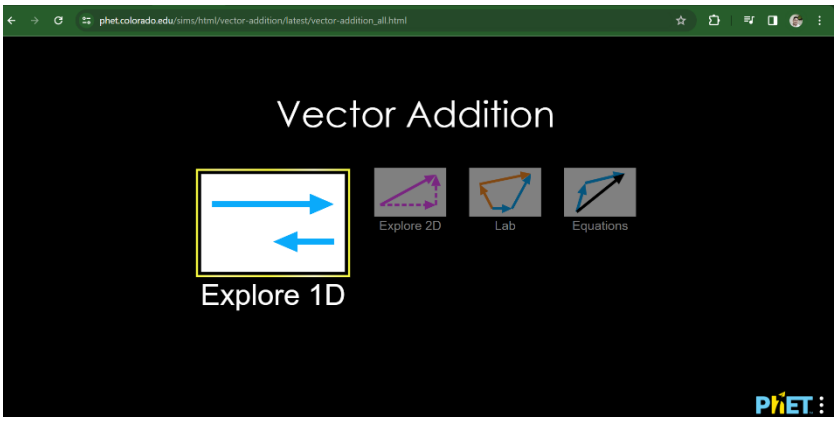
II. Objective(s): At the end of the activity, you should be able to draw vector representations using arrows using the Vector Addition Simulation

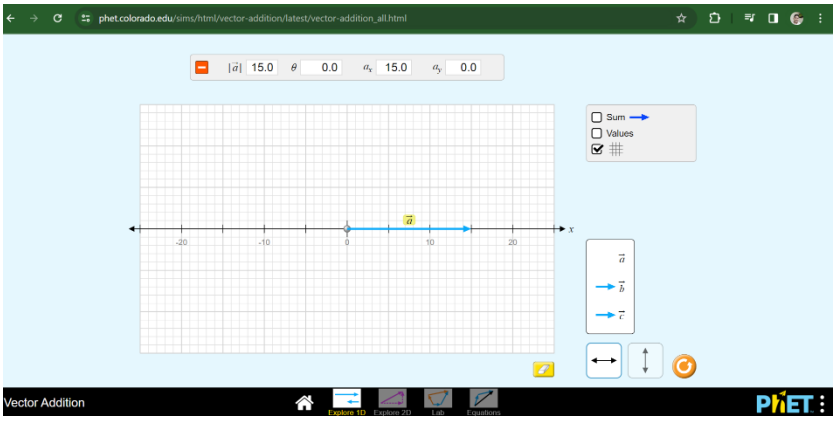
III. Materials Needed: worksheet, pen, laptop/tablet/cellphone, internet connection

IV. Instructions:

1. Explore the Vector Addition Simulation with a laptop and internet connection.

Link: https://phet.colorado.edu/sims/html/vector-addition/latest/vector-addition_all.html





2. Draw the following vectors. Use the cardinal (geographical) direction. (By writing convention, the North is upward, the South is downward, the East is directed to the right, and the West is directed to the left.)

a. 10 units, North

b. 5 units, East

c. 7 units, West

d. 15 units, South

e. 20 units, North

3. From the vectors drawn, which is the longest? The shortest?
4. Is 10 units of Force directed East the same as 10 units of Force directed West? Explain.

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. What can you say about the strength of the force the longer the arrow is?

_____

_____

_____

2. What does the arrowhead represent?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 2.2. Vector Diagram using Graphing Paper (15 Minutes)

II. Objective(s): At the end of the activity, you should be able to draw vector representations manually using arrows.

III. Materials Needed: worksheet, pen, ruler

IV. Instructions:

1. Draw the vectors given in Activity 2.1 on graphing paper using a pencil and ruler. Use the scale 1 unit = 1 cm (two boxes).
2. Answer questions in numbers three and four in Activity 2.1.

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. What can you say about the strength of the force the longer the arrow is?

_____

_____

_____

2. What does the arrowhead represent?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Force as a Vector**		
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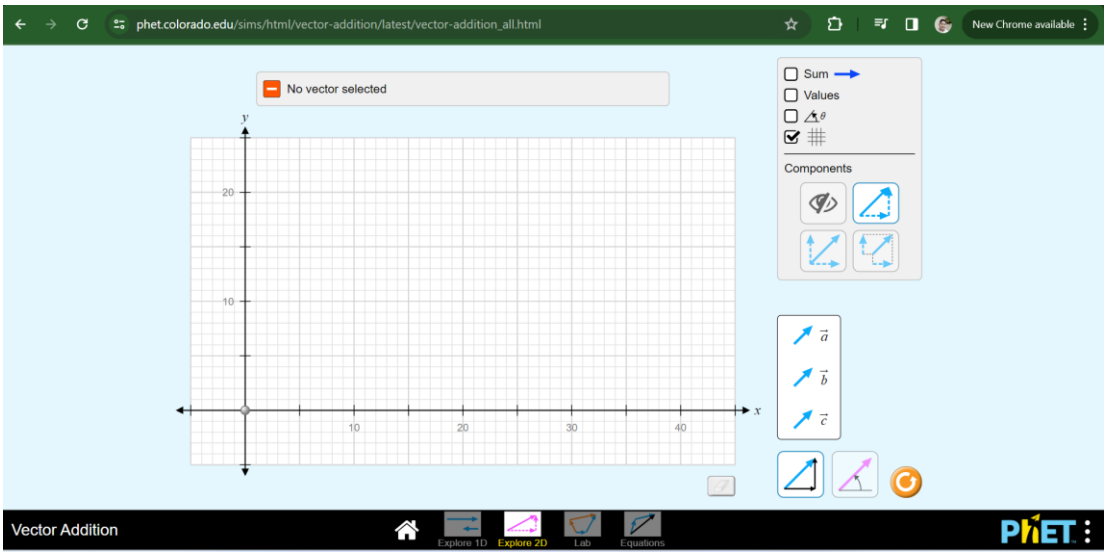
I. Activity 3. Resolving Force Vectors (20 Minutes)

II. Objective(s): At the end of the activity, you should be able to resolve force vectors using Vector Addition: Explore 2D Simulation

III. Materials Needed: worksheet, pen, laptop/tablet/cellphone, internet connection

IV. Instructions:

1. Explore the Vector Addition: Explore Simulation if you have a laptop and internet connection.
   Link:
   https://phet.colorado.edu/sims/html/vector-addition/latest/vector-addition_all.html
2. press the buttons for Components (upper right) and the arrows colored blue (bottom left).



3. Draw the following vectors by dragging the vectors to the coordinate and identify their x and y components. (the x-component is along the East-West direction, and the y-component is along the North-South direction.)
   a. 5 units, 53.1˚ North of East
   b. 13 units, 67.4˚ North of East
   c. 10 units, 53.1˚ South of East
   d. 25 units, 36.9˚ West of North

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. What are vector components? How are they related to the original vector?

_____
_____
_____

2. How do you resolve or determine a vector's horizontal and vertical components?

_____
_____
_____

3. Can you think of a real-world example where vector resolution is applied?

_____
_____
_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
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Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 4. Resolving Force Vectors Graphically (Minutes)

II. Objective(s): At the end of the activity, you should be able to resolve the force vector graphically.

III. Materials Needed: worksheet, pen, ruler, protractor

IV. Instructions:

1. In the graphing paper, draw the x-y coordinate system.
2. Draw the following vectors using a ruler and protractor. (The x-component is along the East-West direction, and the y-component is along the North-South direction.)
   a. 5 units, 53.1˚ North of East
   b. 13 units, 67.4˚ North of East
   c. 10 units, 53.1˚ South of East
   d. 25 units, 36.9˚ West of North

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. What are vector components? How are they related to the original vector?

_____

_____

_____

2. How do you resolve or determine a vector's horizontal and vertical components?

_____

_____

_____

3. Can you think of a real-world example where vector resolution is applied?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
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Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 5. Components of Force Vectors-Application (10 Minutes)

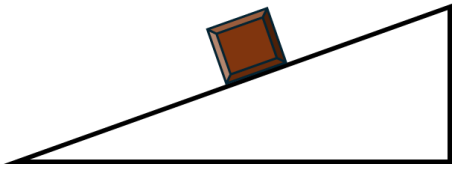
II. Objective(s): At the end of the activity, you should be able to identify the components of vectors in actual scenarios.

III. Materials Needed: worksheet, pen, ruler, protractor

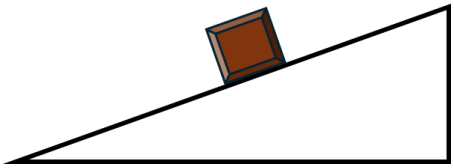
IV. Instructions:

1. Identify the forces and their components in the following scenarios.

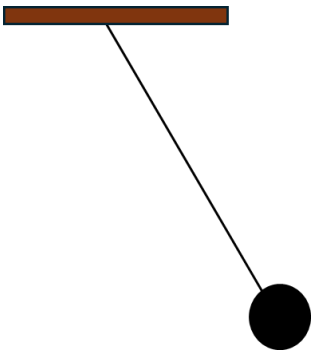
   a. A box at rest on an inclined plane



   b. A box is sliding and increasing speed as it moves along an inclined plane.



   c. A swinging pendulum



d. A soccer ball that is kicked at a 45˚ angle

V. Synthesis/Extended Practice/Differentiation

How did you resolve the components of the forces in the given scenarios?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 6. Balance Forces (20 Minutes)

II. Objective(s): At the end of the activity, you should be able to identify and draw balanced forces in a given scenario.

III. Materials Needed: worksheet, pen, ruler, protractor

IV. Instructions:

1. Identify and draw the force vector in the following scenarios. Use a separate sheet of paper.
   a. A book on top of a table
   b. A fruit on a tree
   c. A picture frame on a wall
   d. A grocery cart is moving at a constant speed
   e. A jeepney moving at a constant speed
   f. An airplane flying at a constant velocity at a constant altitude
   g. A man standing still
   h. A man walking at a constant speed
   i. A box resting on an inclined plane
2. Which of the situations involves an object which is at rest?
3. Which of the situations involves an object which is in motion?
4. How did you determine the direction of the forces?

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. Which of the situation/s involve an object which is at rest?

_____

_____

_____

2. Which of the situations involves an object which is in motion?

_____

_____

_____

3. How did you determine the direction of the forces?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
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Lesson Title/ Topic:	**Force as a Vector**		
Name:		**Grade & Section:**	

I. Activity 7. Unbalanced Forces (15 Minutes)

II. Objective(s): At the end of the activity, you should be able to identify and draw unbalanced forces in a given scenario.

III. Materials Needed: worksheet, pen, ruler, protractor

IV. Instructions:

Identify and draw the force vector in the following scenarios.

a. A falling fruit
b. An accelerating car to the right
c. A helium-filled balloon recently released
d. A man inside an elevator accelerating upward
e. An airplane taking off

V. Synthesis/Extended Practice/Differentiation

Answer the following questions:

1. Which of the following situations has balanced forces?

_____

_____

_____

2. Which of the following situations has unbalanced forces?

_____

_____

_____

3. What is the direction of the unbalanced or net forces in the given scenarios?

_____

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Free-Body Diagrams**		
Name:		**Grade & Section:**	

I. Activity 8. Free-body diagram: balanced forces (15 Minutes)

II. Objective(s): At the end of the activity, you should be able to accurately identify and represent all relevant forces acting on an object in a given scenario using a free-body diagram.

III. Materials Needed: worksheet, pen

IV. Instructions:

1. Follow the steps in drawing a free-body diagram (Ling et al., 2016)
   a. Treat the object as a particle and represent the object as a point.
   b. Place this point at the origin of the xy-coordinate system.
   c. Include all forces that act on the object, representing these forces as vectors.
2. Draw a free-body diagram on the following scenarios.

a. A book on top of a table	b. A box pushed in a constant motion

V. Synthesis/Extended Practice/Differentiation

Answer this question: What can you say about the forces on objects that are at rest or in constant motion?

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Free-Body Diagrams**		
Name:		**Grade & Section:**	

I. Activity 9. Free-body Diagram: Unbalanced Forces (15 Minutes)

II. Objective(s): At the end of the activity, you should be able to accurately identify and represent all relevant forces acting on an object in a given scenario using a free-body diagram.

III. Materials Needed: worksheet, pen

IV. Instructions:

1. Follow the steps in drawing a free-body diagram (Ling et al., 2016)
   a. Treat the object as a particle and represent the object as a point.
   b. Place this point at the origin of the xy-coordinate system.
   c. Include all forces that act on the object, representing these forces as vectors.
2. Draw a free-body diagram on the following scenarios.

a. A falling fruit from a tree	b. An airplane taking off	c. A car speeding up

V. Synthesis/Extended Practice/Differentiation

Answer this question: What can you say about the forces on objects that are changing speed? changing direction? changing speed and direction?

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
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Lesson Title/ Topic:	**Free-Body Diagrams**		
Name:		**Grade & Section:**	

I. Activity 10. Using the Interactive Free-body Diagram (20 Minutes)

II. Objective(s): At the end of the activity, you should be able to accurately identify and represent all relevant forces acting on an object in a given scenario using a free-body diagram with the aid of an interactive free-body diagram.

III. Materials Needed: worksheet, pen, laptop/tablet/cellphone, internet connection

IV. Instructions:

1. Access the physics classroom free-body diagram interactive. https://www.physicsclassroom.com/Physics-Interactives/Newtons-Laws/Free-Body-Diagrams/Free-Body-Diagram-Interactive
2. Identify the type of forces and their relative magnitude. Tap a direction and identify the type of force. Tap an arrow on the diagram to change the size of the force. Tap Check Answer when ready.
3. The screen will show the word "Dataway!" if you get the answer correctly.

V. Synthesis/Extended Practice/Differentiation

Guide Questions:

1. What can you say about the forces on objects at rest or in constant motion?

_____

_____

2. What can you say about the forces on objects that are changing speed? changing direction? changing speed and direction?

_____

_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	2nd Quarter
Lesson No.:	2	**Date:**	
Lesson Title/ Topic:	**Free-Body Diagrams**		
Name:		**Grade & Section:**	

I. Activity 11. Free-body diagram (20 Minutes)

II. Objective(s): At the end of the activity, you should be able to accurately identify, represent, and draw all relevant forces acting on an object in a given scenario using a free-body diagram.

III. Materials Needed: worksheet, pen, ruler, protractor

IV. Instructions:

1. Identify the type of forces and their magnitude.
2. Draw the force vectors on the following scenarios (scenarios are similar to the interactive activity found in Activity 3.4). Make sure to draw the correct relative magnitude and direction.
   a. A rightward force is applied to a dresser to accelerate it to the right across the bedroom floor. Ignore air resistance.
   b. A rightward moving car is skidding to a stop across a level roadway with locked wheels. Ignore air resistance.
   c. The cabin of a small freight elevator is secured to a motor by a cable and is moving upward while slowing down. There is no contact between the cabin and the elevator shaft. Ignore air resistance.
   d. A softball player does a head-first dive while sliding to the right across the infield dirt. Ignore air resistance.
   e. A hockey puck glides to the right across the ice at a constant speed. Ignore air resistance.
   f. A football kicked initially at a 40-degree angle to the horizontal is at the peak of its trajectory. Ignore air resistance.
   g. The cabin of a small freight elevator is secured to a motor by a cable and is moving upward at a constant speed. There is no contact between the cabin and the elevator shaft. Ignore air resistance.
   h. A downward-moving skydiver is falling at a constant speed.
   i. A downward-moving skydiver who has just opened the parachute is slowing down. (Diagram the forces on the skydiver/parachute system.

j. A rightward force is applied to a crate to push it across the floor at a constant speed. Ignore air resistance.

k. A football is moving upward and rightward toward the peak of its trajectory. Ignore air resistance.

l. A sledder has reached the bottom of a hill and is coasting to the right while slowing down along the loosely packed snow. Ignore air resistance.

V. Synthesis/Extended Practice/Differentiation

Guide Questions:

1. What can you say about the forces on objects at rest or in constant motion?

_____

_____

2. What can you say about the forces on objects that are changing speed? changing direction? changing speed and direction?

_____

_____