7

DepED
DEPARTMENT OF EDUCATION

Learning Activity Sheet for Science

Quarter 3

Lesson

3

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

Development Team

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LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.1: Review on FBD and Net Force (15 minutes)

II. Objective(s):

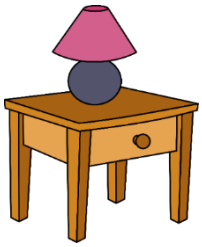
At the end of the activity, the learner should be able to:

a. draw the free-body diagram in the different situations
b. determine the direction of the net force and state of motion (at rest, in motion) of the object

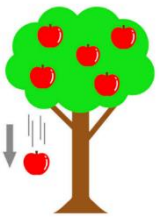
III. Materials Needed: pen

IV. Instructions:

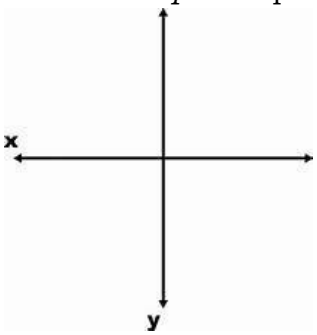
1. Observe the situations illustrated below. Think of the forces that act on the identified object. Draw the free-body diagram and label all forces acting on the identified object in the sample situations. Remember that the length of the arrow represents the strength (or magnitude) of the force.
2. Determine the direction of the net force (right, left, up, down, or not applicable- NA) and state of motion of the object due to these forces (at rest, in motion: constant or changing speed)



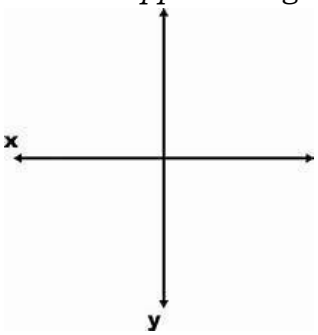
Situation 1: A *lamp* on top of a table



Situation 2: An *apple* falling from a tree



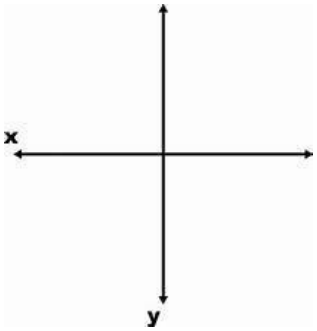
Direction of Net Force: _____
State of Motion: _____



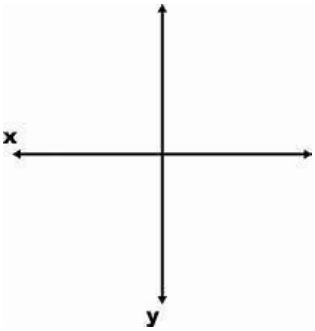
Direction of Net Force: _____
State of Motion: _____

Situation 3: Kicking a soccer ball on a rough surface

Situation 4: Pushing a box along a smooth/ frictionless surface



State of Motion: _____
Direction of Net Force: _____



State of Motion: _____
Direction of Net Force: _____

V. Synthesis/Extended Practice/Differentiation

Answer the ff. guide questions:

1. Which situation/s provided above is/are at rest?

   _____
   _____

2. Which situation/s provided above is/are in motion?

   _____
   _____

3. Which situation/s provided above has/have a zero net force?

   _____
   _____

4. Which situation/s provided above has/have a nonzero net force?

   _____
   _____

5. How were you able to determine the direction of the net force?

   _____
   _____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.2: Let's pull each other (30 minutes)

II. Objective(s):
At the end of the activity, the learner should be able to differentiate balanced from unbalanced force through firsthand experience and observation after participating in the activity

III. Materials Needed: Rope, student players, proper attire, open space

IV. Instructions:

A. Preliminaries
1. The class will be divided into 4 groups with equal members. Each group should select a leader. For the elimination round, groups 1 and 2 will compete with groups 3 and 4 respectively. Whichever group wins in the elimination round, shall compete in the final round.
2. The teacher should be able to secure permission to conduct the activity in an open space such as grassland or gym.

B. Orientation of the Players
1. The learners should wear PE uniform, rubber shoes and cloth gloves.
2. The learners should be familiar with the objectives of the activity such as:
   a. Pull the opposing group across the reference point or center line.
   b. The group will win when any part of the opposite group's foot crosses the reference point or center line.
   c. The player of the group who loses grip on the rope will be considered out.
3. Players should avoid excessive force and dangerous tactics during the game proper. The group can be disqualified if ever any of its players show unsafe behavior. Instead, focus on teamwork by having a good strategy through proper communication with group members.
4. Proper warm-up (stretching, joint mobility exercises, etc.) of about 5 minutes should be done by each group before they compete.
5. Always play fair and observe good sportsmanship.

C. Game Proper Guidelines

1. Your teacher will mark a center line that serves as the reference point on the ground using colored chalk. They will demonstrate the proper way to hold the rope with appropriate body position. They will remind everyone to focus on teamwork, play fair, avoid excessive force and dangerous actions.
2. Let an equal number of players from each group hold the rope from opposite ends. The center of the rope should be above the reference point or center line.
3. Your teacher will make a loud sound (e.g. whistle, etc.) which signals the teams to start pulling on the rope.
4. When one group successfully pulls the other group across the reference point or center line, a winning group will be declared for the elimination round.
5. Repeat steps 1- 6 for the next elimination round.
6. The winning groups of the elimination rounds will compete for the final round.

D. Synthesis/Extended Practice/Differentiation

Reflect on your experience about the 'Let's pull each other' activity by answering the following questions:

1. In what instances did you observe balanced forces? Unbalanced forces?

_____
_____
_____

2. What do you think is the best strategy to win this game?

_____
_____
_____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.3: Balanced or Unbalanced Force? (10 minutes)

II. Objective(s):

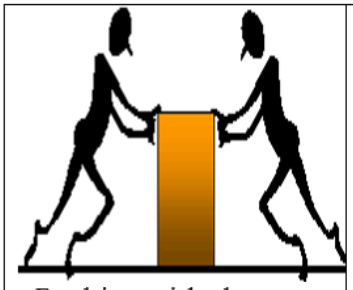
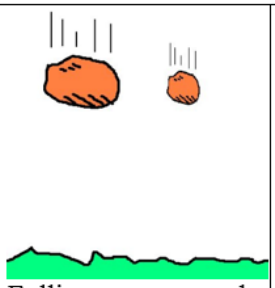
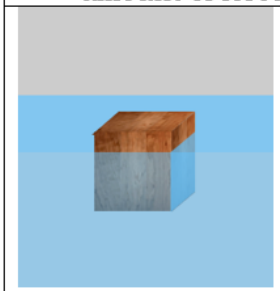
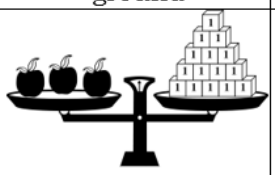
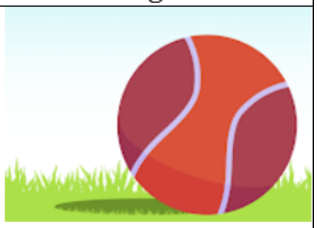
At the end of the activity, the learners should be able to:

a. identify real-life situations that show balanced or unbalanced forces
b. determine the net force on an object and its state of motion
c. describe balanced and unbalanced forces

III. Materials Needed: pen

IV. Instructions:

1. Identify which real-life situations show balanced or unbalanced forces.
2. Determine the **net force** (zero or nonzero) and **state of motion** (at rest, in motion: constant or changing speed)
3. Give a short description of the balanced and unbalanced forces in each situation.

 Pushing with the same amount of force	 Hanging chandelier attached to a ceiling	 Falling stones to the ground	 Sports car moving at constant speed to the right
 Floating block of wood	 lift-off of a space rocket	 Same weight of apples and blocks in each plate of the scale	 Rolling a ball along the grass

BALANCED FORCES	**UNBALANCED FORCES**
Description: _____ _____ _____	Description: _____ _____ _____
1. _____ _____ 2. _____ _____ 3. _____ _____ 4. _____ _____ 5. _____ _____	1. _____ _____ 2. _____ _____ 3. _____ _____ 4. _____ _____ 5. _____ _____
Net Force (zero or nonzero): _____ **State of Motion** (at rest, in motion: constant or changing speed): _____	**Net Force** (zero or nonzero): _____ **State of Motion** (at rest, in motion: constant or changing speed): _____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.4: Balanced Exploration (20 minutes)

II. Objective(s):

At the end of the activity, the learners should be able to demonstrate balanced forces through a simple investigation

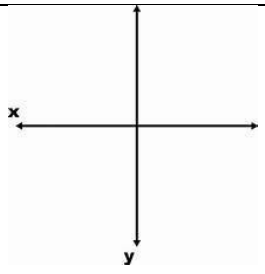
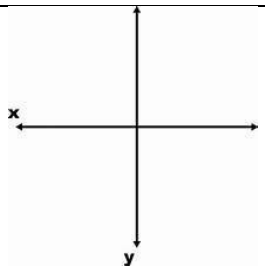
III. Materials Needed:

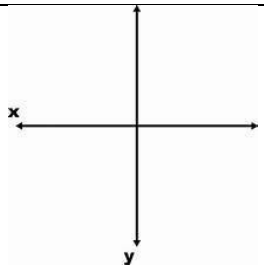
worksheet — pen
platform balance — set of standard masses
3 different objects for comparison

IV. Instructions:

1. Place the platform balance on top of a level, sturdy table. Be sure that the pointer is aligned with the zero mark.
2. Determine the mass of each object for comparison by placing it carefully on the left pan and adding standard mass/es on the right pan until the pointer is aligned with the zero mark.
3. Draw the FBD and label all forces acting on each object.
4. Record the data and complete table 1.

Table 1. Measured masses of the different objects

Object	Mass	FBD	Net Force	***Balanced** or **Unbalanced?***
				
				

V. Synthesis/Extended Practice/Differentiation

Guide Questions:

1. Is it acceptable to record the measured mass of an object using the platform balance if the pointer is not aligned with the zero mark? Why or why not?

   _____

   _____

2. How did you determine the mass of the object using a platform balance?

   _____

   _____

3. Why do you need to add standard masses to align the pointer with the zero mark?

   _____

   _____

4. What can you say about the net force acting on the object if the platform is balanced? Explain your answer.

   _____

   _____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No.3.5: Force and Motion Basics Experiment (25 minutes)

II. Objective(s):

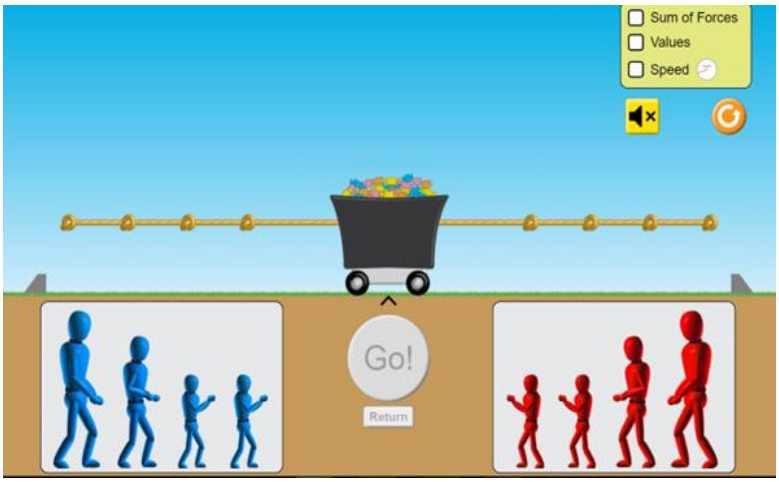
At the end of the activity, the learners should be able to analyze the effects of balanced and unbalanced forces in a virtual experiment related to their firsthand experience.

III. Materials Needed:

Worksheet	Laptop/ tablet (optional)
Pen	Data/ Internet Connection (optional)

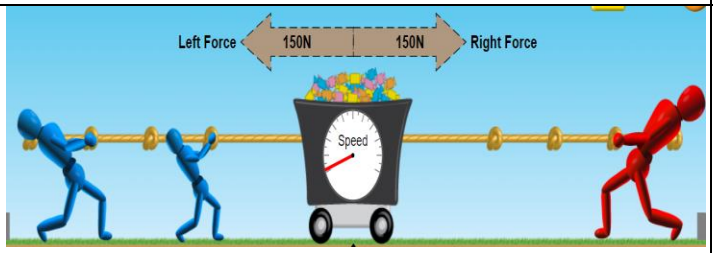
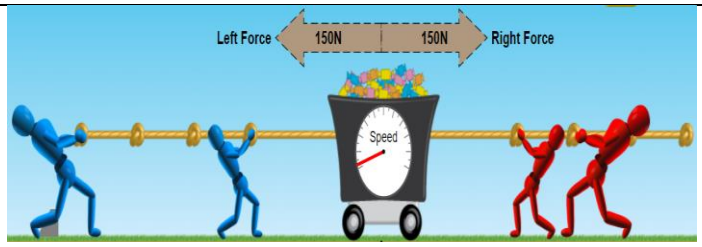
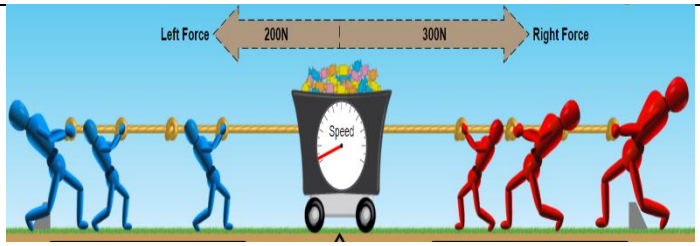
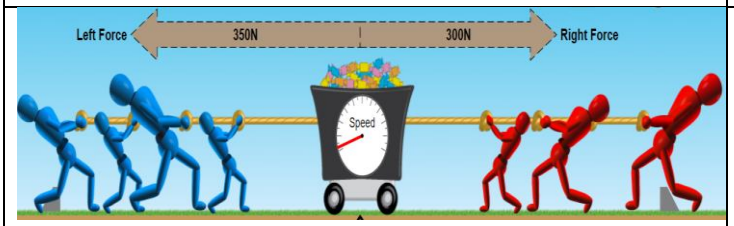
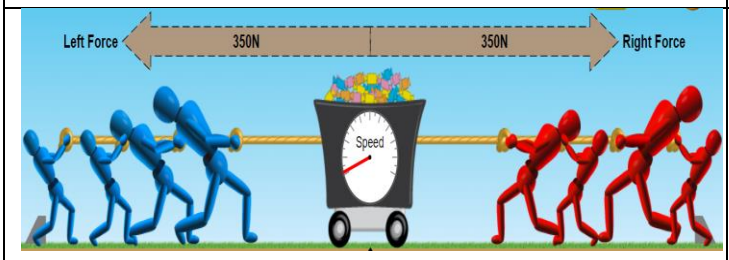
IV. Instructions:

1. Explore the Force and Motion: Basics Simulation (optional if you have a laptop and internet connection).



https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

2. If the forces acting on the crate along the y-axis are always balanced, calculate the net force (tension and friction) along the x-axis. Use the appropriate sign convention for forces to the right/up (+) or left/down (-).
3. Write B and U if the forces along a specific axis are balanced or unbalanced respectively.
4. Describe the state of motion of the crate.
5. Analyze each situation, complete the data needed and answer the guide questions.

Situations	Net Force (x-axis)	Description of Motion	Balanced or unbalanced?
			
			
			
			
			

Guide questions:

1. What happens when the forces acting on the object are not balanced?

   _____

   _____

2. How do you know the direction of motion if the forces are unbalanced?

   _____

   _____

3. Based on the simulation, does changing the position of the players affect the net force?

   _____

   _____

4. What conditions result in balanced forces?

   _____

   _____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.6: Unbalanced Exploration (20 minutes)

II. Objective(s):

At the end of the activity, the learner should be able to demonstrate unbalanced forces through a simple investigation

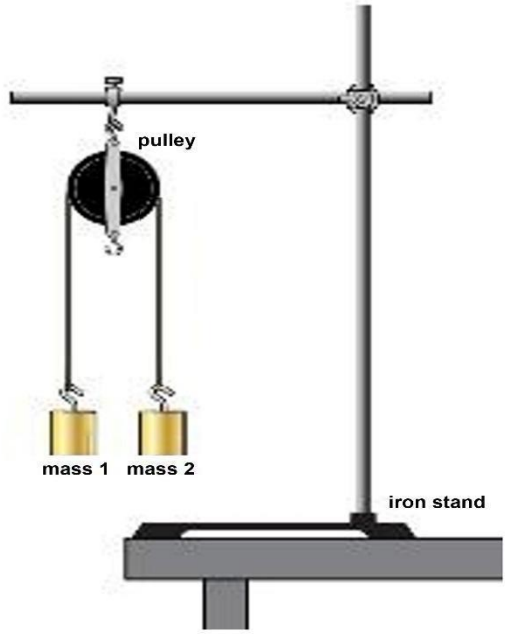
III. Materials Needed:

worksheet
single pulley
2 standard mass holder
timer
pen
String
standard masses

IV. Instructions:

Standard Masses on a pulley system

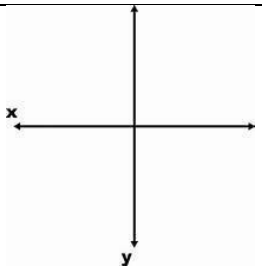
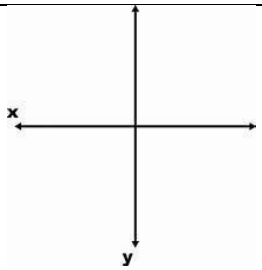
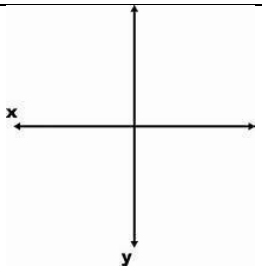
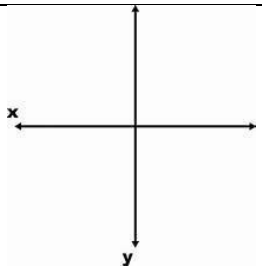
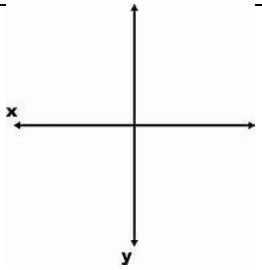
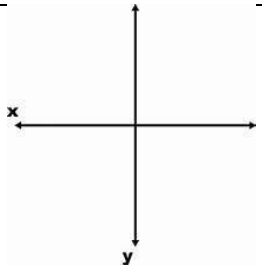
1. Attach different sets of standard masses similar to the setup below.



2. Position the standard masses at the same height and release it.
3. Observe the motion of the masses. Record the time it takes to move.
4. Draw the FBD and label all forces acting on each standard mass.
5. Determine if the forces acting on each mass is balanced or unbalanced. Write **B** and **U** if the forces along a specific axis are balanced or unbalanced respectively.
6. Describe the motion of the system.

7. Record the data and complete table 1.

Table 1. Comparing standard masses

Mass 1	Mass 2	FBD of mass 1	FBD of mass 2	Time	Description of motion	**Balanced** or **Unbalanced?**	
						mass 1	mass 2
50 g	100 g						
150 g	50 g						
50 g	200 g						

V. Synthesis/Extended Practice/Differentiation

Guide Questions:

1. What happens when different standard masses will be attached to a pulley?

   _____

   _____

2. What must be the net force acting on different standard *masses* attached to a pulley?

   _____

   _____

3. What must be the net force acting on the same standard *masses* attached to a pulley?

   _____

   _____

4. What happens to the motion of the standard masses as you increase the difference of masses?

   _____

   _____

5. How do you know in which direction will the mass move towards?

   _____

   _____

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No. 3.7: Rocket Sledder Interactive (25 minutes)

II. Objective(s):

At the end of the activity, the learner should be able to:

1. explore the interactive simulation about balanced/ unbalanced forces
2. analyze and draw the FBD based on the different forces acting on the rocket sledder
3. calculate the net forces along x and y axes
4. differentiate the effect to the state of motion of balanced and unbalanced forces

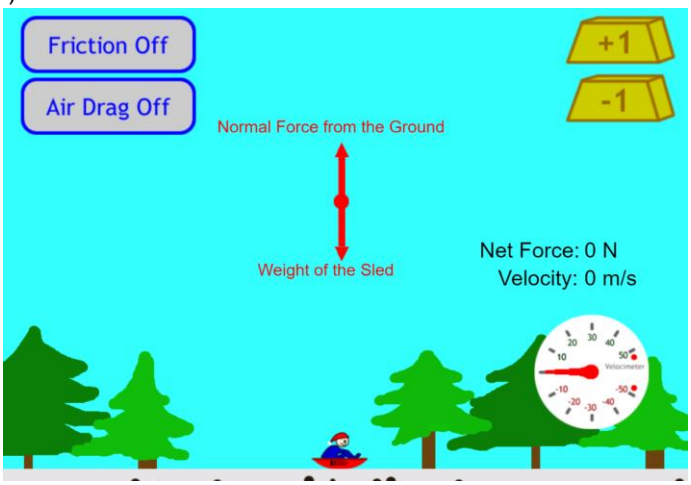
III. Materials Needed:

Worksheet — Laptop/ tablet (optional)

Pen — Data/ Internet Connection (optional)

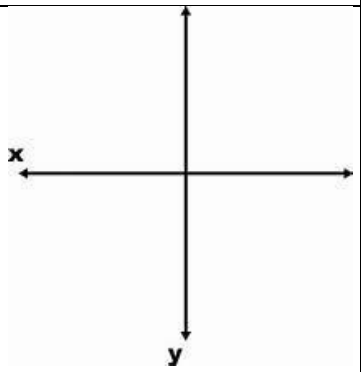
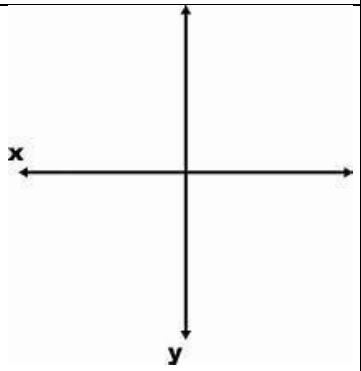
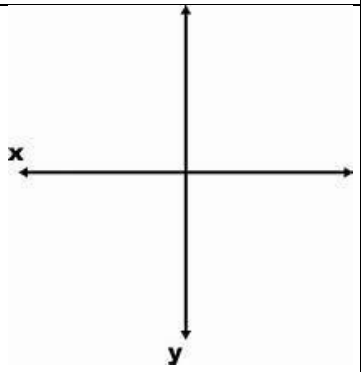
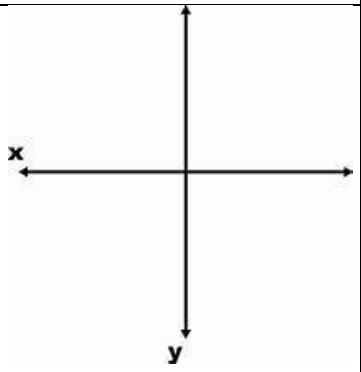
IV. Instructions:

1. Explore the Rocket Sledder Interactive (optional: if you have laptop and internet connection).



https://www.physicsclassroom.com/Physics-Interactives/Newtons-Laws/Rocket-Sledder/Rocket-Sledder-Interactive

2. Analyze each situation with the given values of the different forces acting on the rocket sledder.
3. Draw the FBD and calculate the net forces along x and y axes. Use the appropriate sign convention for forces to the right/up (+) or left/down (-).
4. Write **B** and **U** if the forces along a specific axis are balanced or unbalanced respectively.
5. Describe the motion of the rocket slender.
6. Complete the data and answer the guide questions.

Given	Rocket Sledder FBD	Net Force (x-axis)	Net Force (y-axis)	Balanced/ Unbalanced (x-axis)	Balanced/ Unbalanced (y-axis)	Motion description
Normal Force 700 N Applied Force: 70 N Friction Force: 50 N Air Drag: 0 N Force of Gravity: 700 N						
Normal Force 700 N Applied Force: 70 N Friction Force: 50 N Air Drag: 10 N Force of Gravity: 700 N						
Normal Force 700 N Applied Force: 70 N Friction Force: 50 N Air Drag: 20 N Force of Gravity: 700 N						
Normal Force 700 N Applied Force: 100 N Friction Force: 50 N Air Drag: 20 N Force of Gravity: 700 N						

Guide questions:

1. What happens to the motion of the rocket sledder when the air drag is the same as the applied force in a frictionless surface?

   _____

   _____

2. What happens to the motion of the rocket sledder when the net force is negative?

   _____

   _____

3. What happens to the motion of the rocket sledder when the net force is positive?

   _____

   _____

4. What happens to the motion of the rocket sledder when the sum of the air drag and friction is equivalent to the applied force?

   _____

   _____

5. Which forces are always balanced in all situations?

   _____

   _____

V. Synthesis/Extended Practice/Differentiation

Based on this activity, differentiate the effects to motion of balanced and unbalanced forces.

LEARNING ACTIVITY SHEET

Learning Area:	Science	**Quarter:**	3rd Quarter
Lesson No.:	3	**Date:**	
Lesson Title/ Topic:	**Balanced and Unbalanced Forces**		
Name:		**Grade & Section:**	

I. Activity No.: 3.8 Simple Problem Solving (20 minutes)

II. Objective(s):

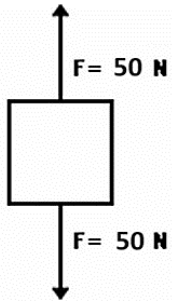
At the end of the activity, the learner should be able to:

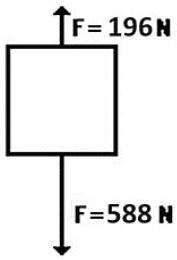
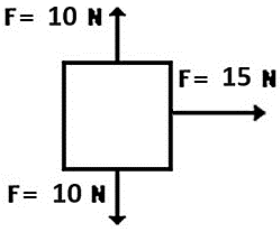
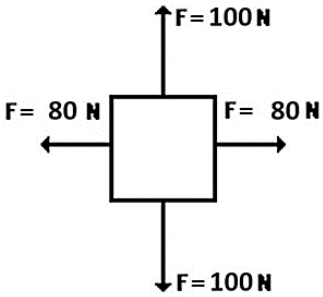
1. analyze the FBD and calculate the net force along x and y axes
2. determine the effect of balanced or unbalanced forces to the state and direction of motion
3. categorize the specific situation from the given scenarios based on the completed data

III. Materials Needed: pen

IV. Instructions:

1. Analyze the free body diagram of the different situations.
2. Determine the following:
   a. net force along x and y-axes (Please indicate NA if not applicable since no forces are present in specific axis)
   b. state of motion (at rest, moving at constant speed, moving at changing speed)
   c. direction of motion (Left/Right/Upward/ Downward/NA*)
3. Identify if the situation shows balanced or unbalanced forces along x- and y- axes.
4. Based on the completed data, match each situation in the template provided into the following activities
   a. pulling a cart on a smooth surface
   b. oven on top of a table
   c. pushing a box on a rough surface
   d. moving car at constant speed
   e. falling skydiver

Free Body Diagram	**Net Force** (x-axis)	**Net Force** (y-axis)	**State of Motion**	**Direction of Motion**	**Balanced or Unbalanced** (x-axis)	**Balanced or Unbalanced** (y-axis)
Situation 1: _____ 						

Situation 2: _____ 						
Situation 3: _____ 						
Situation 4: _____ 						

*NA – Not Applicable