SIMPLE MACHINES

Scientific Method for Students

The Scientific Method is a series of logical, progressive steps used to find out if evidence supports a prediction. This is an excellent set of procedures for the beginning scientist to follow.

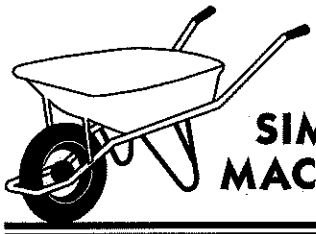
1 Consider a **Question** to investigate.

2 **Predict** what will happen. (State your hypothesis.)

3 Create a plan or **Procedure** to investigate.

4 Record all of the **Observations** of the investigation.

5 Write a **Conclusion**.

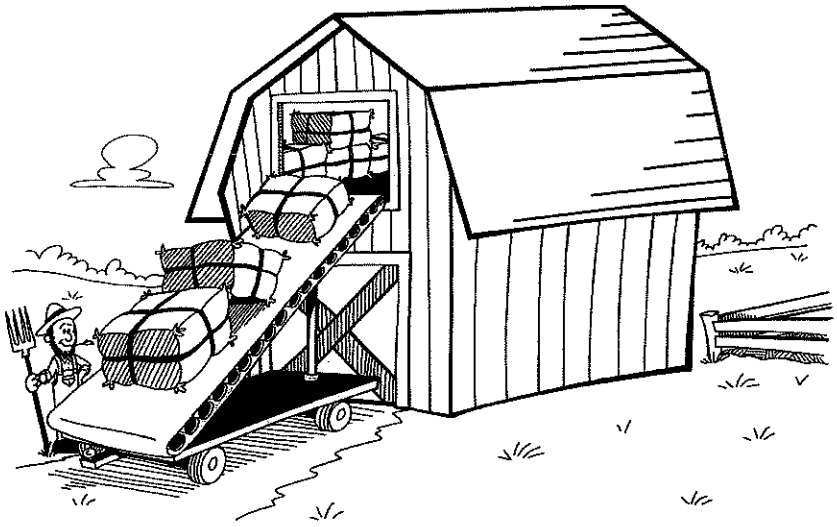


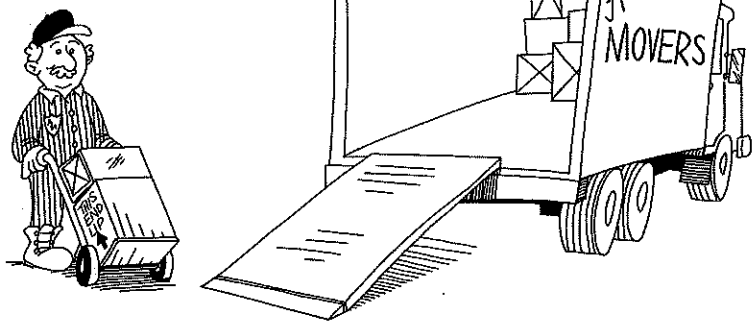
SIMPLE MACHINES

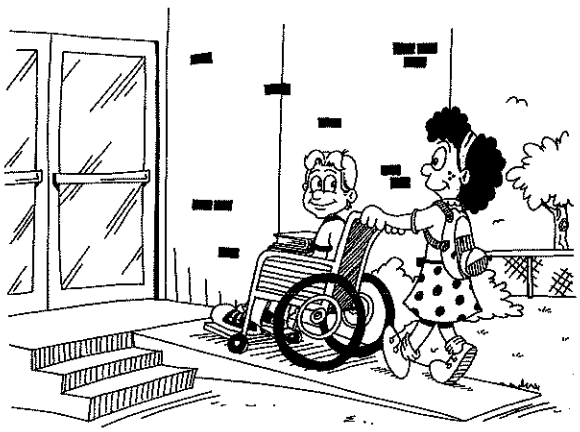
Inclined Plane

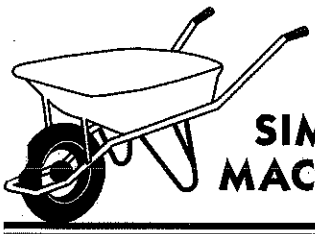
Name:_____

The **inclined plane** is a sloping surface which allows an object to be moved from one elevation to another with less effort than lifting. Using an inclined plane requires **less work**, but effort occurs over a **greater distance**. Pushing or pulling the object using an inclined plane is easier than lifting the object. Color each inclined plane below.









SIMPLE MACHINES

Inclined Plane

Experiment 1

Question: Does an inclined plane make lifting easier?

Materials Required:

- two shoe boxes
- a one-meter (one-yard) string or rope
- a one- to two-meter (three- to six-foot) board
- several weights of equal mass
- a student desk
- a meter stick (yard stick)

Procedure:

Part 1

1. Fasten the string or rope to the shoe boxes. Label them Box A and Box B.
2. Place Box A on the floor and hang Box B over the desk.
3. Begin to place weights into Box B until Box A begins to lift upward.
4. Continue until Box A reaches the top of the desk.
5. Measure the distance from the floor to the top of the desk.
6. Record the amount of weight required to lift Box A.

Part 2

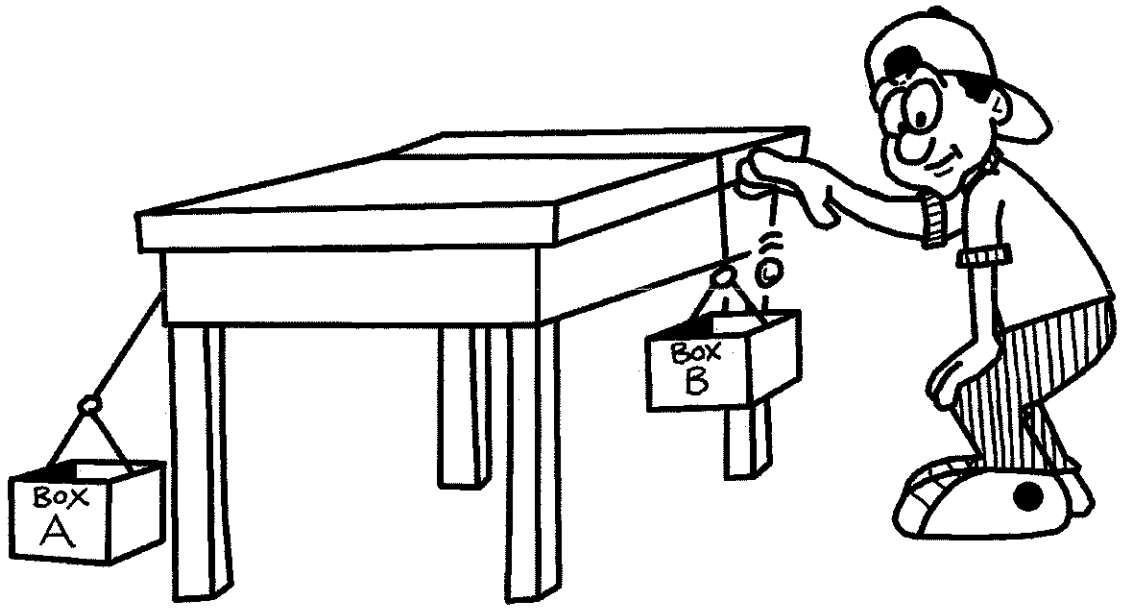
7. Place one end of the board on the floor and the other end on the desk.
8. Repeat steps 1 to 4, but this time Box A should be placed on the board to begin.
9. Measure the distance the box traveled on the board.
10. Compare the amount of weight required to lift Box A to the same elevation of the desk, with and without the use of an inclined plane. Compare the distance traveled.

Conclusion: The students will discover that less weight is required to lift the box using an inclined plane. Have the students complete the student experiment sheet (p. 13). Ensure the students include a diagram.

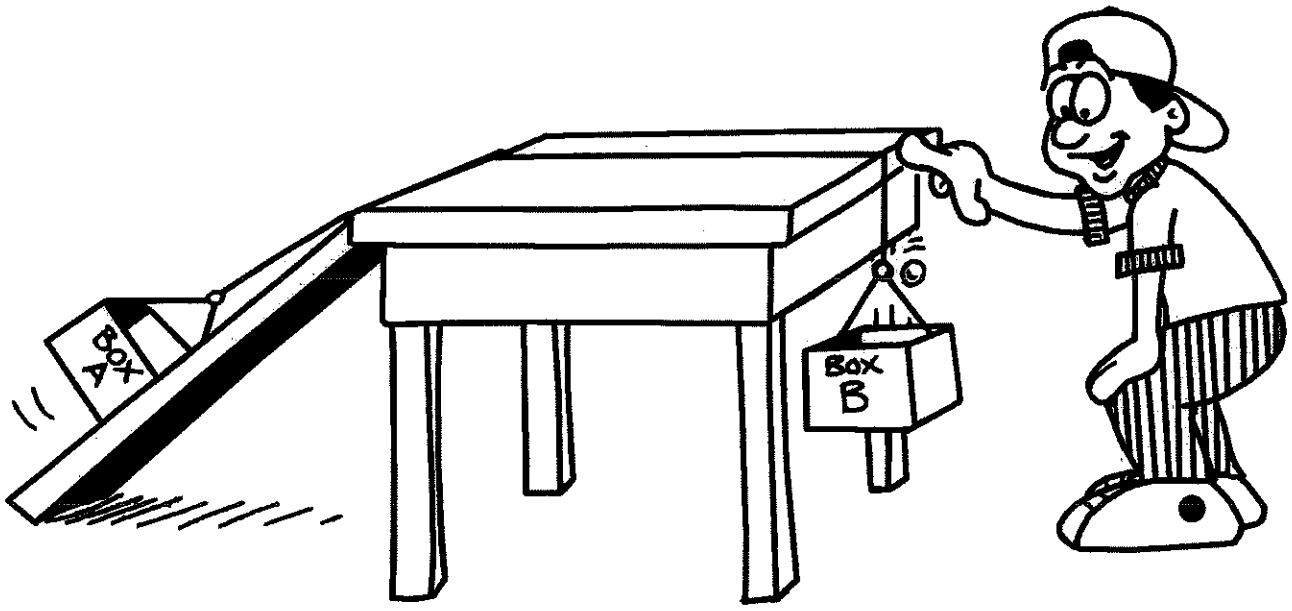
Inclined Plane

Experiment 1

Part 1



Part 2



SIMPLE MACHINES

Inclined Plane

Name:_____

Experiment 1

Question: Does an inclined plane make lifting easier?

Prediction: _____

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Procedure: _____

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Observations: _____

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Conclusion: _____

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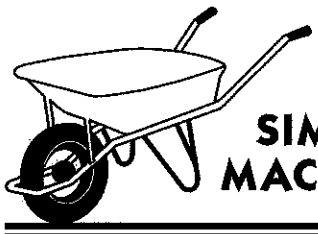


SIMPLE MACHINES

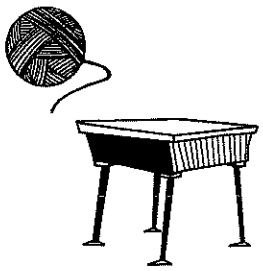
Inclined Plane

Experiment 2

Question: **Does increasing or decreasing the slope of an inclined plane change the amount of effort required to lift an object?**

Materials Required:

- two shoe boxes
- string or rope (length will vary)
- several boards of varying lengths
- several weights of equal mass
- a student desk
- a meter stick (yard stick)



Procedure:

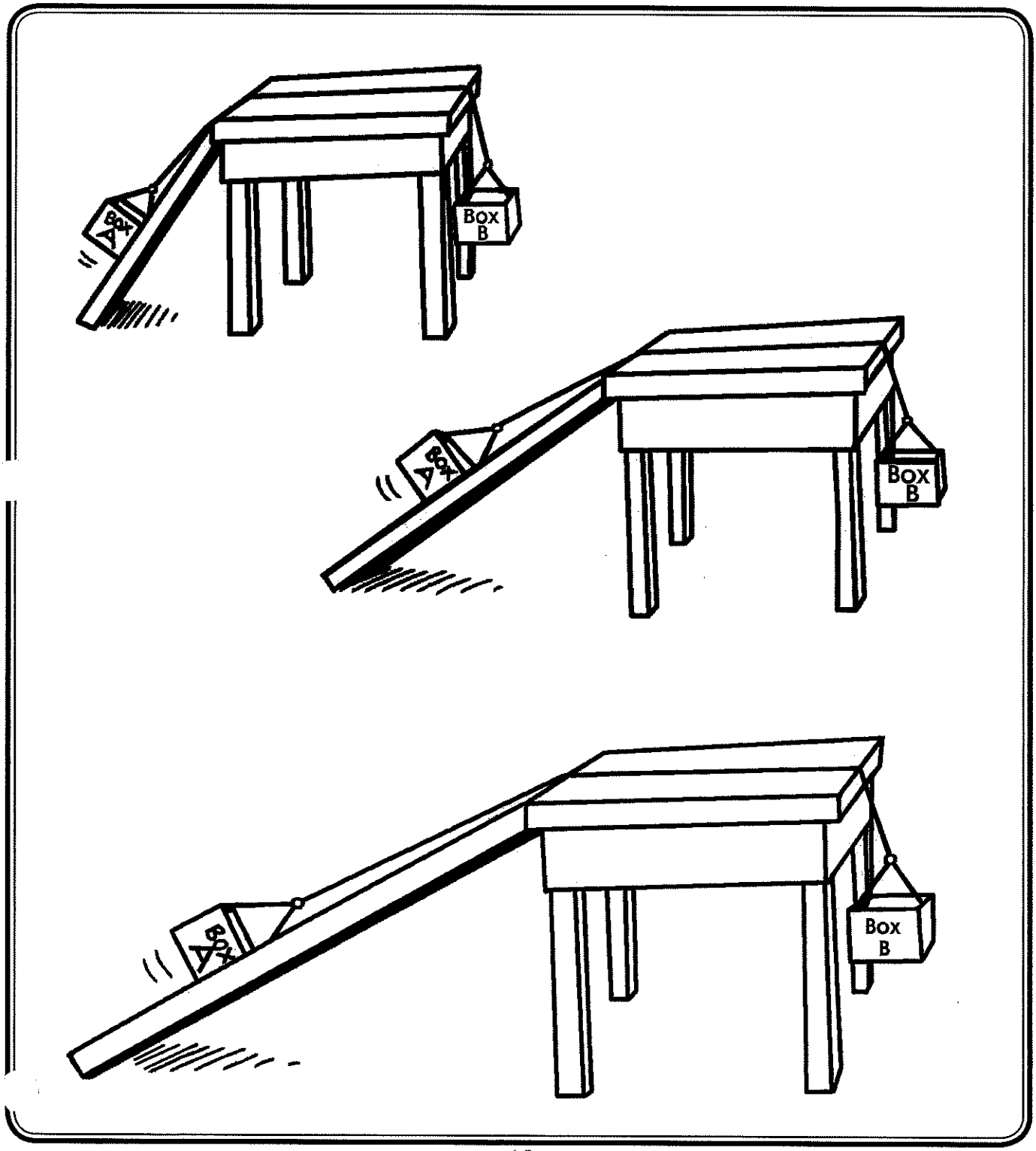
1. Measure the lengths of the boards and record them.
2. Fasten the string or rope to the shoe boxes. Label them Box A and Box B.
3. Place one end of the shortest board on the floor and the other end on the desk.
4. Place Box A on the lower end of the board and hang Box B over the desk.
5. Begin to place weights in to Box B until Box A begins to lift upward.
6. Continue until Box A reaches the top of the desk.
7. Record the amount of weight required to lift Box A.
8. Repeat steps 1 to 7 using another length of board.
9. Compare the amount of weight required to lift Box A to the same elevation of the desk, using inclined planes of different slopes. Compare the distance traveled.
10. Discuss the results with the class.

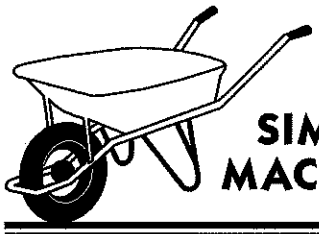
Conclusion: The students will discover that the greater slope requires less effort to lift an object, but the object will travel a greater distance.

Ensure the students complete the student experiment sheet. Have the students include a diagram.

Inclined Plane

Experiment 2





SIMPLE MACHINES

Inclined Plane

Name: _____

Experiment 2

Question: Does increasing or decreasing the slope of an inclined plane change the amount of effort required to lift an object?

Prediction: _____

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Procedure: _____

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Observations: _____

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Conclusion: _____

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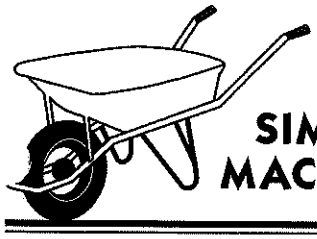
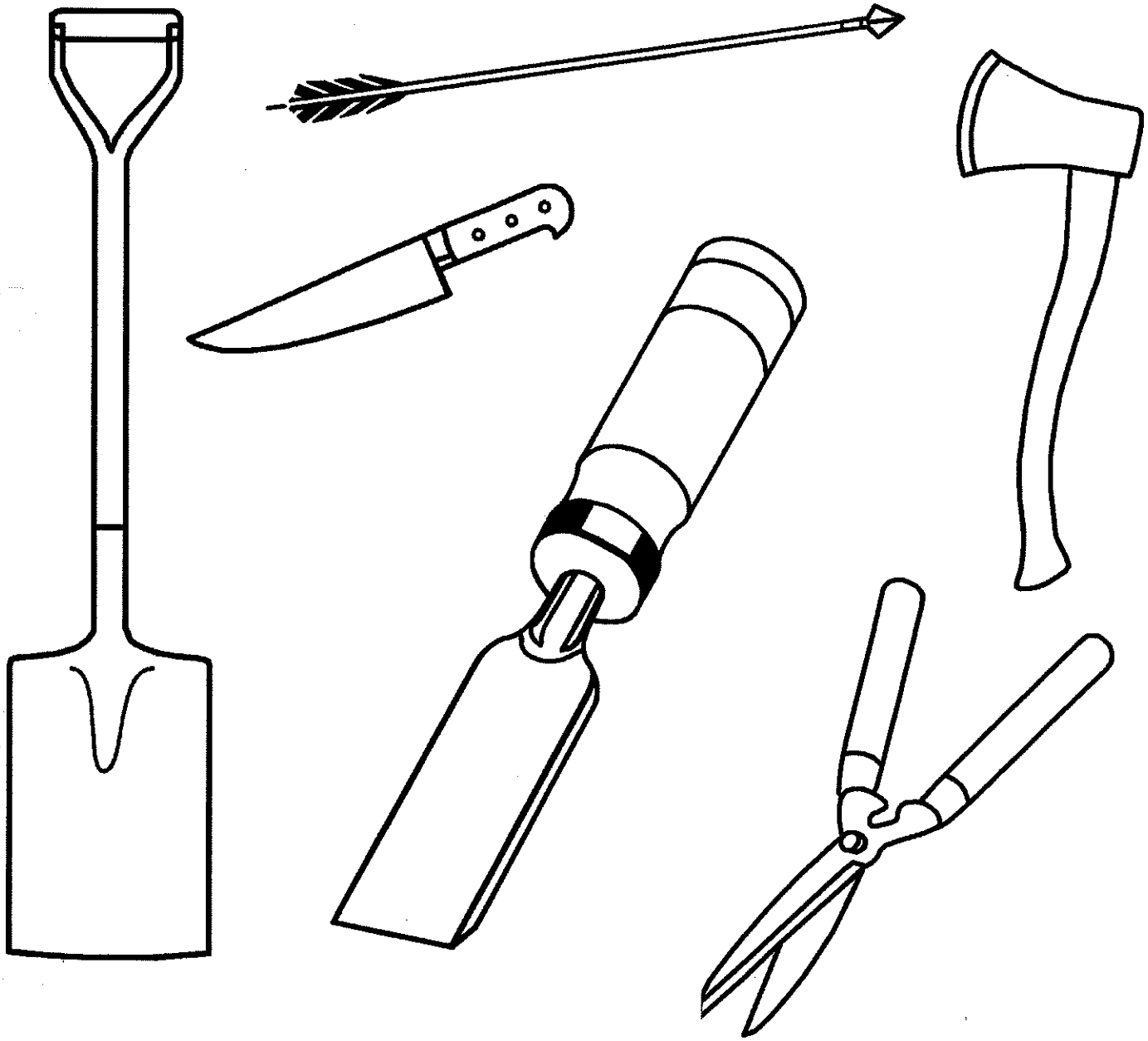


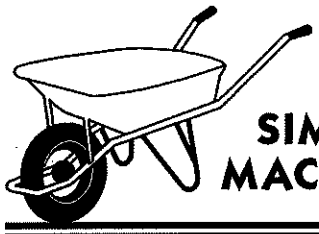
SIMPLE MACHINES

The Wedge

Name:_____

A **wedge** is an inclined plane that **moves**. It is tapered to a thin edge at one end and can be somewhat thicker at the other end. A wedge can be used to raise and object or split an object apart. Wedges are usually made of wood or metal but can be made of many other materials. Color each wedge below.





SIMPLE MACHINES

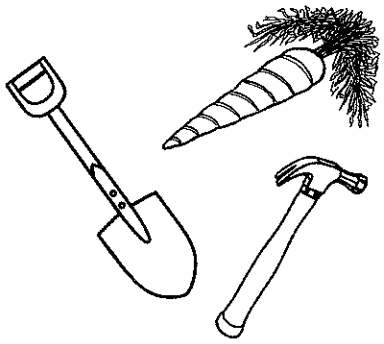
The Wedge

Experiment 1

Question: How is a wedge used?

Materials Required:

- a door stop
- a block of wood
- a shovel
- a knife
- a carrot
- a hammer



Procedure: Part 1

1. Place a block of wood against an open door.
2. Ask a student to close the door.
3. Place a door stop (wedge) under the door.
4. Ask a student to close the door.
5. Discuss why it was more difficult to close the door when using the doorstop.

Part 2

6. Using a knife like a saw, try to cut a cross-section of a carrot.
7. Place the knife across the carrot and strike the back of the knife with a hammer.
8. Discuss which method was the most effective to cut the carrot.

Part 3

9. Take the class out into the schoolyard.
10. Choose one student to dig the shovel into the ground.
11. Discuss how the shovel worked and the amount of force required.

The Wedge

Experiment 1

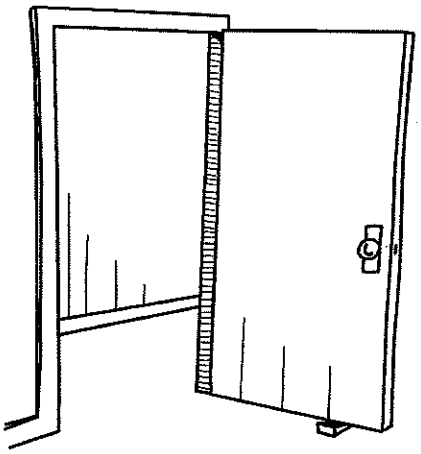
Conclusions: The doorstop raises the door, therefore making it very difficult to close. The further the wedge is driven under the door, the more the door is raised.

The knife acts as a wedge, driving the carrot apart when it is struck with the hammer. It will also separate the carrot when used in a saw-like fashion, but it will take longer to accomplish the goal.

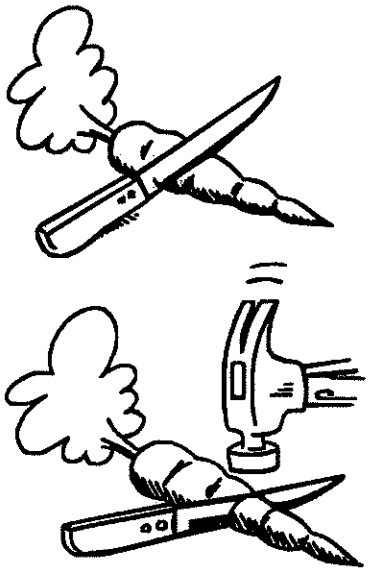
The shovel, when force is applied, will enter the ground with a parting movement.

Have the students complete the student experiment sheet. Ensure the students include a diagram.

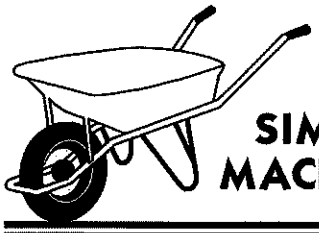
Part 1



Part 2



Part 3



SIMPLE MACHINES

The Wedge

Name: _____

Experiment 1

Question: How is a wedge used?

Prediction: _____

_____

Procedure: _____

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Observations: _____

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Conclusion: _____

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The Wedge

Name:_____

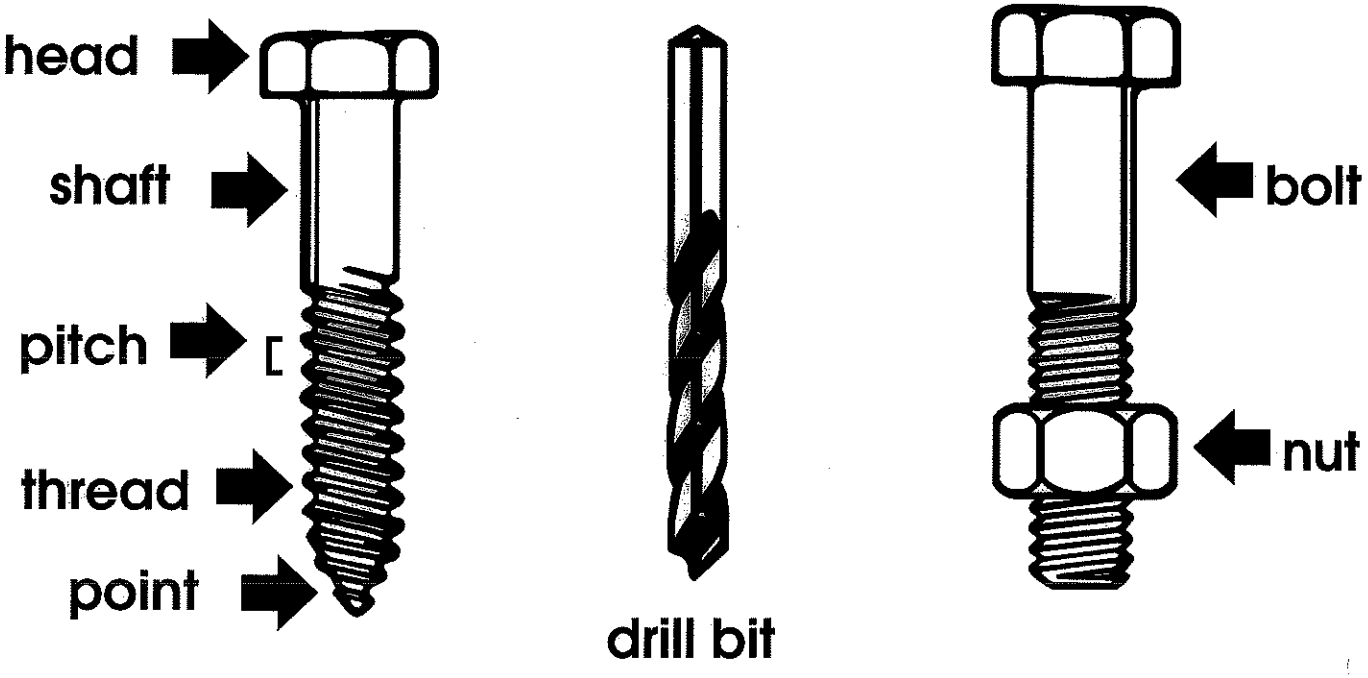
Activity 1

Color only the items on the page that use a wedge.

The Screw

The **screw** is a simple machine which is closely related to the inclined plane. It is made up of a head, a shaft, and a pointed end. A **bolt** is similar to a screw but it has a flat end and works together with a **nut**. Another inclined plane is cut (spiraled) into the shaft creating a thread. The distance between each thread is called the pitch. When the screw is turned completely around once, it will travel a distance equal to the pitch. The threads of the screw spiral around the shaft with a very gentle slope, so many turns are required for even a short screw to enter a piece of wood or metal.

A screw is used to fasten two or more items together. For example, two pieces of wood or metal can be fastened together with screws. All power drills and bits work by spiraling or screwing into an object. The propellers on a submarine are sometimes called "screws" because they assist in forward motion of the boat.

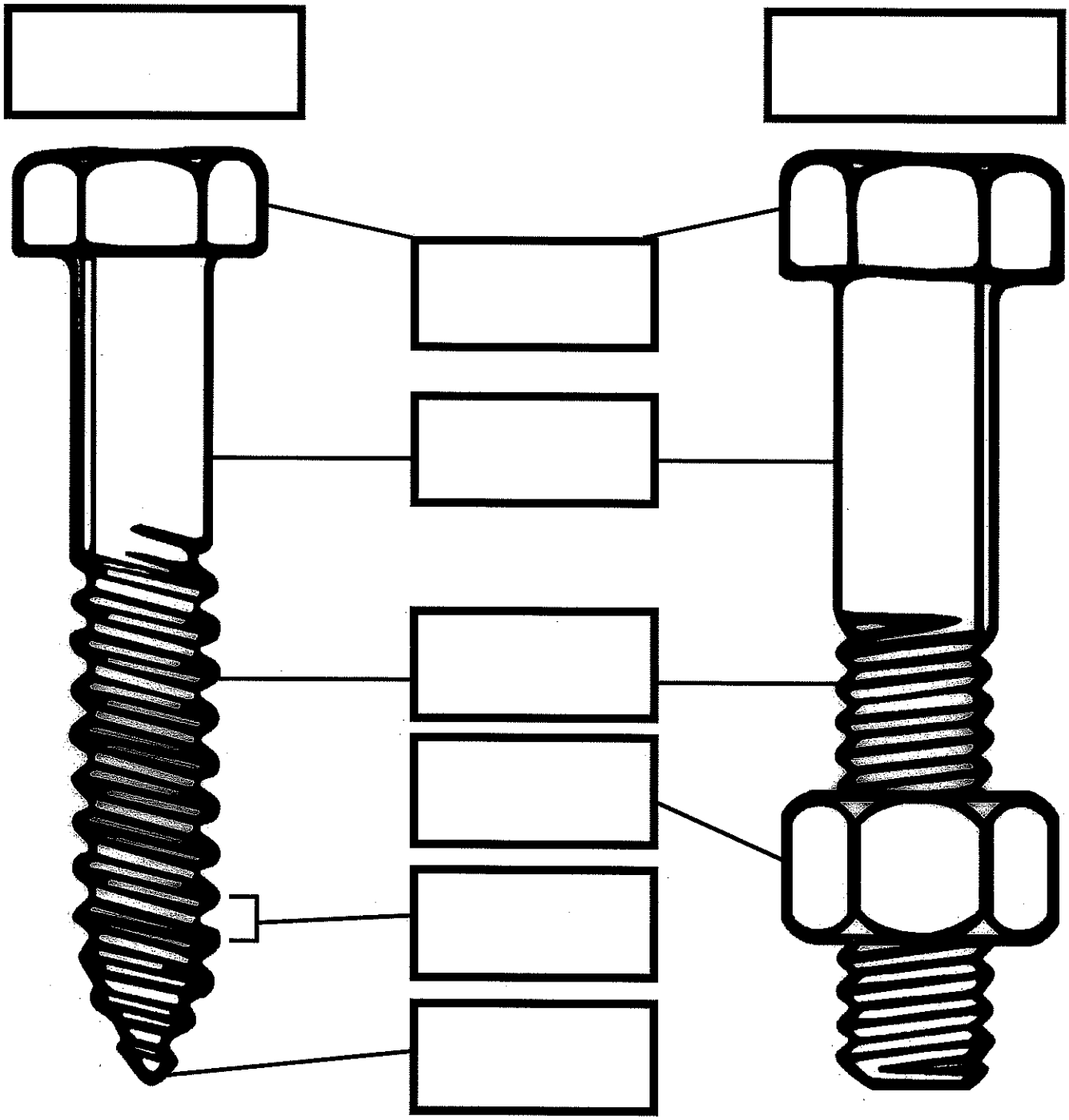


The Screw

Name:_____

Activity 1

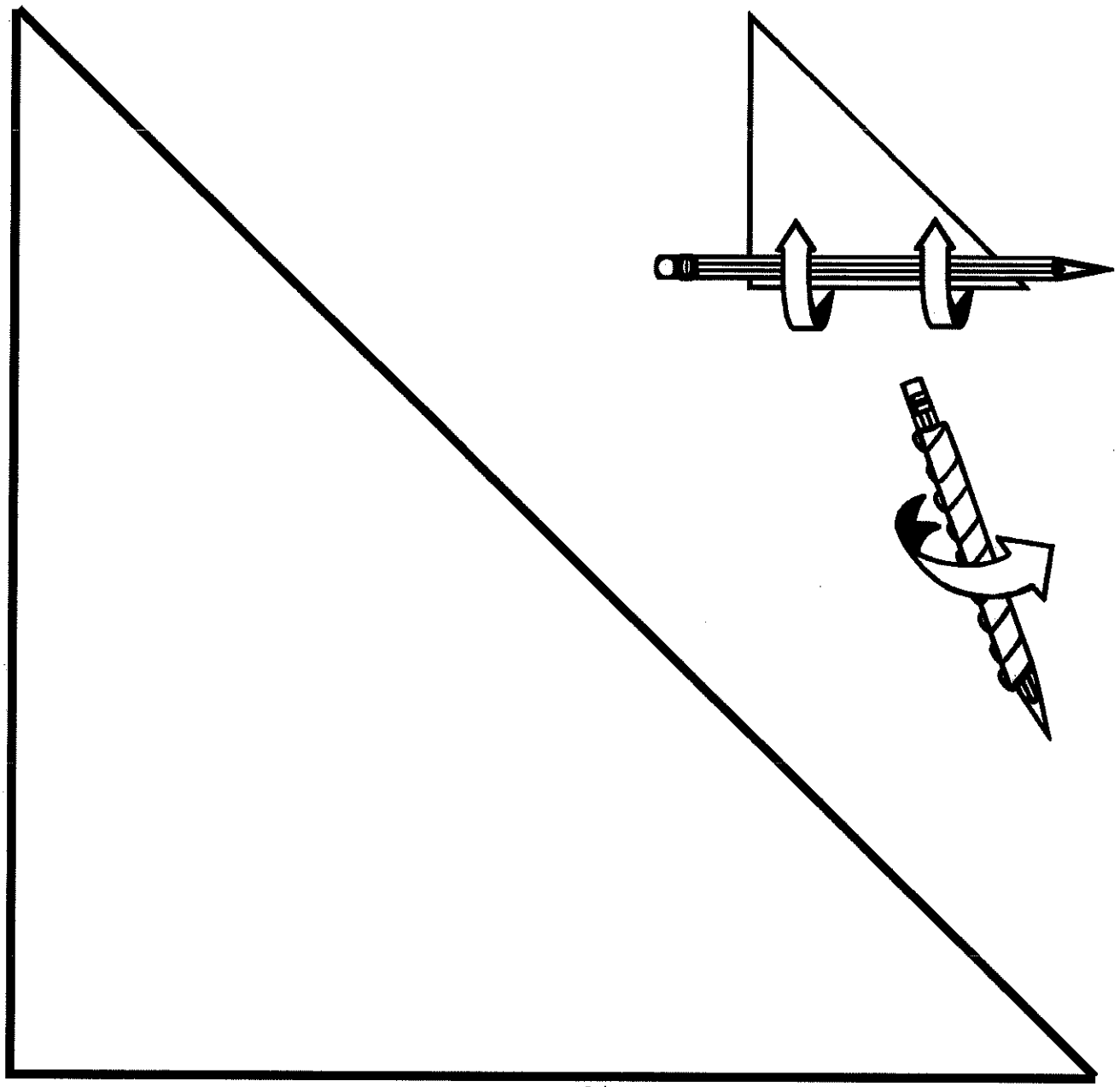
Label the following objects.



The Screw

Activity 2

Cut out the triangle below, and roll it around your pencil or pen to create your own screw (an inclined plane wrapped around a shaft or pole).



SIMPLE MACHINES

The Screw

Experiment 1

Question: How do screws work?

Materials Required:

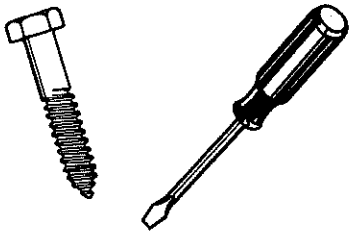
- wood screws (various sizes, lengths, heads)
- a block of soft wood
- various types of screwdrivers

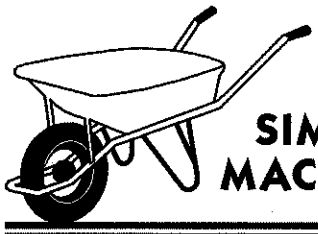
Procedure:

1. Divide the class into small groups of two or three students.
2. Give each group one block of wood, and a variety of screws and screwdrivers.
3. Instruct the students to examine the screws and record their findings.
4. Turn the screws into the wood.
5. Count how many turns it takes to put the screw completely into the wood.
6. Record the results.

Conclusion: A greater number of turns will be required when using screws with a small pitch; however, the work will be easier.

Have the students complete the student experiment sheet. Include a diagram.





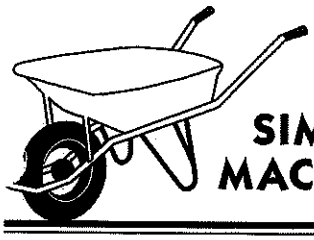
SIMPLE MACHINES

The Screw

Name: _____

Experiment 1

Screw Observation Sheet		
Description	**Picture**	**Number of Turns**
Screw One		
Screw Two		
Screw Three		
Screw Four		



SIMPLE MACHINES

The Screw

Name: _____

Experiment 1

Question: How do screws work?

Prediction: _____

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Procedure: _____

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Observations: _____

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Conclusion: _____

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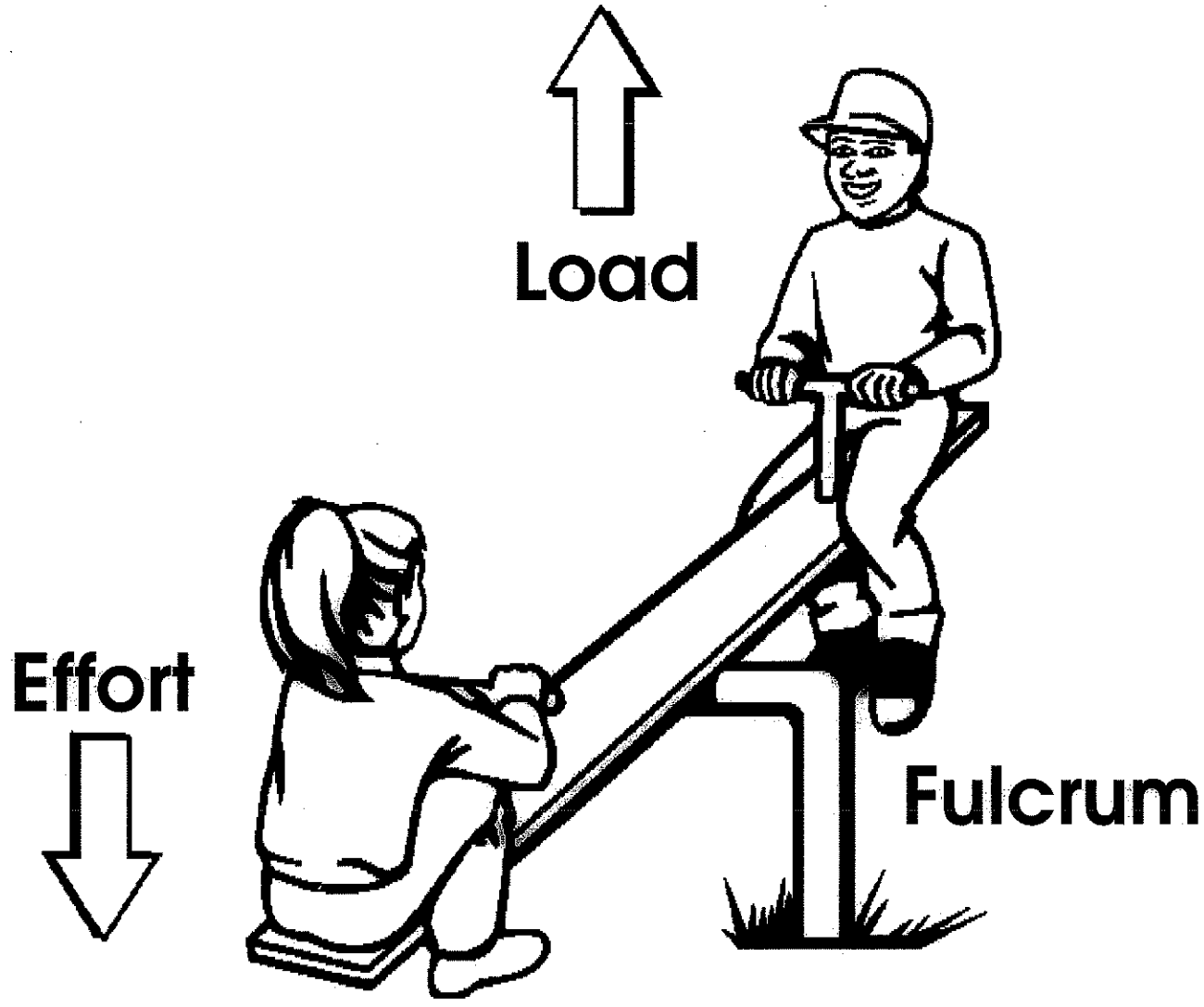
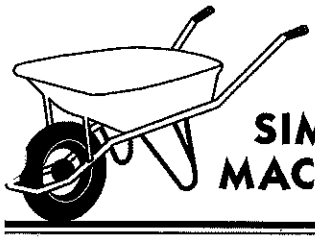
SIMPLE MACHINES

Levers

A **lever** is a simple machine that helps you to lift a large weight with very little effort. It is a bar that turns on a point called a fulcrum. When using a lever, there are three important parts. They are: **effort**, **fulcrum**, and **load**.



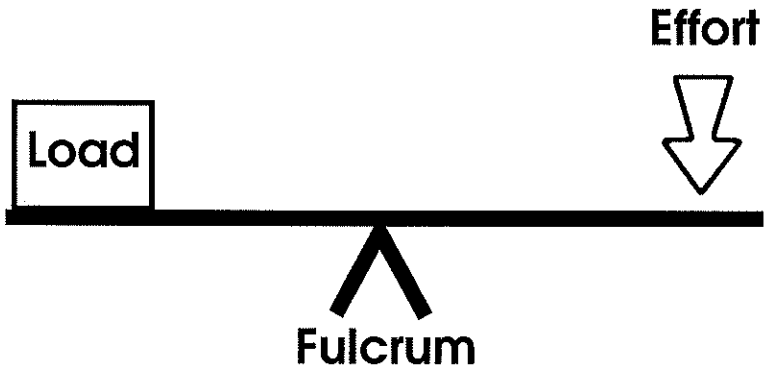


SIMPLE MACHINES

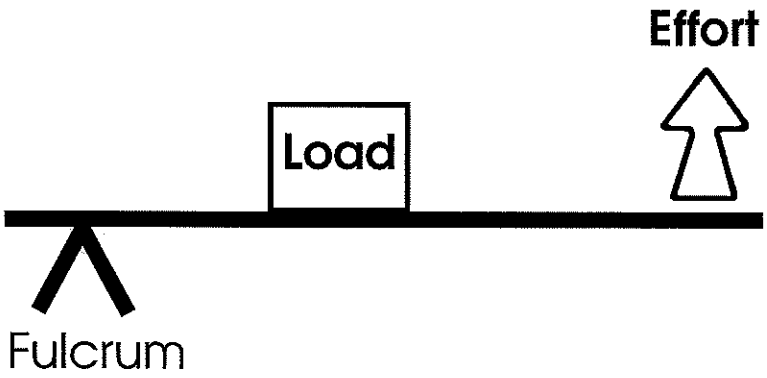
Levers

The **fulcrum** does not always have to be located between the effort and the load. The **effort**, **load**, and **fulcrum** can be arranged in any combination along the bar.

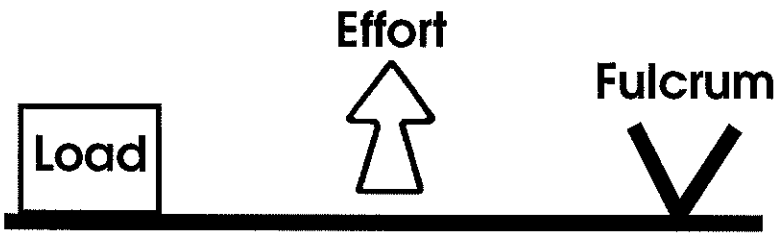
First Class Lever – Example: seesaw

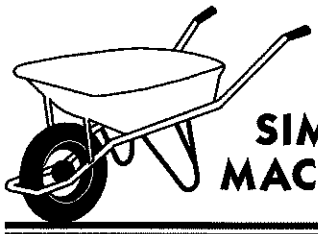


econd Class Lever – Example: wheelbarrow



Third Class Lever – Example: tweezers





SIMPLE MACHINES

Levers

Experiment 1

Question: How does a lever work?

Materials Required:

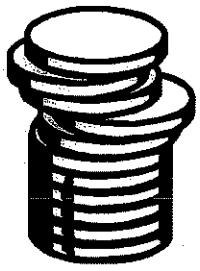
- an eraser
- a ruler
- weights (coins, erasers, etc. of equal mass)

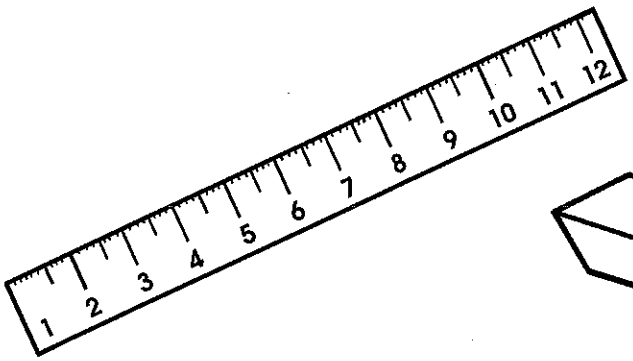
Procedure:

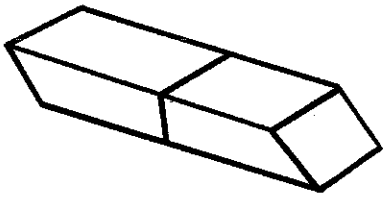
1. Place the eraser on a flat, level surface.
2. Position the ruler on top of the eraser (the eraser will act as the fulcrum) at the 15 cm (6 in) mark so that the ruler is balanced.
3. Move the eraser to various positions (see student diagram (p. 31) along the ruler and using weights, again balance the ruler.
4. Record the amount of weight at each end of the ruler.

Conclusion: When first balanced, the eraser (fulcrum) will be positioned in the middle of the ruler. The end of the ruler to which the fulcrum has been moved will require more weight than the end of the ruler furthest away from the eraser.

Have the students complete the student experiment sheet. Make sure to have the students include a diagram.

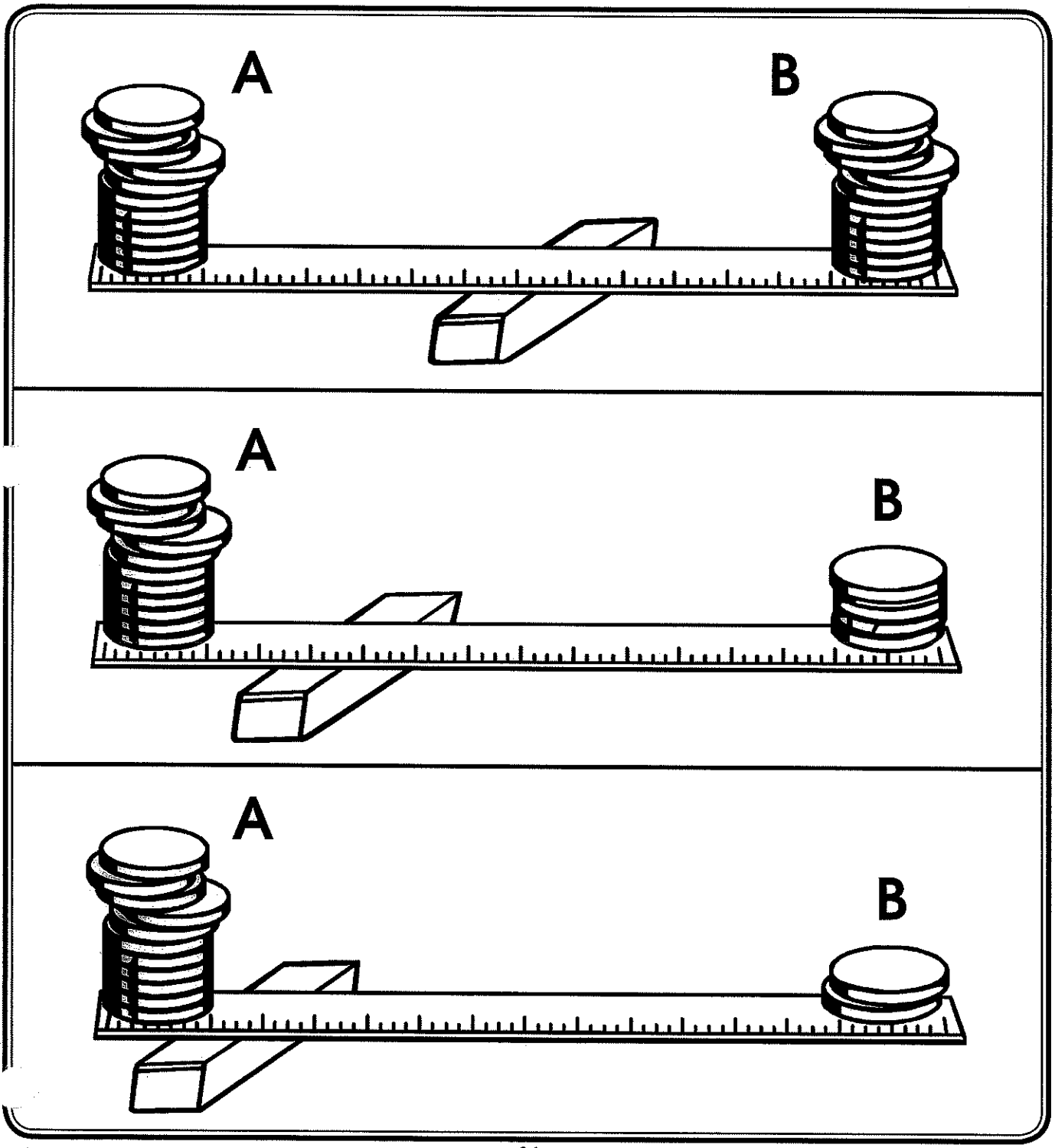


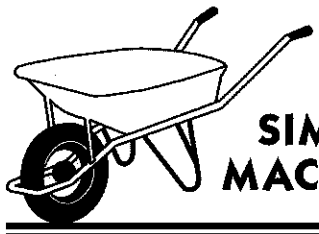




Levers

Experiment 1





SIMPLE MACHINES

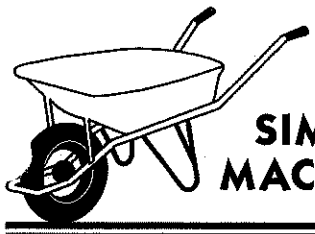
Levers

Name:_____

Experiment 1

Eraser Position	A Weight Required	B Weight Required

Diagram - eraser position at 25 cm (10 in)



SIMPLE MACHINES

Levers

Name: _____

Experiment 1

Question: How does a lever work?

Prediction: _____

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Procedure: _____

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Observations: _____

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Conclusion: _____

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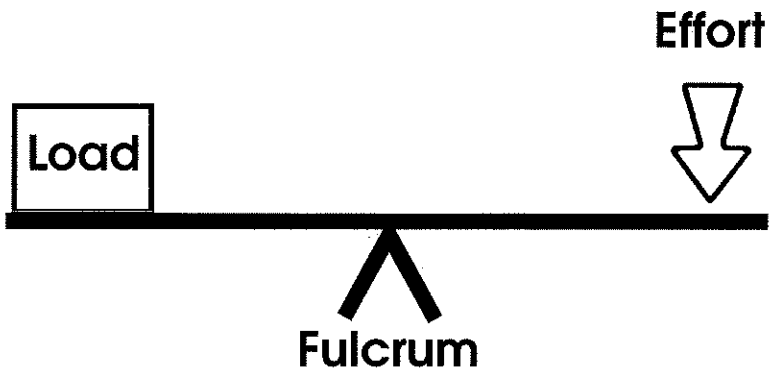
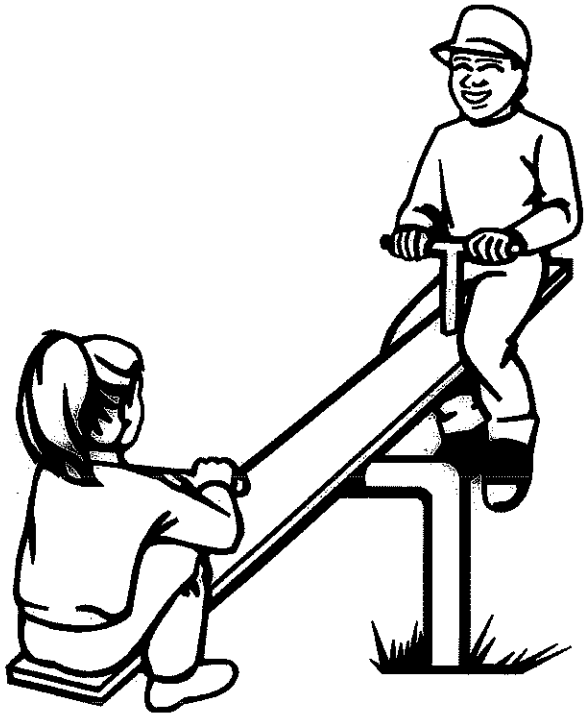
Levers

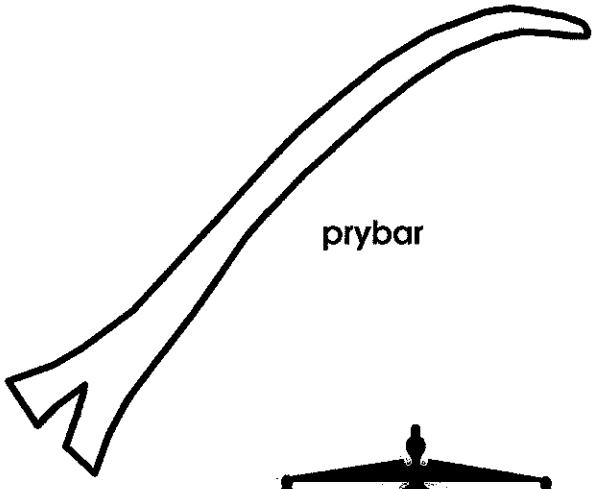
First Class Levers

A **first class lever** has the fulcrum located between the effort and the load.

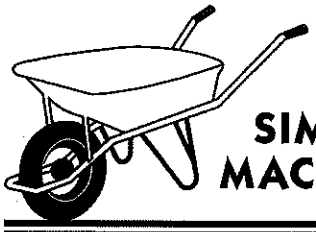




seesaw



scale



SIMPLE MACHINES

Levers

Experiment 2

Question: Do levers help to lift heavy things?

Materials Required:

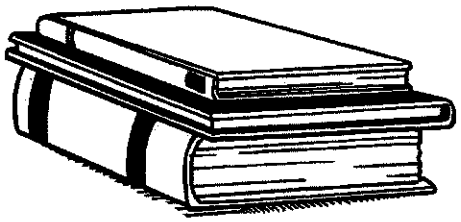
- a wooden board (lever) approximately 120 cm (4 feet)
- a small wooden block (fulcrum)
- several heavy textbooks (load)

Procedure:

1. Place the wooden block on a flat, level surface.
2. Position the board on the block so that the board is balanced.
3. Place the textbooks on one end of the board (A).
4. Using your hand, press down (effort) the other end of the board (B) to lift the textbooks.
5. Describe the effort required to lift the textbooks.
6. Move the fulcrum in a direction away from the textbooks. Repeat steps 4 and 5.
7. Move the fulcrum in a direction toward the textbooks. Again, repeat steps 4 and 5.
8. Compete the student work sheet.

Conclusion: The effort required to lift the textbooks will be considerably less when the fulcrum is closer to the load.

Have the students complete the student experiment sheet. Have the students include a diagram.

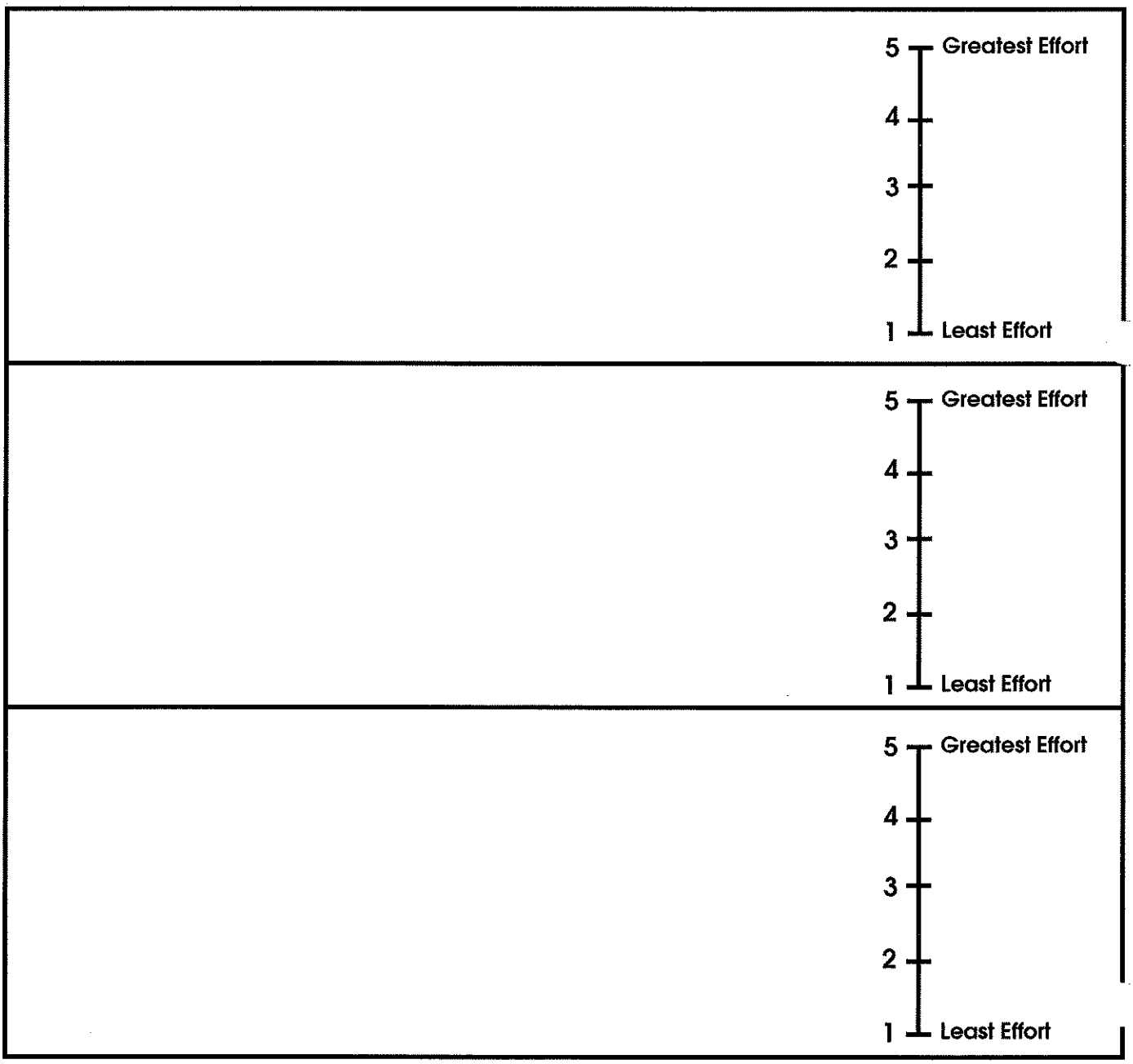


Levers

Name:_____

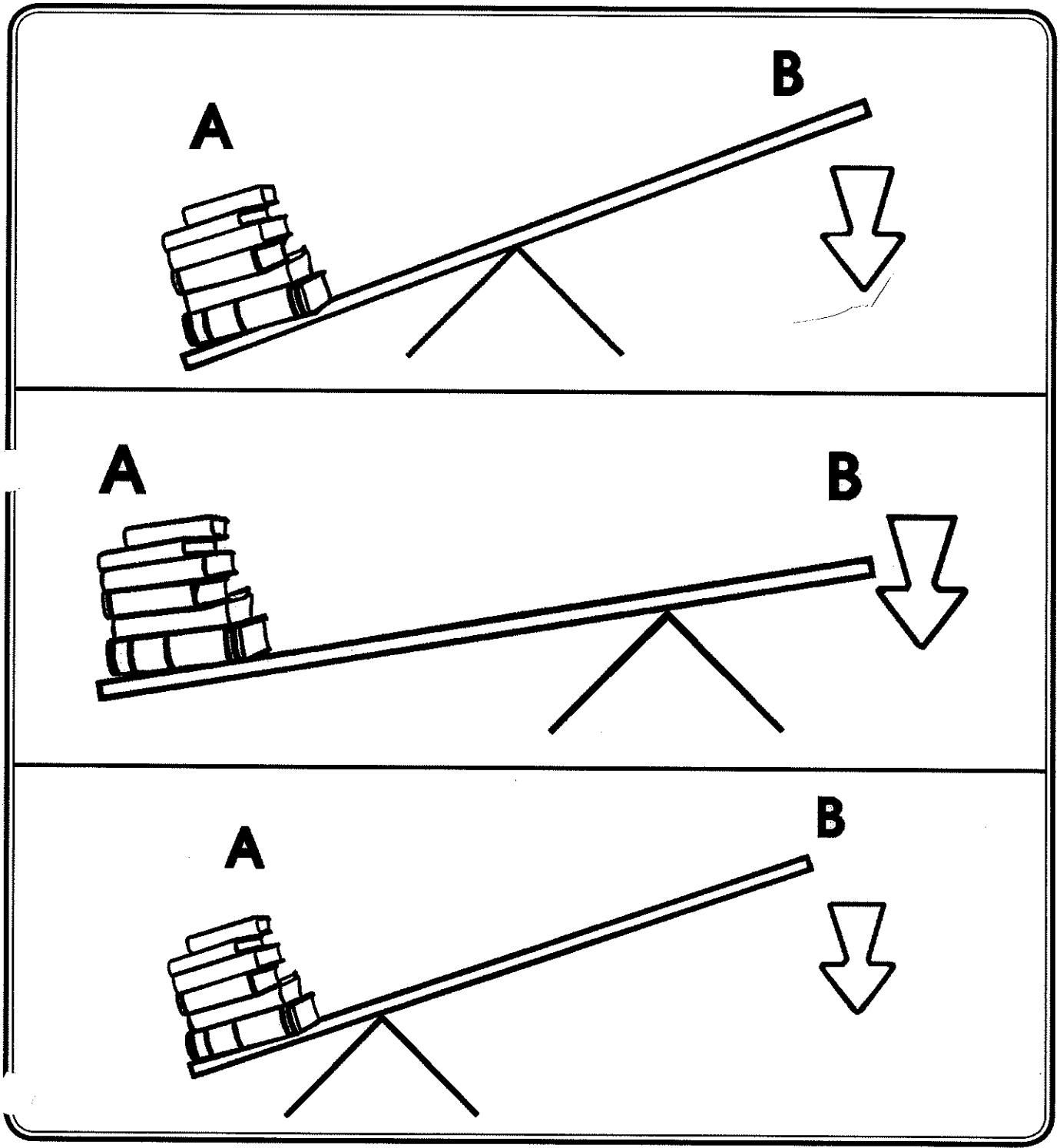
Experiment 2

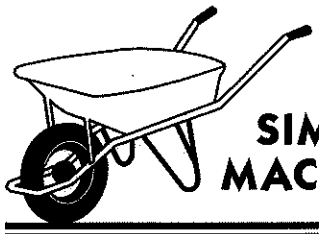
Draw a diagram showing the position of the **fulcrum**, the **effort**, and the **load**. Circle the appropriate number on the scale provided to describe the effort required to lift the textbooks.



Levers

Experiment 2





SIMPLE MACHINES

Levers

Name: _____

Experiment 2

Question: How does a first class lever work?

Prediction: _____

_____

Procedure: _____

_____

_____

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_____

_____

_____

Observations: _____

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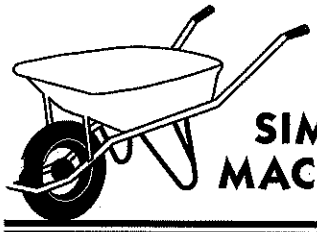
Conclusion: _____

_____

_____

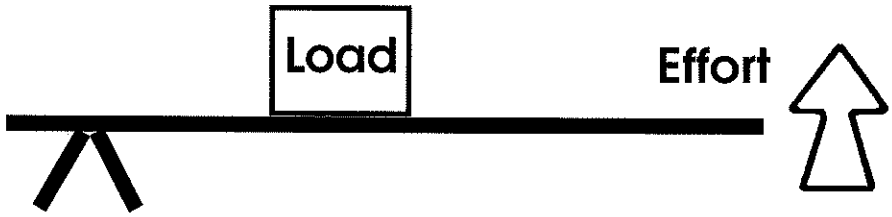


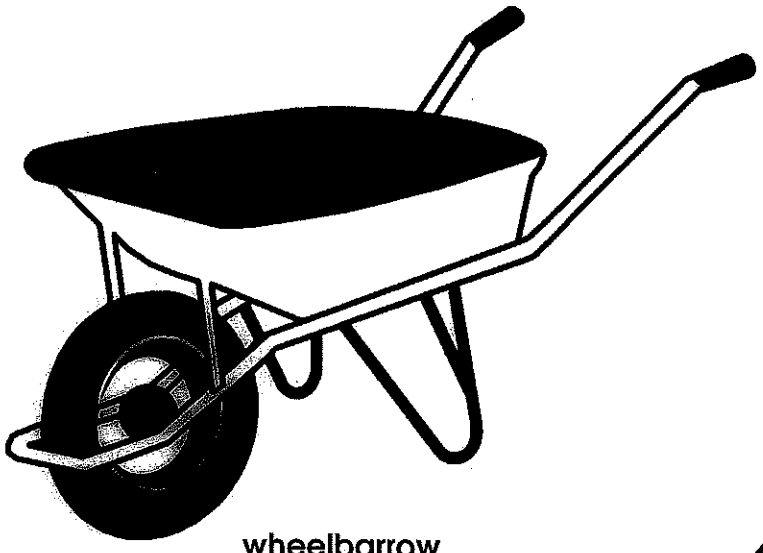
SIMPLE MACHINES

Levers

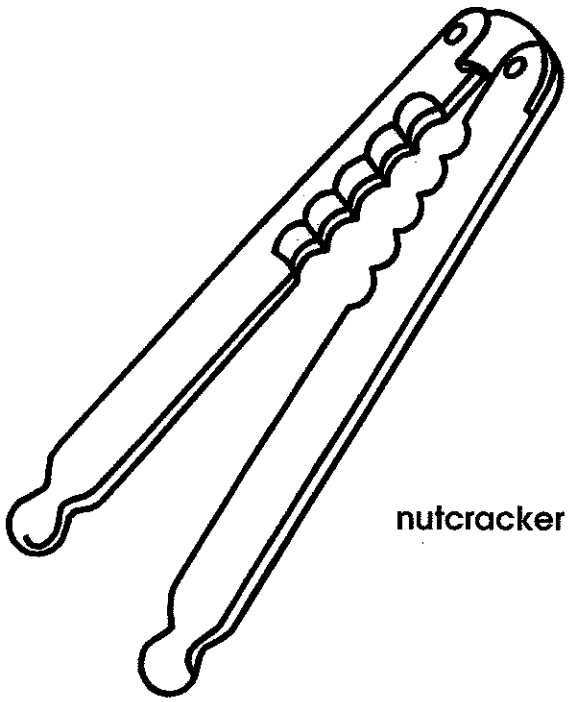
Second Class Levers

A **second class lever** has the load located between the effort and the fulcrum.





wheelbarrow

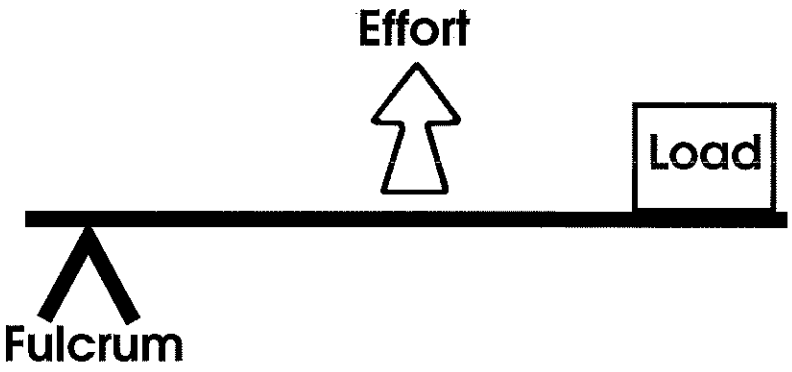


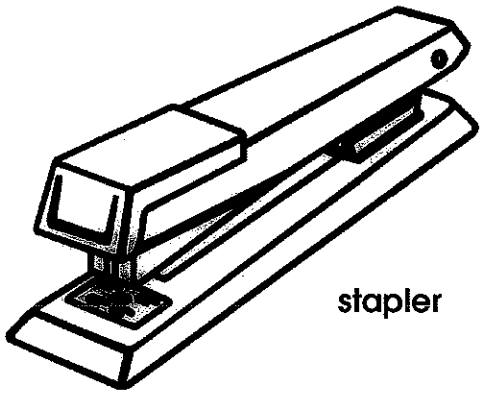
nutcracker

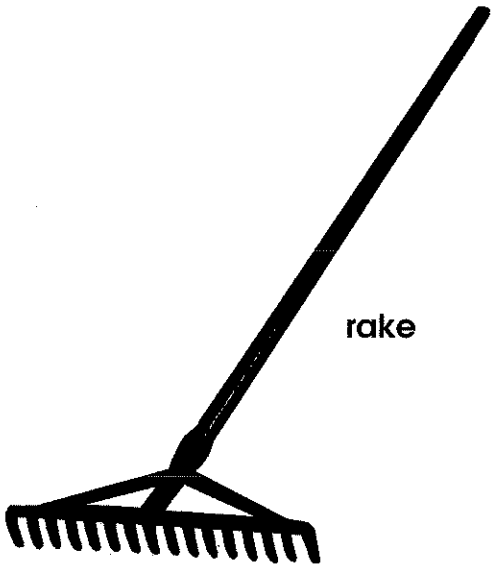
Levers

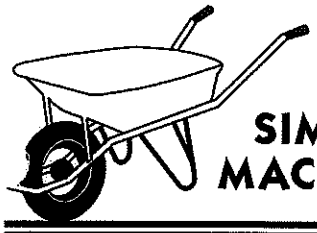
Third Class Levers

A **third class lever** has the effort located between the load and the fulcrum.




stapler


rake



SIMPLE MACHINES

Levers

Experiment 3

Question: Does changing the location of the effort on a third class lever affect its performance?

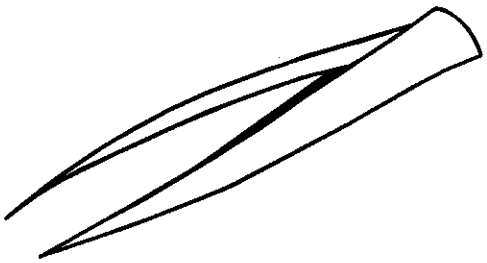
Materials Required:
- one pair of tweezers
- a coin

Procedure:

1. Place your thumb and index finger on the tweezers close to the fulcrum.
2. Squeeze the tweezers to pick up the coin. Using the chart, describe your effort.
3. Repeat step 1, moving your fingers to a location on the tweezers midway between the fulcrum and the load.
4. Repeat step 2.
5. Repeat step 1, moving your fingers close to the load.
6. Repeat step 2.

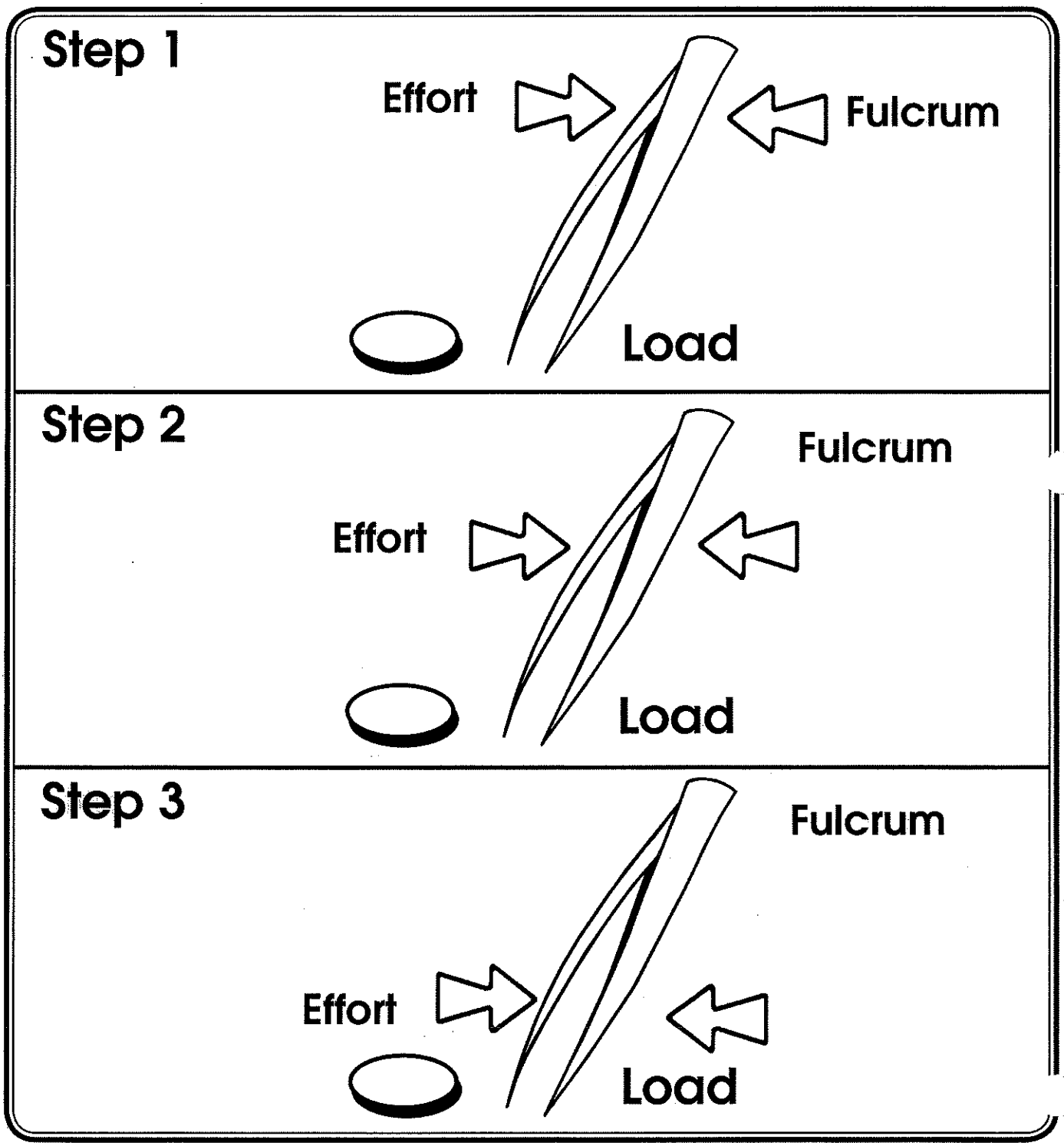
Conclusion: The effort is considerably less when it is applied closer to the load.

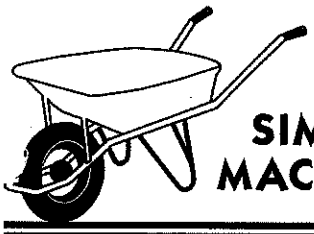
Have the students complete the student experiment sheet. Make sure to have the students include a diagram.



Levers

Experiment 3





SIMPLE MACHINES

Levers

Experiment 3

Draw a diagram of the tweezers and coin. Label the fulcrum, load, and position of the effort. Circle the appropriate number on the scale provided to describe the effort required to lift the coin.

Step 1

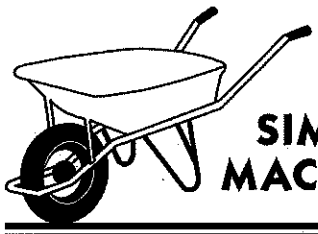
5 Difficult
4
3
2
1 Easy

Step 2

5 Difficult
4
3
2
1 Easy

Step 3

5 Difficult
4
3
2
1 Easy



SIMPLE MACHINES

Levers

Name: _____

Experiment 3

Question: Does changing the location of the effort on a third class lever affect its performance?

Prediction: _____

_____

Procedure: _____

_____

_____

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Observations: _____

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Conclusion: _____

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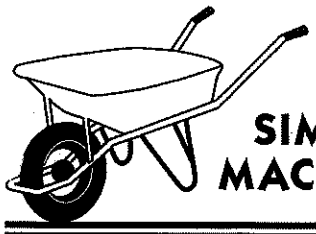


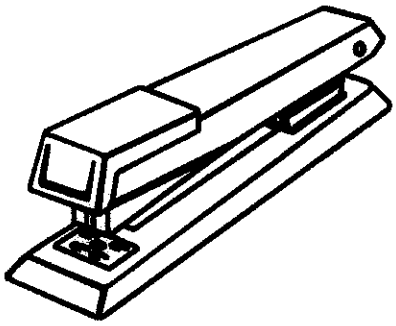
SIMPLE MACHINES

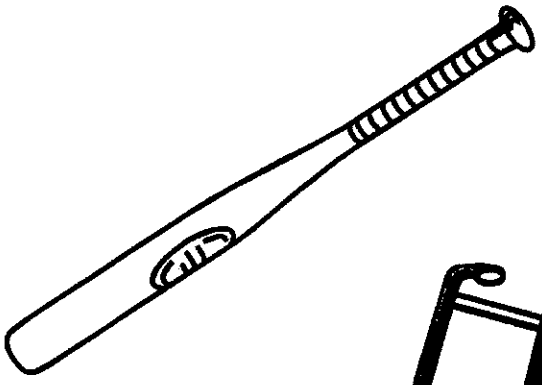
Levers

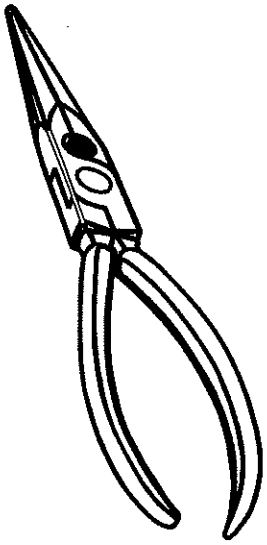
Name:_____

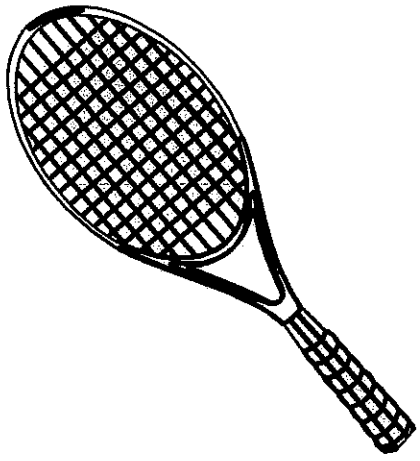
Activity 1

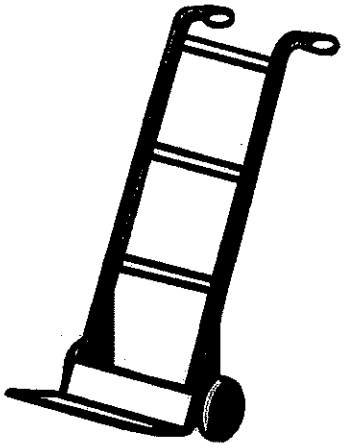
Label the **effort** (**E**), **load** (**L**), and **fulcrum** (**F**) on the objects below. Classify each object as a first, second or third class lever.

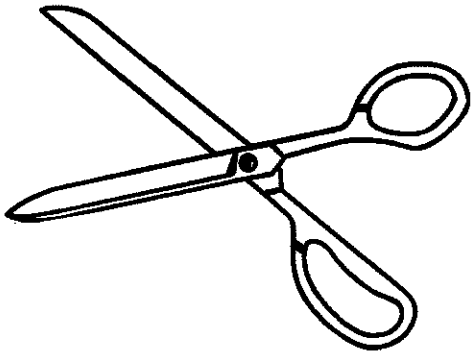








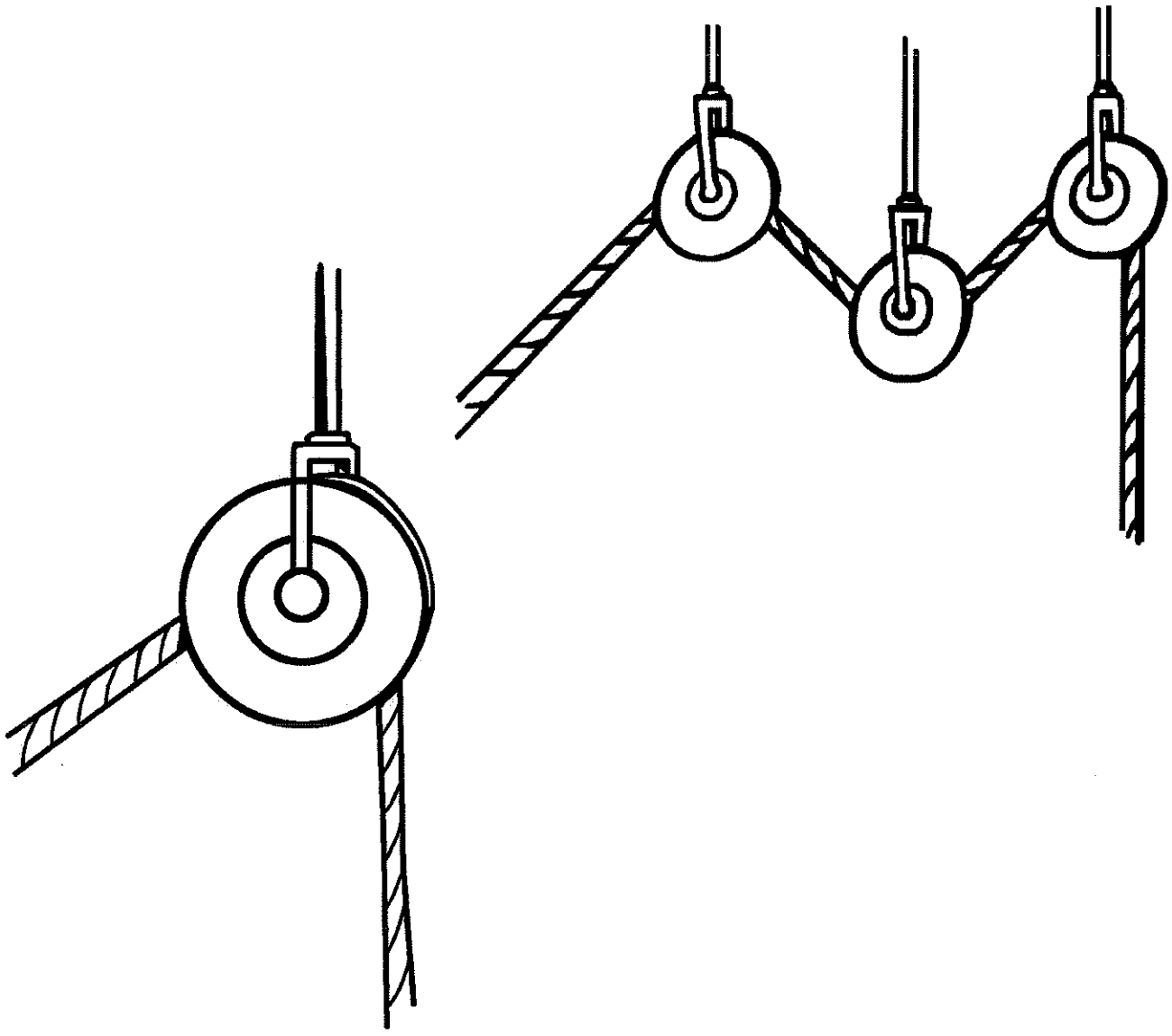




SIMPLE MACHINES

The Pulley

A **pulley** is a form of lever. The center of the pulley acts as a *fulcrum*. The *load* is attached to one end of the rope, and the *effort* occurs at the other end of the rope. A simple pulley replaces a long bar. To lift an object you need only to pull down on the rope. A system using more than one pulley is called a **block and tackle**. Using a longer rope wound around more than one pulley makes lifting easier.



The Pulley

Activity 1

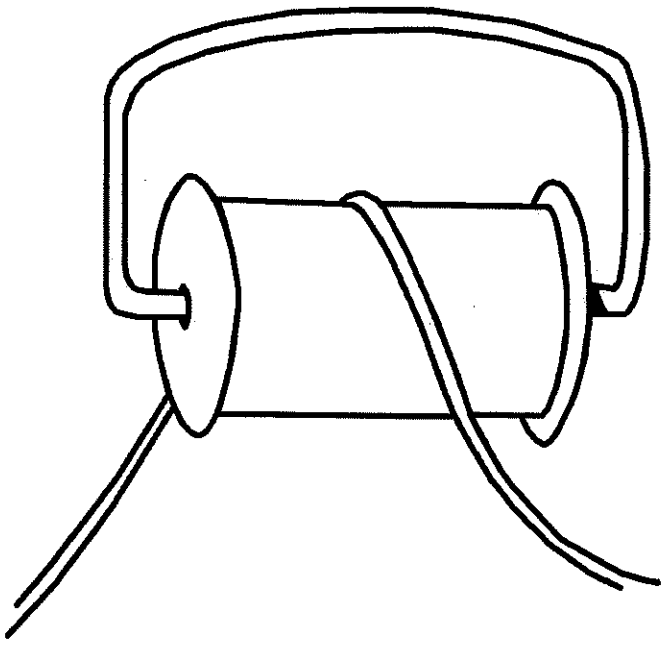
Making a Spool Pulley

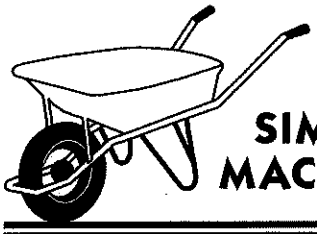
Materials Required:

- one clothes hanger (wire)
- one pair of wire cutters
- one spool (fishing line/thread/ribbon/wire)
- string or fishing line

Procedure:

1. Cut a length of wire from the clothes hanger.
2. Insert the wire through the hole in the spool and bend it into an oval shape making sure that the spool spins freely on the wire. Fasten the two ends of the wire by twisting them together. Use the wire cutters.
3. Place one end of the string on the spool and feed it through until there are equal lengths of string on each side of the spool.





SIMPLE MACHINES

The Pulley

Experiment 1

Question: Does a pulley make lifting easier?

Materials Required:

- a pulley with hook (spool pulley from Activity One)
- a pail with handle
- a spring scale
- two pieces of string (one short, one longer)
- a 0.5 to 1.0 kg (1 to 2 lb) weight

Procedure: **Part 1**

1. Fasten the short string to the pail handle.
2. Place the weight into the pail.
3. Attach the spring scale to the other end of the string.
4. Lift the pail up using only the spring scale.
5. Record the effort required to lift the pail as indicated on the scale.

Part 2

6. Fasten the pulley to an object located above eye-level (ceiling, tree branch, door jamb, playground equipment).
7. Place the longer string around the pulley and fasten one end to the pail handle.
8. Place the weight inside the pail.
9. Attach the spring scale to the other end of the string.
10. Lift the pail using only the scale by pulling down.
11. Record the effort required to lift the pail as indicated on the scale.

Conclusion: The recorded numbers from the spring scale will be very similar, but the students will notice that it is much easier pulling down (using a pulley) to lift an object than it is to lift upward.

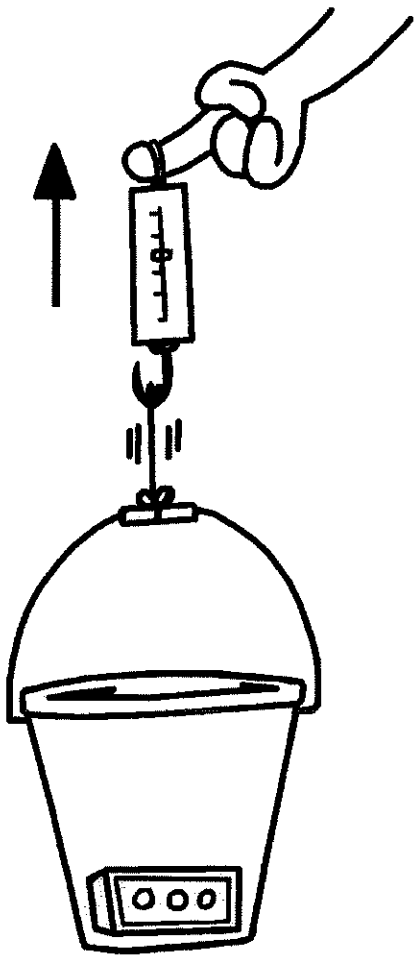
Have students complete the student experiment sheet.

Ensure the students include a diagram.

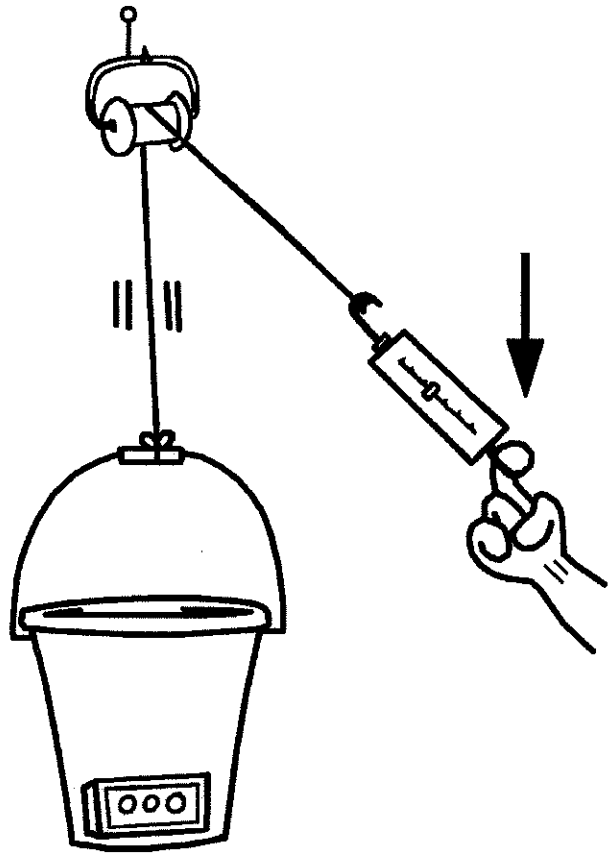
The Pulley

Experiment 1

Part 1



Part 2



SIMPLE MACHINES

The Pulley

Name:_____

Experiment 1

Part 1 – Scale Reading	Part 2 – Scale Reading
_____	_____
Part 1	**Part 2**

SIMPLE MACHINES

The Pulley

Name:_____

Experiment 1

Question: Does a pulley make lifting easier?

Prediction: _____

_____

Procedure: _____

_____

_____

_____

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_____

_____

Observations: _____

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Conclusion: _____

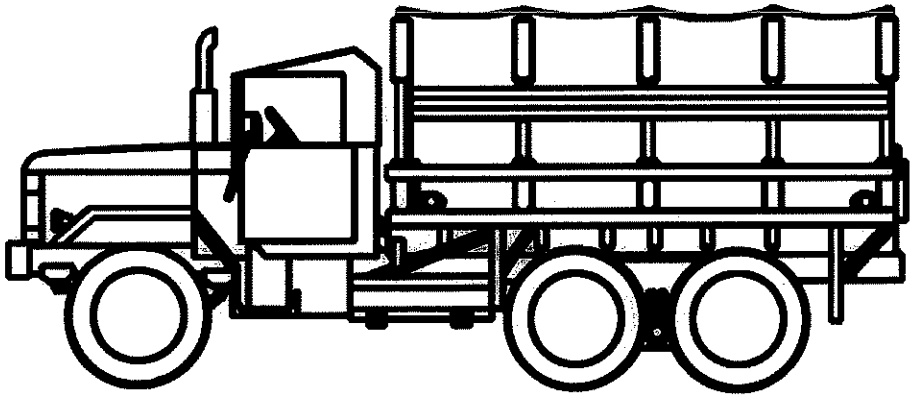
_____

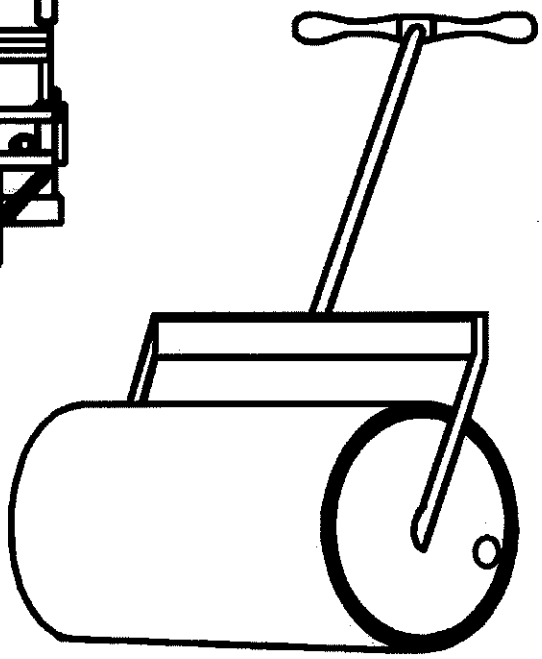
_____

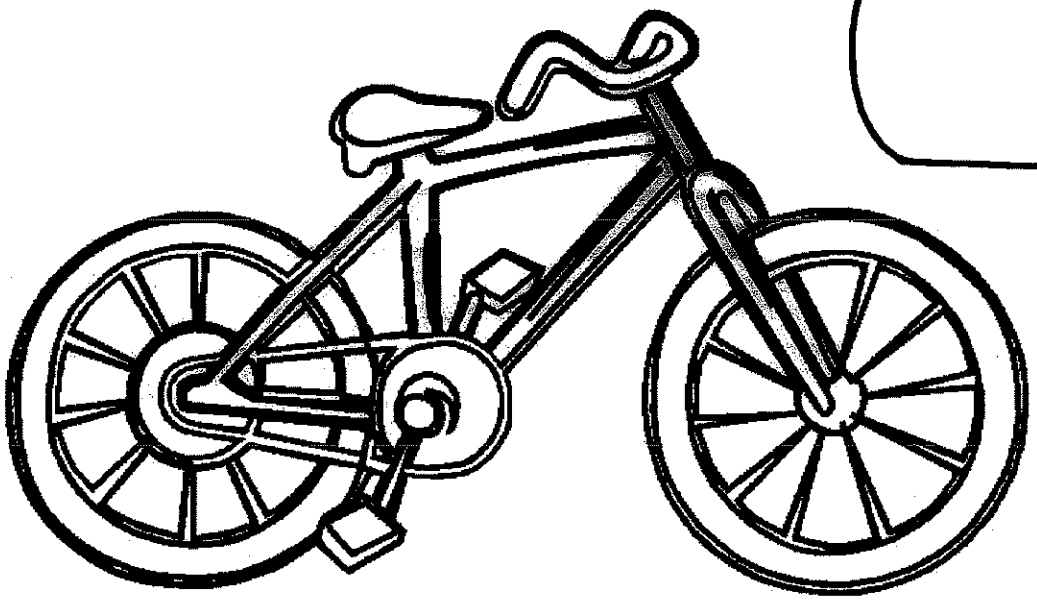
SIMPLE MACHINES

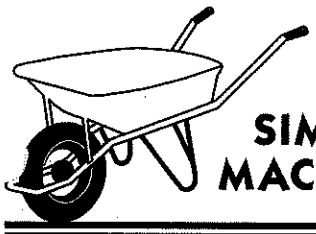
Wheel and Axle

The invention of the wheel is considered to be one of the most important discoveries of all time. The **wheel and axle** is just a round lever. It is made up of a round wheel which turns around an inner cylinder called an axle. The center of the wheel and axle would be the fulcrum of the lever. The wheel and axle can lift heavy loads as in the case of a winch, or produce great force as in the case of a screwdriver.









SIMPLE MACHINES

Wheel and Axle

Experiment 1

Question: **Which makes lifting easier: a larger wheel and axle, or a smaller wheel and axle?**

Materials Required:

- one piece of dowel 2.5 cm (1 in) in diameter
- one piece of dowel, 5 cm (2 in) in diameter
- string, 100 cm (40 in) in length
- a pail
- a weight 0.5 to 1.0 kg (1 to 2 lbs)
- a marker

Procedure: **Part 1**

1. Fasten the string to the pail handle.
2. Place the weight into the pail.
3. Attach the other end of the string to the center of the 2.5-cm (1-in) dowel.
4. Using the marker, place a mark on the top side of the dowel.
5. Begin to roll the dowel in your hands, winding up the string and lifting the pail.
6. Count how many times the mark returns to the top of the dowel while you lift the pail to it.
7. Record your results on the student work sheet.

Part 2

8. Repeat steps 1 to 7 using the 5-cm (2-in) piece of dowel.

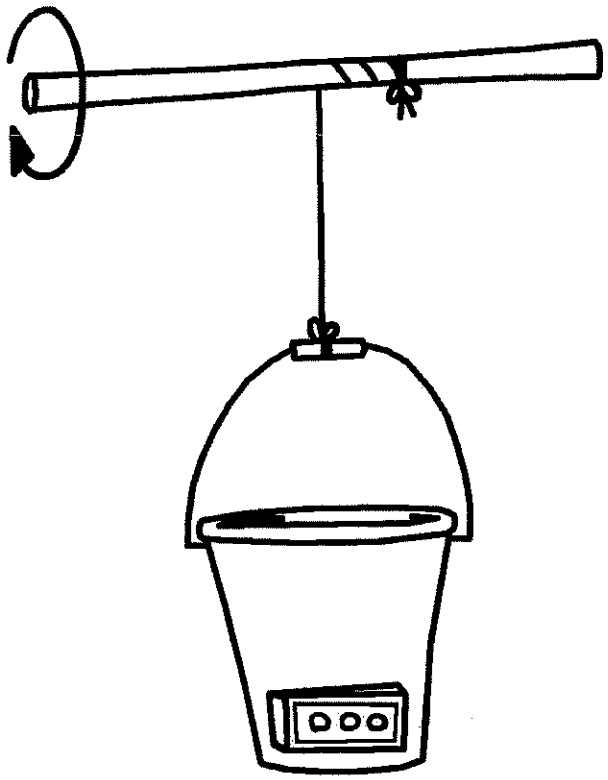
Conclusion: The students will find that the larger (diameter) dowel requires fewer turns to lift the pail, therefore making the work easier.

Have the students complete the student experiment sheet. Ensure the students include a diagram.

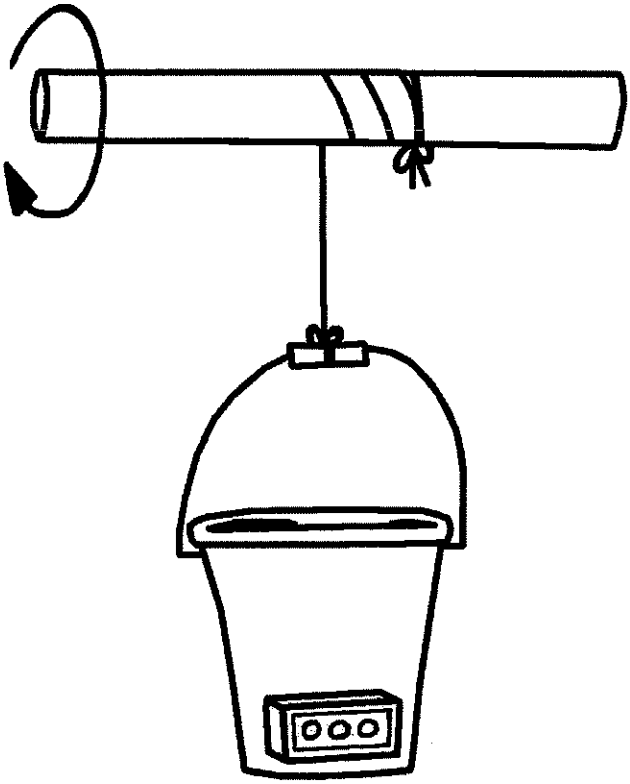
Wheel and Axle

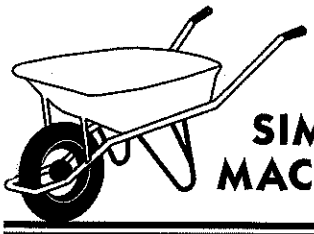
Experiment 1

Part 1



Part 2





SIMPLE MACHINES

Wheel and Axle

Name:_____

Experiment 1

Part 1 – Number of Turns	Part 2 – Number of Turns
_____	_____
Part 1	**Part 1**

SIMPLE MACHINES

Wheel and Axle

Name:_____

Experiment 1

Question: Which makes lifting easier: a larger wheel and axle or a smaller wheel and axle?

Prediction: _____

_____

Procedure: _____

_____

_____

_____

_____

_____

Observations: _____

_____

_____

_____

_____

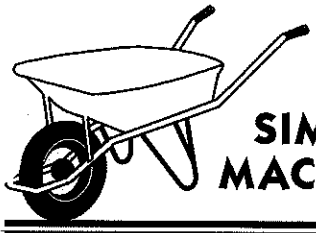
_____

_____

Conclusion: _____

_____

_____



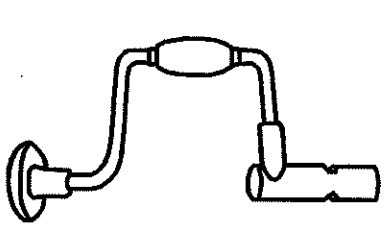
SIMPLE MACHINES

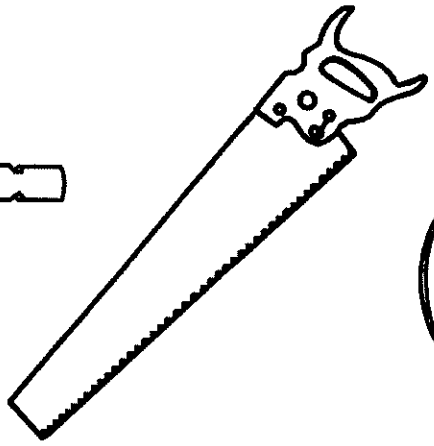
Wheel and Axle

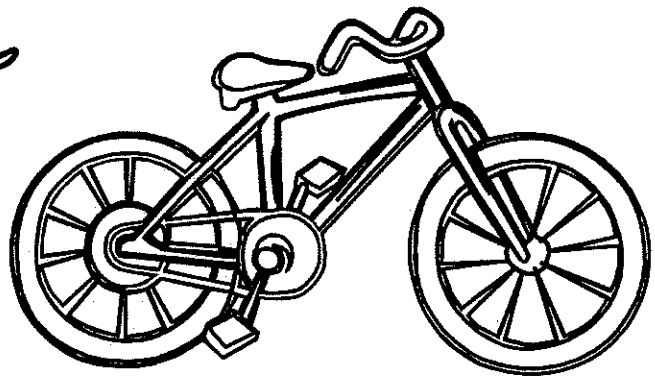
Name:_____

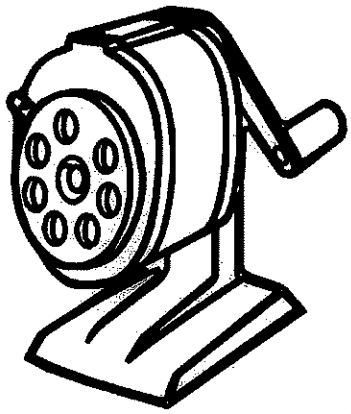
Activity 1

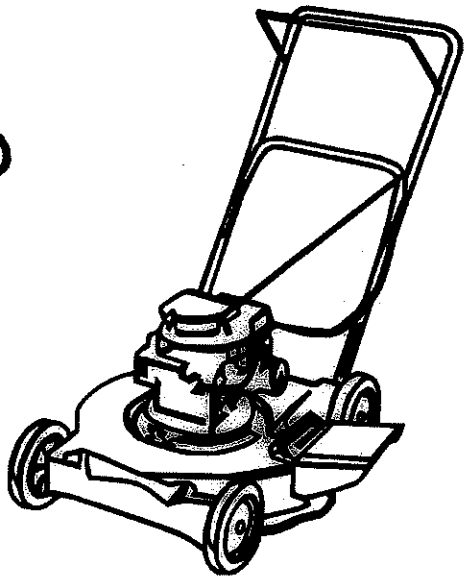
Color the objects which use a wheel and axle.

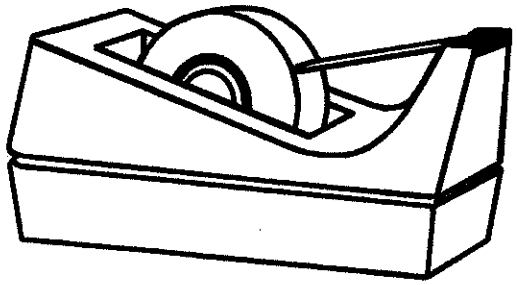


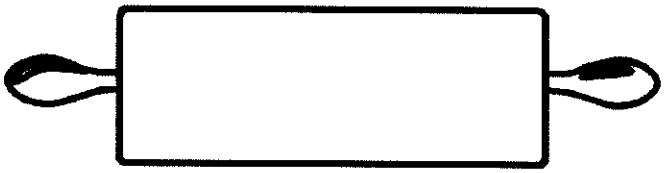








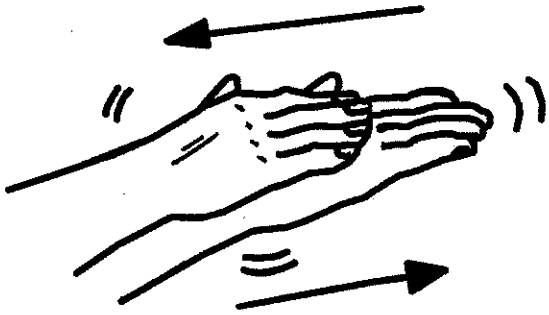


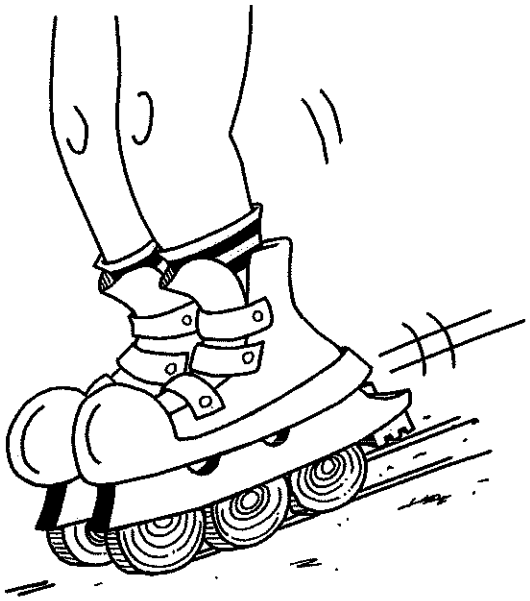


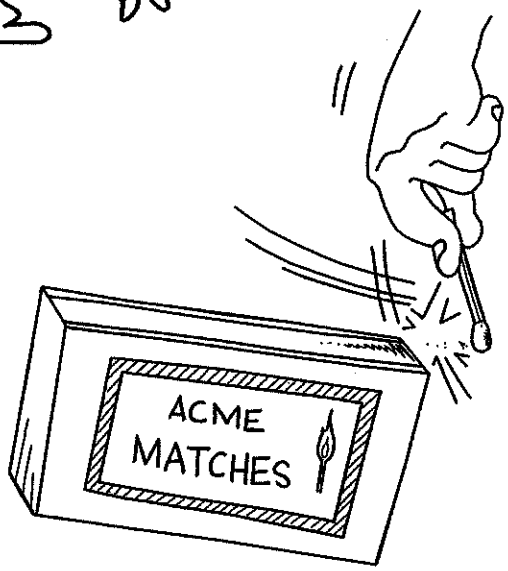
Friction

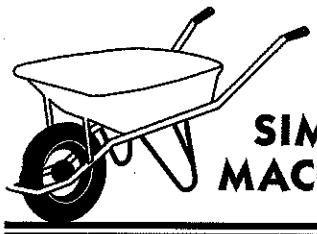
Friction is the **resistance of motion** when the surfaces of two objects come into contact. Friction opposes motion, therefore you will never get an amount of work out of a machine equal to the effort put into the same machine. The work lost appears as heat or sound.

Many machines (rollerblades, pistons in a car) require very little friction and need to be lubricated (oil, grease). Some machines like erasers, car brakes, parachutes, etc. depend on friction to work properly.









SIMPLE MACHINES

Friction

Experiment 1

Question: What is friction?

Materials Required:

- two shoe boxes
- string or rope (length will vary)
- a 2-m (6-ft) board
- several weights of equal mass
- a student desk
- glue
- several different materials (cloth, sandpaper, felt, paper, etc.)

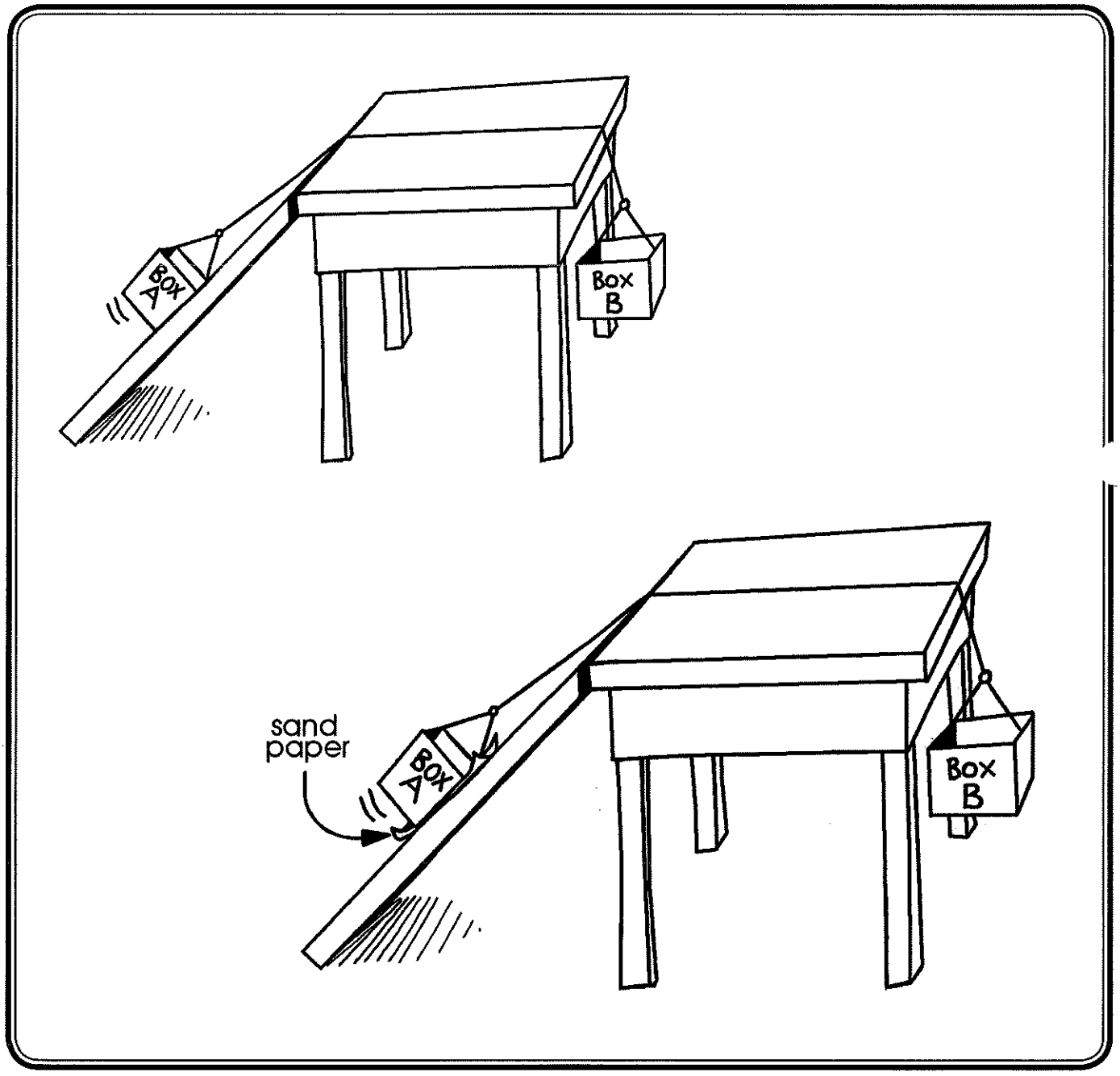
Procedure:

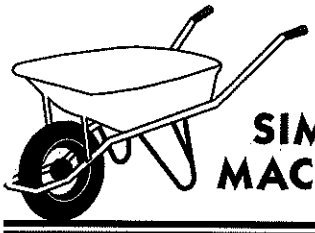
1. Fasten the string or rope to the shoe boxes. Label them Box A and Box B.
2. Place one end of the board on the floor and the other end on the desk.
3. Place Box A on the lower end of the board and hang Box B over the desk.
4. Begin to place weights into Box B until Box A begins to lift upward.
5. Continue until Box A reaches the top of the desk.
6. Record the amount of weight required to lift Box A.
7. Glue another type of material to the bottom of Box A.
8. Repeat steps 1 to 7. (Change the material each time.)
9. Compare the amount of weight required to lift Box A to the same elevation of the desk, using different materials on the bottom of Box A. Compare the amount of weight required.

Conclusion: The students will find that using rougher (surface) material will require more weight to lift Box A. Have the students complete the student experiment sheet. Make sure the students include a diagram.

Friction

Experiment 1





SIMPLE MACHINES

Friction

Name:_____

Experiment 1

Material – _____ Recorded Weight – _____	Material – _____ Recorded Weight – _____
Material – _____ Recorded Weight – _____	Material – _____ Recorded Weight – _____

SIMPLE MACHINES

Friction

Name:_____

Experiment 1

Question: What is friction?

Prediction: _____

_____

Procedure: _____

_____

_____

_____

_____

_____

_____

Observations: _____

_____

_____

_____

_____

_____

_____

Conclusion: _____

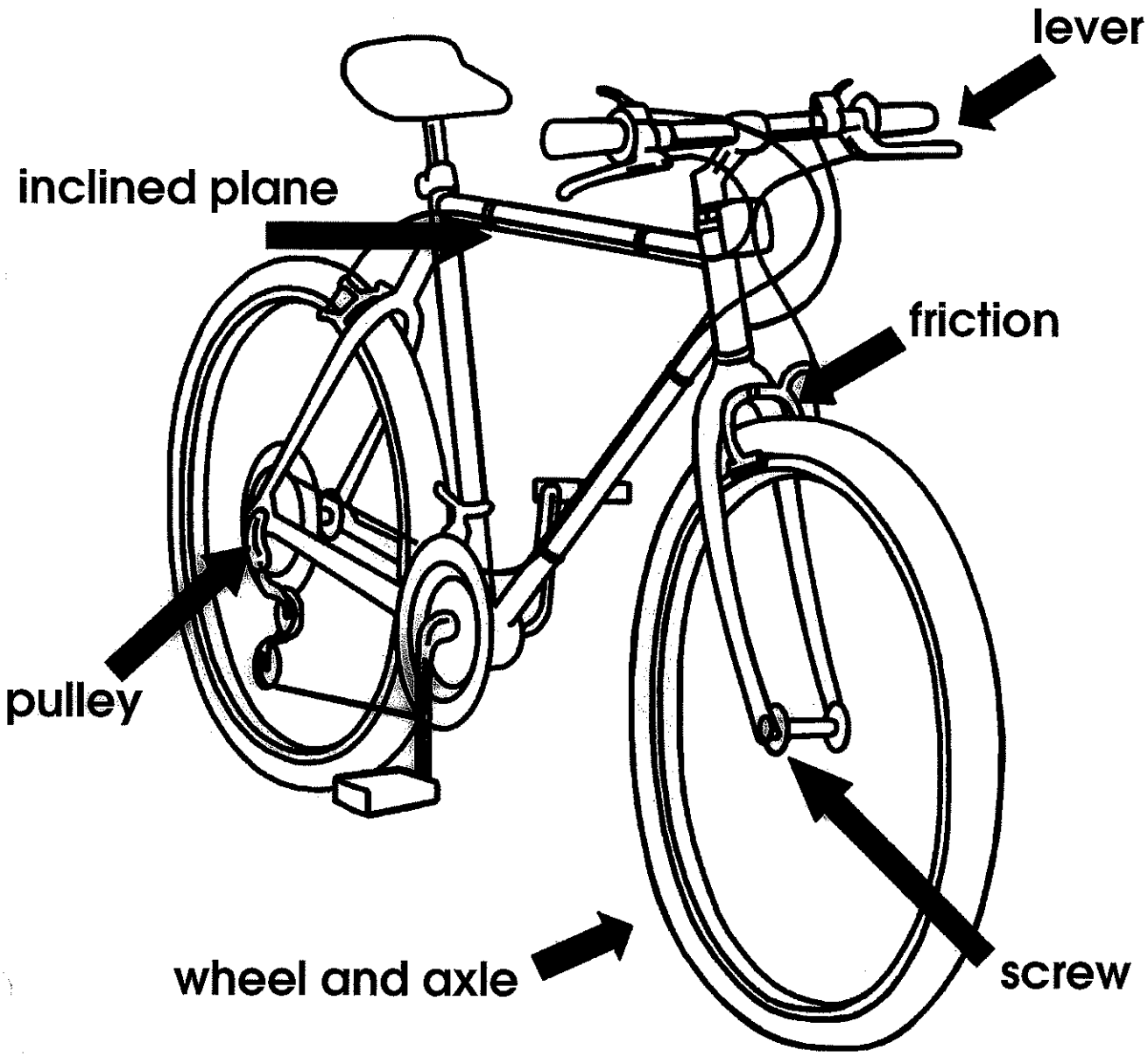
_____

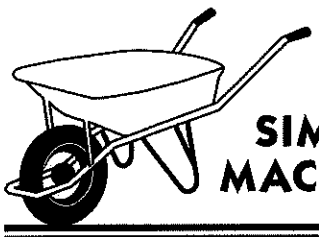
_____

SIMPLE MACHINES

Compound Machines

The importance and need for simple machines is evident in our daily lives. We use many simple machines each day and sometimes they are combined to make a compound machine. For example, a bicycle is a compound machine because it is made up of levers, wheels and axles, inclined planes, pulleys and screws. It also makes use of friction for braking.





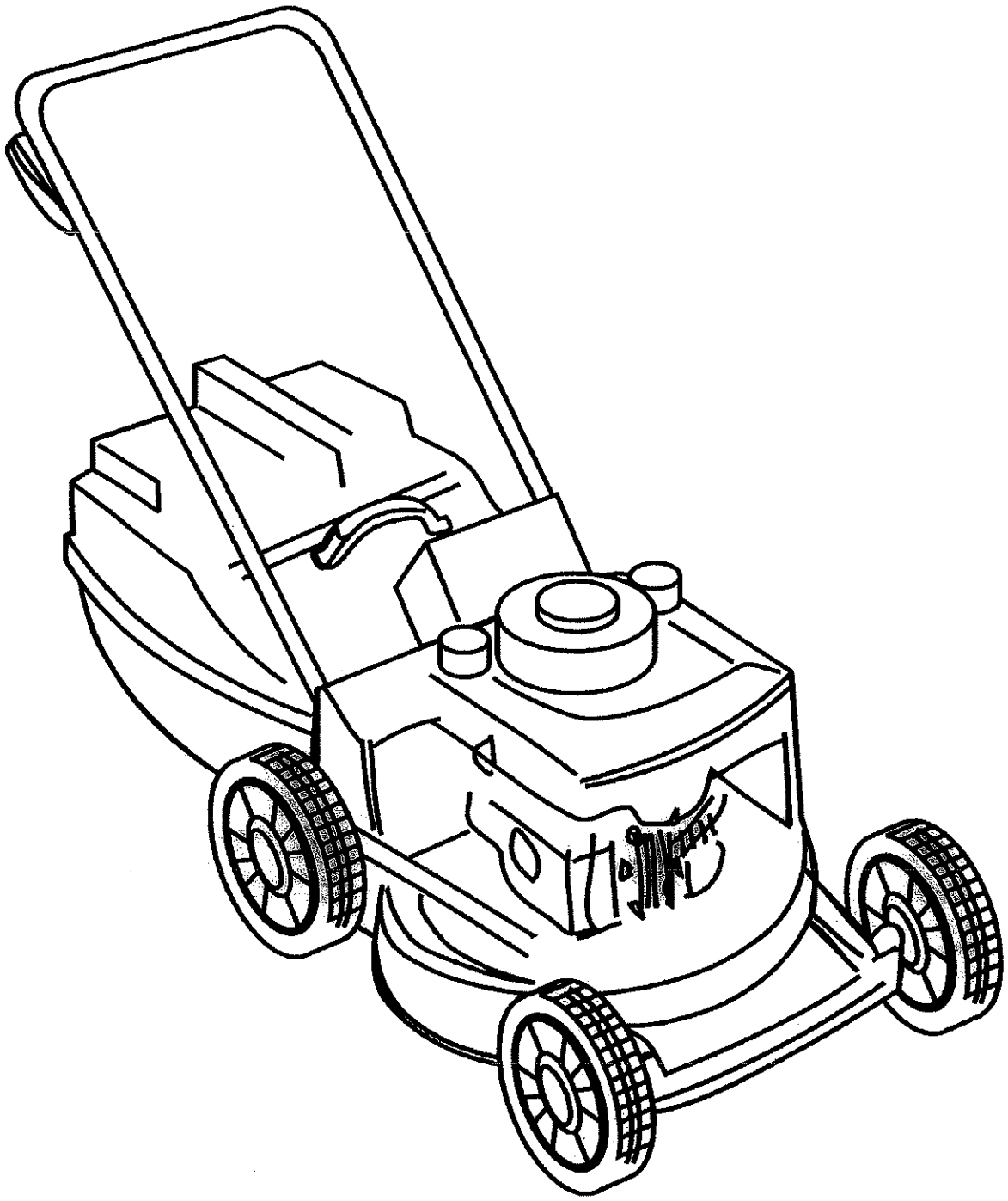
SIMPLE MACHINES

Compound Machines

Name:_____

Activity 1

Find and label six simple machines on the picture below.

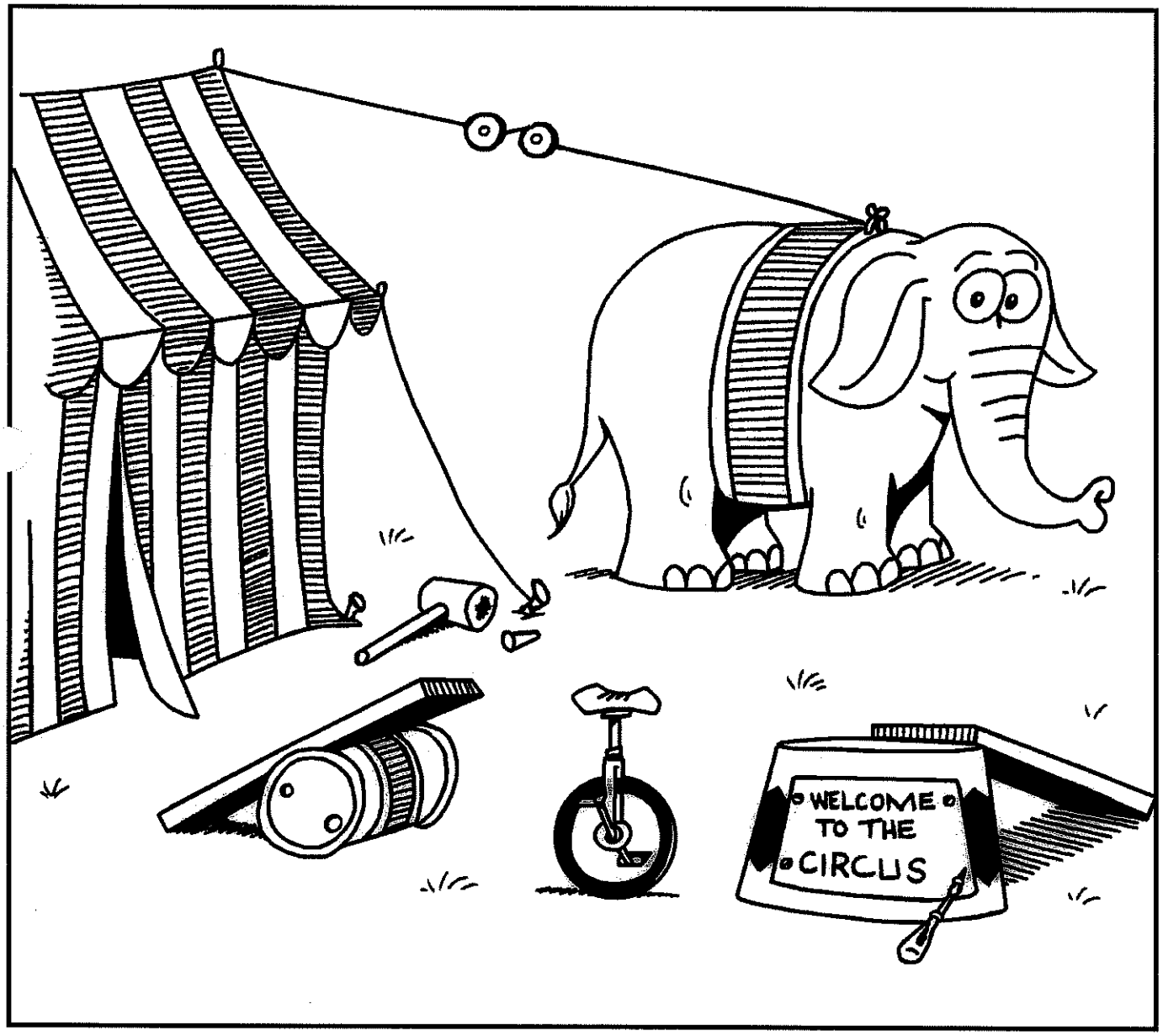


SIMPLE MACHINES

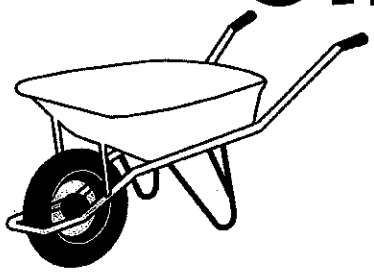
Review

Name:_____

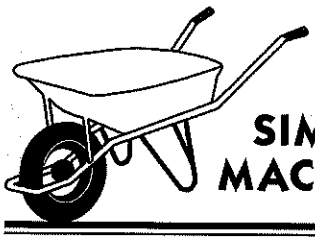
Find and label the simple machines used in the picture.



Simple Machines
Learning Log



Name: _____

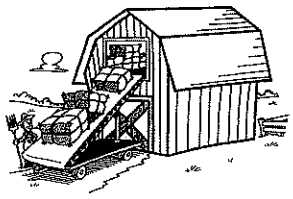


SIMPLE MACHINES

Learning Log

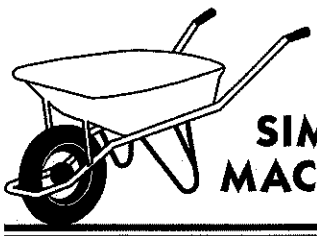
Name: _____

Inclined Plane



1. What we did: _____

2. What I learned: _____



SIMPLE MACHINES

Learning Log

Name:_____

The Wedge

1. What we did: _____

_____

_____

_____

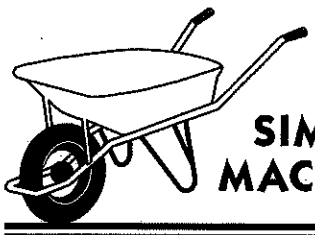
2. What I learned: _____

_____

_____

_____

_____

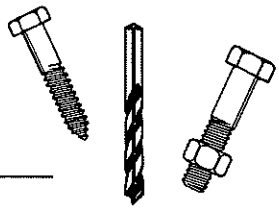


SIMPLE MACHINES

Learning Log

Name:_____

The Screw



1. What we did: _____

_____

_____

_____

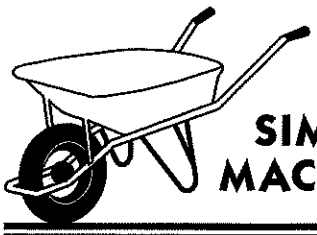
2. What I learned: _____

_____

_____

_____

_____

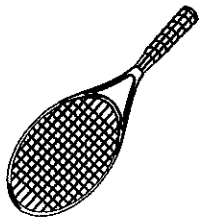


SIMPLE MACHINES

Learning Log

Name:_____

Levers



1. What we did: _____

_____

_____

_____

2. What I learned: _____

_____

_____

_____

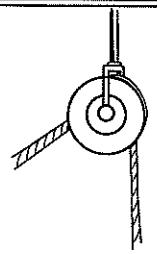
_____

SIMPLE MACHINES

Learning Log

Name: _____

The Pulley



1. What we did: _____

_____

_____

_____

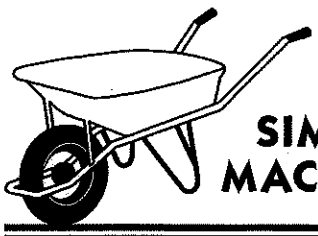
2. What I learned: _____

_____

_____

_____

_____

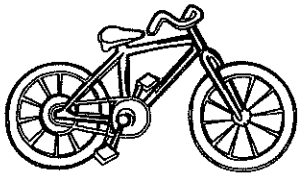


SIMPLE MACHINES

Learning Log

Name:_____

Wheel and Axle



1. What we did: _____

_____

_____

_____

2. What I learned: _____

_____

_____

_____

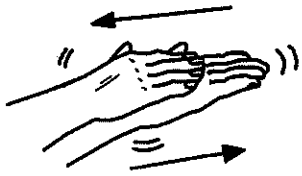
_____

SIMPLE MACHINES

Learning Log

Name: _____

Friction



1. What we did: _____

_____

_____

_____

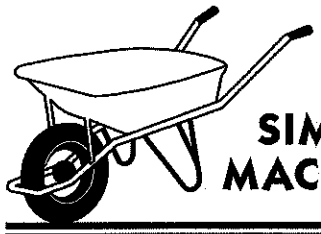
2. What I learned: _____

_____

_____

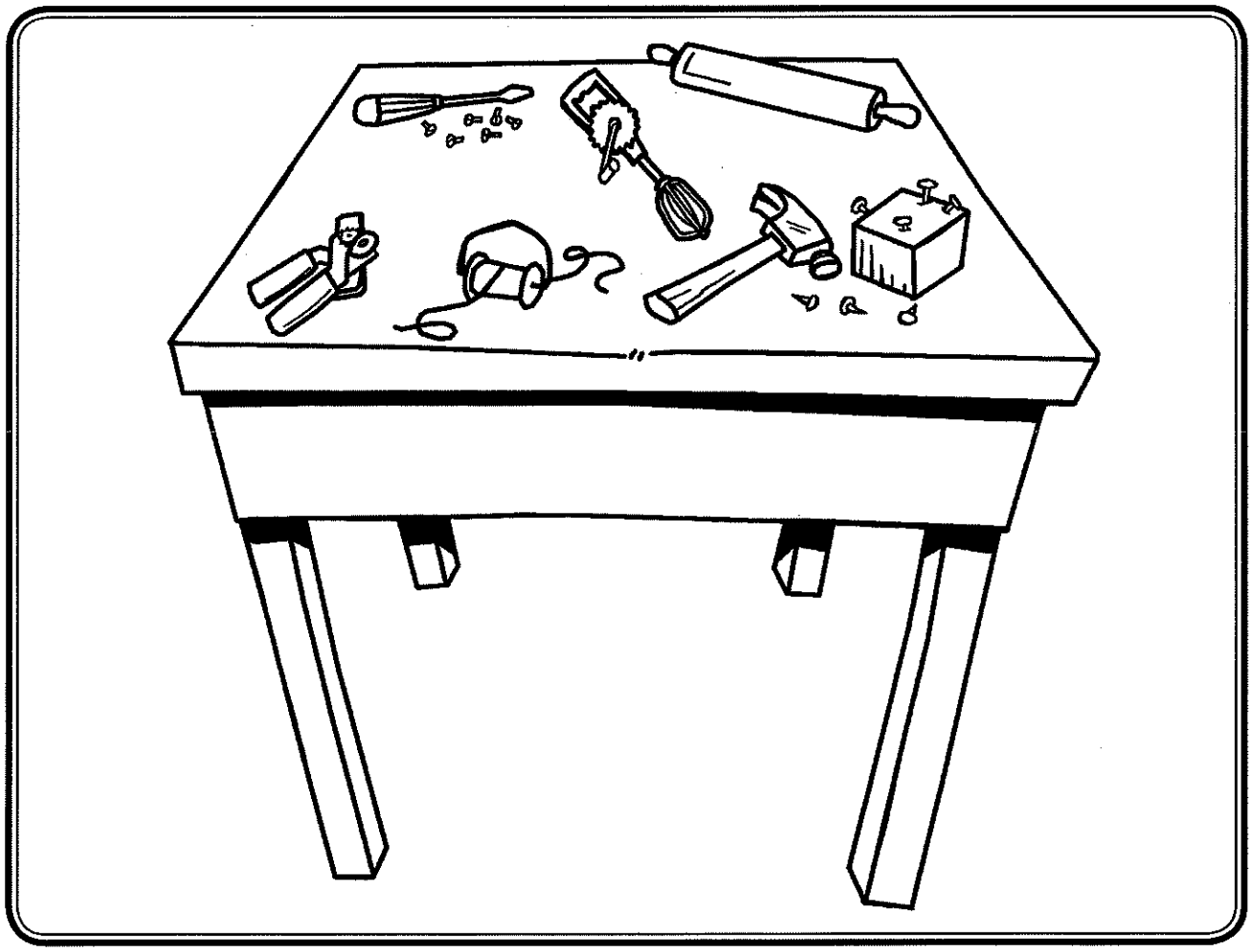
_____

_____



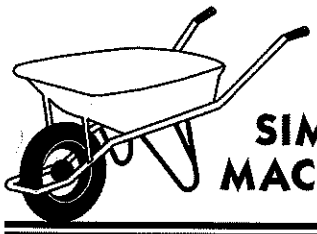
SIMPLE MACHINES

Discovery Table



One of the most important methods of learning is through **discovery**. Place a table in your classroom to display various simple machines. Allow the students to experience firsthand how they feel, how they move, and how they work. Encourage the students to **experiment** with these simple machines and **create** compound machines. Identify the objects on the table for the students.

Be sure to promote safety in the classroom. Safety glasses should be worn by students while they are at the discovery table.



SIMPLE MACHINES

Simple Machines at School

Name:_____

Tour the school and the schoolyard to identify simple machines. Complete the chart below.

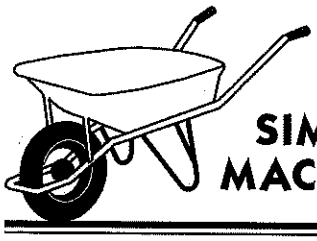
Item Name	Location at School	Type of Simple Machine

SIMPLE MACHINES

Simple Machine ABC's

Name:_____

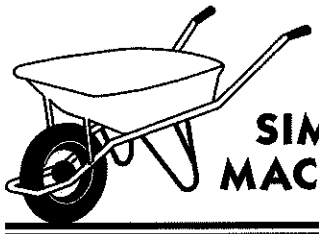
Draw a picture of a machine beginning with each letter of the alphabet. Write each name in the box.	A	B
C	D	E
F	G	H



SIMPLE MACHINES

Name:_____

I	J	K
L	M	N
O	P	Q



SIMPLE MACHINES

Name:_____

R	S	T
U	V	W
X	Y	Z

SIMPLE MACHINES

Machines of the Future

Name:_____

Draw a picture of your machine. Name your machine, and explain how it works and how it will help us in the future.

SIMPLE MACHINES

Idea Web

Name:_____

Machines

Pulley

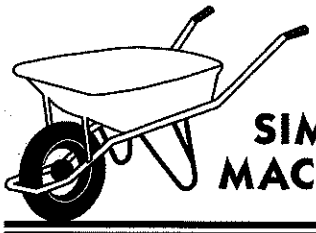
Inclined Plane

Wheel & Axle

Wedge

Screw

Lever

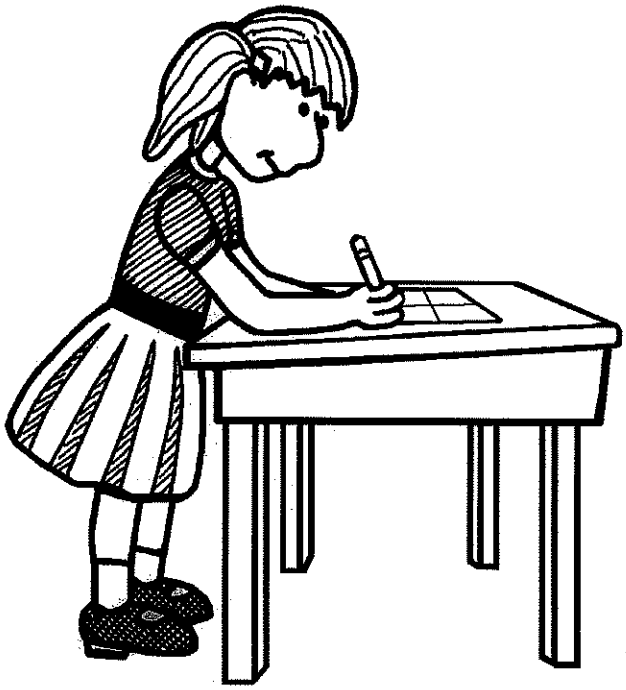


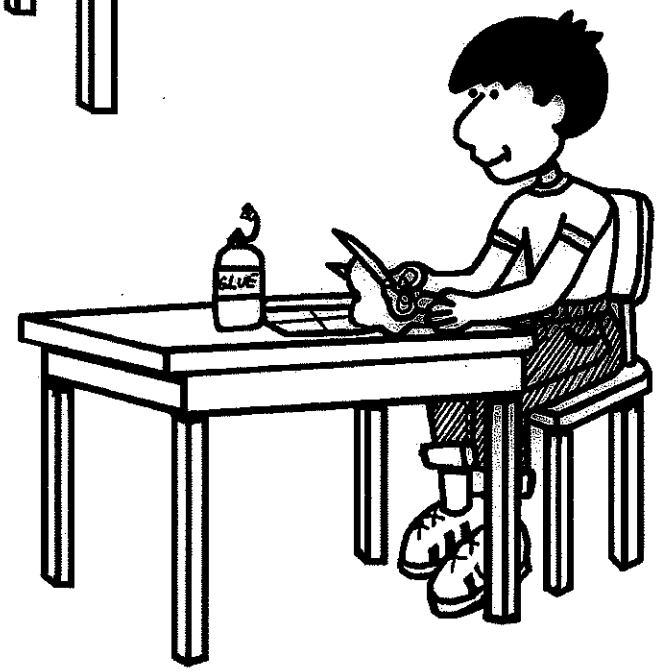
SIMPLE MACHINES

Collage

Name:_____

Create six equal sections on a large piece of construction paper. Label each section with the name of a different simple machine (example: lever). Using old magazines, catalogs and newspaper advertisements, find as many examples as you can and glue them onto your page to create a **simple machines collage**.

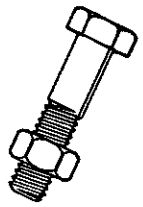




SIMPLE MACHINES

Crossword Puzzle

Name:_____

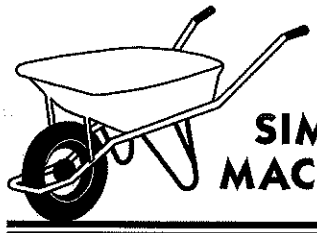


Across

1. the use of energy to do something
2. an educated guess
5. the support on which a lever rests
6. a bar used as a pry
9. an object that is tapered to a thin edge
11. to mix or combine
12. a structure with moving parts for doing work
13. a circular object turning on an axis

Down

1. a test to discover something
3. a new product or service
4. a small wheel and rope used to lift weights
6. a mass that is moved or lifted
7. a rubbing of one object against another
8. a flat, level surface
10. having only one or a few parts



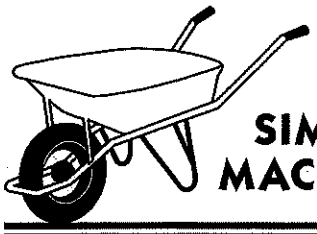
SIMPLE MACHINES

Word Search

Name:_____

o	u	x	h	u	z	n	u	d	a	w	h	e	e	l
h	b	o	o	m	w	z	o	v	t	z	p	y	g	m
t	y	s	f	p	m	d	v	i	f	z	u	j	d	r
e	x	p	e	r	i	m	e	n	t	p	l	e	e	d
n	l	h	o	r	i	d	r	n	q	s	l	v	w	v
i	e	x	f	t	v	c	t	q	a	p	e	c	u	y
h	f	r	a	r	h	a	t	f	m	l	y	u	v	n
c	f	r	u	h	j	e	t	i	j	l	p	v	q	f
a	o	i	f	d	p	q	s	i	o	z	h	b	u	i
m	r	i	n	v	e	n	t	i	o	n	w	e	c	y
v	t	p	l	x	m	c	n	s	s	n	r	a	y	e
i	d	n	u	o	p	m	o	c	j	u	h	s	k	o
f	a	n	s	f	u	l	c	r	u	m	w	m	i	i
a	o	x	l	m	g	q	z	e	p	a	u	w	g	i
c	l	w	l	n	j	j	s	w	l	a	f	y	t	l

axle	machine	compound	observation
effort	plane	experiment	procedure
friction	pulley	fulcrum	question
hypothesis	screw	invention	simple
lever	wedge	load	wheel



Invention Conference

Dear Parent/Guardian,

Your child/children will soon be participating in an **Invention Conference**. It is designed to promote creative problem-solving, and encourage independent thinking skills. The students will follow a sequential process to invent a new product or develop a new method of completing a task.

We will begin by discussing existing inventions and, if possible, their inventors. This will allow the children to gain an appreciation for the invention process.

It is necessary for the children to first find an idea for an invention. You may be asked if you need a new product, or if you require a new method to solve a problem or to lessen your workload. Your participation and encouragement will make the children's experience a positive one.

Once an idea has been established, research is necessary to ensure that the idea has not already been invented. Students will complete an **Invention Declaration** form and your child's form will require your signature. After approval has been given, he/she may begin to plan and complete the invention.

During the actual process of inventing and building, the children may need to be reminded that many inventors have met with failure along the way. Constant encouragement is needed throughout the entire process!

Once the invention has been assembled, a **Patent Application** will need to be completed. Your interest and encouragement will ensure that this science experience is unforgettable!

Inventions are required at school on _____ .

Sincerely,

_____

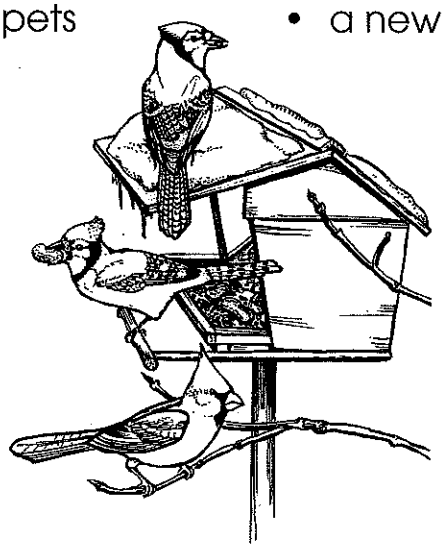
Invention Conference

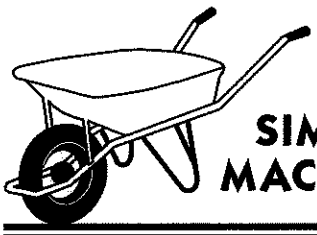
Invention Ideas

"I don't know what to do. I can't think of anything."

The following list of invention ideas can be used to motivate and encourage young inventors.

- a new bird feeder
- a new book bag
- a new container
- a new musical instrument
- a new pencil case
- a new board game
- a new clothing design
- a new cleaning tool
- a new toy
- a new product for pets
- a method of keeping drinks cold
- a new way of organizing pencils
- a new way to remember things
- a way to prevent spills
- a new bread machine recipe
- a new garbage collection method
- a method of cleaning your room
- a method of scraping dirty plates
- a new toothbrush holder
- a new use for household items





SIMPLE MACHINES

Invention Conference

Successful inventions are ones that make improvements to existing products, solve problems or meet a specific need. Make a list of improvements that would help your community, school, or home. Use this list to help you to decide on an invention topic.

Name: _____

Date: _____

Improvement, problem, need:

_____

_____

_____

Materials required:

_____

_____

_____

Invention description:

_____

_____

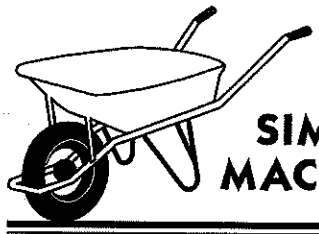
_____

_____

_____

_____

_____



SIMPLE MACHINES

Invention Conference

Invention Declaration

Inventor: _____

(Last Name) *(First Name)*

Address: _____

City: _____ Province/State: _____

Postal Code/Zip Code: _____ Telephone: ( ) _____

School: _____ Teacher: _____

Invention Description (brief): _____

_____

_____

_____

Research Completed: _____

_____

_____

_____

Materials List: _____

_____

_____

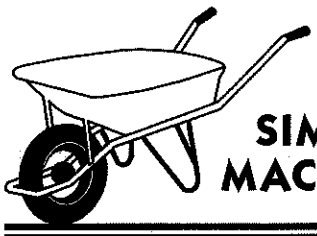
_____

Invention Due: _____ _____

(Inventor's Signature)

_____

(Parent's/Guardian's Signature)



SIMPLE MACHINES

Invention Conference

Name:_____

Invention Sketch

Draw a diagram of your invention.

SIMPLE MACHINES

Invention Conference

Application for a Patent

I, _____ the undersigned, do declare that the information provided below is truthful and accurate. It is my belief that I am the creator of an original invention called:

_____

Declaration

Inventor (Full Name): _____

Address: _____

City: _____ Province/State: _____

Postal Code/Zip Code: _____ Telephone: ( ) _____

School: _____ Grade: _____

Teacher: _____

Principal: _____

I believe that my invention is original and the first of its kind in

_____.

(name of continent)

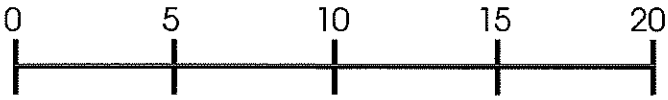
Inventor's Signature: _____ Date: _____

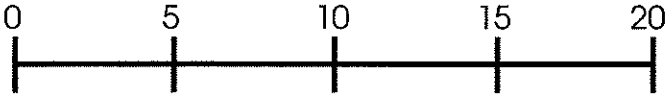
Invention Conference

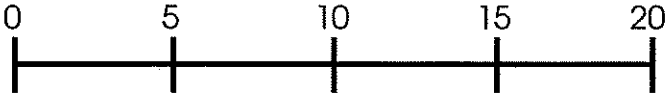
Invention Conference Evaluation

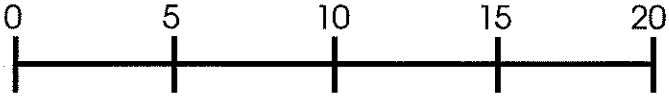
Inventor: _____ Grade: _____

Invention: _____

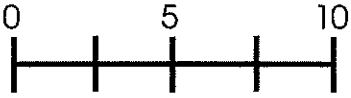
Originality 

Design 

Research 

Use in Society 

Production Cost 

Presentation 

Total Score: _____

Judged by: _____

Excellence in Science Award

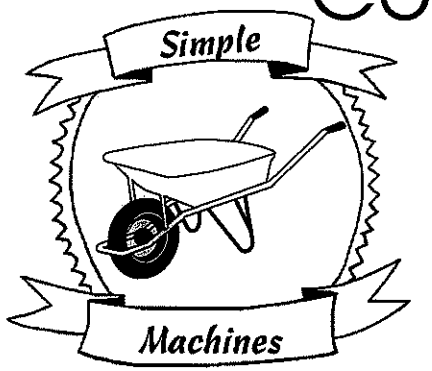
_____

has successfully completed the unit on

Simple Machines

Congratulations!

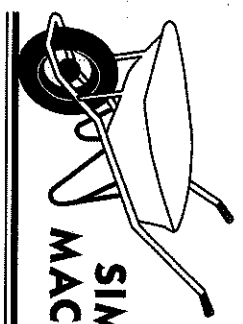
Teacher



_____

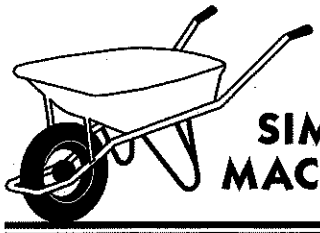
Date

_____



SIMPLE MACHINES

Certificate



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Experiment

Question: _____

_____

Prediction: _____

_____

Procedure: _____

_____

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Observation: _____

_____

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_____

Conclusion: _____

_____

_____

_____