

MOTION

UNIT OVERVIEW

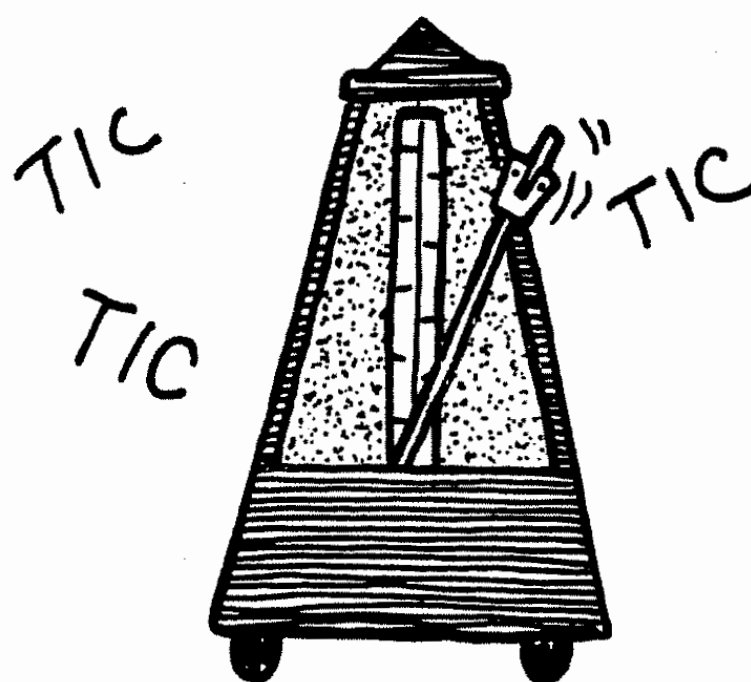
Students get cool notions all about motion! This highly informative and simple-to-use unit teaches students all about motion - from linear motion, to oscillating motion, to reciprocating to rotational motion. Students participate in meaningful activities associated with the core theme of each lesson, which are followed by related overhead notes. This format helps to stress "process" rather than concentrating on the memorization of factual information. Students will "move" through this material like it was nothing!

PART I - CORE TEACHING LESSONS

- | | | |
|-----------------------------------|---|----------------------------------|
| 1. Motion - Four Types | - | Motion Wordsearch |
| 2. Linear Motion | - | How Fast??? - Worksheet Activity |
| 3. Rotational Motion | - | Battling Tops |
| 4. Oscillating Motion | - | Swinging - Experiment |
| 5. Reciprocating Motion | - | Piston Power Worksheet |
| 6. Levers And Linkages | - | Picture Enlarger |
| 7. Rotary To Linear Motion | - | Windmill |
| 8. Crankshafts And Cams | - | Motion Pictograms |
| 9. Energy Transfers | - | Action Cartoon |
| 10. Culminating Activity | - | Motion Theme Park |

PART II - OPTIONAL LESSONS

1. **Motion Crossword**
2. **Matching Review**
3. **Oscillating Motion Bowling**
4. **Bowling**
5. **Science Videos**
6. **Hot Rod Report**
7. **Elastic-Powered Mania**
8. **Internet Fill-In-The Blanks**
9. **Levers and Linkages Review**



PART III - STUDENT NOTES

Basic information and concepts are conveyed using student notes. These notes can be put onto overhead transparencies, photocopied for the students or simply written on the board for students to copy into their notebooks.

HOW FAST???

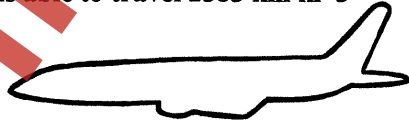
NAME: _____

Instructions: Answer the word problems below. Be sure to write down the formula and show all of your work. Put your final answer in the box provided.

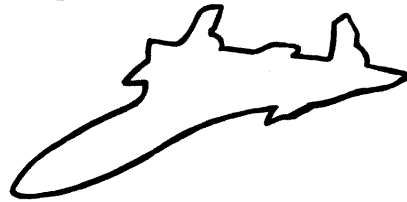
- 1) The team bus carrying a junior hockey team went on a road trip. The bus travelled 186 kilometers in 2 hours. What was the speed of the bus?



- 2) A 777 passenger jet, carrying 387 people, is able to travel 2585 km in 5 hours. What is the speed of the jet?



- 3) In 3 hours, the fastest spy plane in the world, called the SR 71 Blackbird, is able to fly a distance of 5496 km. What is the speed of this jet?

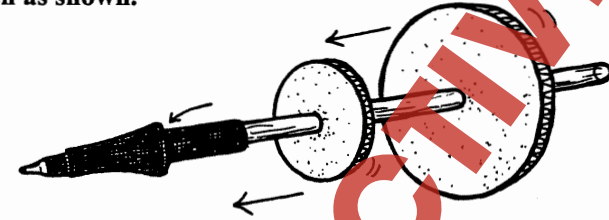


BATTLING TOPS

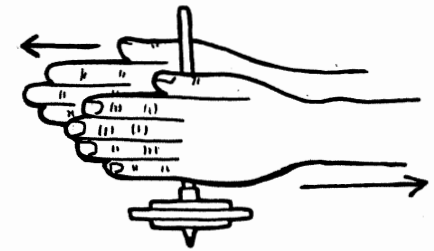
NAME: _____

Instructions:

- 1) Your task is to make a working top that will spin for as long as possible, using only the ink cartridge from a "Papermate" pen, cardboard, scissors, glue, tape, markers, and pencil crayons.
- 2) Cut out cardboard pieces and poke a hole in the center of each. Slide them onto the pen as shown.



- 3) At least two cardboard pieces must be used to make each top (although more can be used if you choose). The pieces can be glued or taped together and attached to the pen.
- 4) Experiment to determine what size, shape and number of cardboard pieces will allow your top to spin the longest. Also, find out the best way to start your top spinning, whether it is by using your thumb and forefinger or using two hands.



- 6) After your top is built, decorate it using markers or pencil crayons.
- 7) Time limit is 20 minutes.

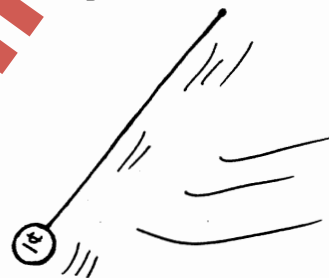
SWINGING

NAME: _____

What is the purpose of the experiment? (What are you trying to find out?)

Part I

- 1) Cut two lengths of string 30 cm long. Attach a large mass to one string and a smaller mass to the other.
- 2) Hold the pendulum against a wall and pull it back so it is horizontal. Release it so that it can swing back and forth. Count how many times the pendulum swings back and fourth in one minute. Repeat with the smaller pendulum and record your counts in the boxes provided.

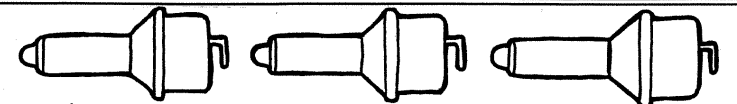


Number Of Swings
(larger mass)

Number Of Swings
(smaller mass)

- 3) What did you learn in Part I of this experiment?

Questions



- 1) Why is a gasoline engine a good example of reciprocating motion?

- 2) What is the purpose of a spark plug in a cylinder?

- 3) What is the purpose of the piston rod in an engine?

- 4) Why are cylinders and pistons made out of very strong metals?

- 5) Why is it important for both valves to be closed when the spark plug sparks?

- 6) Describe one difficulty or problem that designers would have when trying to join six or eight cylinders together instead of just one.

MOTION WORDSEARCH



NAME: _____

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

Find These Words:

CAM
 CAM FOLLOWER
 CRANKSHAFT
 CYCLE
 FRICTION
 HERTZ

KINETIC ENERGY
 LINEAR MOTION
 MECHANICAL ADVANTAGE
 OSCILLATING MOTION
 ROTATIONAL MOTION
 RACK AND PINION
 RECIPROCATING MOTION

LEVER
 LINKAGES
 PENDULUM
 PISTON
 SPEED
 VELOCITY

ANSWER KEY

N #1 - MOTION - FOUR TYPES

Objectives and Activities

Students understand what motion is and learn the four types of motion (linear, rotational, oscillating, reciprocating).

Students complete notes on the topic and an introductory wordsearch.

Guided Teaching Strategies

Introduce the unit by challenging students to guess the answers to the following questions:

- Q1 I am the fastest runner in the animal world.
a) greyhound b) roadrunner c) gazelle d) cheetah
- A1 d) cheetah - 100 km/hour
- Q2 The fastest human in the world can run 100 meters in less than:
a) 9 seconds b) 10 seconds c) 12 seconds d) 20 seconds.
- A2 b) 10 seconds - Maurice Greene - 9.79 seconds
- Q3 The fastest breed of dog is.
a) Poodle b) Doberman c) St Bernard d) Greyhound
- A3 d) Greyhound
- Q4 What do the three previous questions have in common?
- A4 The questions all have something to do with motion.

Work with the notes about the four types of motion. Students can write the notes in notebooks, with the teacher giving the notes on overheads or written on the board.

As a fun, introductory activity designed to familiarize students with some of the vocabulary words in the unit, complete "Motion Wordsearch".

Answer Key

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