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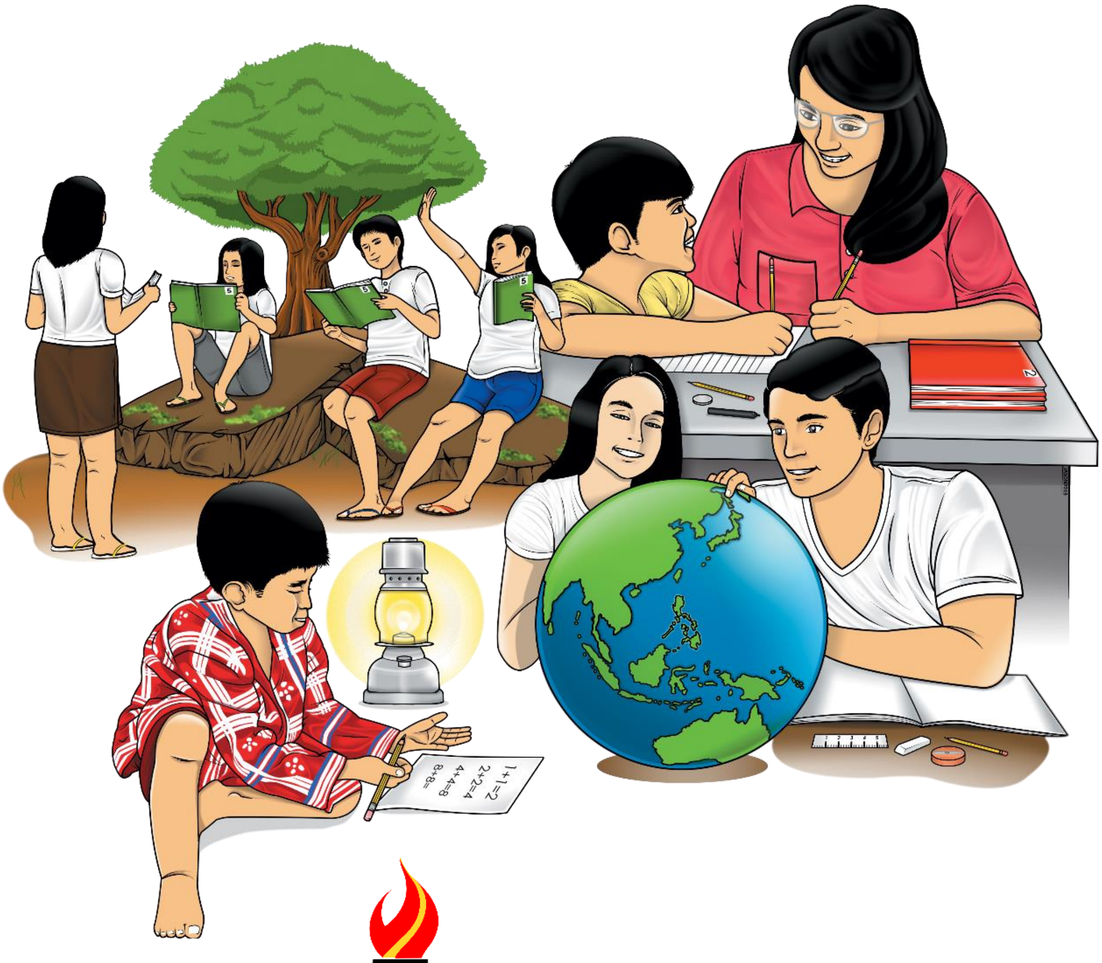
Science

Quarter 1 – Module 2:
Laws of Motion



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8

Science

Quarter 1 – Module 2:
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Introductory Message

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This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using them.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the **Laws of Motion.** The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

After going through this module, you are expected to:

1. Infer that when a body exerts a force on another, an equal amount of force is exerted back on it. (Week 1-2 S8ES-IIa-15)

What I Need to Know

Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Who formulated the Three Laws of Motion?
   A. Aristotle
   B. Isaac Newton
   C. Thomas Edison
   D. Alexander Graham Bell

2. Which has more mass, a kilogram of cotton or a kilogram of iron?
   A. iron
   B. cotton
   C. both have the same mass
   D. cannot be determined from the given information

3. Which has the greatest inertia?
   A. airplane
   B. car
   C. jeepney
   D. bike

4. Which of these vehicles moving at the same velocity is difficult to stop?
   A. bus
   B. car
   C. train
   D. truck

5. All of the following apply the third law of motion EXCEPT ____________.
   A. kicking a ball
   B. rowing a banca
   C. throwing a stone
   D. taking out ketchup from a bottle

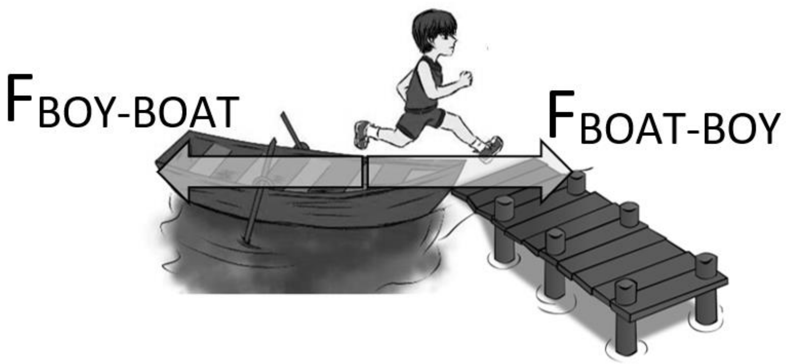
6. Which of the following statements are true?
   I. Action and reaction forces occur in pair.
   II. Action and reaction forces act on the same object.
   III. Action and reaction forces can occur one at a time.
   IV. Action and reaction forces have the same magnitude.

   A. I and II
   B. I and IV
   C. II and III
   D. II and IV

7. Which Newton's law explains when a man is pushed forward in the car as it stops?
   A. 1st law
   B. 2nd law
   C. 3rd law
   D. 2nd and 3rd laws

8. In Newton's first law of motion, a moving object that is not acted upon by a net force will ___________.
   A. accelerate
   B. change its velocity
   C. eventually come to a stop
   D. continue moving at constant velocity

9. A boy jumps out of the boat into a dock. As the boy moves forward to the dock, the boat moves backward. Which statement describes this situation?



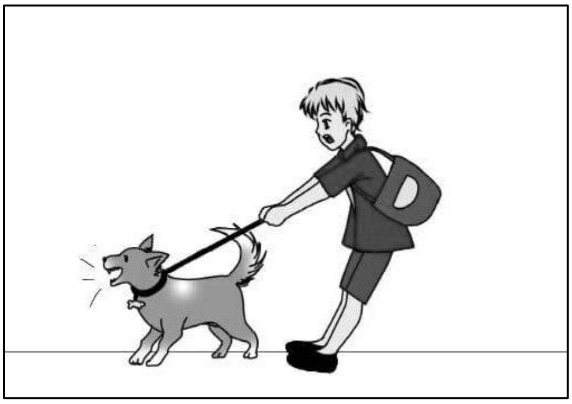
Illustrated by: Rosa Mia L. Pontillo

   A. An object at rest remains at rest.
   B. Friction opposes the motion of an object.
   C. For every action, there is an equal and opposite reaction.
   D. The net force is directly proportional to mass and inversely proportional to acceleration.

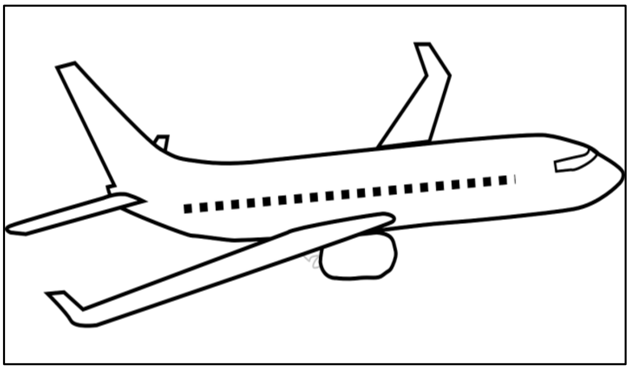
10. Two balls are simultaneously applied with a force of 20 N. One ball has a mass of 0.3 kg and the other has 0.4 kg. Which ball has greater acceleration?
   A. They will both accelerate at the same rate.
   B. None of them will accelerate greater than the other.
   C. The one with a mass of 0.3 kg has the greater acceleration.
   D. The one with a mass of 0.4 kg has the greater acceleration.

Lesson 1 Newton's Three Laws of Motion

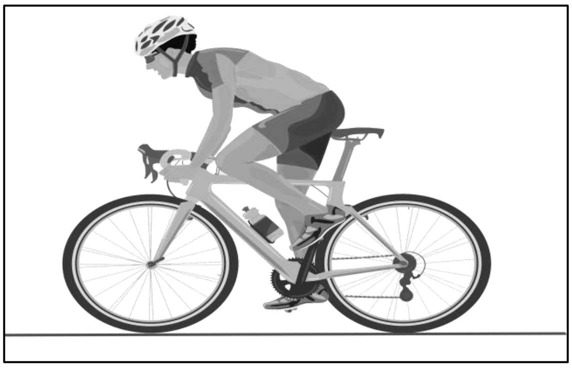
A. a man rowing a boat
Illustrated by: Rosa Mia L. Pontillo



C. a boy pulling his pet dog
Illustrated by: Rosa Mia L. Pontillo



B. a flying airplane
https://pixabay.com/vectors/aeroplane-plane-air-airplane-311601/



D. a man riding a bike
Illustrated by: Rosa Mia L. Pontillo

Figure 1. Situations that involve application of forces

What is common in the situations above?

Look around you. What do you observe? How would you describe most of the objects that you see? What can you say about moving vehicles and running animals? Have you ever asked yourself what causes these things to move? How will the world be without motion?

What's In

You have learned in the previous module that net force enables objects to change its state of motion. If an object is at rest, moving it requires force. For an object already moving, changing its velocity either in magnitude or in direction also requires a force.

Do you know who are the scientists and great men behind the concept of force? The next activity is a word search associated to the concept and understanding of force. It includes scientists and terms related to the laws of motion that will be discussed in the succeeding activities.

Note to the Teacher

Provide a copy of the word search to the students.

Locate and circle the 15 words in the grid. Words appear straight across, up, down and diagonally. Be guided with the words you are to locate inside the box at the right side.

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

ACCELERATION
ACTION
ARISTOTLE
AT REST
BURIDAN
EQUAL
FORCE
GALILEO
INERTIA
INTERACTION
MASS
MOTION
NEWTON
PHILOPONUS
REACTION

Did you enjoy the word search activity? These words shall be discussed in the next section of this module.

What's New

Activity 1. Men Behind Forces

Objective: To be able to understand the timeline of the significant development of the concepts of force and motion.

Material: pen

Procedure:

1. Read the text below.

Motion has been studied for centuries by many great minds. Aristotle (284 – 322 B.C.) for example, believed that a moving object needs a continuous application of force to keep it moving. To him, an object is naturally at rest. He believed that the greater the force on the object, the greater is its speed. He introduced the idea of impetus that keeps a body in motion.

John Philoponus (550 A.D.) conceptualized the idea of surrounding force similar to inertia found in Galileo's idea and Newton's First Law of Motion. He first introduced "Theory of Impetus", a concept similar to force. According to the theory, when impetus decreases, the speed of the object also decreases. When that impetus is removed, the object stops moving.

Jean Buridan (1300 -1358) also saw impetus as the cause of movement. He further developed the "Theory of Impetus" introduced by Philoponus. According to him, motion is possible through a "mover" that keeps the object moving with power proportional to the speed and mass of the object. When the mover is removed, the object stops moving. He later named impetus as force.

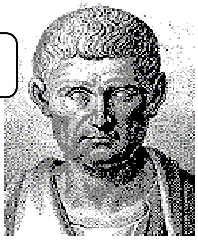
Galileo Galilei (1564 – 1642), on the other hand, disagreed to Aristotle. He claimed that even without a continuous application of force, an object can continue to move with constant speed in a straight line provided there are no outside forces acting on it.

Finally, Sir Isaac Newton (1643 – 1727) used Galileo's ideas and eventually formulated the three laws of motion.

Lifted from: EASE Module 10: Force and Motion

2. In each number, match the scientist who spoke the corresponding dialogue on the right side. Write the letter of the correct answers on a separate sheet of paper.

No. 1

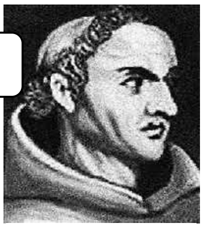


Aristotle

No. 2

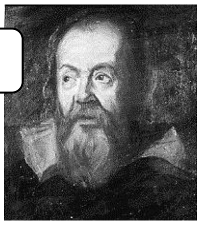
Philoponus

No. 3



Buridan

No. 4



Galileo

No. 5

Newton

A
Hey guys look at this. If I exert an impetus, an object moves. Ha! A new discovery indeed! Impetus keeps a body moving.

B
All right! And when that impetus reduces, motion also reduces. When the impetus is removed, the object stops moving!

C
I don't think that the force is proportional to the velocity. Velocity remains constant if no force, including friction, is applied. Force that affects vertical motion creates constant acceleration.

D
Let's rename impetus as force. I believe that force affects the velocity of moving objects. Thus, force is proportional to the velocity. If no force is applied, an object has no velocity. Thus, the object is at rest.

E
What if I push an object which is already moving horizontally? Wouldn't its velocity change and cause acceleration in the object? Thus, force would cause acceleration in horizontal motion. The natural acceleration actually observed in vertical motion must be the result of a vertical force on the body. Without this force, the natural vertical motion would also be at a constant speed, just like natural horizontal motion. This vertical force is of course the force of gravity.

Lifted from: EASE Module 10: Force and Motion

What is It

Many phenomena can be explained by the use of actual observation and simple common sense. Many attempts have been done to provide a set of ideas about motion as introduced in Activity 1. One of the famous men who developed an explanation for motion, which lasted for almost 2000 years, was the Greek philosopher Aristotle (384-322 B.C.). His ideas were based on very common experiences. Aristotle formulated the idea that, for an object to move, a force must be exerted on it; but when this force is removed, the object comes to rest.

Another important man is Galileo Galilei. In his experiment, he let a perfectly round ball rolled down an inclined surface and prepared three set ups under ideal conditions (lack of friction and air resistance). The following were his observations:

1. The ball is released at a certain height. It speeds up and, if it rolls up another inclined surface of the same slope, it slows down and reaches the same height (figure 2A).

Figure 2A
Illustrated by: Rhenan O. Bacolod

2. In another set up (figure 2B), the ball is released from the same height as figure 2A. It speeds up and if it is rolling up another inclined surface that is not as steep as figure 2A, it slows down and reaches the same height. However, it covers a farther distance as it rolls up the slope.

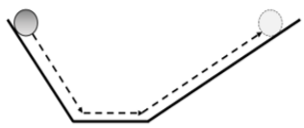


Figure 2B

Illustrated by: Rhenan O. Bacolod

3. In the last set up, the ball is released from the same height as figure 2A. This time, it continues to roll in a flat surface. The ball does not speed up nor slow down (see Figure 2C) as if it continues to move forever.

Figure 2C
Illustrated by: Rhenan O. Bacolod

Galileo concluded that in the absence of friction and air resistance, the ball would continue rolling up to a height above the base equal to the height from where it was released. On a flat surface, the ball would continue to move forever, since there would be no force to cause its state of motion to change.

Galileo was the first to suggest that uniform speed straight-line motion was just as natural as at-rest state of motion. He called this tendency of an object to maintain its initial state of motion as *inertia.*

Although Galileo did not fully explain motion, he took the first important step that completely changed the world's view about motion of objects. Galileo greatly influenced other scientists including Sir Isaac Newton who then formulated the three laws of motion.

Law of Inertia

Newton's first law of motion, the ***law of inertia***, states that, "*an object at rest remains at rest, and an object in motion will continue to move at constant velocity unless acted upon by a net force*." The tendency of an object to maintain its state of rest or of uniform velocity in a straight line is called ***inertia***. Mass is a measure of the inertia of an object. The greater the mass of an object, the harder it is to move when it is at rest, or difficult to stop when in motion.

A common example where inertia can be observed is when you are on a bus. Initially, the bus is at rest. When it starts to move, your body has the tendency to move backward. On the other hand, when the bus suddenly stops, your body has the tendency to move forward. When the bus either starts to move or suddenly stops, your body has the tendency to change your state of motion.

Law of Acceleration

The second law of motion is the ***law of acceleration*** which states that "*the acceleration of an object is directly proportional to the net force acting on it and is inversely proportional to the object's mass. The direction of the acceleration is in the direction of the net force acting on the object.*"

Newton's second law of motion is expressed through the equation:

$$\sum \vec{F} = m\vec{a}$$

Recall from Module 1 that the symbol $\sum$ (sigma) stands for the algebraic sum. $\sum \vec{F}$ stands for the net force acting on the object, m for mass of the object and $\vec{a}$ for its acceleration. The arrow above the letters F and a indicates that both have magnitude and direction.

Table 1 shows the different units of mass, acceleration and force involved in the second law of motion.

Table 1. Units for mass, acceleration and force.

System	Mass	Acceleration	Force
MKS	kg	m/s^2	N= kg. m/s^2
CGS	g	cm/s^2	Dyne = g.cm/s^2
FPS	slug	ft/s^2	Pounds (lbs) = slug. ft/s^2

In the Philippines, Presidential Decree No. 187 dated May 10, 1973, prescribes the use of the metric system of weights and measures as the standard measurement for all products may it be commodities, materials, utilities, services as well as in all business and legal transactions. In this module, Meter-Kilogram-Second (MKS) units are mostly used. However, for some problems you may convert the unit from one system to another.

Study and understand the problems below.

Sample problem 1.

A 1000.0 kg truck is traveling at an acceleration of 4.5000 m/s^2, East. Find the net force needed to accelerate the truck.

Given: $\vec{a} = 4.5000\ \mathrm{m/s^2}$, East

$m = 1000.0\ kg$

Find $\sum \vec{F}$.

Solution:

$$\sum \vec{F} = m\vec{a}$$

$$\sum \vec{F} = (1000.0\ kg)(4.5000\ \mathrm{m/s^2}) = 4500.0\ kg \cdot \mathrm{m/s^2}\ or\ 4500.0\ N, \text{ East.}$$

Sample problem 2.

A boy rolls a 200 g baseball horizontally on the floor with a net force of 2 N to the right. What is the acceleration of the baseball?

Given: $m = 200\ g = 0.2\ kg$ (notice the conversion of unit)

$\sum \vec{F} = 2\ N$, to the right

Find $\vec{a}$.

Solution:

$$\sum \vec{F} = m\vec{a}$$

$$2N = (0.2\ kg)\ \vec{a};$$

$\frac{2\ \cancel{kg} \cdot m/s^2}{0.2\cancel{kg}} = \vec{a}$; since N is equivalent to kg. m/s^2,

$\vec{a} = 10\ m/s^2$, to the right.

Sample problem 3.

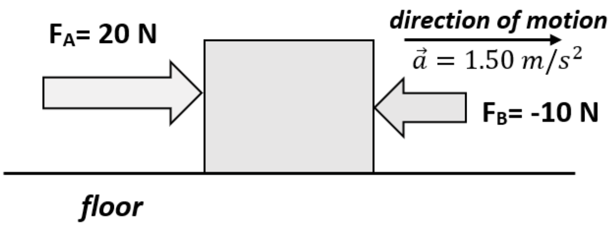
A box is pushed with an applied force of 20 N parallel to the floor. It accelerated at 1.50 m/s^2 to the right. A parallel applied force of 10 N on the opposite side slowed down the motion of the box. Neglecting friction, what is the mass of the box?

Given: $\vec{a} = 1.50\ m/s^2$, to the right;

F_A = 20 N, F_B = 10 N;

Find mass, m.

Solution: To fully understand the problem, let us draw the figure and consider the horizontal forces that acts on the box.



Illustrated by: Rhenan O. Bacolod

$$\sum \vec{F} = \vec{F}_{net} = (+20\ N) + (-10\ N) = +10\ N;$$

$$\sum \vec{F} = m\vec{a};$$

$$+10\ N = m(1.50\ m/s^2)\ ;$$

$$\frac{10\ kg\cdot \cancel{m/s^2}}{1.50\ \cancel{m/s^2}} = m;$$

$$m = 6.67\ kg$$

Law of Interaction

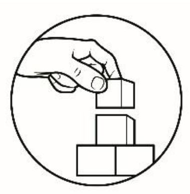
The third law of motion is the ***law of interaction*** which states that "*for every action, there is always an equal and opposite reaction.*" This law tells us that a force exerted on any object is always exerted back by an equal magnitude of force but in opposite direction. Always remember that in this law, forces always come in pairs. These are called ***action*** and ***reaction*** forces, and they do not act on the same body. In determining the action and reaction forces, be able to identify first the action that requires force, and then identify the reaction force that counteracts the action force. An example of this is a boy pushing a wall. When the boy pushes the wall (*action*), the wall exerts an equal and opposite magnitude of force to the boy (*reaction*). Another example is a horse pulling a calesa (*action*). The calesa pulls an equal and opposite magnitude of force towards the horse (*reaction*). Some more examples include hammering a nail, pushing a grocery cart, and attracting a paper clip using a magnet.

The Force of Gravity or Weight

In one of Galileo's experiments, objects dropped near the surface of the Earth would fall with the same acceleration, if air resistance is neglected. This acceleration is denoted by $\vec{g}$ with an approximate value of 9.8 m/s^2 or 980 cm/ s^2 or 32 ft/s^2. The force that causes this acceleration is called the ***force of gravity or gravitational force***. The force acts vertically downward toward the center of the Earth. The gravitational force on an object, $\vec{F}_g$,can be expressed as

$$\vec{F}_g = m\,\vec{g}$$

where $\vec{F}_g$ is for gravitational force, ***m*** for mass and $\vec{g}$ for acceleration due to gravity. The direction of this force is always down toward the center of the Earth. The magnitude of the force of gravity on an object, ***mg,*** is called the object's **weight**, symbolized by the letter **W.** When a person's mass is 40 kg, the computed weight is 392 N (multiply the mass to g = 9.8 m/s^2) on Earth. His weight differs when he is on other planets and satellites like the Moon.

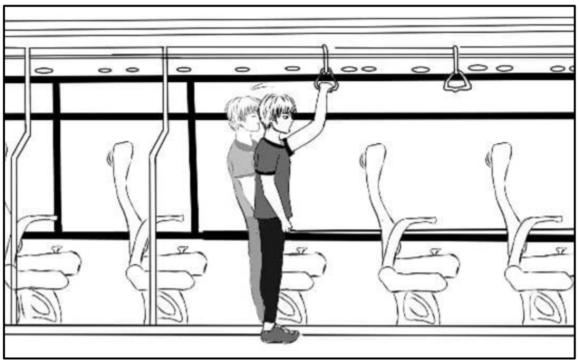


What's More

To understand Newton's laws of motion, answer the succeeding activities.

Activity 2. Newton's First Law of Motion (Law of Inertia)

In your answer sheet, match the pictures to the statements that describes the pictures found below. Write the letter of the correct answers on a separate sheet of paper.



A

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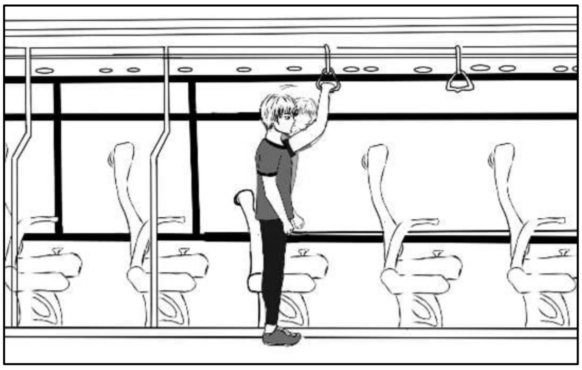

B

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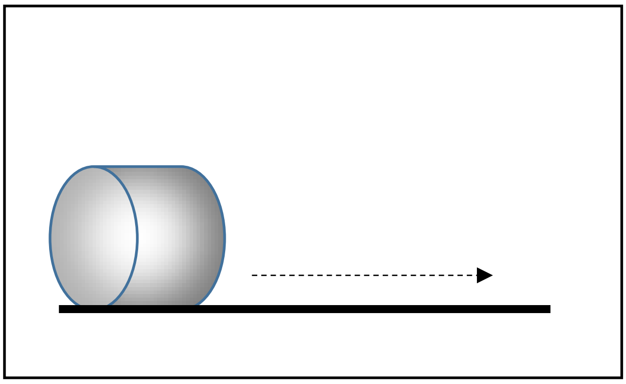


C

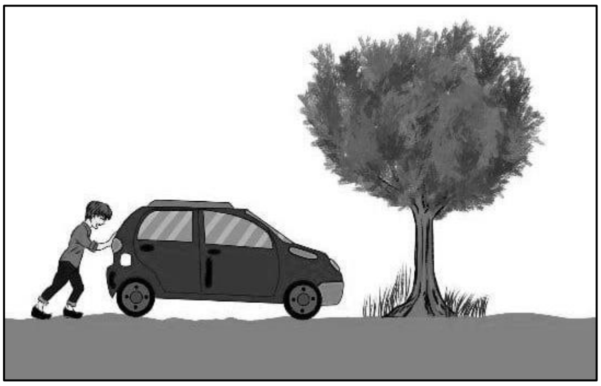
Illustrated by: Rhenan O. Bacolod

1. The body will continue to move and so it will move forward until something will stop it. ____________
2. As you hold on the handle, the force exerted by the train through the handle gives your body forward velocity. ___________
3. Your body has inertia, and so a force is needed to change its velocity. The train floor accelerates your feet but your body falls backward. ___________

Activity 3. Newton's Second Law of Motion (Law of Acceleration)

Read the situation and analyze the pictures. Write your answers on a separate sheet of paper.

Mario and Alex are on a trip to Tinuy-an Falls, Bislig City, Surigao del Sur. Suddenly the car runs out of fuel then stops. Alex volunteers to push the car to the side of the road. He pushes it hard, but he cannot barely move the car. A bystander helps him then the car accelerates.



A

Illustrated by: Rosa Mia L. Pontillo

B

Illustrated by: Rosa Mia L. Pontillo

Questions:

1. How do you compare the applied forces to the cars in both pictures?

   ____

2. Why does the car in Picture B accelerate?

   ____

3. What is the relationship between net force and acceleration based on the situation?

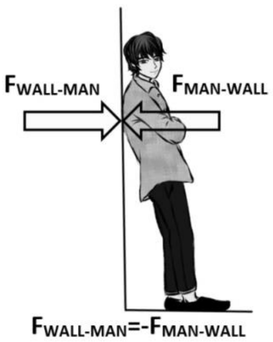
   ____

Rubric for Scoring in numbers 1 and 2.

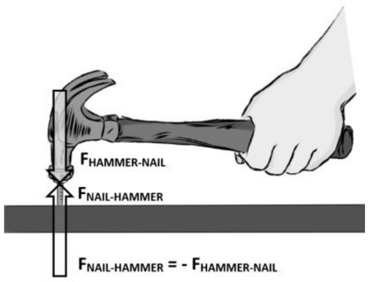
Points	Description
2	Discussion is complete with no misconception.
1	Discussion is incomplete with minor misconception.
0	No discussion made.

Activity 4. Newton's Third Law of Motion

Identify the action-reaction forces in each picture. The first picture is done for you. Write your answers on a separate sheet of paper.



A



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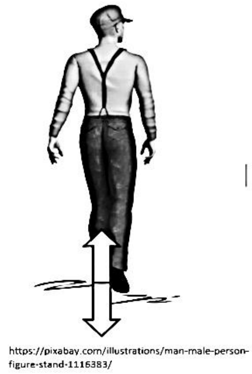
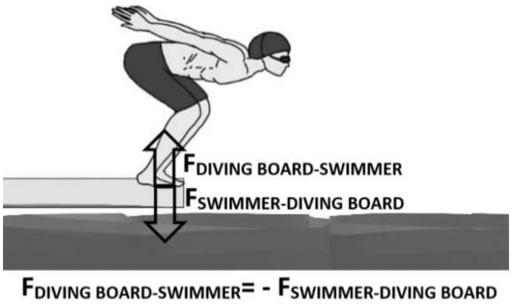


D



B

E

All illustrations were illustrated by: Rosa Mia L. Pontillo

Condition	Force of Action	Force of Reaction
A. A boy leaning against the wall.	The force exerted by the boy on the wall.	The force exerted by the wall on the boy.
B.		
C.		
D.		
E.		

What I Have Learned

Fill in the blanks with the correct term/s. Write your answers on a separate sheet of paper.

1. ____________ is the tendency of an object to resist any change in its initial state. If it is initially at rest, it tends to remain at ____________. On the other hand, if it is initially moving at constant velocity, it tends to continue moving unless acted upon by a ____________.

2. Inertia depends on the object's ____________.
3. Newton's ____________, also known as the ____________, states that an object at rest remains at rest and an object in motion will continue to move in a straight path with constant velocity unless acted upon by a net force.

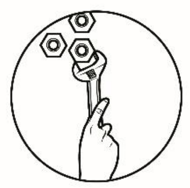
4. Newton's ____________, also known as the____________, states that acceleration of an object is directly proportional to the net force causing it and inversely proportional to its mass. In symbol,

$$\sum \vec{F} = m\vec{a}$$

5. Newton's ____________, also known as the ____________, states that for every action, there is an equal and opposite reaction.

6. When air resistance is neglected, all objects fall toward the ground with the same acceleration called ____________. It is approximately equal to ____________. The force that causes object to fall toward the center of the Earth is called ____________. It is expressed through the equation _____________.

7. The magnitude of the force of gravity on an object, $m\vec{g}$, is called the object's ____________.



What I Can Do

Let us see how the second law is applied to the problems below.

Problem 1

A boy pushed horizontally a 3.5 kg plastic chair across the slippery floor. If the acceleration of the plastic chair is 2.2 m/s^2 to the left, what is the net force exerted on the plastic chair?

Given: m= ______________kg

$\vec{a}$= ______________m/s^2, to the left

Find: $\sum \vec{F}$

Formula: $\sum \vec{F} = m\vec{a}$

Problem 2

A 3 kg box accelerated at 2 m/s^2 upward when pulled vertically by a string. Using $\vec{g}$ = 9.8 m/s^2, what is the tension on the string?

Given: m = ______________

$\vec{a}$ = ______________

$\vec{g}$ = ______________

W = $m\,\vec{g}$ = (______________)(______________) = ______________

Find the Tension (T).

Solution:

There are two forces that act on the box, the weight (W) of the box and the tension (T) exerted by the rope on the box. In formula,

$\sum\vec{F}$ = m $\vec{a}$

Since the box is moving upward, we have

T – W = m $\vec{a}$

T – ______________ = ______________

T = ______________

Assessment

Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. What is the definition of weight?
   A. the size of an object
   B. the time it takes to get on a ride
   C. the amount of matter in an object
   D. the magnitude of the force of gravity on an object

2. Which law states that forces act with equal magnitude and in opposite direction?
   A. Law of Inertia
   B. Law of Interaction
   C. Law of Acceleration
   D. Law of Gravitational Force

3. For every _________ there is an equal and opposite ___________.
   A. action, action
   B. reaction, action
   C. action, reaction
   D. reaction, reaction

4. What Newton’s law of motion requires the use of seat belt in cars?
   A. Law of Inertia
   B. Law of Interaction
   C. Law of Acceleration
   D. Law of Universal Gravitation

5. A guava with a mass of 0.200 kg has a weight of ___________.
   A. 0.200 N
   B. 1.96 N
   C. 4.50 N
   D. 10.0 N

6. A stone hits the ground before a flat sheet of paper because ___________.
   A. it is less massive
   B. it is more massive
   C. the acceleration of gravity is greater on the stone
   D. there is more air resistance against the flat paper

7. If the mass of an object is 45 kg on Earth, what is its mass on the moon?
   A. 45 N
   B. 45 kg
   C. 441 N
   D. 441 kg

8. Which of the following phenomena applies the first law of motion?
   A. A leaf sways back and forth falling from a tree.
   B. When a ball falls on the floor, the ball bounces back up.
   C. When pushed with the same force, a car accelerates slower than a grocery cart.
   D. When a cardboard with coin on top is suddenly pulled, the coin falls into the glass.

9. According to the second law of motion, the net force is the product of mass and acceleration. Which of the following has the greatest acceleration?
   A. A 5.000 kg stone is pulled with a 10 N net force.
   B. A 0.5000 kg toy car is pulled with a 9 N net force.
   C. A 7.000 kg metal ball is pushed by a 17 N net force.
   D. A 500.0 kg truck is accelerated by 1000 N net force from its engine.

10. In a grocery store, you can easily push a cart with 5 kg sack of rice than a cart with a 10 kg sack of rice to the counter. Which of these explains the situation?
   A. Law of Inertia
   B. Law of Interaction
   C. Law of Acceleration
   D. Law of Universal Gravitation

Additional Activities

Identify the law of motion that applies in each situation. Write your answers on a separate sheet of paper.

Situation	Law/s of Motion
1. Throwing garbage on the river would go back to the community during the flood season.	
2. It is easier to push an empty shopping cart than a loaded one.	
3. The baseball is thrown into the air after being hit by the bat.	
4. When walking, your foot pushes the ground backward, and the ground pushes your foot forward.	
5. A runner who reaches the finish line must continue running for some time.	

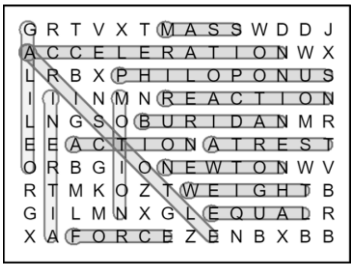
Answer Key

What I Know

1. B
2. C
3. A
4. C
5. A
6. B
7. A
8. B
9. C
10. C

What's new

Activity 1



What's more

Activity 2

1. C
2. B
3. A

Activity 3

1. A has lesser force, B has greater force
2. The acceleration is due to the net force which is not zero
3. Directly Proportional

Activity 4

Condition	Force of Action	Force of Reaction
B. a boy jumping off a diving board	The force exerted by the feet on the diving board	The force exerted by the diving board on the feet
C. hammering a nail into the wood	The force exerted by the hammer on the nail.	The force exerted by the nail on the hammer.
D. a man walking on the ground/floor	The force exerted by the foot on the ground/floor	The force exerted by the ground/floor on the foot
E. a boy holding a ball	The force exerted by the hand on the ball	The force exerted by the ball on the hand

Additional Activities

1. Law of Interaction
2. Law of Acceleration
3. Law of Interaction/Acceleratin
4. Law of Interaction
5. Law of Inertia

What I can do

1. m = 3.5 kg
   $a=2.2\ m/s^2$
   $F_{net}=7.7N$
2. m=3kg
   $a=2m/s^2$
   $g=9.8m/s^2$
   $W=(3kg)(\ 9.8m/s^2) =$ 29.4 N
   T-29.9 N = 6N
   T = 35.4 N

What I have learned

1. Inertia, rest, net force
2. Mass
3. Newton's First Law, Law of Inertia
4. Newton's Second Law, Law of Acceleration
5. Newton's Third Law, Law of Opposite Reaction/Interaction
6. Acceleration due to gravity, $9.8\ m/s^2$ Gravitational force, F=mg
7. weight

Assessment

1. D
2. B
3. C
4. A
5. B
6. D
7. B
8. D
9. B
10. C

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