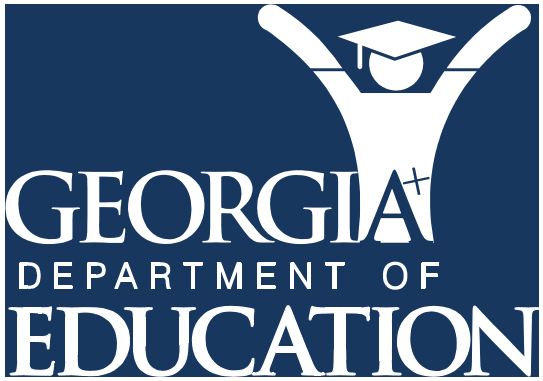


Exam Preparation for Science and Social Studies Program

ExPreSS

June 8 through June 19
2009

TEACHER

Monday, June 15		
Objective **Domain: Ecology** • Students evaluate relationships between organisms, populations, communities, ecosystems, and biomes		
Time	**Activity/Task**	**Assessment**
15 min	*Opening/Pre-Assessment Activity-Organization Levels* The teacher begins the lesson with an activity on organization levels using cards that the students organize (see relationship cards in Monday's June 15, materials section). Put students in pairs. Give each pair a baggie of cards. Tell students to organize the cards in some way and be able to explain how they are organized. After all groups have completed the task, number each student in each pair a 1 or a 2. 2s stay seated and 1s visit three other tables to review and discuss. **No one makes any changes!!** 1's return to their seats and 2's visit three other groups to review and discuss. Everyone returns to their seats *Teacher note*: Use the suggested guiding questions to guide the discussion (see Suggested Guiding Questions handout in Monday's June 15, materials section). After each question is discussed, ask the students to write their own answer to the question. Place the large organization signs somewhere in the classroom where students can see them and keep them there until Thursday.	Participation in the discussion. Completion of the Suggested Guiding Questions handout
15 minutes	*Word Splash Activity* Now that the students have reviewed the levels of organization, the teacher will review other key terms related to ecological relationships through the use of a word splash. The teacher will write terms on the board and students will respond on paper by completing the Ecological Relationships graphic organizer (see word splash activity in Monday's June 15, materials section).	Completion of the Ecological Relationships graphic organizer
25 minutes	*Relationships video clips* Students will watch three video segments from United Streaming on relationships of populations. • Relationships between populations: Competition • Relationships between populations: Predator-Prey • Relationships between populations: Symbiotic As they watch they will complete an interactive note-taking chart (see Relationships Between Populations handout in the Monday's June 15 materials section). At the conclusion of the video segments the teacher will go over the note-taking chart with the students to make sure they have the correct information. The students will use this chart for the next part of the lesson	Students completing notes

Monday, June 15 (continuation)		
Time	**Activity/Task**	**Assessment**
20 minutes	*Paired Activity- Ecosystem Relationships Manipulative Cards* Using their notes from the previous activity as a reference, students will match the relationship description in each picture to the type of relationship described and lay the cards next to each other. (See Ecosystems Relationships Cards in the Monday's June 15 materials section). The teacher will circulate among the students and will ask questions about their work to determine level of understanding. After students have completed their work the teacher should summarize with students the importance the relationships within the ecosystem.	Students matching cards correctly
20 min	*Review Questions 9* Provide students with a set of questions (see Review Questions 9 handout in the Monday's June 15, materials section) about the organisms, populations, communities, ecosystems, and biomes. Give them 15 minutes to answer the questions individually. Conduct a group discussion of the answer to the questions and ask the students to correct their own answer if necessary and to write an explanation of why the answer needed to be corrected. The explanation must state the original reason the student chose the wrong answer and what makes the correct answer correct.	Student questionnaire
15 min	*Closing* Students will answer the following question and will submit it to the teacher: • Which relationship do you think is the most beneficial for populations in an ecosystem and why?	Student responses to question

Monday, June 15 (continuation)		
Objective **Domain: Forces, Waves, and Electricity** • Analyzes relationships between force, mass, and motion by applying the calculations of velocity and acceleration.		
Time	**Activity/Task**	**Assessment**
20 min	*Pre-Assessment* As the students walk in, provide them with the pre-assessment handout and ask them to answer all the questions. Tell the students that what it is important is to write their ideas and not if their ideas are right or wrong. After about 10 minutes, ask the students to stop writing and proceed to have a group discussion on each question.	Completion of the pre-assessment handout
15 min	*Force, Mass, and Acceleration* Group the students in small groups. Provide each group with markers and a large sheet of paper. Instruct each group to copy the concept maps for force, mass, and acceleration from their respective handouts (see concept maps for force, mass and acceleration in the Monday's June 15 materials section) and complete them on their large sheet of paper. Each group should post their concept maps on a wall in the classroom. Students should perform a gallery walk and review other group's posters. During the walk students will note additional ideas presented by other groups in their notebooks. Once the gallery walk is complete, the student should modify or expand their concept maps on their handouts for force, mass and acceleration.	Completion of the concept maps
40 min	*Velocity and Acceleration* Follow the instructions for the laboratory Students in Motion (see Student in Motion laboratory in the Monday's June 15 materials section)	Lab report
20 min	*Lab Reflection* Hand the students the post-assessment handout (see Post-Assessment handout in the Monday's June 15 materials section) and ask them to answer all the questions the best that they can. After about 10 or so minutes, ask the students to stop working and discuss each question. Instruct the students to correct their answers if necessary.	
20 min	*Review Questions 10* Provide students with a set of questions (see Review Questions 10 handout in the Monday's June 15, materials section) about force, mass, and motion. Give them 15 minutes to answer the questions individually. Conduct a group discussion of the answer to the questions and ask the students to correct their own answer if necessary and to write an explanation of why the answer needed to be corrected. The explanation must state the original reason the student chose the wrong answer and what makes the correct answer correct.	Student responses to question

Monday's June 15

Materials Section

Relationship Cards

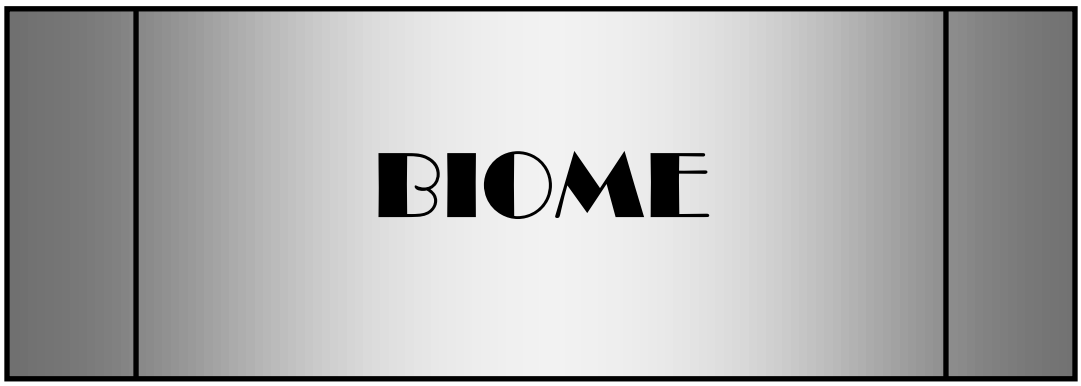
ORGANISM

POPULATION

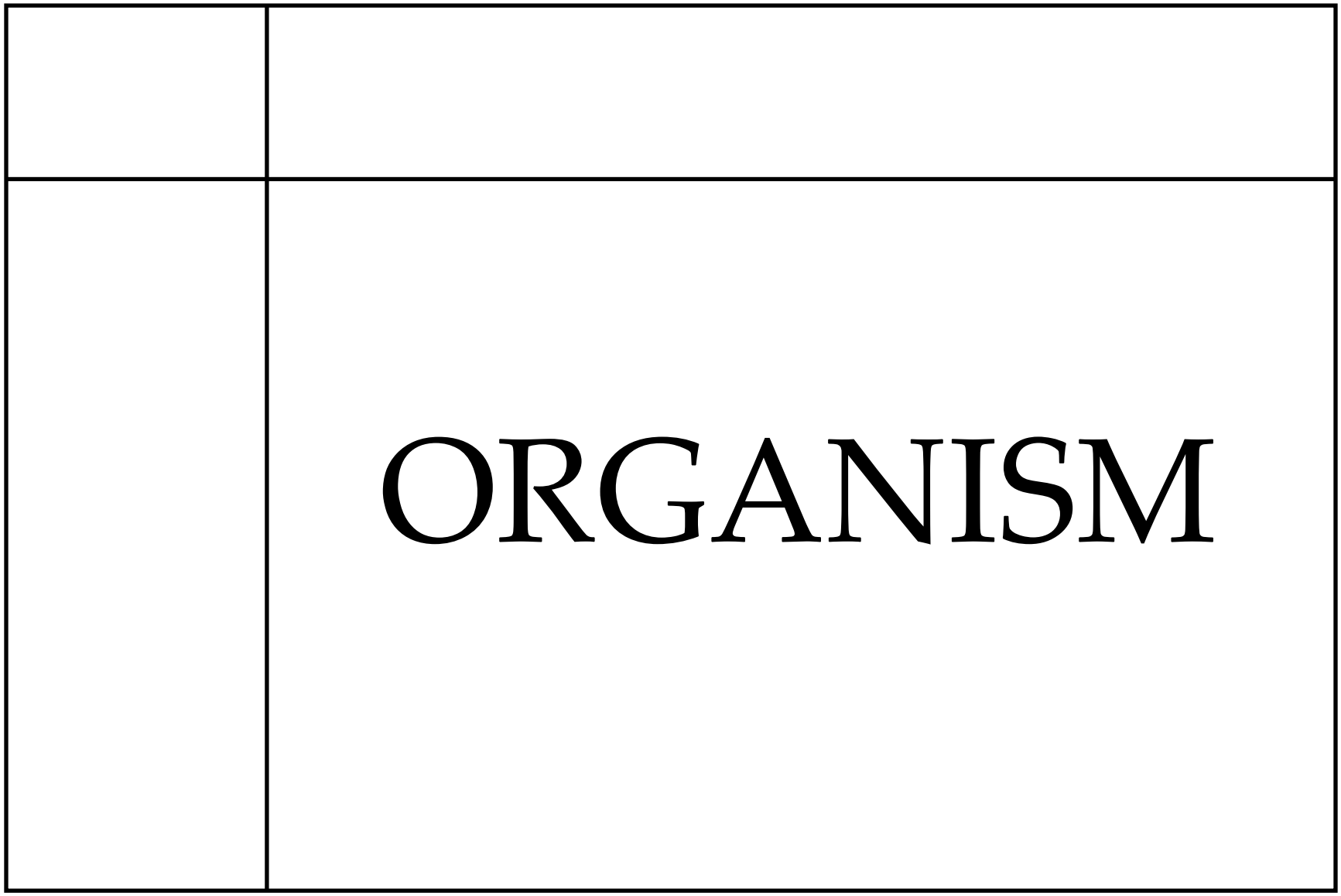
COMMUNITY

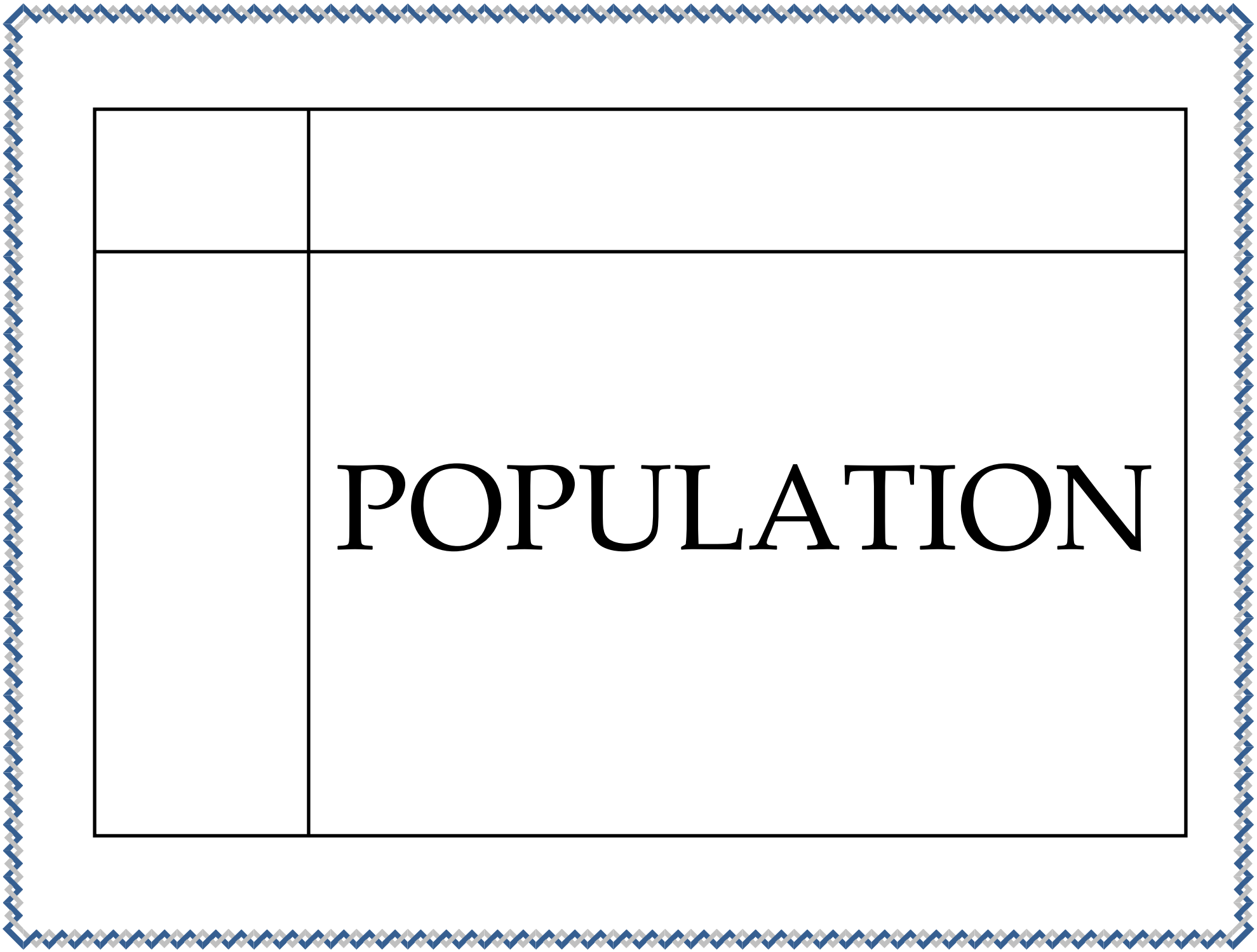
ECOSYSTEM

Relationship Cards



Organization Signs




POPULATION


COMMUNITY

ECOSYSTEM

	BIOME

Organization Guiding Questions	
What similarities did groups have in the arrangement of their cards?	
What differences did groups have in the arrangement of their cards?	
What criteria are used by scientist to organize organisms?	
What is the correct organization level?	

Ecological Relationships graphic organizer

Concept	What I know	What I learn
Predation		
Predator		
Prey		
Symbiosis		
Parasitism		
Commensalism		
Mutualism		

Relationships Between Populations Videos	
When do we say that two species compete with each other?	
What happens when two species fill the same role in an ecosystem?	
What is an example of competition between two species?	
When do we say that an organism is a predator?	
When do we say that an organism is a prey?	
What is an example of a predator-prey relationship? Identify the co-evolutionary traits developed by both the prey and predator.	

Relationships Between Populations Videos	
Describe three examples of how prey protect themselves against predators.	
What is a symbiotic relationship?	
What are the three types of symbiotic relationships? Provide the definition and give one examples of each type of symbiotic relationship	

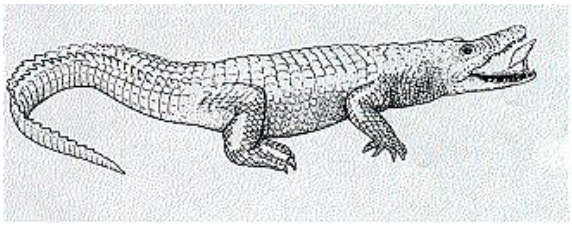
Ecosystem Relationships Manipulative Cards

Mutualism	Commensalism	Parasitism	Predation
Mutualism	Commensalism	Parasitism	Predation
Mutualism	Commensalism	Parasitism	Predation
Mutualism	Commensalism	Parasitism	Predation

Ecosystem Relationships Manipulative Cards

	
The Cattle Egret (***Bubulcus ibis***) forages in pastures and fields among livestock such as cattle and horses, feeding on the insects stirred up by the movement of the grazing animals. The egrets benefit from the arrangement, but the livestock, generally, do not.	The cuckoo bird attacks another bird's nest and removes the bird's eggs. She then lays her eggs in the attacked nest and lets the unsuspecting bird raise the cuckoo's young.
	
Hummingbirds pollinate plants	This lynx is attacking the hare.
	
Butterflies pollinate plants	The wolf preys on smaller mammals.

Ecosystem Relationships Manipulative Cards

	
Barnacles attach to rocks, ships, shells, whales, and just about anywhere else they can gain a foothold. In the example, the two barnacles are attached to the shell of a scallop. The barnacle gains a place to live and, presumably, the scallop is not harmed by the presence of the barnacles.	The fungus species attaches the lichen structure to the log, rock, or brick wall it lives on and absorbs nutrients from the environment. In addition, the fungus forms a protective envelope for the algae preventing the algae from drying out. The algae in its turn use the nutrients absorbed by the fungus and the carbon dioxide produced to photosynthesize. The sugars and oxygens produced by the algae are, in turn, used for food by the fungi.
	
Mosquitoes spread the disease malaria.	Clownfish live in the stinging tentacles of sea anemone. They are coated in mucous, which protects them from the anemone's stinging nematocysts.
	The drawing shows the Nile crocodile opening its mouth to permit the Egyptian plover to feed on any leeches attached to its gums. The small bird gets to eat and the croc gets its teeth cleaned.

Review Questions 9
Relationships

1. A group of similar ecosystems that share the same climax community is called a

   A. Population
   B. Community
   C. Trophic level
   D. Biome

2. The role an organism plays in an ecosystem is called it's

   A. Habitat
   B. Niche
   C. Trophic level
   D. Biome

3. The abiotic factor in this list is

   A. Bacteria
   B. Fungi
   C. Water
   D. Human

4. The biome that is the most biologically diverse is

   A. tropical rain forest
   B. Temperate forest
   C. Desert
   D. Grassland

5. The biome that is dominated by cone bearing trees, and is populated by moose, showshoe hare, and lynx, and has long winters is

   A. Tundra
   B. Taiga
   C. temperate forest
   D. Chaparral

6. An intense forest fire burns an entire forest to the ground. Soon wild flowers, grasses, and weeds begin to repopulate the area. This is

   A. primary succession
   B. secondary succession
   C. tertiary succession
   D. climax succession

7. An example of a population would be

   A. neighborhood cats and dogs
   B. all the rocks in your yard
   C. all the largemouth bass in a fish pond
   D. all the species of trees in the school nature area

8. Major ecosystems that occur over wide areas of land are called

   A. Communities
   B. Habitats
   C. Biomes
   D. food chains

9. A relationship between a producer and consumer is best illustrated by

   A. a snake eating a bird
   B. a fox eating a mouse
   C. a lion eating a zebra
   D. a zebra eating grass

10. A tick feeding on a human is an example of

   A. Parasitism
   B. Mutualism
   C. Competition
   D. Predation

11. An organism's niche includes

   A. what it eats
   B. where it eats
   C. when it eats
   D. all of the above

12. An ecologist who studies how several species in an area interact among each other and with the abiotic parts of the environment is interested in the biological organization level called

   A. Organism
   B. Population
   C. Community
   D. Ecosystem

13. The relationship between plants and the bees that pollinate them is an example of

   A. Commensalisms
   B. Competition
   C. Mutualism
   D. Parasitism

14. Symbiosis involving a fungi and algae is seen in which of the following?

   A. Moss
   B. lichen
   C. mildew
   D. bread mold

15. In the study of ecology, what is a population?

   A. all plants and animals in a liven place
   B. all the living and nonliving things in an environment
   C. all the organisms of one particular species in a given place
   D. different plants interacting with each other in a given place

16. Which of the following is an abiotic factor in an ocean ecosystem?

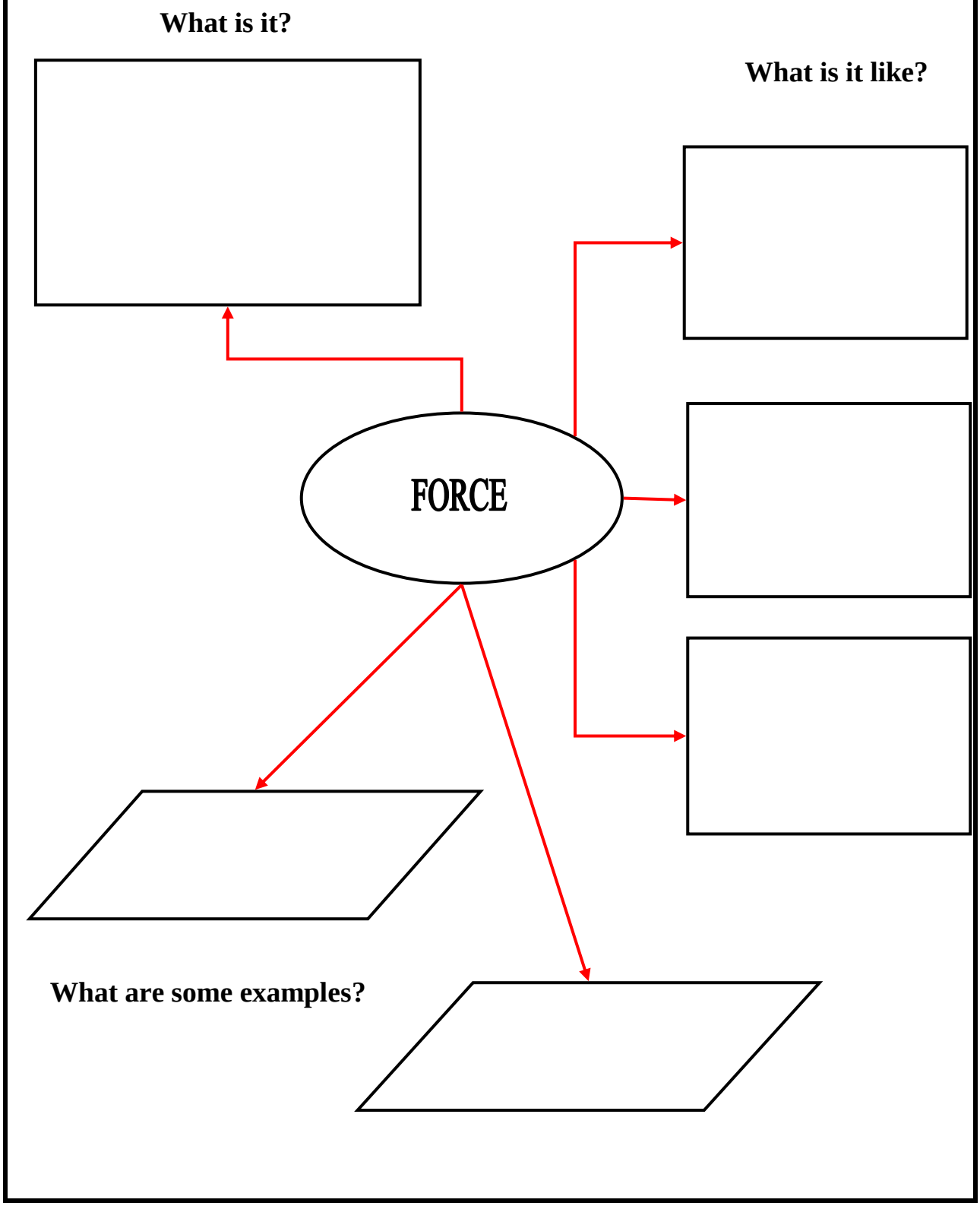
   A. Coral
   B. Whale
   C. water
   D. shrimp

15. Which of the following best describes a biome?

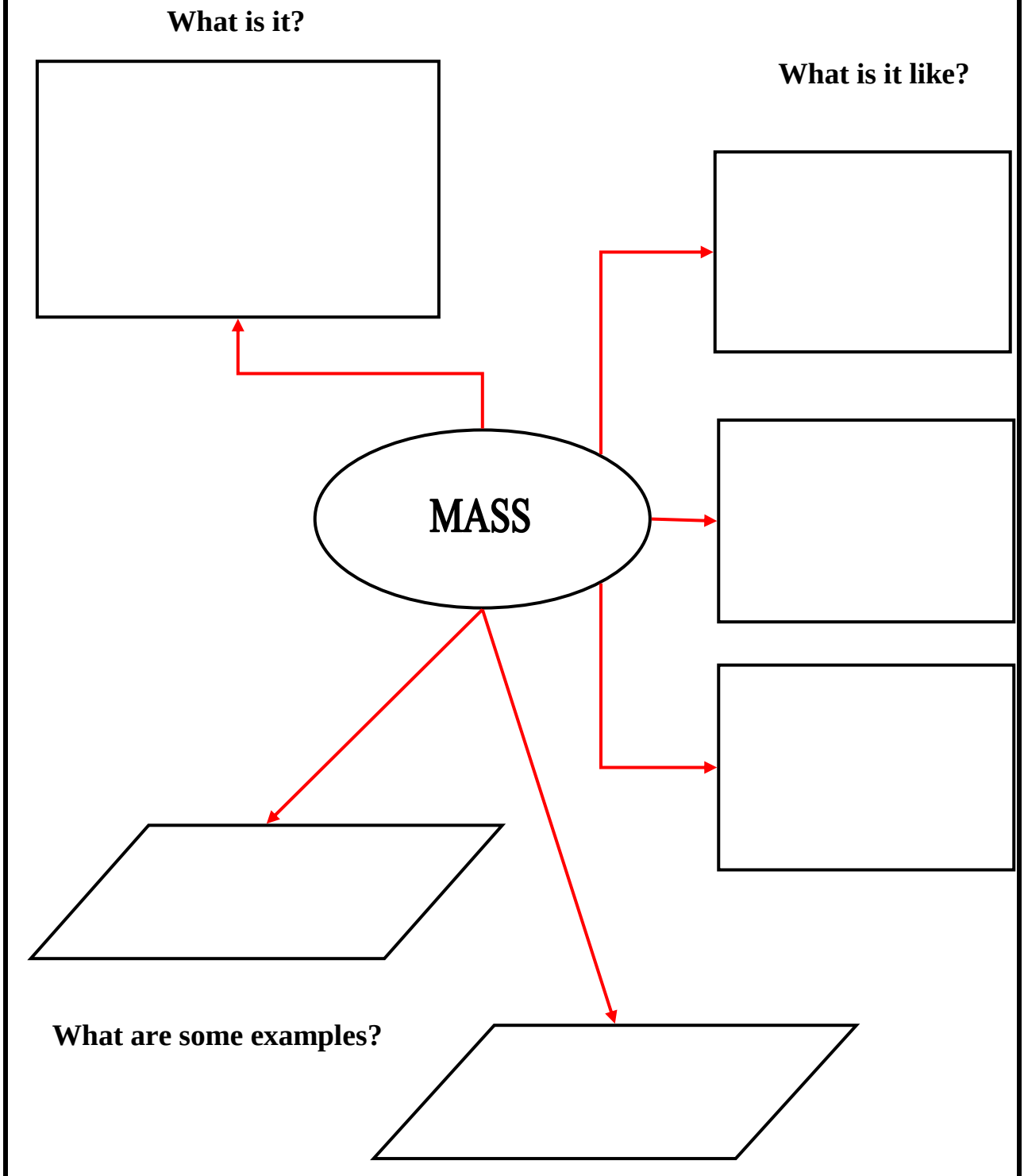
   A. areas of like climate and ecology
   B. primary productivity per square kilometer
   C. all of the living organisms in an ecosystem
   D. areas that include the entire range of an organism

Pre-Assessment	
Name:	Date:
Instructions: This assessment is designed to guide the lessons that we are going to study in this unit. Please answer all the questions the best that you can.	
1. A mass resting on a table is attached to a compressed spring. Describe all the forces acting on the mass while in contact with the spring and after the mass has been push away from the spring.	
2. Why do objects start or stop moving?	
3. There are two objects: one with small mass but large volume and one with large mass but small volume. Explain which object will have a greater acceleration if each object is pushed by the same force.	
4. How does friction affect the motion of objects?	
5. Describe the motion of a spaceship propelled forward by a constant force F for 20 minutes. The force suddenly stops after 20 minutes. Describe the motion of the spaceship after the force F stops.	
6. How are weight and mass related?	

Concept Map for Force



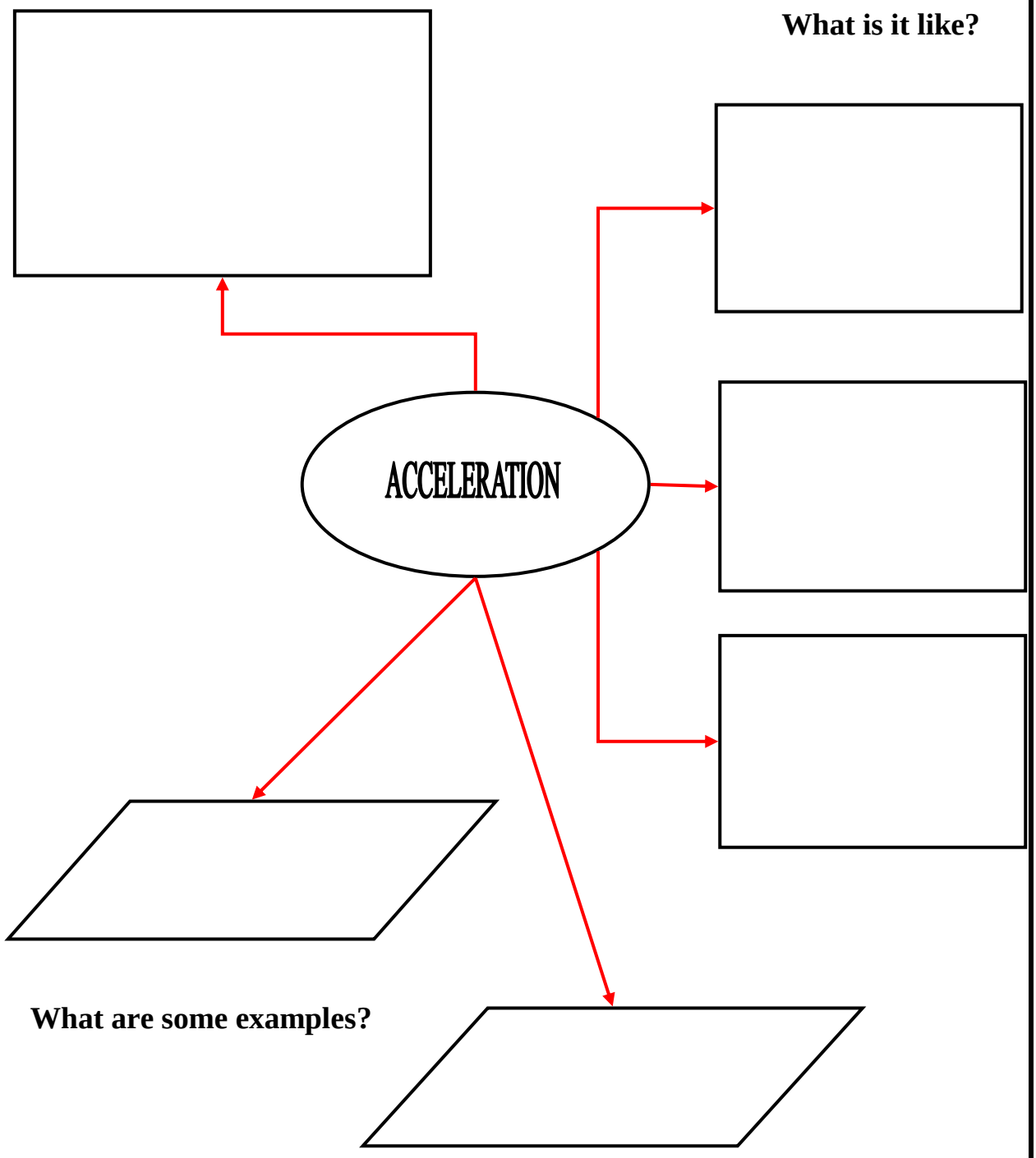
Concept Map for Mass



Concept Map for Acceleration

What is it?

What is it like?



What are some examples?

Students in Motion: A Graphical Representation

Theory:

Drawing graphs is a very useful means of presenting information and making it easily understood. A further advantage of using graphs is that changes and patterns can be quickly recognized. The motion of an object is regularly represented with graphs. Graphs provide information about what is being represented on each axis. The type of curve and its slope provide additional information about the relationship between those two variables.

This laboratory will provide us with an understanding on how to draw and read graphs of position vs. time, velocity vs. time, and acceleration vs. time. Information about the motion of an object can also be obtained from the slope of the line in the graph. The slope of the line obtained when the position of an object is plotted against time represents the velocity with which the object is moving. The shape of the line when position of an object is plotted against time gives us information about the velocity of the object. In the case of a velocity vs. time graph, the slope of the line obtained when plotting the velocity of an object against time represents its acceleration. The shape of the line when velocity of an object is plotted against time gives us information about the acceleration of an object.

It is important to remember that motion is a change in position of an object measured by distance and time. Velocity tells the speed and direction of motion, whereas speed tells us the rate at which an object moves. Finally, the acceleration of an object tells us the rate at which the velocity, speed and/or direction, changes. The slope of a line gives us information about the magnitude of the rate of change, the steeper the slope the higher the rate of change and vice versa.

Research Question: How does the shape of the graph representing the relationship between displacement vs. time, velocity vs. time, and acceleration vs. time offer information about the motion of an object?

Materials:

Graph paper	Timers
Calculator	Meter Sticks or Trundle Wheels
Clipboards	Computers (not essential)

Procedure:

1. Organize the students such that there are enough timers to have two times for each data point (see Figure 1). Make sure that all the students have a copy of the data sheet form (see the data collection section of this laboratory) and a clipboard.
2. Measure 100 meters (if possible conduct this activity on the schools track) and place two students with timers every 10 meters.
3. Some students volunteers need to perform one of the following activities (each activity needs a volunteer):
    a. Walking at a uniform pace
    b. Walking faster and faster
    c. Running at a constant rate
    d. Sprinting
    e. Oscillating (moving back and forth). In this case the student should start in the middle (the 50 meter mark) and move back and forth. It is not necessary for the student to reach the starting and finishing line every time.
    f. A combination of some or all of the previous motions.

Procedure (continuation):

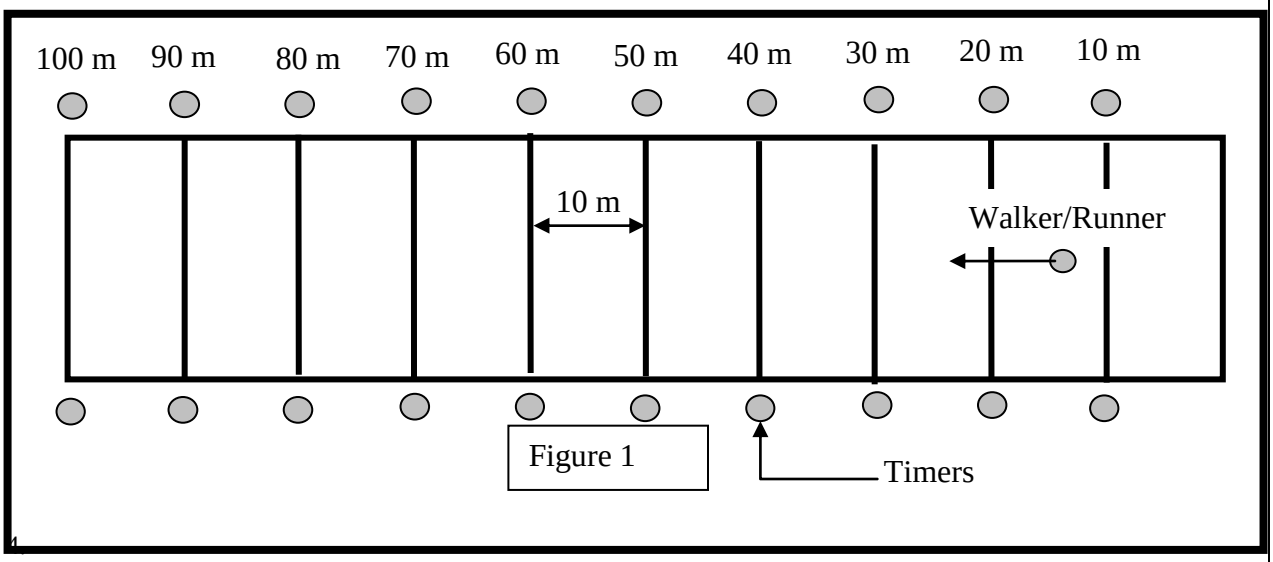


Figure 1

4. The timers need to agree in a signal that all timers can see, and use it to indicate when all the timers will to start their timers.
5. The first student will walk from the starting line (0 meters) to the finish line (100 meters) at a constant pace. As the student passes in front of each pair of timers, the timers should stop their timer and record the time.
6. Repeat this process for each type of motion described on step 3.
7. Students need to share their information. In general the two times for each distance will be very close. If not they are not close, use personal judgment to either accept one or the other, take an average or disregard both times. (Note: I have found that the best way to do this is to have everybody back in the classroom and fill out a blank data sheet placed on an overhead projector or, if available, filling a spreadsheet and then printing enough copies for the whole class).

Data Collection:

(See following pages)

Data Calculations

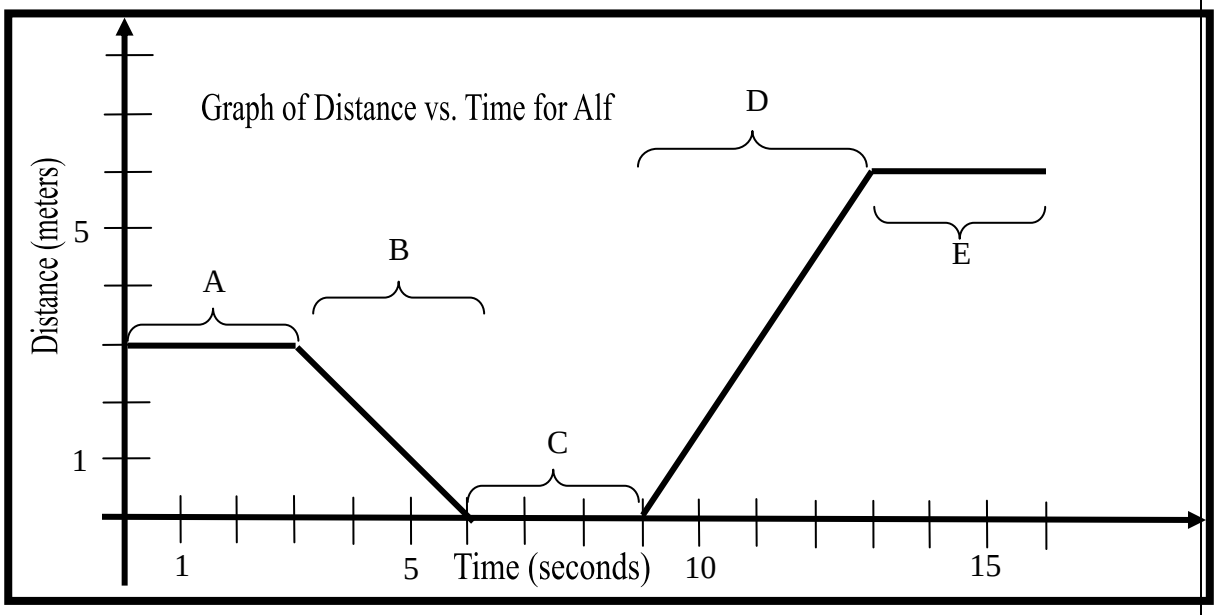
1. Draw a distance vs. time graph for each type of motion studied on this lab. Use a separate sheet of graph paper for each one.
2. Select two of the types of motion and calculate the velocity of the walking/running student on each 10 meter interval. Record answers on the Velocity Data Sheet. Calculate the average speed for each interval using the expression

$$\langle v \rangle = \frac{v_f + v_i}{2} = \frac{d}{t}$$

Where v_f is the final velocity, v_i is the initial velocity, d is the distance travel (10 meters in our case), t is the time that it took for the student to cover the distance d, and $\langle v \rangle$ is the average speed.

Analysis

1. Identify regions that represent one of the two types of motion analyzed in part two of the calculations on each distance vs. time graphs (See example below).



A → Alf was standing still at 3 m of the detector for 3 seconds.
B → Alf was moving for 3 seconds with constant speed towards the detector
C → Alf was standing still next to the detector for 3 second.
D → Alf was moving away from the detector for 4 seconds with constant speed.
E → Alf was standing still for 3 seconds at 6 m of the detector.

2. As done for the previous section, identify, on each of velocity vs. time graph, the particular type of acceleration/deceleration (uniform acceleration, not uniform acceleration) taking place.

Timing Data Sheet																				
	10 m		20 m		30 m		40 m		50 m		60 m		70 m		80 m		90 m		100 m	
Walking at a constant rate																				
Walking faster and faster																				
Running at a constant rate																				
Sprinting																				
Oscillating																				

Timing Data Sheet (Averages)										
	10 m	20 m	30 m	40 m	50 m	60 m	70 m	80 m	90 m	100 m
Walking at a constant rate										
Walking faster and faster										
Running at a constant rate										
Sprinting										
Oscillating										

Average Velocity Data Sheet										
	10 m	20 m	30 m	40 m	50 m	60 m	70 m	80 m	90 m	100 m
Walking at a constant rate										
Walking faster and faster										
Running at a constant rate										
Sprinting										
Oscillating										

Post-Assessment

Name:	Date:

Instructions: Please answer all the questions the best that you can. Your grade for this assessment is based on the quality of your answers (explanations and thinking) not correctness.

1. Explain the difference between the concepts of speed and velocity. Give an example of a situation in which you would use each one.

2. Explain what is mean by saying that a car is accelerating. What is mean by saying that a car is decelerating?

3. Explain if the following statement is true or false, “if the velocity of an object is zero, its acceleration must be zero”

4. Explain if the following statement is true or false, “heavier objects fall faster than lighter objects”

Post-Assessment (continuation)

5. An object moves with constant velocity of 10 m/s for 20 seconds, it then accelerates at a rate of $2m/s^2$ for 10 seconds and then moves with constant velocity of 50 m/s for 20 seconds. Sketch a graph for the motion of this object.

Review Questions 10
Force, Mass, Velocity and Acceleration

1. How much force is needed to accelerate a 500.0-kg car at a rate of 4.000 m/s/s?

   A. 125.0 N
   B. 2,000. N
   C. 250.0 N
   D. 4,000. N

2. Two equal forces act at the same time on the same stationary object but in opposite directions. Which statement describes the object's motion?

   A. It remains stationary.
   B. It accelerates.
   C. It moves at a constant speed.
   D. It decelerates.

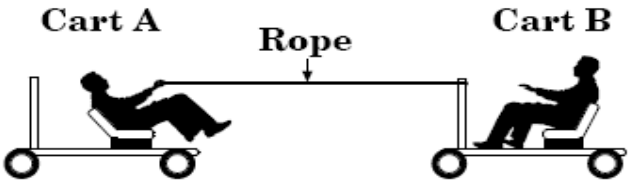
3. A 100-N force causes an object to accelerate at 2 m/s/s. What is the mass of the object?

   A. 0.02 kg
   B. 102 kg
   C. 50 kg
   D. 200 kg

4. A chair exerts a force of 20 N on a floor. What is the force that the floor exerts on the chair?

   A. 10 N
   B. 21 N
   C. 20 N
   D. 40 N

5. Carts A and B have the same mass. Both students have a mass of 80 kg.



   If the student in cart A pulls the rope, what will result?

   A. Cart A will move toward a stationary Cart B.
   B. Cart B will move toward a stationary Cart A.
   C. Both carts will move toward each other.
   D. Cart B will move faster than Cart A.

6. A student in a boat decided to go for a swim. He dove off the back of the boat, as shown in the diagram. The boat moved in the direction shown by the arrow.

   Which statement ***best*** explains why the boat moved in the direction shown?

   A. A body in motion tends to remain in motion.
   B. The acceleration of a body is directly proportional to the force applied.
   C. For every action there is an equal and opposite reaction.
   D. Friction on the bottom of the boat was reduced because of the lake water.

7. A car's velocity changes from 0 m/s to 40 m/s in 5 seconds. What is the average acceleration of the car?

   A. 5 m/s/s
   B. 35 m/s/s
   C. 8 m/s/s
   D. 200 m/s/s

8. A rocket sled accelerates from 10 m/sec to 60 m/sec in 2 seconds. What is the acceleration of the sled?

   A. 10 m/sec^2
   B. 25 m/sec^2
   C. 40 m/sec^2
   D. 20 m/sec^2

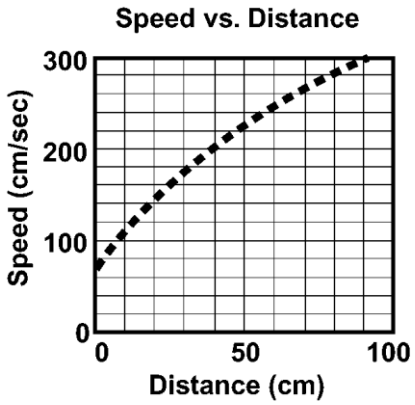
9. John Force, a drag racer, starts from a stopped position he reaches a speed of 140 m/sec in 7 seconds. What is his acceleration?

   A. 147 m/sec^2
   B. 200 m/sec^2
   C. 0.5 m/sec^2
   D. 20 m/sec^2

10. A rocket can fly into space because

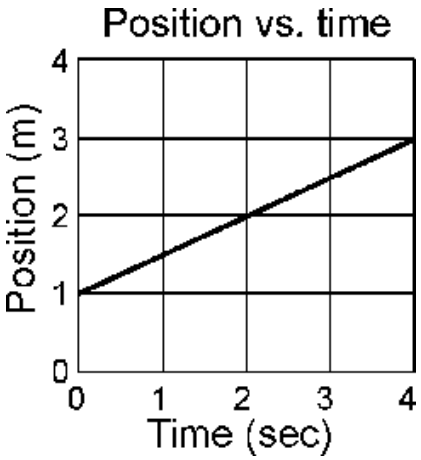
   A. when it is launched, the hot exhaust gases hit the ground and push the rocket forward.
   B. the rocket pushes the exhaust gases backward, and there is an equal and opposite reaction pushing the rocket forward.
   C. when the gases are burning up, the mass of the rocket decreases, changing the amount of gravity on the rocket.
   D. the launch pad pushes the rocket forward like a slingshot.

11. Use the graph to predict the speed of the car when the car is at 60 cm.



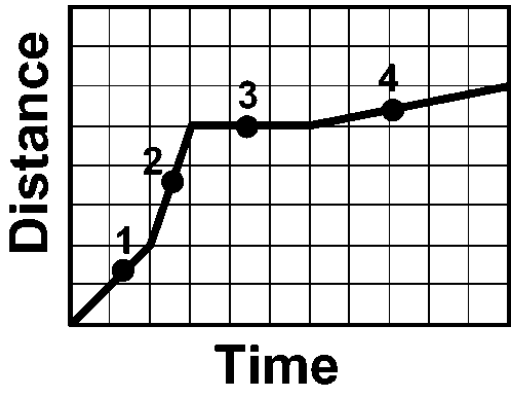
   A. 220 cm/sec
   B. 230 cm/sec
   C. 240 cm/sec
   D. 250 cm/sec

12. Calculate the speed of the object from the position vs. time graph shown below.



   A. 0.5 m/sec
   B. 0.75 m/sec
   C. 2 m/sec
   D. 3 m/sec

13. At which of the following points on the graph is the speed the greatest?



A. Point 1
B. Point 2
C. Point 3
D. Point 4

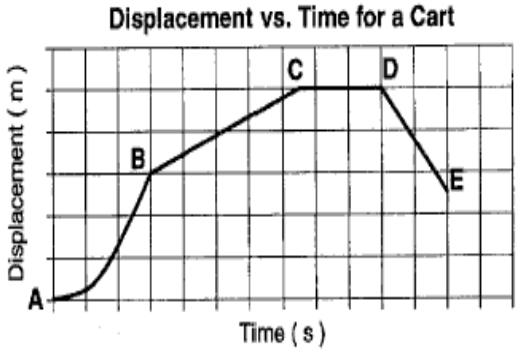
14. Compared to your weight and mass on Earth, if you were on the moon

A. your weight and mass would be less.
B. your weight would be less but your mass would remain the same.
C. your weight would remain the same, but your mass would be less.
D. your weight would increase, but your mass would remain the same.

15. A car passed a truck on the road. The car accelerates from 20 meters/second to 24 meters/second in 2 seconds. What was the car's acceleration?

A. 2 meters/second/second
B. 4 meters/second/second
C. 12 meters/second/second
D. 22 meters/second/second

16. The displacement-time graph below represents the motion of a cart along a straight line. During which interval is the cart NOT moving at constant speed?



A. AB
B. BC
C. CD
D. DE

17. A vehicle travels a distance of 160 km in 5 hours. The average speed is

A. 32 km/hr
B. 40 km/hr
C. 80 km/hr
D. 165 km/hr