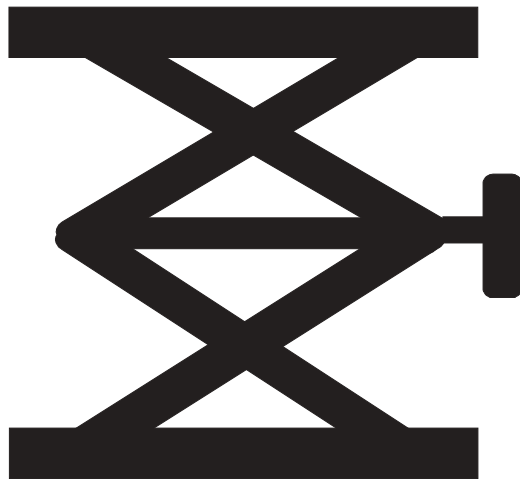




**THINK
THEMES!**

SIMPLE MACHINES



Simple Machines

State Goals and Chicago Academic Standards & Frameworks

State Goal 11: Have a working knowledge of the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

Chicago Academic Standard A: Understand that science involves asking and answering questions and comparing experimental results to what is already known.

Curriculum Framework Statements:

- 1 Conduct simple experiments and observations and explain what was discovered.
- 2 Demonstrate how repeated observations improve confidence in results.
- 3 Read and discuss science-related materials from a variety of sources.

Chicago Academic Standard B: Design and conduct simple scientific investigations in which observations are made, data are gathered and organized, and reasonable conclusions are drawn.

Curriculum Framework Statements:

- 1 Ask questions and formulate hypotheses about objects, events, and organisms that can be tested through scientific investigation.
- 2 Observe and describe changes in terms of starting conditions, type of change, and ending conditions, using words, diagrams, or graphs (e.g., melting ice cubes, germinating seeds, burning candles).
- 3 Select and use instruments to collect, organize, and present data related to a scientific investigation (thermometers, timers, magnifiers, balances, microscopes, calculators, and computers).
- 4 Organize observations and measurements into charts and graphs and communicate conclusions orally and in writing.
- 6 Use data based on observations from guided experiments to construct reasonable and accurate explanations.
- 7 Compare observations of individual and group results.

Chicago Academic Standard C: Understand and apply the concepts, principles, and processes of technological design.

Curriculum Framework Statements:

- 2 Use appropriate vocabulary to describe scientific phenomena and instrumentation.

- 3 Plan and construct simple physical structures to solve specific technological challenges (e.g., blocks to build bridges, towers from drinking straws).

State Goal 12: Have a working knowledge of the fundamental concepts and principles of the life, physical, and earth/space sciences and their connections.

Chicago Academic Standard D: Investigate, explain, and demonstrate characteristics of forces and motion.

Curriculum Framework Statements:

- 1 Compare and contrast an action and reaction in the behavior of objects.
- 2 Describe how push or pull may affect the motion of objects.
- 3 Compare forces using various tools.

State Goal 13: As a result of their schooling, students will have a working knowledge of the relationships among science, technology, and society in historical and contemporary contexts.

Chicago Academic Standard A: Identify and describe major technological changes and their effects on people, tools, and nature.

Curriculum Framework Statements:

- 2 List and categorize simple machines that make work easier.

Chicago Academic Standard D: Follow basic safety rules.

Curriculum Framework Statements:

- 1 Explain the need for order, cleanliness, and safe practices during an experiment.
- 2 Describe safety hazards associated with laboratory investigations (e.g., no tasting of any chemicals).

State Goal 16: Understand and analyze events, trends, individuals and movements shaping the history of Illinois, the United States and other nations.

Chicago Academic Standard A: Analyze the historical development of communities in the Midwest and the United States (e.g., settlement, statehood, wars, technological developments).

Curriculum Framework Statements:

- 1 Describe events using categories of time (e.g., yesterday, today, tomorrow, long ago).



Simple Machines

Second Language Goals and Standards

(Adapted from CPS – ESL Goals and Standards PK-12)

Goal I: To use the second language to achieve in all academic areas and settings.

Standard A: Students will use the second language for personal and instructional interactions in the classroom.

Performance Indicators:

- 1d Acquire the vocabulary necessary for instruction.
- 1o Interact with target language-speaking peers.
- 1p Request assistance from teachers and peers.
- 1q Participate in simple dialogues.
- 1s Participate in cooperative groups verbally and/or non-verbally.
- 1t Follow simple oral directions.
- 2a Ask the teacher to restate, simplify and expand information and directions.
- 2f Interact in a small group.
- 2i Express ideas both orally and in writing.
- 2j Ask for and give information both orally and in writing.
- 2l Write level-appropriate compositions.
- 3d Express ideas using increasingly complex language (e.g. embedded phrases, cause and effect and reported speech, etc.)
- 3f Make inferences.
- 3i Make generalizations.
- 3j Draw conclusions.

Standard B: Students will use the second language to obtain, process, construct, manipulate, provide and expand knowledge and information through spoken and written media.

Performance Indicators:

- 1d Record ideas through pictures.
- 1i Comprehend conversational sequence.
- 1k Classify objects according to number, shape, size, use, etc.
- 1m Attempt to convey gathered information in writing.
- 1n Illustrate a story.
- 1o Give general oral descriptions from pictures, charts, etc.
- 2e Create a booklet with illustrations for a content area project.
- 2f Participate as a speaker in small group activities to obtain information.
- 2g Construct a chart or other graphic organizer to show information.
- 2k Access information from a newspaper, dictionary, encyclopedia, thesaurus, etc.
- 2l Read for information.

- 2m Write a description from a sequence of pictures.
- 2n Give written descriptions from pictures, charts, etc.
- 3c Write reports using information from a variety of sources.
- 3e Give a short oral report on a familiar topic and be able to answer questions about it.

Standard C: Students will use appropriate learning strategies to construct and apply academic knowledge.

Performance Indicators:

- 1h Use pictures for purposes of classification.
- 1j Use manipulatives and illustrations to elicit verbal understanding of various concepts.
- 2b Arrange events in chronological order.
- 2n Improve fluency and understanding by using such strategies as rereading, retelling and summarizing.
- 3b Rephrase, explain and expand oral or written information to check comprehension.
- 3c Collect and organize information.
- 3d Select materials from school resources to complete a project.
- 3h Give oral reports.
- 3k Scan entry in book to locate information for an assignment.

Goal II: To use the second language for all social and personal purposes.

Standard A: Students will use the second language to communicate and meet personal needs.

Performance Indicators:

- 1a Interact with others.
- 1b Share and request information.
- 1g Understand and use verbal and non-verbal cues.
- 1n Give and carry out common commands.
- 2c Participate as speaker/listener in group activities.
- 3a Practice new language while engaging in informal and formal conversation.

Standard B: Students will interact in and through spoken and written second language for personal expression and enjoyment.

Performance Indicators:

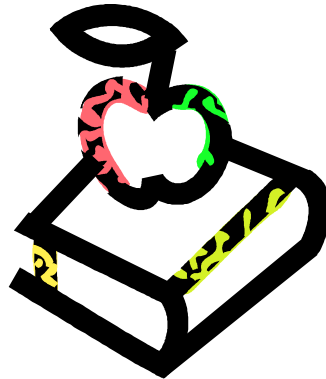
- 1a Recount events of interest/importance.

- 1e Participate in games, activities, etc.
- 2a Engage in dialogue about events of interest/importance
- 3a Write about events of interest/importance.

Standard D: Students will use appropriate learning strategies to extend their communicative competence.

Performance Indicators:

- 2b Contribute information that is relevant for specific purposes.
- 2e Experiment with learned language chunks to construct meaning in oral and written forms.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/B/3. 5 - 7

11/C/1

13/A/2

ACTIVITY 1

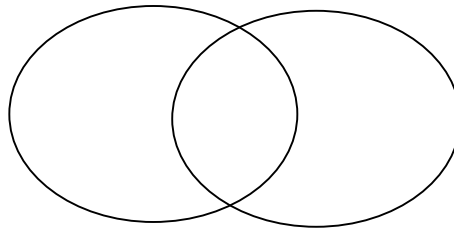
Exploring and categorizing simple machines

Set up centers for small groups to explore a variety of simple machines (e.g. can opener, cork screw, screws, nuts, bolts, pulley, scissors, stapler, pencil sharpener, wrench, etc.)

Give students time to examine the various objects.

Come together as a whole group and discuss what each object does/is used for.

In small groups, students categorize objects into 2 groups based on similarities and differences. They illustrate and record what they did on a graphic organizer as illustrated below:



Have each group discuss their reasoning behind their categorizing (e.g., “Why did you put the _____ in this group?”) to the rest of the class.

**At this point explain what a simple machines is: anything that helps people do work by putting ones weight on it; it may contain a ramp, lever, or wheel.*

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/ 1s; 2f, i, j

I/B/1k, n, o; 2g

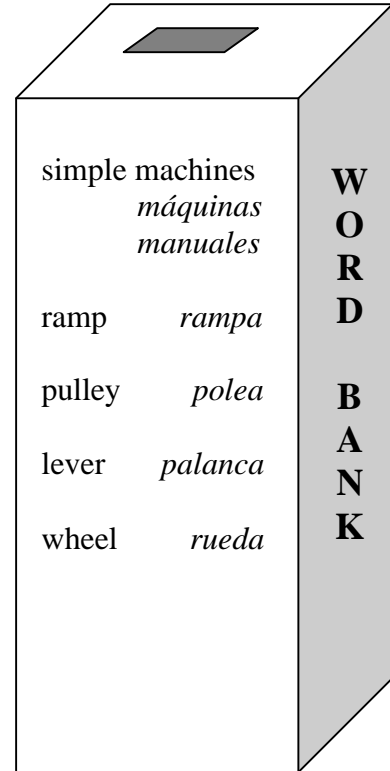
I/C/3c

II/A/1a; 2c; 3a

MATERIALS

Variety of simple machines:
can opener, cork screw, screws, nuts, bolts
pulley, scissors, stapler, pencil sharpener,
wrench, etc.

Graphic organizer

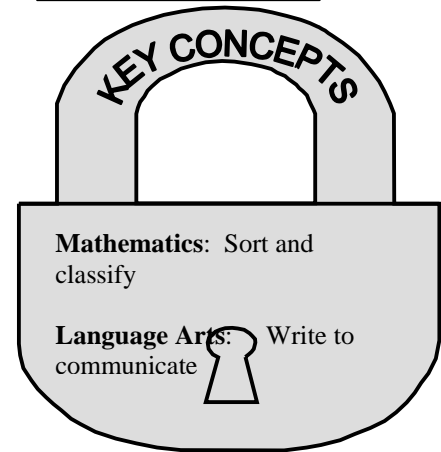


STRATEGIES

Whole group
Small groups
Cooperative learning
Grouping and classifying
Word bank
Mapping

RESOURCES

Science on the Go! Moving Mechanics
Scott Foresman Science



LITERACY CONNECTIONS

Present observations/findings using invented spelling and letter/sound association.

THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/A/1 11/B/1, 6, 7 12/D/1-3 13/D/1, 2

ACTIVITY 2

Ramps

Prior Knowledge: Ask students if they know what ramps are and what they are used for. If students do not know, explain that ramps help people move or raise very heavy things. Another name for a ramp is incline plane.

Brainstorm examples of ramps and where they are found.

Show pictures of various ramp uses and discuss how they help people.

Ramp testing activities:

- Stairs/ramps: Have students test carrying three crates full of books up the stairs all at once, then try one crate at a time. Discuss whether a ramp would make this job easier to do. Next have students place the three crates on a cart/dolly and then wheel them up the ramp. Compare ramp use to stairs.

*Option: can discuss the use of wheel to make this job easier.

- Take students out to the playground. Have one volunteer stand at the top of the stairs of the slide and have another volunteer sit at the top of the slide. Ask students to predict which will get to the ground faster (climbing or sliding). Have volunteers begin their descent to the ground.

*Discuss safety rules prior to doing activity.

*Set up different height ramps at a learning center for students to experiment pushing and pulling objects.

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1d, o I/B/1i; 2e I/C/1j

II/A/1g II/B/1e

MATERIALS

Chart paper
3 crates full of books
Stairs and ramps (within the school)
Cart/dolly
Slide (at playground)
Paper
Pencils
Crayons

STRATEGIES

Whole group
Small group
Cooperative learning
Individual
Think-pair-share

RESOURCES

Science on the Go! Moving Mechanics
Scott Foresman Science

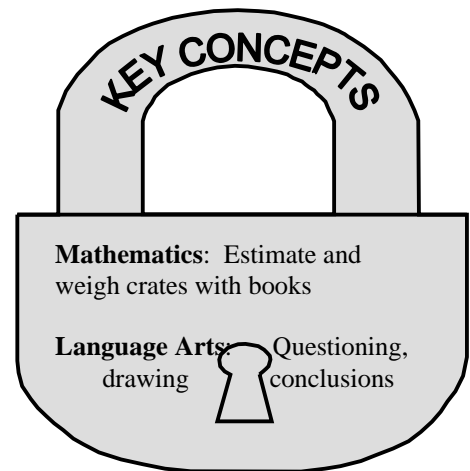
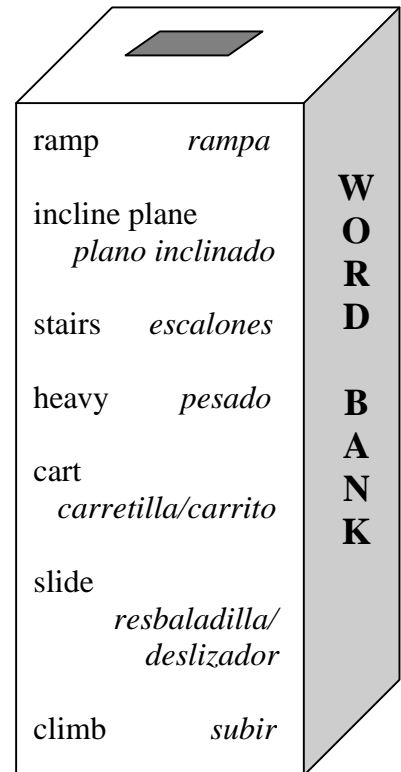
LITERACY CONNECTIONS

Book-making:

Think-pair-share: Partners review and discuss different uses of ramps. Then individuals write 2-3 sentences (one sentence on a page) for a “Uses of Simple Machines” book.

e.g. A ramp can help me _____.

*collect pages for later use



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/A/1,2

11/B/1, 2, 6, 7

11/C/1

12/D/3

ACTIVITY 3

Screw as an inclined plane

Have students work in small groups to experiment screwing two different types of screws into soap bars (i.e. one with a bigger incline than the other).

Students share their opinion of which is easier to screw and why.

Explain that a screw is an inclined plane by demonstrating the following pencil activity taken from Science on the Go! Moving Mechanics:

1. Distribute an Inclined Plane Patterns sheet to each student. Have them cut out patterns from their papers. Ask, "Which of these paper inclined planes would require less force to move an object up?"
2. Distribute pencils and some tape to each group. Instruct each student to place the inclined planes on the desk, with the written side face down. Place a pencil on top of triangle A as shown in the diagram, and secure with tape. Wrap the paper around the pencil and again secure with tape. Follow the same procedure using the other pencil and triangle B.
3. Hold the pencils up and note the patterns made by the black edge of the triangle that was wrapped around the pencil. What does this pattern remind you of? What words would you use to describe it? It should look like a screw. Which triangle, when wrapped around the pencil, had the lines of the spiral closer together? Which were farther apart? Knowing what you do about inclined planes, which spiral should take less force to move up? It would be triangle A.

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1p, t; 2a, f

I/B/2f

I/C/1j; 2n; 3d

II/A/1a, n

MATERIALS

2 different types of screws with different inclines
Bars of soap
Screwdrivers
Copies of Inclined Plane (triangle) pattern sheets
Two pencils per student
Tape

STRATEGIES

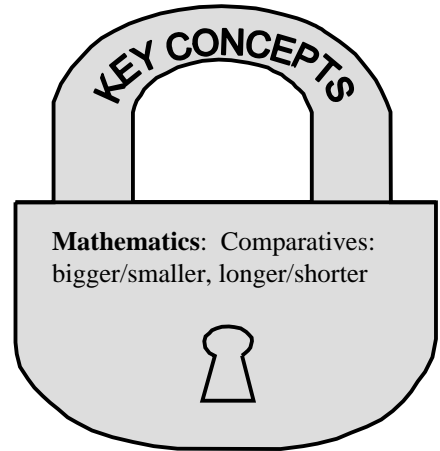
Small group
Cooperative learning
Individual
TPR

RESOURCES

Science on the Go! Moving Mechanics
Scott Foresman Science
Hands on Science Máquinas Simples

LITERACY CONNECTIONS

Language development: Demonstrate attentive listening, paraphrasing and explains and expresses ideas in complete sentences.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/A/1

11/B/1.6.7

12/D/1-3

13/D/1.2

ACTIVITY 4

Levers

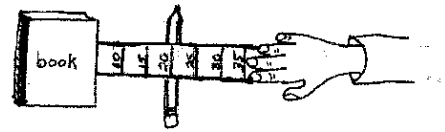
Prior knowledge: Show pictures of different levers. Ask students if they know what they are and what they are used for. If students do not know, explain that a lever is:

A simple machine that helps us lift things using less force (pushing less).

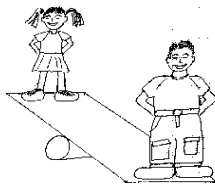
In cooperative groups, students do a roundtable to record types of levers, their uses, and where they are found. Then have students share ideas with the rest of the class.

Lever testing activities:

- How does a lever work?
 1. Set up a book, pencil, and ruler as shown in the picture.
The pencil is under the 20 centimeter mark.
The book is on the 5.
 2. Push down on the end of the ruler to lift the book.
 3. Do it again with the pencil under the 15.
 4. Do it again with the pencil under the 10.
 5. Observe each time. Which time was it easiest to lift the book?
 6. Draw a picture of the ruler, book, and pencil. Show where the pencil is when it is easiest to lift the book.
 7. Think about your results: Was it easiest to lift the book with the pencil under the 10, 15, or 20? Would it be easier to lift the book with the pencil under 12 or 18-centimeter mark?
 8. Inquire further: A ruler makes a good lever. What else could you use as a lever?
(Scott Foresman Science, 1999)



- Present a dilemma: You (or a larger student selected) are stuck in quicksand/wet cement. Is there any way that the smaller student can pull you out? (Students will probably suggest many ways that require more students pushing, longer or shorter boards, etc.) Allow students to experiment lifting each other up without the lever and then with a lever as shown below:



Which required more work/effort?

*Discuss safety rules prior to conducting activity.

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1o, t

I/A/2a

I/C/1h

MATERIALS

Picture cards of levers
Various objects that are or have a lever
Paper
Pencils
Round log
6' X 12" piece of wood

STRATEGIES

Whole group
Small group
Partnerships
Cooperative learning
TPR
Journaling

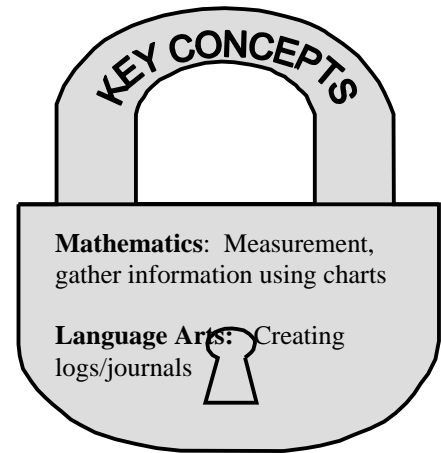
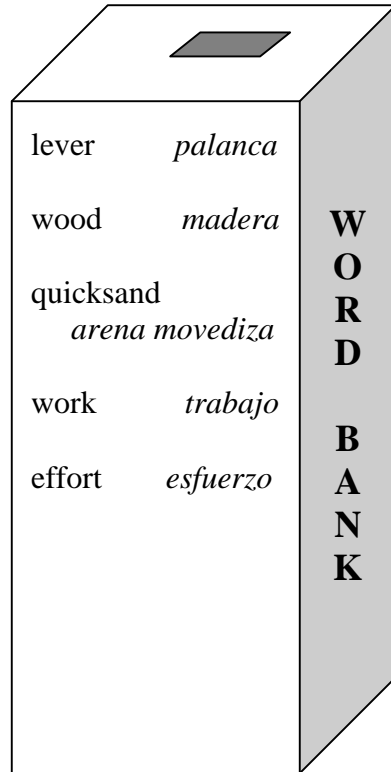
RESOURCES

Science on the Go! Moving Mechanics
Scott Foresman Science

LITERACY CONNECTIONS

Book Making: Write 2-3 sentences (one sentence on a page) for a "Uses of Simple Machines" book.

A lever can help me _____.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/A/1 11/B/1, 5 12/D/2

ACTIVITY 5

Pulley

Prior knowledge: Set up 3 – 4 stations with various pulleys in each. Allow students to explore/play with the pulleys for 15 minutes. Afterwards, individuals write their guesses on what types of machines they think they are and what they are used for on a piece of paper.

Name of machine	Used for . . .

Have students share their ideas with a partner and try to come to a consensus on type and use.

Have students come together as a whole group and share ideas.

Teacher gives the specific name for the simple machine that is used in each object (pulley) and defines it.

Pulley: a simple machine that helps us lift heavy objects and also move others.

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1q I/B/2g I/C/1h

MATERIALS

Various objects with pulleys: crane, clothesline pulley, tow truck toy, etc.

Paper
Pencils
Crayons
Construction paper

STRATEGIES

Small group
Individual
Partnerships
Whole group
Cooperative learning
Journaling

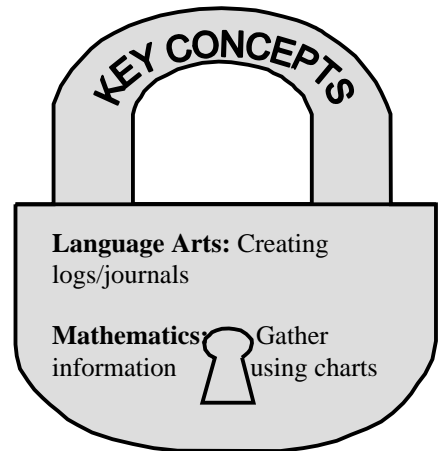
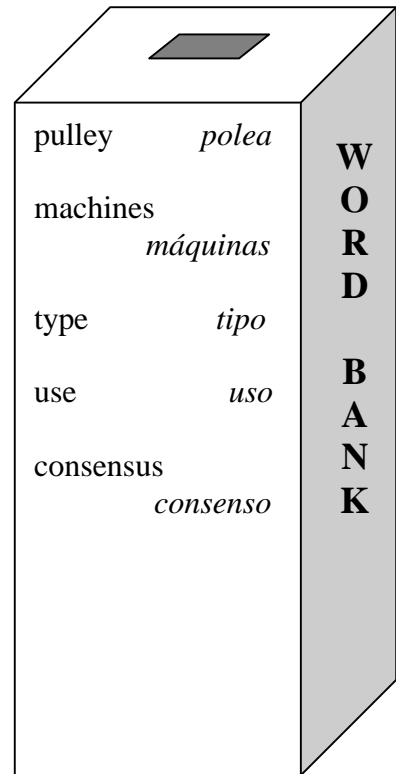
RESOURCES

Scott Foresman Science
Science on the Go! Moving Mechanics
Hands-on Science: Máquinas Simples

LITERACY CONNECTIONS

Book Making: Complete “Uses of Simple Machines” book by creating the last pages and stapling pages together onto construction paper. Allow students to design their own cover for their book.

A pulley can help me _____.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/C/2

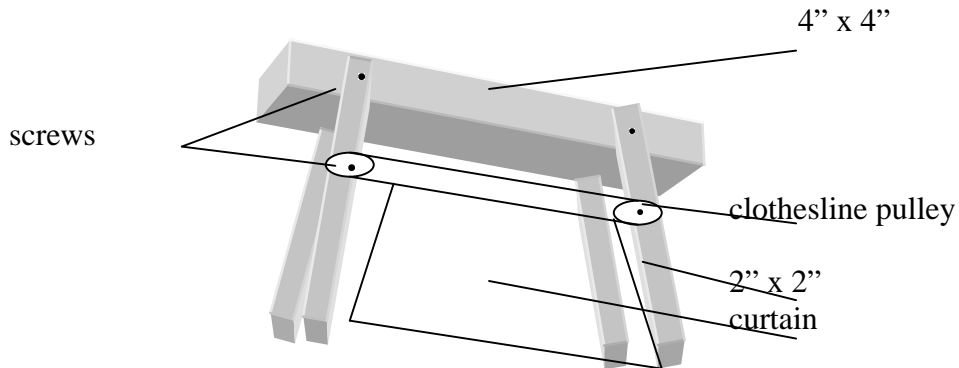
12/D/3

ACTIVITY 6

Constructing a theatre using simple machines

Explain to students that before constructing a theatre they will look at the materials and simple machines they will be using to build.

Provide screwdrivers, clothesline pulleys, screws, cloth, and pieces of wood for students to look at. Have them discuss, in small groups, how they think they will use all this material to construct a theatre.



**Teachers look at illustration and explain to students how they are going to build a theater. First they will use the pieces of wood, screws, and screwdrivers to build a construction horse. Then they will attach the clothesline pulley to two of the horse's legs (same side). Lastly, they will hang the cloth from the clothesline pulley line to create the curtain.*

***Option: Build a structure of your choice using simple machines.*

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1p, t; 2a, f

I/B/2e, f

I/C/1j; 2n; 3d

II/A/1a, n

MATERIALS

- 6 1-1/2" screws
- 2 Clothesline pulleys
- 1 3ft. long 4"x4" piece of lumber
- 4 3ft. long 2"x2" piece of lumber
- Piece of fabric for the curtain

STRATEGIES

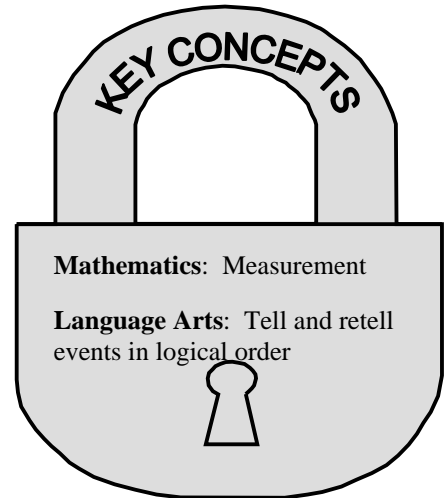
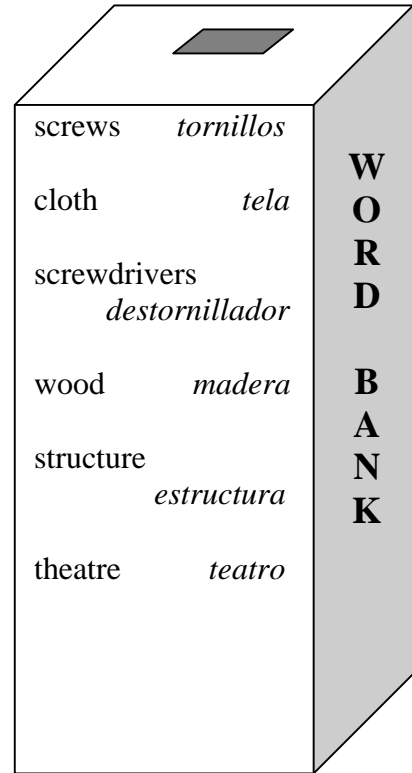
- Whole group
- Small group
- Cooperative learning
- TPR

RESOURCES

- Science on the Go! Moving Mechanics
- Scott Foresmans Science*
- Hands on Science: Máquinas Simples

LITERACY CONNECTIONS

Expository writing: Create a book about the steps used to make the theatre using capitalization and punctuation in sentences.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/B/3, 5, 7

11/C/1

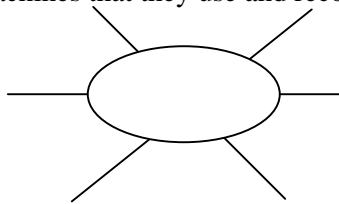
13/A/2

ACTIVITY 7

Differentiating between simple and fine machines

Prior knowledge: Have students tell what a fine machine is.

Ask students to name some machines that they use and record ideas on a word web.



Gather pictures of simple and fine machines.

Using a 2-column, non-labeled chart, teacher shows one picture at a time and places it in one of the columns. (Place pictures of simple machines in one column and pictures of fine machines in the other column without telling students that this is what you are doing).

Simple Machines	Fine Machines

After placing 3-4 pictures on each side, ask students to guess your rule (i.e., “Why did I group these this way?”). Give students the opportunity to describe characteristics of each column.

*At this point, define what a fine machine is: a machine that runs/is powered by water, steam, gasoline, gas, coal, electricity, or another element.

Students work in small groups to find pictures of simple and fine machines in magazines/newspaper and paste them on the corresponding column of the chart.

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/B/3, 5, 7

11/C/1

13/A/2

MATERIALS

Picture cards of simple machines
Chart paper
Magazines
Newspapers
Scissors
Tape
Markers

STRATEGIES

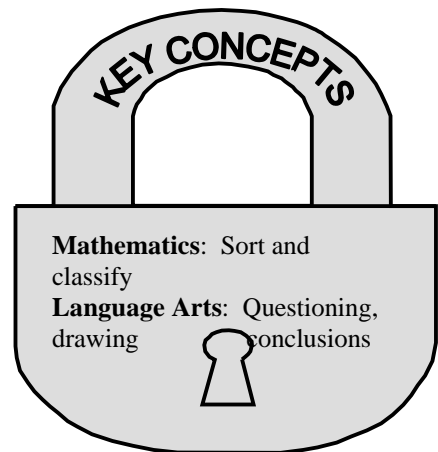
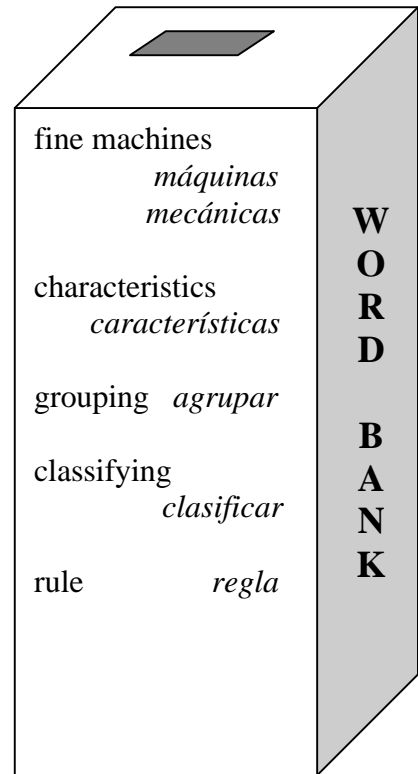
Whole group
Small group
Cooperative learning
Word banks
Grouping and classifying
Mapping
Anticipation/prediction guides

RESOURCES

Science on the Go! Moving mechanics
Scott Foresman Science

LITERACY CONNECTIONS

Present observations/findings using invented spelling and letter/sound association.



THEME: Forms and Function
TOPIC: Simple Machines

CPS ACADEMIC GOALS/STANDARDS/Frameworks

11/A/3 11/B/3, 7 11/C/1 16/A/1

ACTIVITY 8

From simple to fine machines

Explain that students will be researching the evolution of one simple machine to fine machine within their small groups.

Teacher demonstrates the process by researching the evolution of the car. At this point you may want to point out that the car is based on more than one simple machine or let them discover it on their own.

1. Carried by people
2. Push logs and pull with rope
3. One wheel
4. 2 wheels
5. 4 wheels

Assign each group of 2-4 students to research the evolution of one simple machine to fine machine and bring pictures in (e.g. plane). You may want to draw names out of a hat.

When research is done, have groups share with one another.

CPS SECOND LANGUAGE GOALS AND STANDARDS

I/A/1o, q, s; 2a, f, j, l; I/B/1d, m; 2e, k, l, m, n; 3c, e
I/C/1h, j; 2b, n; 3b, d, h, k II/A/1a, b; 3a II/B/1a; 2a; 3a
II/D/2b, e

MATERIALS

Encyclopedia
Books on theme
Transportation books
Catalogs
Model kits

STRATEGIES

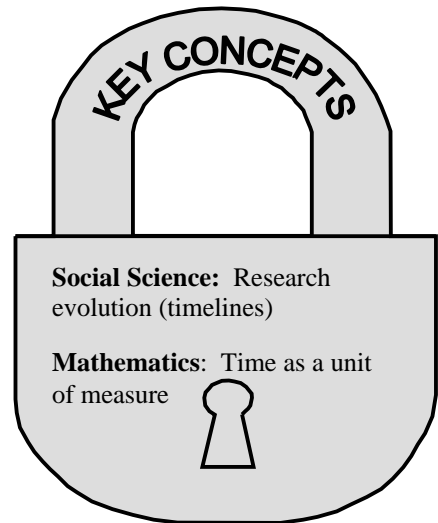
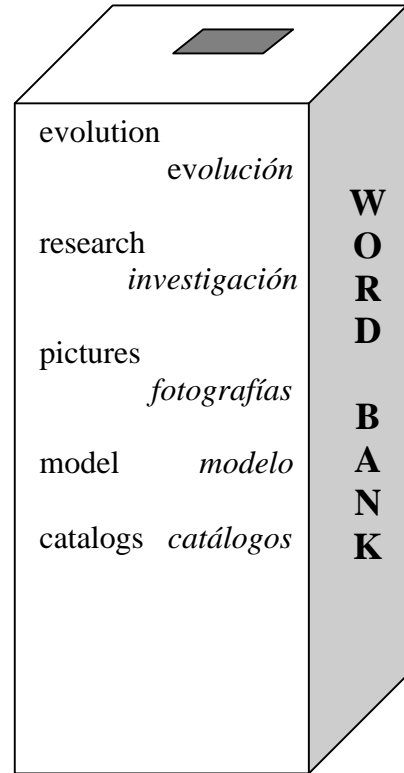
Whole group
Small group
Cooperative learning
Partnerships
TPR

RESOURCES

Science on the Go! Moving Mechanics
Scott Foresman Science
Field trip to auto shop/dealership/museum

LITERACY CONNECTIONS

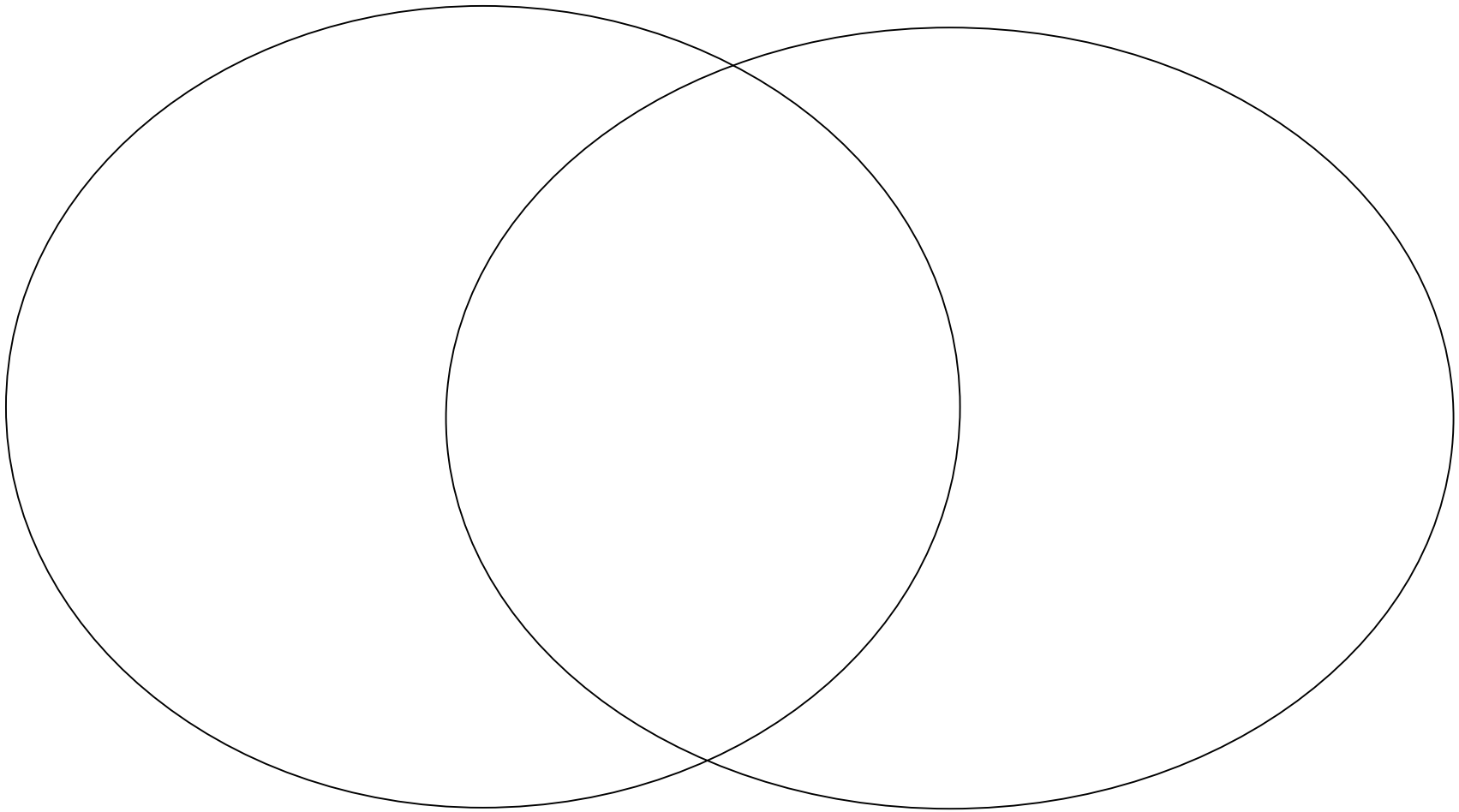
Create a book on the evolution of a simple machine to a fine machine using a variety of books to present research (non-readers: pictures).



Nombre _____

Fecha _____

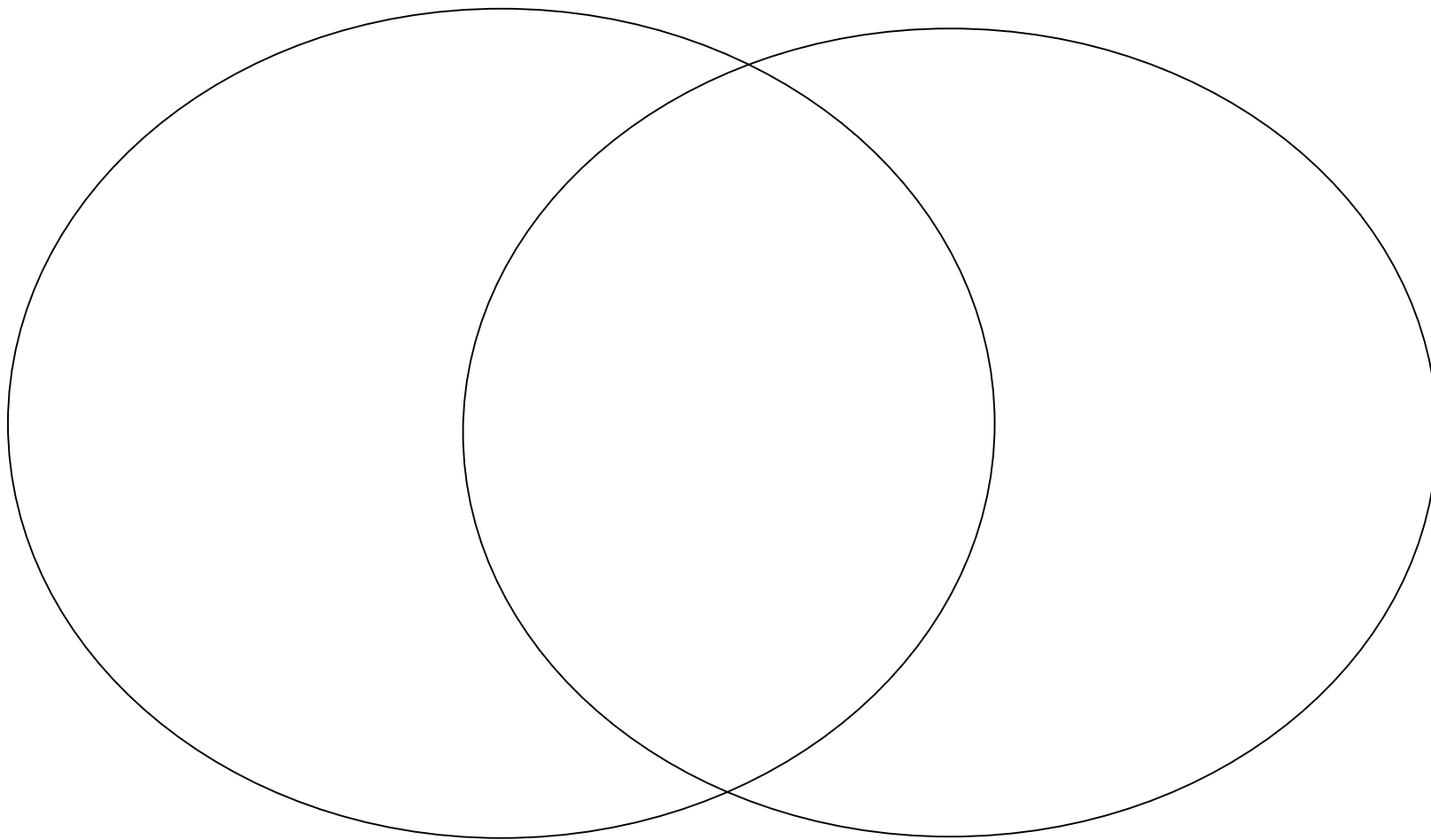
Título



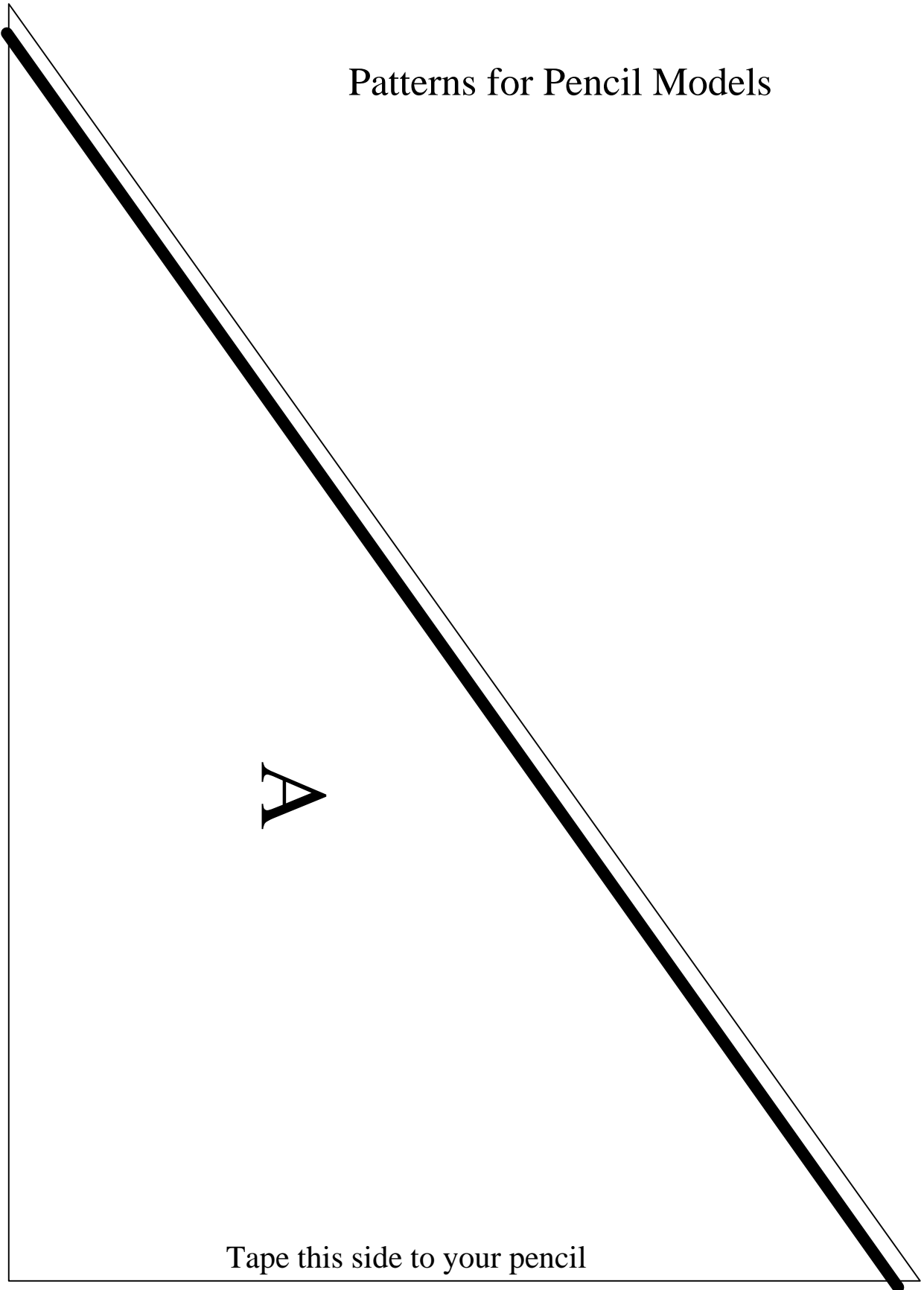
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Date _____

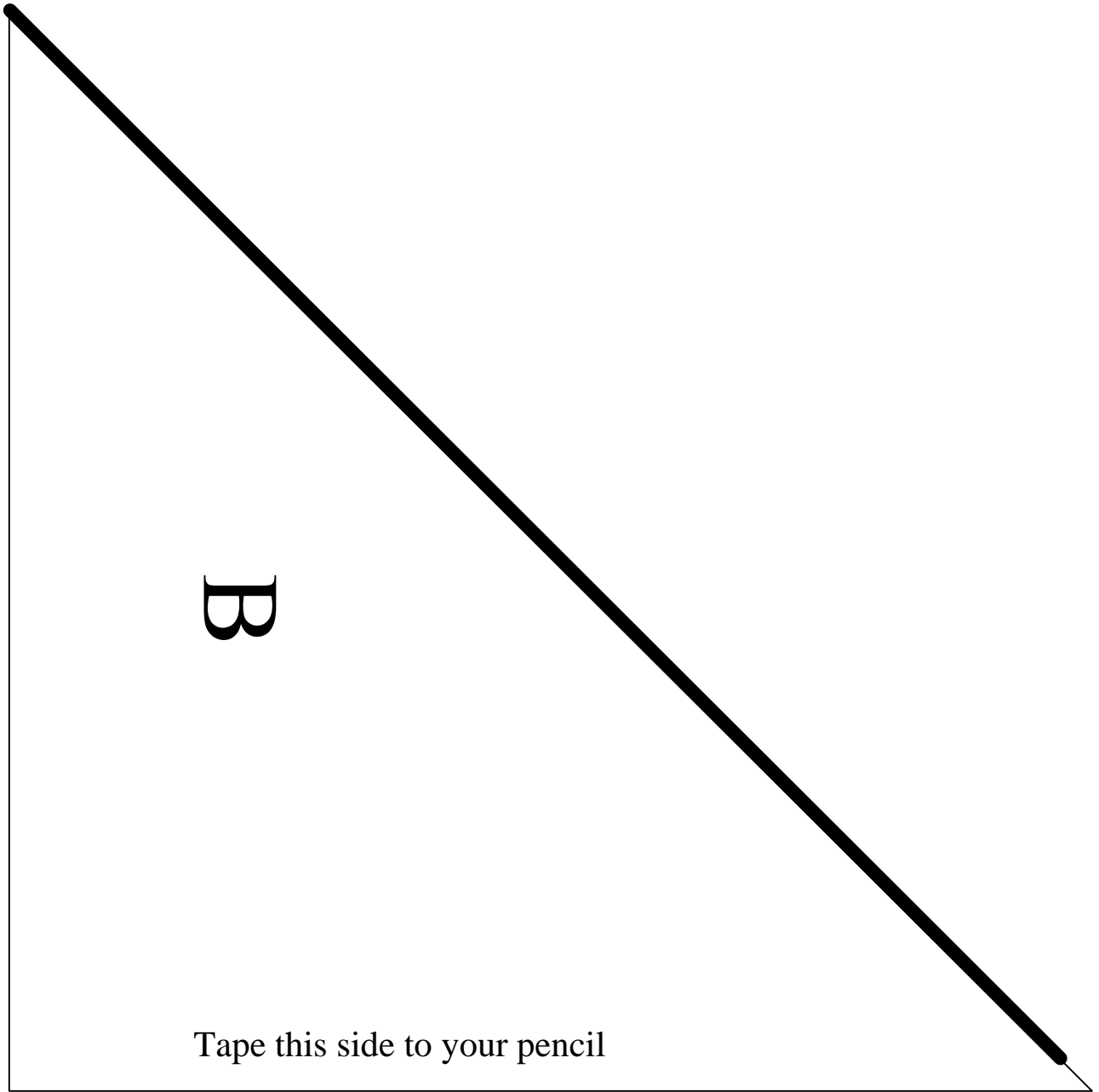
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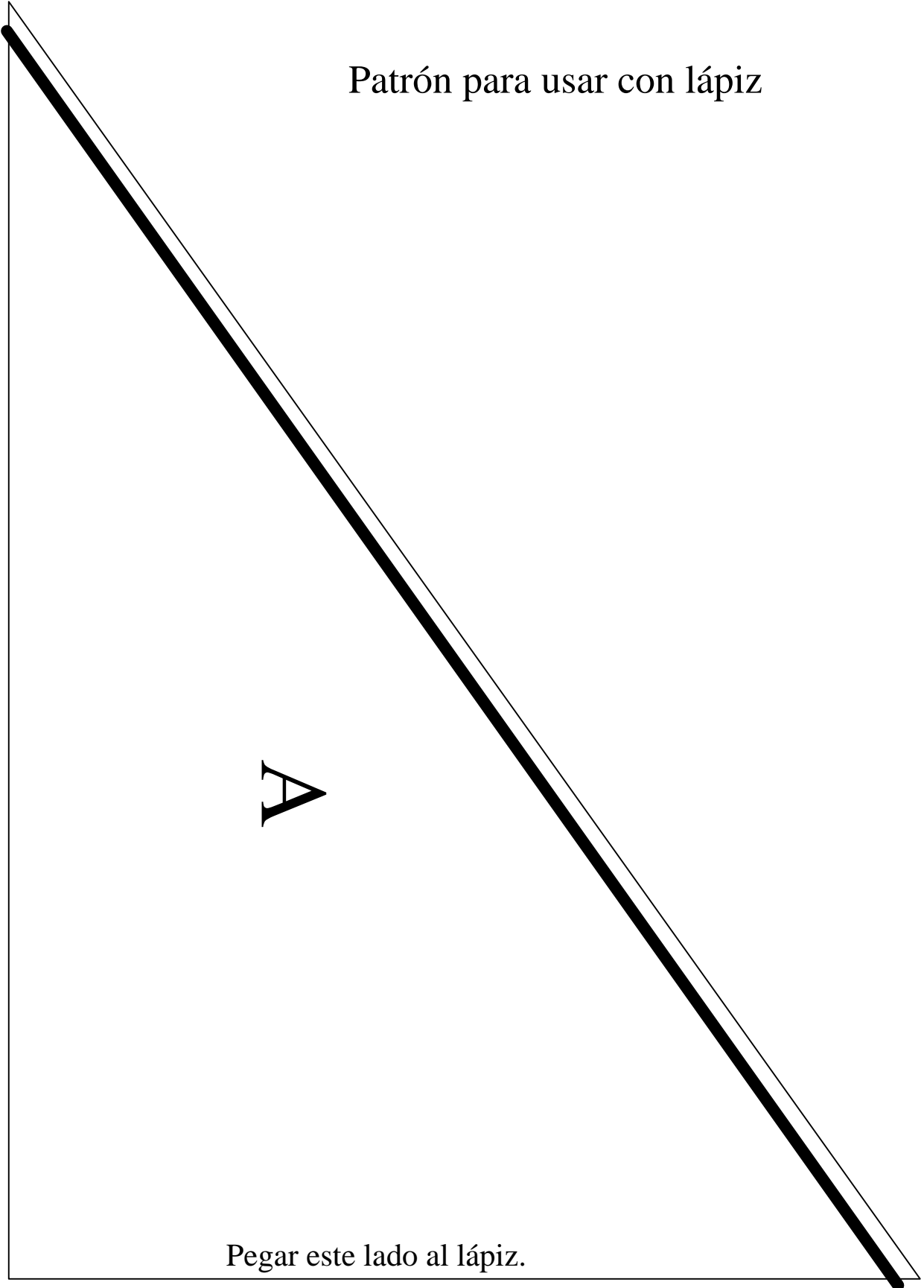
Patterns for Pencil Models



Patterns for Pencil Models

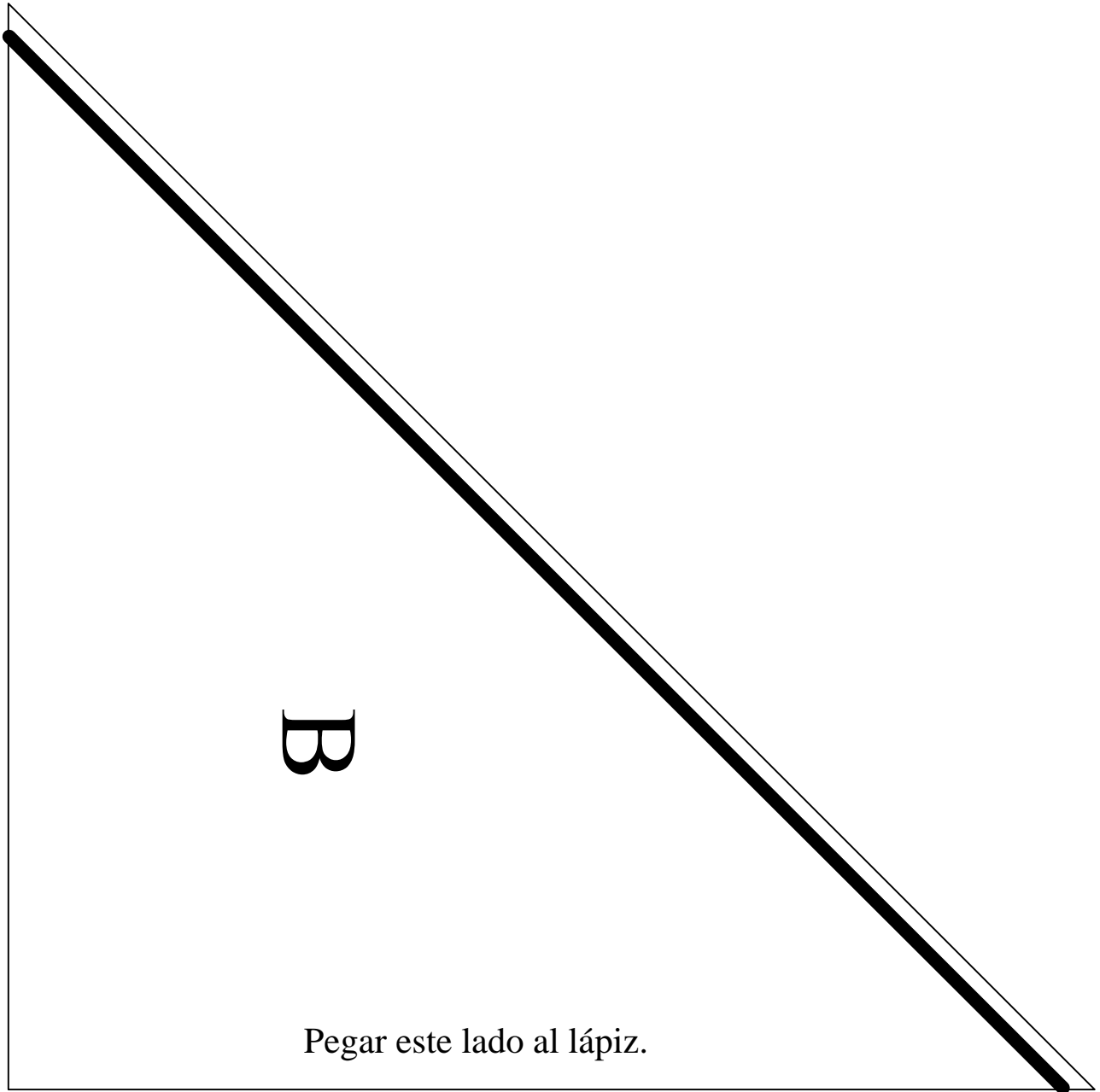


Patrón para usar con lápiz



Pegar este lado al lápiz.

Patrón para usar con lápiz



Nombre _____

Fecha _____

Palanca

Dibujo de la palanca	Uso	Lugar donde se encuentra

Name _____

Date _____

Levers

Picture of lever	Use	Places found

Nombre _____

Fecha _____

Polea

Nombre de máquina	Se usa para . . .	¿Están de acuerdo? Sí o No (parejas)

Name _____

Date _____

Pulley

Name of machine	Used for . . .	Agree/Disagree (partners)

Nombre: _____

Fecha: _____



Máquinas que usamos

Name: _____

Date: _____



Machines we use

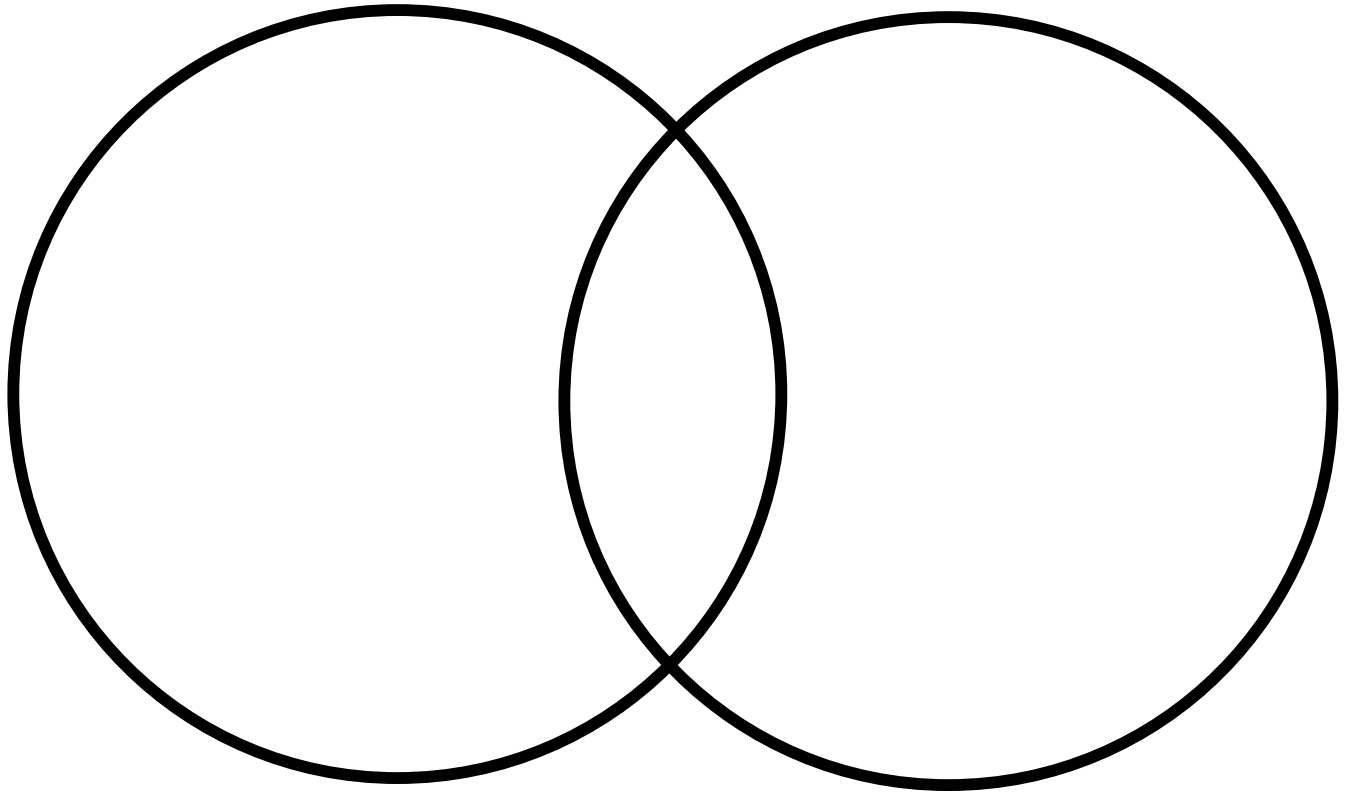
SIMPLE MACHINES

ASSESSMENT FOR ACTIVITY 1

Oral Group Presentation

Using a Venn diagram, students will be able to group/ categorize objects by similarities and differences.

Students should be able to explain the reasoning behind each category.



Depending on the grade level of the students, various methods can be used for this activity. For example, pictures of simple machines can be used for younger children while the name of the simple machine or its description can be printed on an index card for older children and the same sorting activity can be performed.

SIMPLE MACHINES

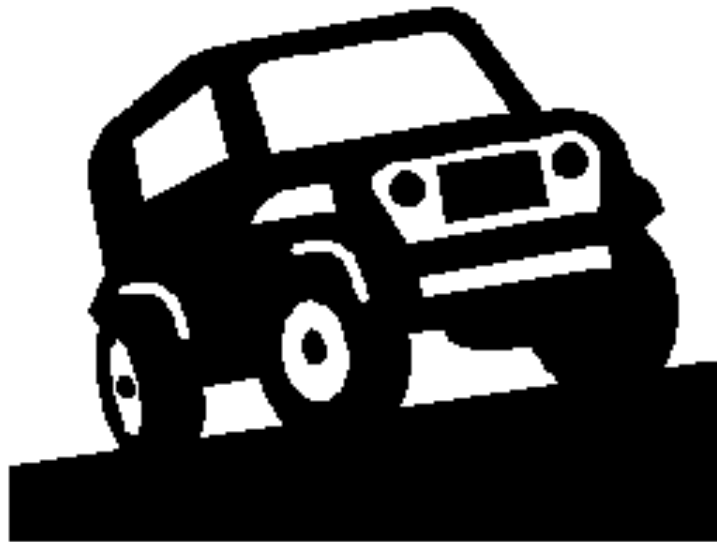
ASSESSMENT FOR ACTIVITY 2

Observation / Prediction

Make a chart comparing each activity. Use a stopwatch. Can students brainstorm another similar activity?

Comparison / Prediction

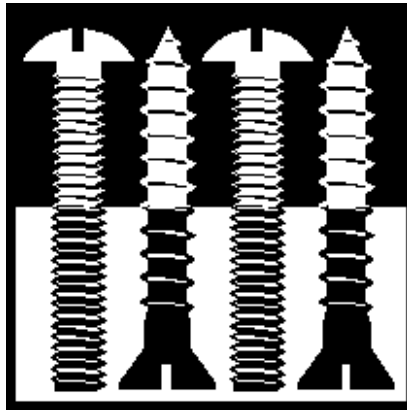
Using a car and ball, students can compare each object by weight and size. Comparisons can be made between the first and second predictions. At this time an assessment can be on their accuracy.



SIMPLE MACHINES

ASSESSMENT FOR ACTIVITY 3

Use questions from each activity for your assessment.
This can be in the form of an oral or written assessment.



SIMPLE MACHINES

ASSESSMENT FOR ACTIVITY 4

Make a two-column chart labeling one side with “easier” and the other with “harder.” Use check marks at points of 20, 15, 10 and 5 to track levels of use and amount of work needed to do so.

Questions

What else can be used as a lever?
Which required more work/effort?
Demonstrate your answer.

ASSESSMENT FOR ACTIVITY 5

Using an Erector Set, students can draw first and/or construct a toy that uses a pulley.

ASSESSMENT FOR ACTIVITY 6

Using simple machines and various materials students will construct a theater. Refer to the model in the activity.

Simple Machines Extension Activity A

How do wheels work?

Materials:

Cardboard box

String

Four wooden spools

Two pieces of wire or pipe cleaners long enough to serve as axles

Staples or brads to fasten “axles” to box

Heavy items for weight in box

What to do:

1. Tie the string to the box. Put items in the box. Try to pull the box. How hard is it to pull? How can we use the spools to help us?
2. Run each pipe cleaner (axle) through two spools and fasten pipe cleaners to box with brads so that a little wagon is constructed. Now try pulling the box again. How does this change the amount of strength it takes to move the wagon?

*Sometimes young children suggest putting the wheels on by gluing them to the box. Try it out with them before going on to the wheel and axle project.

Additional Activity

Materials:

Heavy book

Two rounded pencils

What to do:

With just one finger, try to move a heavy book along the surface of a table. Was it hard or easy? Now rest the book on the sides of the two pencils. How do the pencil-wheels affect the amount of effort it takes to move the book?

Simple Machines Extension Activity B

How do pulleys help us?

Materials:

Rope or wire

Pulley

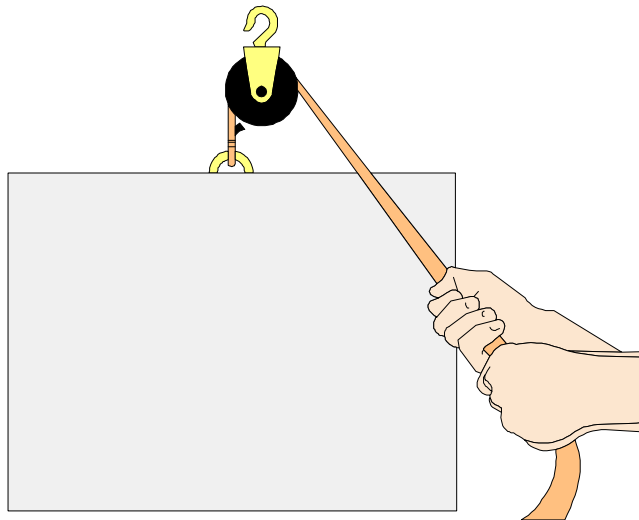
Stick

Two tall chairs or other supports for stick

Bundle of heavy books

What to do:

1. Try to lift the bundle of heavy books. Was it hard or easy?
2. Now suspend the stick between the two tall chairs and attach the pulley to the stick.
3. Tie the bundle of books to one end of the rope and thread the rope through the pulley.
4. Now try lifting the book bundle by pulling down on the free end of the rope. Describe the difference in the amount of effort needed.



Simple Machines Extension Activity C

How can we make our own pulley?

Materials:

Empty cotton spools
Pieces of wire

What to do:

1. Use about 10-20 inches of wire. Thread the wire through the hole in the spool.
2. Bend the ends of the wire up to hold the spool in place. Twist them together forming an arch by which the spool-pulley can be suspended from a rod. Make sure the spool spins loosely on the wire.

*Cutting a slight notch across the center of the spool helps keep the load-carrying string in place.

Simple Machines Extension Activity D

Pulley into Line

Vocabulary:

Pulley

Belt

Turn

Crank

Rotate

Materials:

3-5 thread spools (preferably wooden)

Long thin rubber band

Nails

A piece of $\frac{3}{4}$ inch plywood or particleboard 25 to 30 cm square

What to do:

1. Place the spools on the plywood in a design similar to the one illustrated. Nail the spools in place so they turn easily. With a magic marker, place an arrow on top of each spool. This mark will help the children to see which way the spools turn.
2. Have a child place rubber bands over the spools as shown. Turn one spool and watch the others turn.
3. Experiment with other rubber band arrangements and see what happens.

Simple Machines Extension Activity E

How do levers help us?

Materials:

Heavy object (stone, box)

Brick or cylinder shaped wooden block

Long building block or board

What to do:

1. Try to lift the heavy object manually.
2. Now slip a board under the object and, using the brick as a fulcrum, again try to lift the object by stepping down on the free end of the board. What happens? How is this different from the first experience?



Simple Machines Extension Activity F

Ramp Distances

Materials:

Long board
Building blocks
Toy cars
Measuring tape

What to do:

1. Build a ramp at various angles. Begin with the slightest incline.
2. Students release a car on the ramp at each angle and measure and record the distance it travels.
3. Discuss the data, asking questions like the following:

How much farther did the car go when we had a two-block ramp?



Simple Machines Extension Activity G

Wagon Push and Pull

Materials:

Wagon

2 long boards

What to do:

1. Take students to a short flight of steps and have them work in pairs to push and pull a wagon up and down.
2. Place two long boards on the steps, wagon-wheel-width apart, to form a ramp. Partners push and pull the wagon up and down the steps again.
3. Discuss how the ramp helped make it easier to move the wagon.



Simple Machines Extension Activity H

Neighborhood Machines

Materials:

Teacher

Students

Other adults to help supervise

Notebooks

Pencils

What to do:

1. Take students on a walk around the school grounds or the school's surrounding neighborhood. Ask students to identify machines they see as they walk and give them time to sketch them in their notebooks. Remind them that inclined planes such as entrance ramps and slides are machines.
2. When you get back to the classroom, have the students go through their notebooks to recall all the machines and discuss how they make work easier.

CHILDREN'S BOOKS

SIMPLE MACHINES

Bryant-Mole, Karen, *Machines*, (K-3)
ISBN# 0-382-393962-3

Buehr, W., *The First Book of Machines*

Castro, E., Flores, B., Hernández, E., *Mi bicicleta*, (K-3)
ISBN# 0-673-77490-2

Calmenson, Stephanie, *Engine, Engine, Number Nine*, (PreK-3)

Crews, Donald, *Freight Train*, (K-3)

Dahl, Michael, *Pulleys*, (K-3)
ISBN# 1-56065-445-7

Espasande, Juan A., *El libro de los juegos*, (K-3)
ISBN# 958-04-0532-8

Fisher, Leonard E., *Sailboat Lost*, (K-3)
ISBN# 0-02-735351-6

Gordon, Maria, *Empujar y Tirar*, (3-5)

Gramatky, Hardie, *Little Toot*, (K-3)
ISBN# 0-399-20649-3

Hall, Donald, *Ox-Cart Man*, (K-3)

Hellman, H., *The Lever and the Pulley*

James, E. and Barkin, C., *The Simple Facts of Simple Machines*

Lee Burton, Virginia, *Mike Mulligan y Su Maquina Maravillosa*, (K-3)

Marshall, Edward & James, *Fox on Wheels*, (K-3)

Metzger, Steve, *The Little Red Caboose*, (Ages 3-6)

Morris, Ann, *En marcha*, (K-3)
ISBN# 0-590-46865-0

Noonan, Diana, *Whizz! Whizz!*, (K-3)
ISBN# 0-478-20527-9

Piper, Watty, *The Little Engine That Could*, (K-3) (Spanish)

Richards, Roy, *Trucos Científicos en Movimiento*, (3-5)
Williams, Vera B., *Tres días en una canoa roja*, (K-3)
ISBN# 0-590-29182-3

Rylant, Cynthia, *Mr. Putter and Tabby Fly the Plane*, (K-3)

Stevenson, James, *Monty*, (K-3)
ISBN# 84-7525-076-9

Tompert, Ann, *Just a Little Bit*, (K-3)
ISBN# 0-395-51527-0

Wilkes, Angela, *Mi Primer Libro de Ciencia*, (3-5)

OTHER BOOKS:

¿Cómo Funciona Un Auto? (3-5)

El Avión (3-5)

Los Aviones (3-5)

Los Transportes, (3-5)

Palancas (3-5)

Poleas (3-5)

COMPUTER SOFTWARE:

My Science Books – Physical Science – CD-ROM (K-2) Scholastic

Como Funcionan Las Cosas – CD-ROM (Ages 4-9) Dorling Kindersley

INTERNET RESOURCES:

“The Mad Scientist Network:
<http://medinfo.wustl.edu/~yvsp/MSN/>

“Ropes and Pulleys”
<http://www.cpo.com/ropes.html>

“The Museum of Scientific Discovery”
<http://www.net-works.net/community/msd/msd.htm>

