Movement

Name:_____

Ontario Science and Technology Curriculum 1999
Strand: Structures and Mechanisms
Topic: Movement
Grade 2

Overall Expectations
- describe the position and movement of objects, and demonstrate an understanding of how simple mechanisms enable an object to move
- design and make simple mechanisms, and investigate their characteristics
- recognize that different mechanisms and systems move in different ways, and that the different types of movement determine the design and the method of production of these mechanisms and systems.

Specific Expectations
* All specific expectations are covered by this unit and are mentioned at the end of each activity. The following are specific expectations that are met throughout the unit but are not specifically mentioned: LS7:plan investigations to answer some of these questions or solve some of these problems, and describe the steps involved

Materials Box	
LARGE paper clips (class set) small paper clips (class set) wheels (for demonstration) tops (for demonstration) balls (for demonstration) pager/cellphone or something that vibrates (for demonstration) a toy that swings (for demonstration) construction paper junk box (a box with collected treasures) scissors glue tennis ball baseball wooden plank textbooks film canisters marbles tissue boxes (class set) a thick nail straws (enough for 2 per student)	straight pins (enough for four per student) hole punch hammer metre stick carpeted floor tiled floor sand box (or an eaves trough with sand in it)

Dear Parent or Guardian,

We are beginning our next Science and Technology Unit, Structures and Mechanisms: Movement. By the end of this unit, your child will:

- describe the position and movement of objects, and demonstrate an understanding of how simple mechanisms enable an object to move
- design and make simple mechanisms, and investigate their characteristics
- recognize that different mechanisms and systems move in different ways, and that the different types of movement determine the design and the method of production of these mechanisms and systems.

As outlined in the Science and Technology Curriculum, Ministry of Education , 1999.

Home Links:

To help your child further their understanding of this science unit, here are some fun activities for you and your family:

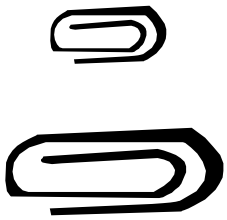
- Go to an auto show to see new concept cars.
- Visit the Ontario Science Centre in Toronto or online at www.ontariosciencecentre.ca.
- Take a car ride, subway ride, train ride, bus ride, boat ride or bicycle ride as a family and talk about movement.
- Play games with tops or balls and discuss their movements.

Happy Adventures,

Movement
Our Science Words

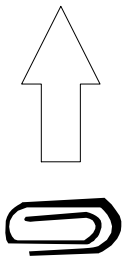
Materials
1) a **LARGE** paper clip
2) a small paper clip

Method:
1) Place the **LARGE** paper clip in the middle of your desk.
2) Place the small paper clip over the **LARGE** paper clip. This is drawn in the chart below for you.
3) Place the small paper clip under the **LARGE** paper clip. Draw what it looks like in the chart below.
4) Place the small paper clip to the left of the **LARGE** paper clip. Draw what it looks like in the chart below.
5) Place the small paper clip to the right of the **LARGE** paper clip. Draw what it looks like in the chart below.

Over	Under	To the Right	To the Left
			

6) Move the small paper clip upwards. The drawing in the chart on the next page shows you how you can draw this movement.
7) Move the small paper clip downwards. Draw this movement in the chart below.

8) Move the small paper clip to the right.
Draw this movement in the chart below
9) Move the small paper clip to the left.
Draw this movement in the chart below.

Upwards	Downwards	Moving to the Right	Moving to the Left
			

Our New Science Words

Here's a place to keep all of the new science words we learn during our adventures.

Grade 2 SMactivity001 covers:
SM3:describe, using their observations, the position of an object in relation to other objects or to a specific area (eg. use such words as over, under, beside, behind)
SM4:identify changes in the position of an object in relation to other objects (eg. movement upward or to the left)
SM8: use appropriate vocabulary to describe their investigations, explorations, and observations (eg. use words such as rotate, turn, faster, and slower to describe the motion of wheels and axles)

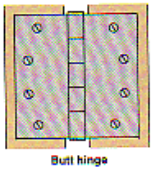
Movement
How do things move?

As a class let's make a of list of things that move in different ways. Write lists in the chart below:

Things that **turn**	Things that **spin**	Things that **swing**	Things that **bounce**	Things that **vibrate**

Grade 2 SMactivity002 covers:
SM5:describe, using their observations, the pattern of movement of objects (eg. turning, spinning, swinging, bouncing, vibrating)

Movement
Simple Machines

Simple Machine	Movement	Where do we find it?
_____ 		
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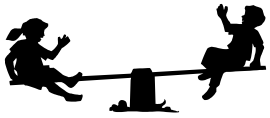
_____ 		
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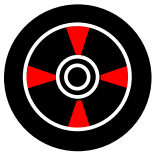
_____ 		

Let's Make a Hinge!

As a class let's make a list of things that use hinges:

_____

_____

_____

Materials:
1) a piece of construction paper
2) junk from the junk box
3) scissors
4) glue

Method:
1) Pick an object from the list above to build.
2) Draw a plan of your creation.
3) Make your creation with the construction paper, junk from the junk box, scissors and glue.
4) Draw an after picture of your creation.
5) Share HOW you made your creation with the class.

My plan:	The final product:

Grade 2 SMactivity003 covers:
SM1:describe different mechanisms through observation and investigation (eg. hinge, inclined plane), and identify the components that are simple machines (eg. lever, wedge)
SM2:describe, using their observations the characteristics and movements of simple mechanisms (eg. hinge, wheels and axle)
SM10:communicate the procedures and results of investigations and explorations for specific purposes, using drawings, demonstrations, and oral and written descriptions (eg. draw a sketch of an object they plan to make and another sketch of the object after it is made; tell the class the procedures they followed in making a vehicle or a container with a hinged lid)
SM14:identify, through observation, the mechanical parts of objets (eg. hinges on doors) and describe the motion of these parts

Movement
Changing Motions

Circle which ball you think will bounce better.


Let's try it!
Which one bounced better?_____

Why did it bounce better?

_____

_____

Purpose: _____

Materials
1) wooden Plank
2) textbooks
3) film cannister (the ones where the tops don't have a lip)
4) marbles

Method:
1) Place the wooden plank on top of two text books.
2) Place an empty film cannister at the top, let it go and let it roll down.
3) Measure how far the film cannister travelled and fill out the chart below.
4) Place the wooden plank on top of four text books.
5) Place a film cannister at the top, let it go and let it roll down.
6) Measure how far the film cannister travelled and fill out the chart below.
7) Continue adding 2 textbooks at a time until the chart is complete.

	2 books	4 books	6 books	8 books	10 books
distance travelled in centimetres					

8) Place the wooden plank on top of 4 text books.
9) Fill one film cannister with two marbles.
10) Place the film canister at the top, let it go and let it roll down.
11) Measure how far the film cannister travelled and fill out the chart below.
12) Continue adding 2 marbles to the film cannister until the chart is complete.

	0 marbles	1 marbles	2 marbles	3 marbles	4 marbles
distance travelled in centimetres					

Questions:

1) Did the empty film canister travel farther with only 2 books or with 10 books?

_____

2) Did the empty film canister travel faster with only 2 books or with 10 books?

_____

3) Why do you think it travelled faster and farther?

_____

4) Did the film canister travel farther with 2 marbles or with 10 marbles?

_____

5) Did the film canister travel faster with 2 marbles or with 10 marbles?

_____

Why do you think it travelled faster and farther?

_____

Grade 2 SMactivity004 covers:
SM16:compare the motion of similar objects made with or filled with different materials (eg. ways in which baseballs, and tennis balls bounce; ways in which film canisters containing different materials roll down a slope)
SM18:describe, using their observations, the effects of changing the slope of an inclined plane on the motion of an object that is placed on it (eg. changes in speed, changes in distance travelled)

Movement
Let's Drive Away!

Purpose: _____

You have been hired to design a new concept car for Hot Wheels! The first step in designing a concept car is to plan it. Remember you MUST use the same materials as in the sample car, and the materials should be shown in your plans. Make a drawing of your plans below:

Concept Car Name:_____
Designed by:_____

Materials:
1) a tissue box
2) a thick nail
3) a hammer
4) two straws
5) wheel cutouts
6) four straight pins
7) hole punch
8) scissors

Method:

1) With the long side of the tissue box facing you, measure 3 cm in from each end. Make a mark with your pencil.
2) Repeat step 1 on the other side.
3) Place the nail on your marks and nail a hole into the tissue box. You may need to enlarge the hole with a pencil.
4) Thread the two straws through the holes. These make your axles. Could you think of another way to attach your axles and still have the wheels spin?

_____

_____

5) Cut out the wheels.
6) Hole punch the middle of the wheel, this is so the axle can be attached to the wheel (repeat for all four wheels).
7) Cut the fringes of the wheels and fold them down in alternating directions (repeat for all four wheels).
8) Cut out the treads for the wheels.
9) Place glue on the white part of the tread.
10) Form a circle with the tread strip and attach the two ends, overlapping only on the white part (repeat for all four treads).
11) Place glue on the alternating fold fringes, then carefully place the wheel into the circular tread (repeat for all four wheels).
12) Slide axle into the middle hole of the wheel (repeat for all four wheels).
13) Place a straight pin through the straw, this keeps the wheel from falling off. Make sure there is enough room so that the wheels don't rub on the car body (repeat for all four wheels).
14) Decorate your concept car as you planned above.

Grade 2 SMactivity005 covers:
SM10:communicate the procedures and results of investigations and exploration for specific purposes, using drawings, demonstrations, and oral and written descriptions (eg. draw a sketch of an object they plan to make and another sketch of the object after it is made, tell the class the procedures they followed in making a vehicle or a container with a hinged lid)
SM11:make simple mechanisms and use them in building a device they have designed (eg. vehicle with wheels and axles)
SM12:select and use appropriate tools, utensils, and equipment (eg. use a paper punch to make holes for the axle in cardboard wheels)
SM13:use appropriate techniques to make and fasten the components of a model that they have made (eg. bend cardboard to make hinges; glue various materials together)
SM22: identify different ways in which wheels and axles can be attached to a chassis (eg. by using an axle-holder, by placing the axle in holes drilled in the frame

Movement
Let's go for a Drive!

The wheels turn clockwise when the car is going _____.
The wheels turn counter clockwise when the car is going _____.

Driving on different surfaces

Rub your hands together really fast. What happens? _____

Materials:
1) your new car
2) a metre stick or measuring tape
3) carpeted floor
4) tiled floor
5) sand box

Method:
1) Take your new car to the carpet.
2) Give your car a small push.
3) Measure how far your car went and record it in the chart below.
4) Take your new car to the tiled floor.
5) Give your car a small push (the same as last time).
6) Measure how far your car went and record it in the chart below.
7) Take your car to the sand box.
8) Give your car a small push (the same as last time).
9) Measure how far your car went and record it in the chart below.

	Carpet	Tile	Sand
Distance travelled in centimetres			

Which surface let the car go furthest? _____

Does that mean it has more or less friction with the car? _____

Which surface made the car stop the quickest? _____

Does that mean it has more or less friction with the car?_____

Grade 2 SMactivity006 covers:
SM2:describe, using their observations, the characteristics and movements of simple mechanisms (eg. hinge, wheels and axle)
SM6:ask questions about and identify needs or problems related to structures and mechanisms, and explore possible answers and solutions (eg. investigate the effect of different floor coverings on the motion of a toy car)
SM15:compare the motion of objects on different surfaces (eg. wheels of a toy on carpet, tile, and sand)
SM17:describe, using their observations, the effect that different surfaces (eg. wood, tiles, carpet, water) have on the rate at which an object slows down
SM19:predict factors that make a load easier or more difficult to move (eg. the size of a wheel or hinge, the amount of friction)
SM21:demonstrate awareness that the wheels of a vehicle rotate clockwise or counter-clockwise depending on the direction of movement of the vehicle

Movement
MONSTER CARS!

Purpose: _____

Make a prediction:
Do you think that a car with small wheels or **BIG** wheels would travel farther down a ramp?

_____

Materials:
1) 8cm wheel cutouts
2) scissors
3) glue
4) a wooden plank
5) text books
6) a metre stick or measuring tape

Method:
1) Place the wooden plank on several textbooks to make an incline.
2) Place your car new car with 6 cm wheels at the top of the incline, let it go and let it roll down.
3) Measure the distance your car travelled and record it in the chart below.
4) Cut out the wheels.
5) Hole punch the middle of the wheel or cut the out the middle circle with scissors, this is so the axle can be attached to the wheel (repeat for all four wheels).
6) Cut the fringes of the wheels and fold them down in alternating directions (repeat for all four wheels).
7) Cut out the treads for the wheels.
8) Place glue on the white part of the tread.
9) Form a circle with the tread strip and attach the two ends, overlapping only on the white part (repeat for all four treads).
10) Place glue on the alternating fold fringes, then carefully place the wheel into the circular tread (repeat for all four wheels).
11) Remove the existing 6 cm wheels on your car and replace them with the 8cm wheels by sliding the axle through the middle hole of the wheel (repeat for all four wheels).
12) Place the straight pins back into the straw, this keeps the wheel from falling off (repeat for all four wheels).

13) Place your car, now with 8cm wheels on top of the incline, let it go and let it roll down.
14) Measure the distance your car travelled and record it in the chart below.

	6 cm wheels	8 cm wheels
Distance travelled by car in centimetres		

Did the wheel size make a difference?

_____

Why or why not?

_____

_____

_____

_____

_____

Grade 2 SMactivity007 covers:
SM9:record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (eg. record what happens to the movement of a vehicle released from a ramp if the size of its wheels is changed)
SM19:predict factors that make a load easier or more difficult to move (eg. the size of a wheel or hinge, the amount of friction)

Movement Certificate

This certificate hereby certifies

_____

as a Grade 2 Movement expert.

_____ _____

Principal Teacher

Share your science booklet with at least one family member at home. After you have shared complete the following:

1) Cut out your Movement Certificate.
2) Get the person you shared your science booklet with to fill out the form below, detach it and bring it back to school.

C .....

_____ shared their science booklet with the following family members:

_____

Parent's Signature