



Leap into Science is a national program that integrates open-ended science activities with children's books for children and their families.

Leap into Science uses Core Four strategies essential for engaging children and families in meaningful science and literacy learning.

Go to leap.fi.edu for more information on Leap into Science. Sign up to become part of Leap through Franklin Institute and National Girls Collaborative.

Following here are several activities and extended literacy activities for three of the Leap units.

If you have questions, contact Maggie Kempel, kempelm@rps205.com or call 815 966-3176.



Ask
Questions



Encourage
Scientific
Thinking

Leap
into
science

core
four



Cultivate
Rich
Dialogue



Make
Connections

Leap into Science Core Four

Strategies for Building Science and Literacy Skills



1. Ask Questions

Ask questions when reading stories and exploring science concepts to deepen children's thinking and engagement.

- Why:**
- Questions bring out people's natural curiosity, motivating them to explore and learn.
 - Questions allow children to express their ideas through language.

- How:**
- Ask *open-ended* questions—questions with multiple possible responses—to help children explain their thinking. Examples: *What do you notice? Why do you think that?*
 - Ask *closed-ended* questions—questions with one or a few possible responses—to guide children toward a particular area of focus. Examples: *Where do you think the balancing point is? Where did the ball go when it fell?* Often follow up with an open-ended question: *Why do you think that? How can you tell?*



2. Encourage Scientific Thinking

Encourage children and their caregivers to think scientifically by observing, asking questions, making predictions, testing their ideas, and learning from repeated attempts.

- Why:**
- These practices strengthen critical thinking skills that are essential in both science and literacy learning.
 - Focusing on the *process* of science rather than a specific *product* or outcome frees children and their caregivers to explore and take risks.

- How:**
- When reading a storybook, invite children to make observations about the book's cover, predict what they think will happen next, ask questions about the illustrations, and draw conclusions about the story.
 - During science explorations, point out occasions when people notice things, guess what will happen, test a new idea, or learn from something that didn't work.
 - Model scientific thinking yourself. If you don't know the answer to a participant's question, respond with: *I don't know! Let's find out together!*



3. Cultivate Rich Dialogue

Provide opportunities for children and their caregivers to learn new vocabulary words, use them in different contexts, and have meaningful conversations while learning together.

- Why:**
- Literacy skills develop when children use language in relevant contexts, such as everyday science concepts. Similarly, science learning requires language through describing, questioning, and communicating ideas.
 - Rich dialogue during learning allows people to explore new concepts together, and strengthen their ability to express their ideas.

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- How:**
- Define and use key vocabulary during the explorations.
 - Encourage children and families to connect their ideas and discoveries back to words and concepts from the book(s).
 - Encourage children and their caregivers to explain their ideas to each other during their explorations.



4. Make Connections

Connect learning experiences to people's everyday lives and interests to make the learning more meaningful and memorable.

- Why:**
- People understand new information better, and are more motivated to learn, when the topic is connected to their own experiences.
 - Highlighting how children behave like scientists during their explorations can help them see themselves as scientists, and potentially increase their future interest in science careers.

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- How:**
- Draw connections between children's everyday experiences and the books, activities, and science concepts by asking children about their interests relating to the topic; for example: *What do you like to do outdoors? What is it like to do that on a windy day?*
 - Encourage children and their caregivers to reflect on the ways they were scientists during the workshop. Ask questions like *How did you feel like a scientist today?* or use a book, such as *What is a Scientist?* by Barbara Lehn, to guide the discussion.
 - Introduce children and their caregivers to science role models who reflect their race, ethnicity, gender, and/or cultural background, either in person or through books, photos, articles, or credible websites.

To make and bind books:

Lintor Publishing www.lintorpublishing.com (book covers, binding strips)

Bare Books www.Barebooks.com (blank comic books)

Questions:

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Get the Facts

LEAP into Science Unit 1

Literacy Activity

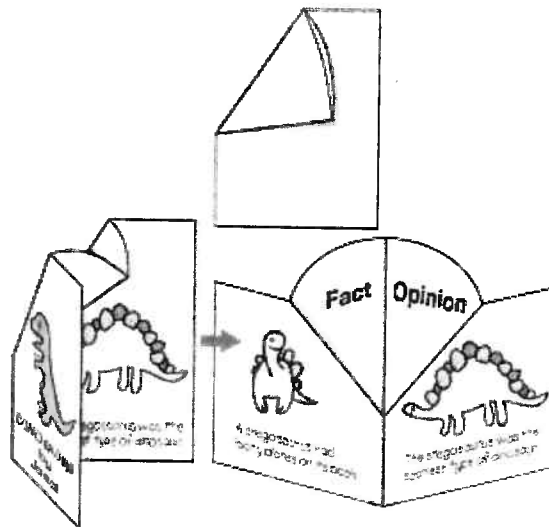
Pop Up comparison:

Inference + Evidence
Book: Seven Blind Mice by Ed Young

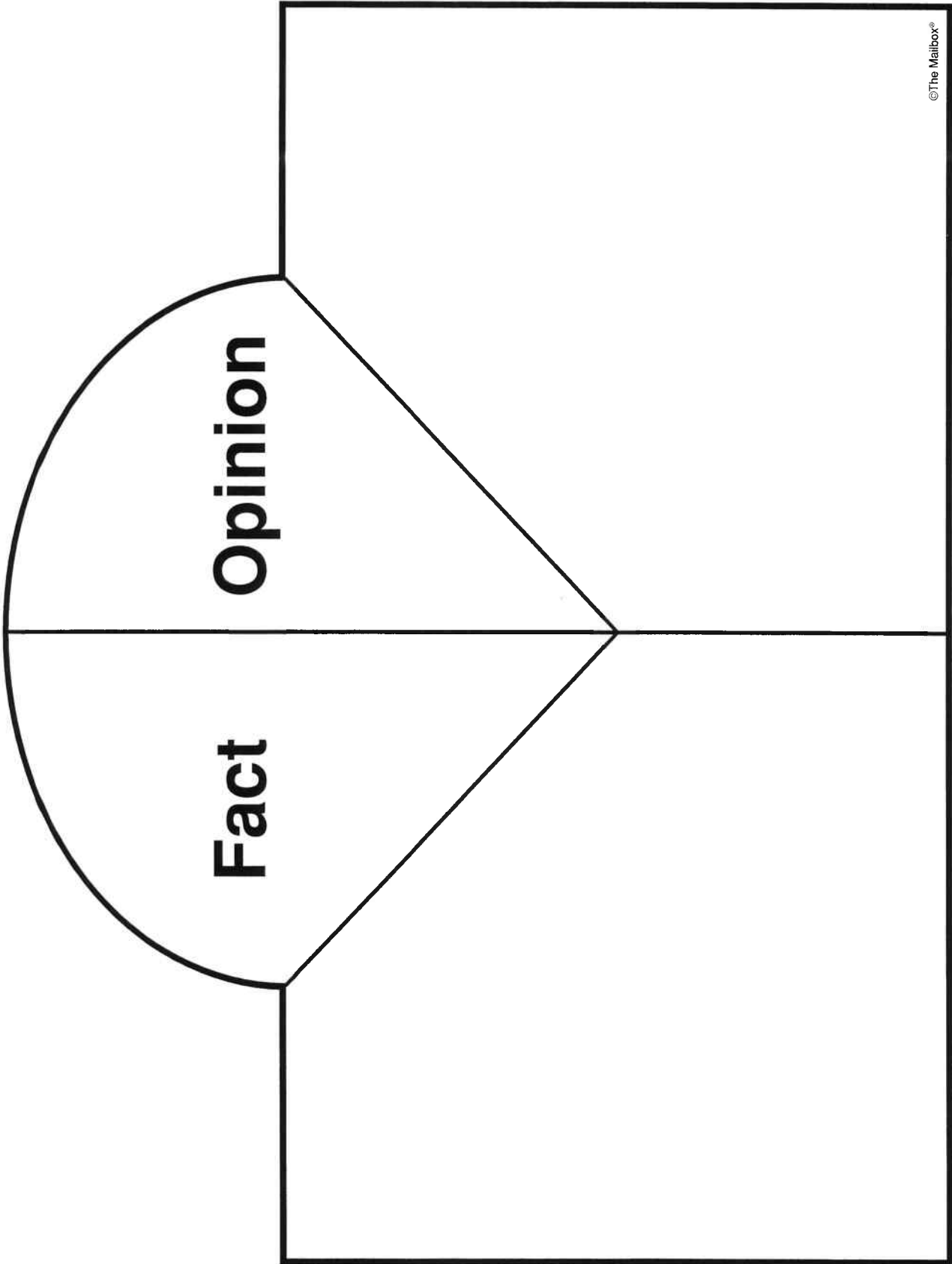
Give each student a copy of the booklet pattern. Have students pick a topic, then write a fact (on the topic) on the first blank section and an opinion (on the topic) in the second blank section. Have the student (use crayons not pencil) illustrate the fact and opinion. Cut out the booklet pattern.

Then:

1. Fold the pattern in half along the center line.
2. Fold the curved section downward as shown.
3. Unfold the paper. Reverse the fold on the curved section and push that section inward.
4. Close the booklet with the pop-up section inside. Crease the folds. Title and illustrate the cover.



Minibooklet Pattern



Sketch to Stretch

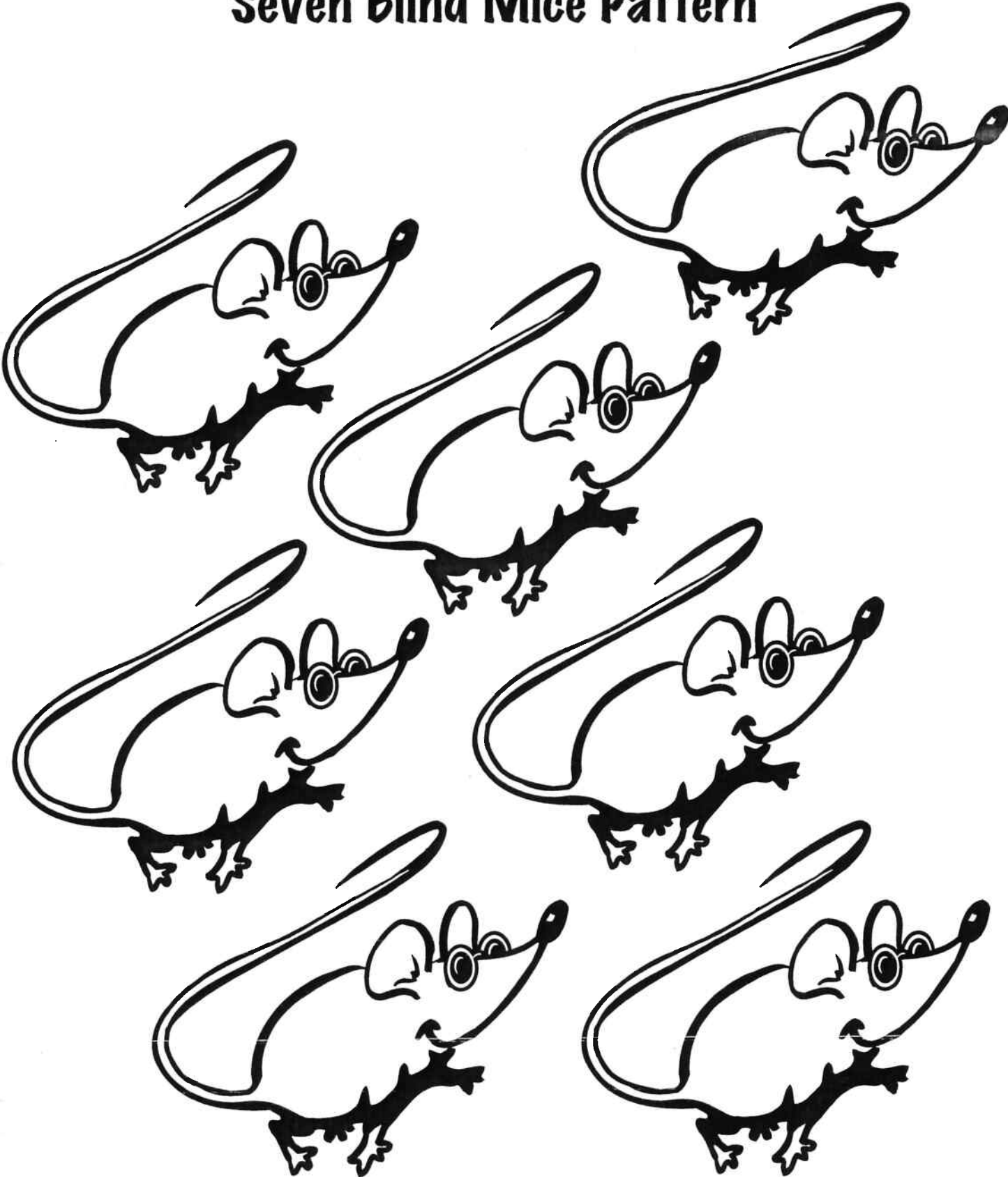
<h1>SKETCH to STRETCH</h1>	Day One, Monday, Red Mouse saw:	Day Two, Tuesday, Green Mouse saw:
Day Three, Wednesday, Yellow Mouse saw:	Day Four, Thursday, Purple Mouse saw:	Day Five, Friday, Orange Mouse saw:
Day six, Saturday, Blue Mouse saw:	Day seven, Sunday, white Mouse saw:	COMPLETED BY:

Get the Facts Unit 1

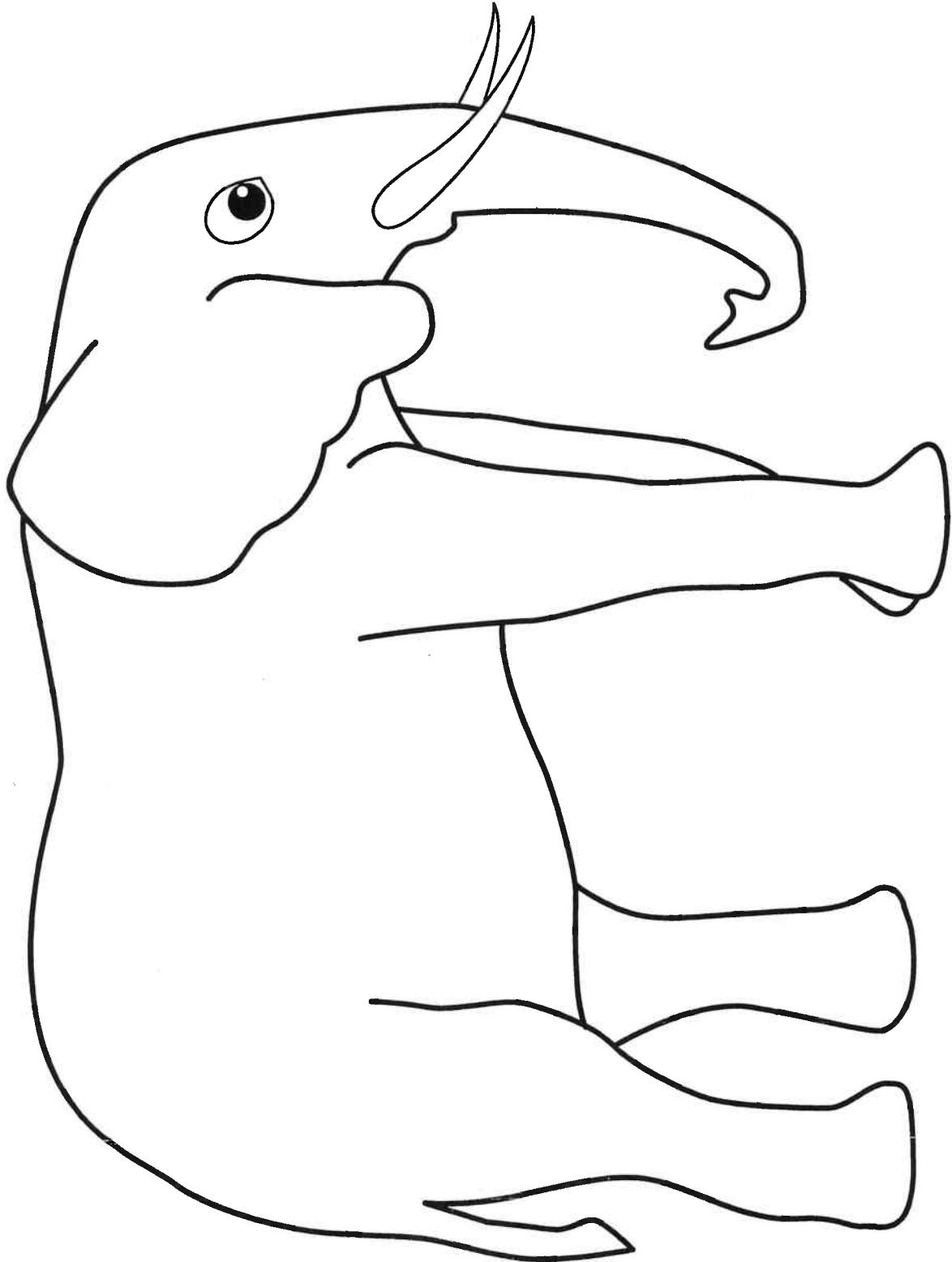
Prep: Make copies of mice and elephant sheet for each student. After reading the book and doing the LEAP activities use these sheets to practice ordinals, retelling and sequencing:

1. Have students color the mice as they were in the book: Red, Green, Yellow, Purple, Orange, Blue, White; cut out mice.
2. Write the ordinals on the chalkboard for students to copy: first, second, third, fourth, fifth, sixth and seventh.
3. Have students show which mouse was first, (red), then write first on the back. Continue through each mouse/color/ordinal.
4. Have students retell the story putting the correct mouse in the correct spot on the elephant in the correct order.

Seven Blind Mice Pattern



Elephant Pattern



SOUND VIBRATIONS

You need: 1 metal clothes hanger (no plastic coating), two pieces of string about 2 to 3 feet long, pencil

1. Tie a loop at the end of each piece of string large enough for an index finger to fit into
2. Tie the other end of each string to the bottom corners of the metal clothes hanger.
3. Put an index finger in each loop and suspend the clothes hanger above the floor (yes, the clothes hanger is now up-side-down)
4. Have a partner tap the clothes hanger once with a pencil. Note the sound.
5. With the loops still on the index fingers, put your fingers in your ears. The clothes hanger should still be suspended above the ground.
6. Have the partner tap the clothes hanger again. Note the difference in sound. I love the expression on the children's faces.

(the lesson? -- Sound travels thru solid objects very well!!!)

LEAP into Science

Unit: Sound Sleuths

Sound Palm Pipes:

Students pop pipe against palm of hand to make tone. Have students group themselves into groups with similar tones (pipes same length). Have each group "pop" at your signal. Have groups figure out pitch (different tones). You act as "director" and point to group to make sound. Keep doing this until they get the idea and "play" on prompt. There are 4 different lengths of pipe in the bin. Label them 1 as shortest to 4 as longest.

To play song, you will direct. Tell students you will point to the group; they will make one sound each time you point at them.

Mary Had A Little Lamb

2 3 4 3 2 2 2 3 3 3 2 1 1
2 3 4 3 2 2 2 2 3 3 2 3 4

Go ahead and try to do Jingle Bells and other songs.

Sound Sandwich

Experience how vibrations make sound!

Blowing into the Sound Sandwich makes the large rubber band vibrate, creating a sound. When the straws are farther apart, the rubber band vibrates slowly, making a low-pitched sound. When the straws are closer together, the rubber band vibrates more quickly, making a higher-pitched sound.

1. Place a large rubber band lengthwise over one of the craft sticks.
2. Place one small piece of straw under the rubber band about an inch (a fingertip's length) from each end of the stick.
3. Place a second craft stick on top of the first. Make sure the straws are between the sticks.
4. Wrap a small rubber band around both ends of the sound sandwich.
5. Put your mouth in the middle and blow!
6. Try moving the straws closer together. Does the sound change?

Pipes of Pan

CONCEPT: Columns of air vibrate at frequencies relative to their volumes.

OBJECTIVE: Students create vibrating columns of air and manipulate their sizes to change the pitch.

<u>materials needed:</u> straws tape popsicle sticks scissors cardboard tubes (optional) like mailing, wrapping paper, and paper towel tubes	<u>vocabulary:</u> frequency resonance harmonic compression wave vibration pitch Pan
<u>setting:</u> classroom or lab	<u>time frame:</u> 40 minutes

Background information: Sound is produced when something moves back and forth. This back and forth motion is called a **vibration**.

The background noise in your room is a mixture of many sounds with different pitches which are normally blended (footsteps, voices, wind, machinery). You can separate them by listening through different tubes. Put your ear to a large cardboard tube and listen. Like the sound in a seashell, a tube of a specific length picks up and traps the background vibrations that are natural to that particular length, and bounces them around inside the tube. The result is a kind of hum: a sound made from a variety of wave lengths that are **harmonic** to the basic sound wave length. This blend of harmonic sounds natural to each length is called **resonance**.

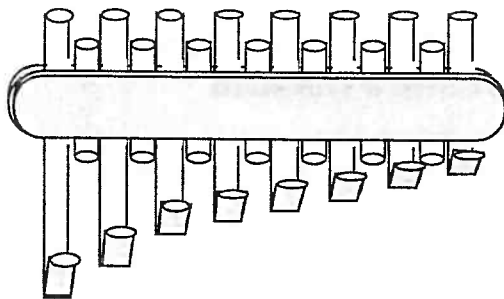
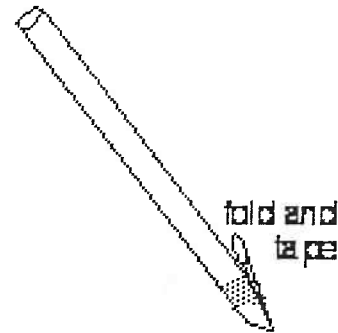
Any object has a frequency or set of frequencies, called natural frequencies, at which it "likes" to vibrate. For example, a pendulum will

swing back and forth at a natural frequency until you either shorten or lengthen that pendulum. The longer it is, the slower it tends to swing (vibrate). This principle is true for any vibrating substance—even a column of air. In the Pipes of Pan, a column of air is vibrating. Each tube resonates to a different set of frequencies. When you put your ear to a long tube, you hear the lower frequencies, the lower sounds. The shorter the tube, the higher the frequency, and the higher the pitch of the sound.

Pipes of Pan is an ancient musical instrument, used worldwide, which consists of an array of tubes of different lengths. The air inside these pipes is set into motion by blowing into the pipes. Each tube has a column of vibrating air. The longer this column of air, the more slowly it tends to vibrate and the lower the sound. Blow into each tube and compare the sounds you hear. Notice that you hear high-pitched sounds in the shorter tubes and low-pitched sounds in the longer tubes. The Pipes of Pan make use of resonance to separate sound into individual frequency components.

Procedure:

- [1] Fold the bottom 1/2" of a straw and tape it in place.
- [2] Blow down into the straw and listen to the "toot" sound. Continue with 7 more straws.
- [3] Tune the straws to make an octave scale by snipping the top a little at a time and listening to the note.



- [4] Tape the straw lengths in order from low note to high note between two popsicle sticks. Put a piece of straw between each note to act as a spacer.

Awful Sounds

Materials needed:

Clean empty cans
Paper clips

Water
Straws

Scissors
String

Demonstration Preparation: Can Cacophony

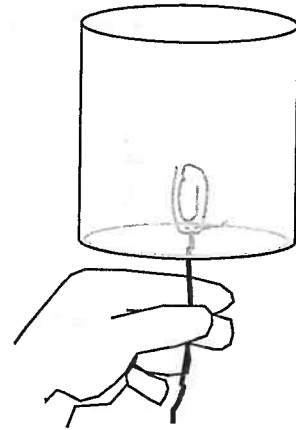
Use a nail to punch a hole in the bottom of a can. Tie a paper clip to a string and slide the other end of the string through the hole so the paper clip is inside the can.

Demonstration procedure:

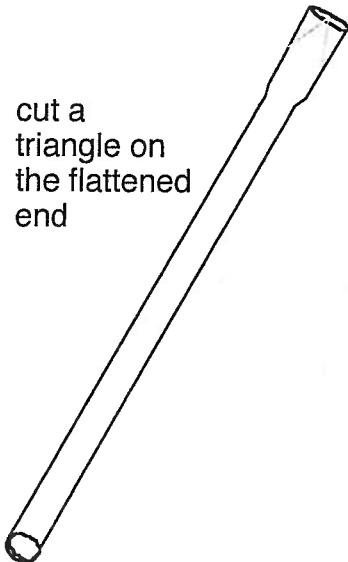
Rub your first two fingers in resin dust and rub the dust between fingers and thumb.

Using medium tension, grab the string between resin-coated fingers and stroke downward, letting your fingers slide along the string. If you don't hear a sound, vary the pressure of fingers and thumb on the string and try again.

During the demonstration, use cans of different sizes to reinforce the correlation between size and pitch.



cut a
triangle on
the flattened
end



Demonstration Procedure: Squawking Straws

Flatten about an inch on the end of a plastic drinking straw by biting it with your front teeth and pulling the rest of the straw through your closed teeth.

Take a pair of scissors and cut an upside down "V" at the top of the flattened end.

This triangular shape will act as a double reed when you blow through it.

Stretch your lips over your teeth. Place the triangle in your mouth between your lips and press down gently. Blow through the straw to get a sound.

Practice! The distance between the two triangles needs to be just right to make the vibrations resonate with the straw.

Cut the straw to make it shorter as you are blowing through it to reinforce the correlation between size and pitch.

Background information: Sounds are caused by vibrating objects. In this activity, a straw is cut to form a double reed. Make your lips “disappear” by pulling them over your teeth. Place the pointed flat end of the straw between your lips and blow through it. The two points of the triangle “reed” will vibrate to make a sound. The pitch of the sound can be changed by changing the length of the straw.

The string suspended from the can is made to vibrate when it is stroked with wet fingers or when the string itself is wet. The water helps establish the vibration. The can vibrates with the pitch that resonates with the can's size. These vibrations team up together and are amplified, made louder, so they can be heard.

One can easily tell the difference between a piano and a clarinet even though both instruments are playing the same note. The sounds coming from the straw and the can are quite different from the sounds heard in the crystal glass. The quality, or **timbre**, of the sounds is easily distinguished.

The quality of the sound is actually made up of a number of vibrations. The lowest or **fundamental frequency** determines the pitch of the sound. Other sounds which have vibration frequencies that are whole number multiples of the fundamental frequency are also present. This conglomeration of vibrations at different frequencies makes the difference between music and noise.

The Listening Walk

1. Read the poem "Ears Hear."
2. Discuss how certain animals or objects make noises: bees buzz.
3. Ask students to brainstorm ideas of other sound words. Record ideas on chalkboard.
4. Handout copies of "Ears Hear" poem and paper for students to try writing their own "Ears Hear" poem.
5. Tell students that they may work independently or in a group to write their own "sounds" poem.
6. Circulate room to help students get started with the poems and help with spelling.
7. Share poems.

Ears Hear

Flies buzz,
Motors roar.
Kettles hiss,
People snore.
Dogs bark,
Birds cheep.
Autos honk: Beep! Beep!
Winds sigh,
Shoes squeak.
Trucks honk,
Floors creak.
Whistles toot,
Bells clang.
Doors slam: Bang! Bang!
Kids shout,
Clocks ding.
Babies cry,
Phones ring.
Balls bounce,
Spoons drop.
People scream: Stop! Stop!

Lucia and James L. Hymes, Jr.

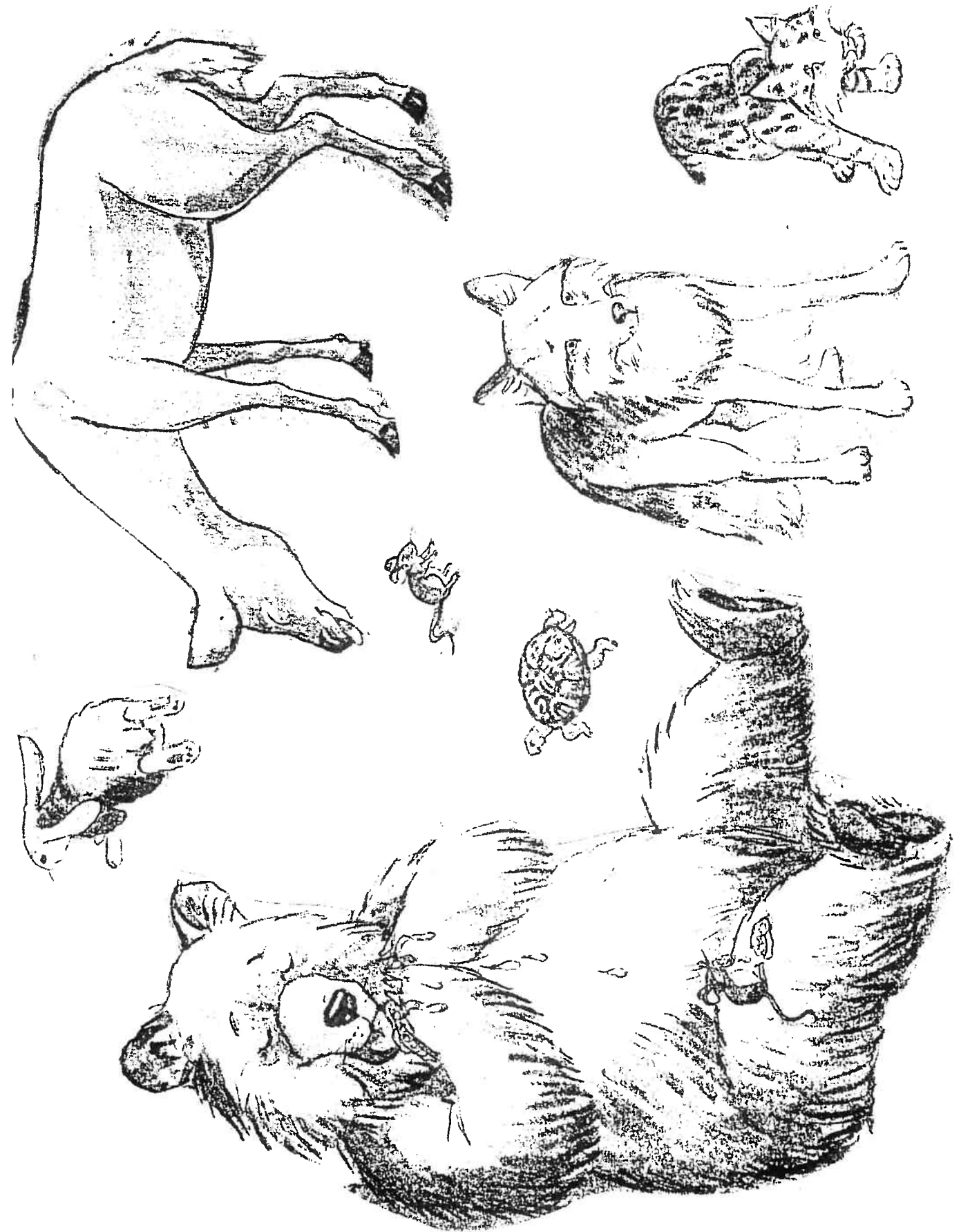
Balance Shmalance

Equal Shmequal

by Virginia Kroll

A Balancing Act by Ellen Stahl Walsh
Tosirette on the High Wire by Emily McCully

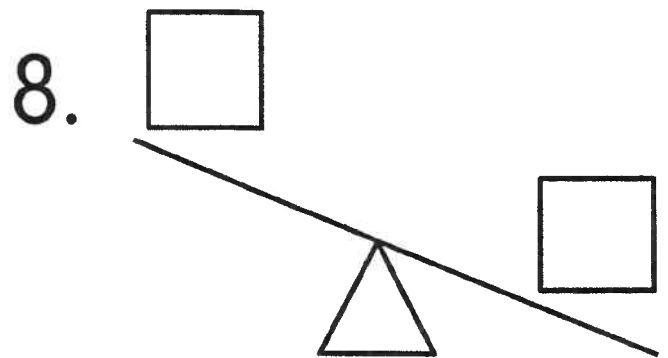
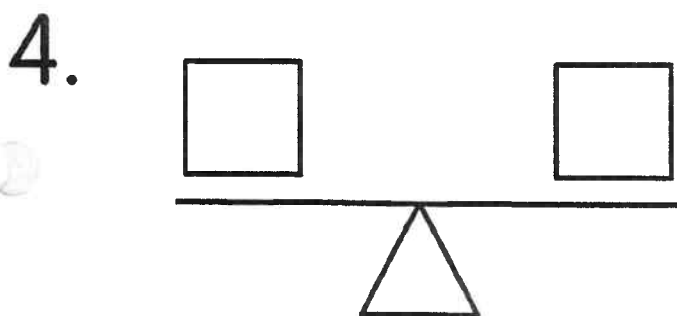
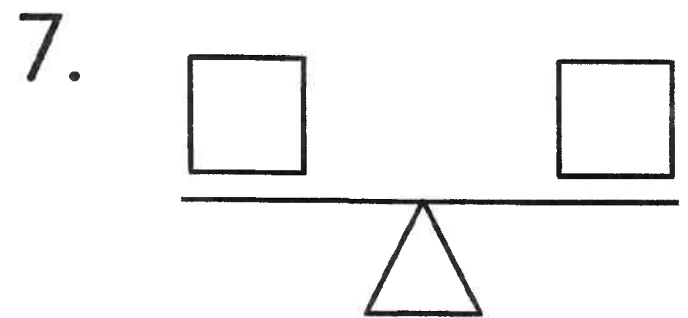
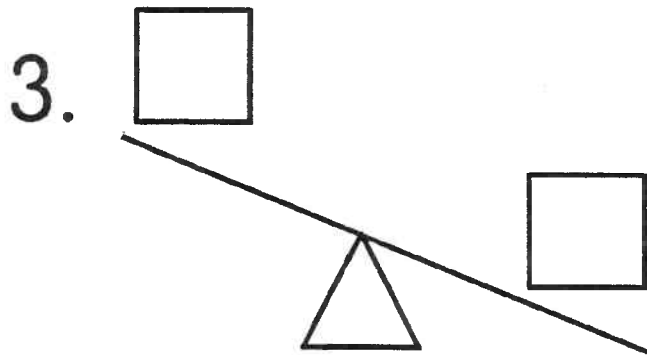
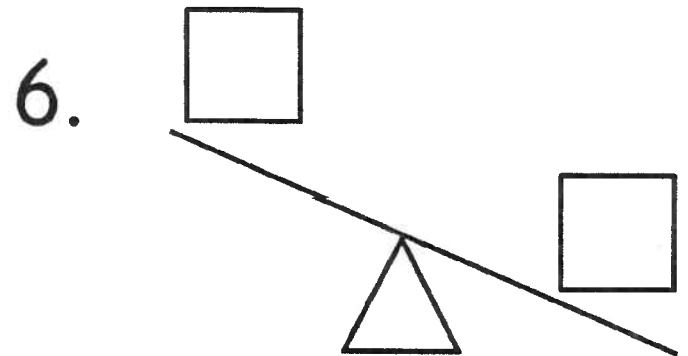
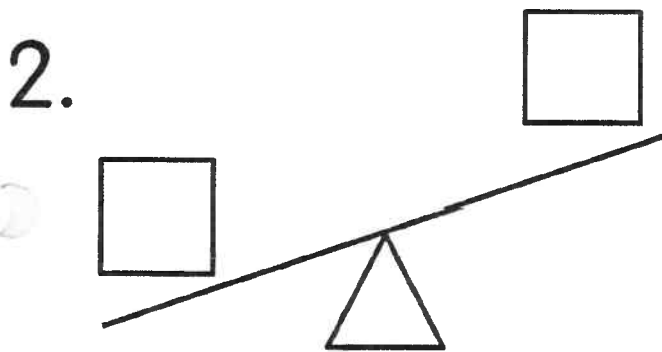
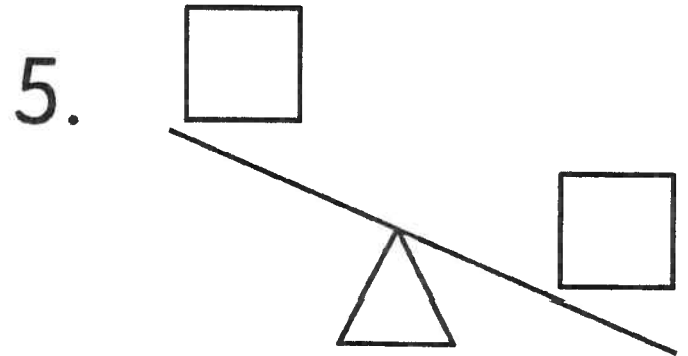
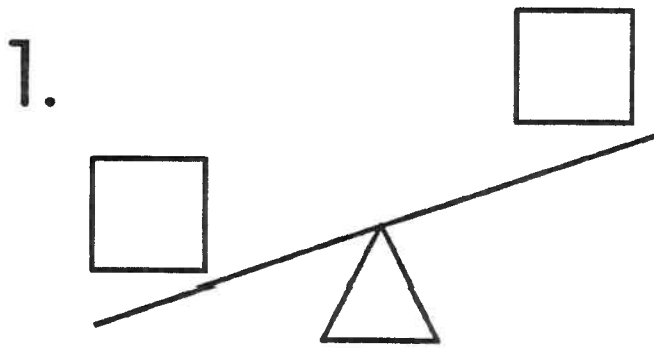
1. Using the large size animal cutouts, have your students take turns putting the animals in order from smallest to largest. Next, place all but one or two pictures on the chalk rail in the correct order. Have students place the missing animal(s) where they go size-wise. (Studies have shown that this concept or sense of "between-ness" is one of the hardest concepts for children to master.) Do this varying the missing animals, and number of missing animals.
2. Do math sheet with students. Each animal has a number value. Using the seesaw for balance, they can use the animals to show balance (1 mouse and 1 turtle on one side with 1 rabbit on other side). Then write the math equation this shows: $1 + 2 = 3$
Have students make equations showing the balance. Do one that shows the wolf on one side and the bear on the other side of the seesaw. Help them write the equation $5 < 7$. Keep doing equations using the correct signs.



Name: _____

Find the Numbers

Directions: Use a scale to find two numbers that make it balance in the same direction as each problem. Write the numbers in the box.



Equal Shmequal

Math Activity

Show students the worksheet. Tell them they are going to balance the animals:

Mouse = 1

Turtle = 2

Rabbit = 3

Bobcat = 4

Wolf = 5

Deer = 6

Bear = 7

Have students draw a seesaw (that is balanced) on the paper. Have students draw the animals to have them balance the seesaw. (You can do this as whole group on the board as demonstration first. Draw a triangle with a line over it for the seesaw.



Then have students give you examples of where to put the animals so they will balance.

Ex: 2 mice on one side, 1 turtle on other side; bear on one side, wolf and turtle on other side. $1+1=2$, $7=5+2$

Then have students draw how to balance the animals on their paper. Have students write the math equation to show their animals balancing. If students do not have their equation balanced, show them the proper sign to use <, smaller than or > greater than.

Mirette on the High Wire (Balance Schmalance Unit 2)

Book Discussion: What are some ways the author makes this story seem real?
What kind of person is Mirette?
How do you think Mirette felt when she made it across the wire in the courtyard?

Ask each student what dream or goal to do something they may have. Discuss what they have to do to reach that goal (learn how to do something, have that talent, what will it take to reach the goal?)

Instruct your students to write about a dream or goal they may have that would require determination. What can they do to achieve the goal? Are they willing to do what it takes?

Write your goal, tell how you will reach your goal, draw picture of you performing/reaching your goal. Group Leader: send writing in to have made into book.