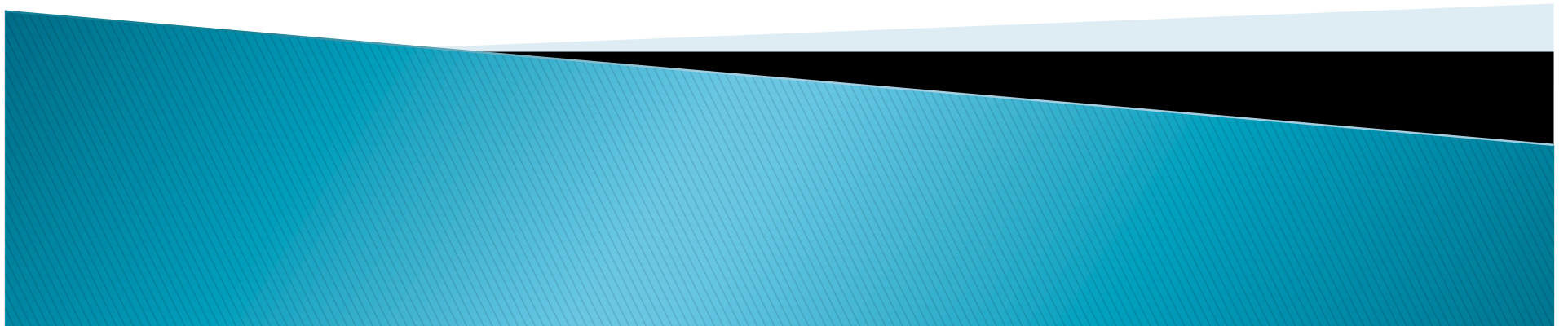


Auditory Skill Development

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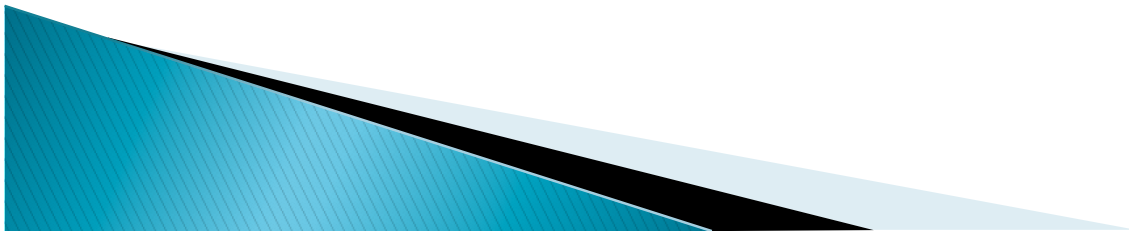
Definition

"Auditory Training"

...the process of teaching a person to take full advantage of available auditory clues.

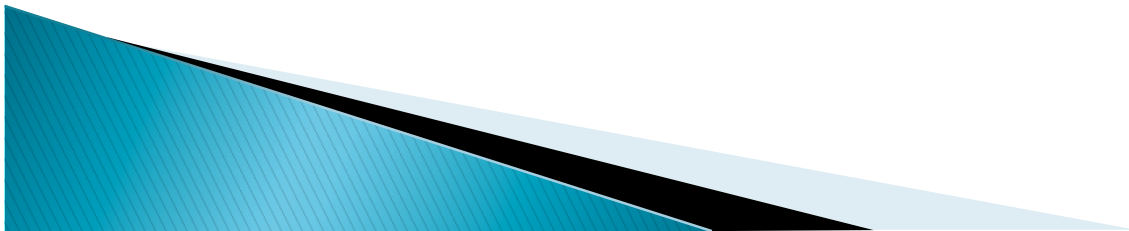
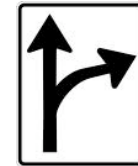
Learning to Listen

Listening to Learn



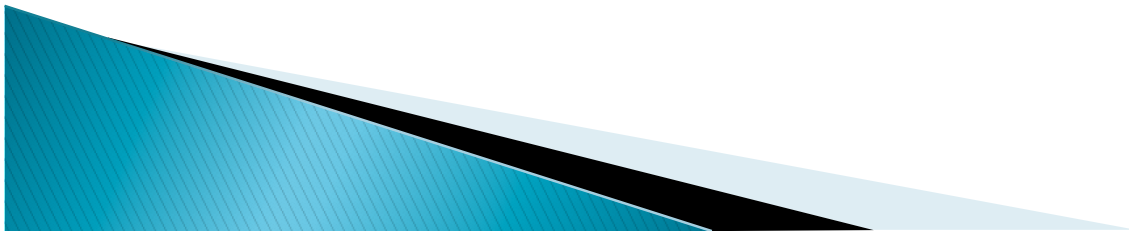
What is “learning to listen”?

- ▶ **GOAL:** Improve perception of acoustic contrasts in speech
 - **Make** new perceptual **distinctions**
 - Example: “**right**” vs. “**light**”
 - **Integrate** new neural response patterns into meaningful perceptual events



Necessary Conditions

- ▶ **Detection** and **discrimination** underlie speech perception and recognition
 - Child cannot understand speech if sound is below threshold or if everything sounds the same



Components of speech


▶ Segmental components

- Individual sounds of speech

m + ae + n =  m + ae + d = 

▶ Suprasegmental components

- Acoustic cues that are superimposed over the segmental elements (spread out over the utterance)

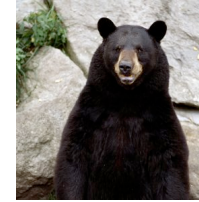
- Rhythm, prosody “A, b, c, d, e, f, g, ...” (song) 
- Rate Fast vs. slow
- Pitch, intonation “Are you OK?” ~~“Yes, I’m fine.”~~
- Stress, emphasis “I have TWO dogs.” I have two DOGS.”
 - Changes in intensity over time – see next slide for illustrations



Time-intensity patterns

Feel the voicing

► Bear



► Children



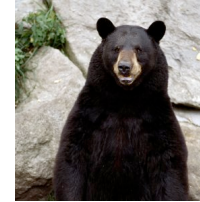
► Ice cream





Time-intensity patterns depend on speech elements

▶ Bear



▶ Lemon



▶ Railroad



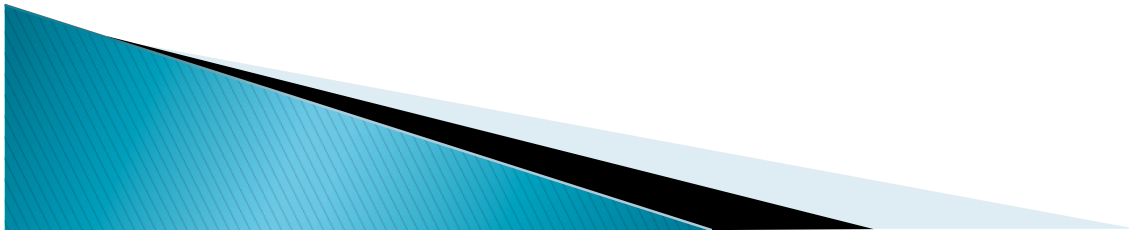


Targeted word list

ammonia astronomer atmosphere Cape Canaveral chemistry
data Earth Florida lava moons
parachute Saturn spacecraft speed telescope
Titan volcano

Arrange words by pattern:

1-syllable	2 (" ')	3 (" ' ')	3 (' " ')	Multi-syl.





Answers

Targeted word list

ammonia	astronomer	atmosphere	Cape Canaveral	chemistry
data	Earth	Florida	lava	moons
parachute	Saturn	spacecraft	speed	telescope
Titan	volcano			

Arrange words by pattern:

1-syllable	2 (" ')	3 (" ' ')	3 (' " ')	Multi-syl.
Earth	data	chemistry	volcano	astronomer
moons	lava	atmosphere	ammonia	Cape Canaveral
speed	Saturn	Florida		
	spacecraft	parachute		
	Titan	telescope		



Levels of Auditory Skill Development

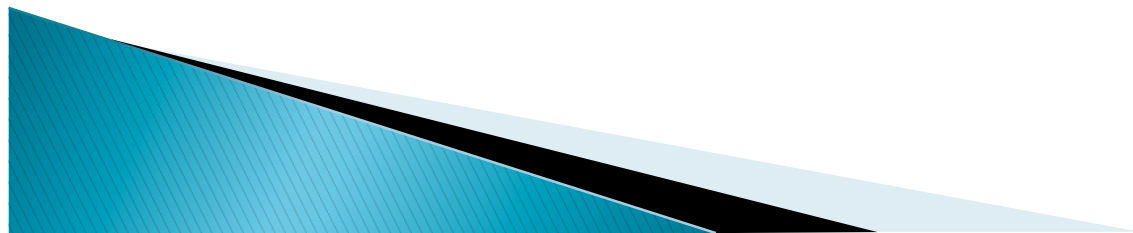
1. Sound Awareness (Detection)

◦ On vs. Off

- Listener knows when sound is present or absent.

◦ Examples

- Child turns to her name
- Child follows printed text while listening to a sound recording (CD) and stops at the appropriate spot
- Child looks around the room to find the source of an environmental sound
 - visitor's voice, telephone ring, fire alarm, loudspeaker, car horn outside, crash of dropped books)
- Child participates in a hearing aid listening check
 - Raises her hand when she detects "ah," "ee," "oo", "mm," "s," "sh," "or"



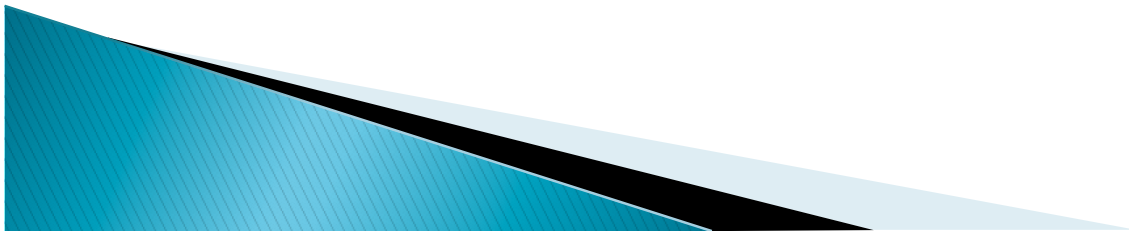
Aids to sound awareness

1. Build an environmental sound dictionary

- One child sits in front of the room and concentrates on a math problem
- Another child chooses a sound to make
 - kick the desk leg; clap the erasers; slam a book
- The child in the front of the room then turns around at the sound and the other child must describe the sound source.

2. Set a listening window

- Near lunch time, ask the children to become quiet and wait for the bell to sound. When it rings, name the sound.
- Ask one child to keep time during a brief class quiz.
 - Student sets his watch for 2 minutes, listens for the beep, and alerts the class.
- Children listen for a cue while working on papers at their desks.
 - Teacher stands at the back of the classroom.
 - Students listen for the teacher to say, "Time's up."
 - Students put their pencils down at the sound of her voice.



2. Discrimination (Pattern perception)

- Same or Different

- Listener discriminates two utterances of different length, frequency, or pattern
 - Does *not* have to *identify* the sounds or associate them with meaning

- Examples

male voice

loud voice

rapid speech

"eeeeeee"

"tah, tah, tah"

"square" 

"Poe"

"curve" 

"5 times 50" 5×50

"White House"

female voice

soft voice

slow speech

"uh"

"mmmmm"

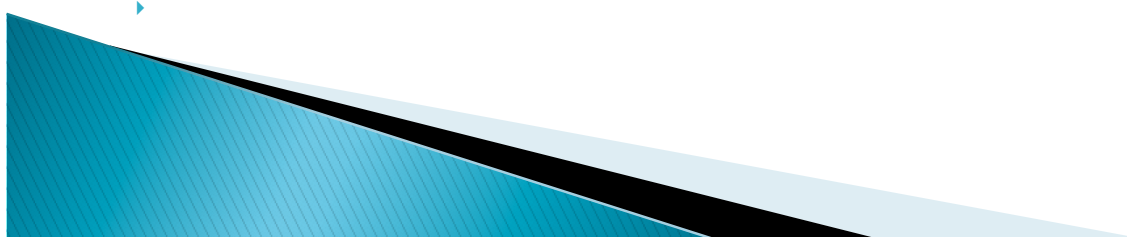
"rectangle" 

"William Shakespeare"

"straight line" 

"5 divided by 50" $5 \div 50$

"Jefferson Memorial"



3. Identification (Segmental identification)

- Repeat
- Imitate
- Select the right object
 - Listener does not have to indicate comprehension of the meaning of the utterance
 - Listener says back what she heard
 - Response cannot be based on pattern alone
 - Elements have the same length or pattern

- Examples

"eeee"

"triangle" ▲

"e.e. Cummings"

"solid line" —

"hot pink" ●

"5 subtracted from 50" $50 - 5$

"uhhh"

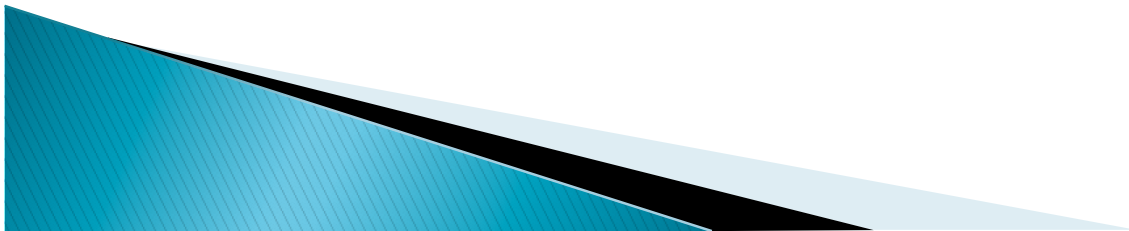
"rectangle" ■

"William Shakespeare"


"dotted line" ⋯

"deep wine" ●

"5 divided by 50" $5 \div 50$



4. Comprehension

- Child responds appropriately to the sound, indicating understanding of the meaning
 - Requires vocabulary and grammar knowledge
- Examples
 - "Describe the main character."
 - "Turn to page 562."
 - "Put one chisel brush on everyone's desk." 
 - "Which body of water is between Vietnam and the Philippines?"
 - "True or false: 'Viet Nam is a country in Africa.'"

Response context:

Managing the difficulty level

▶ Closed sets

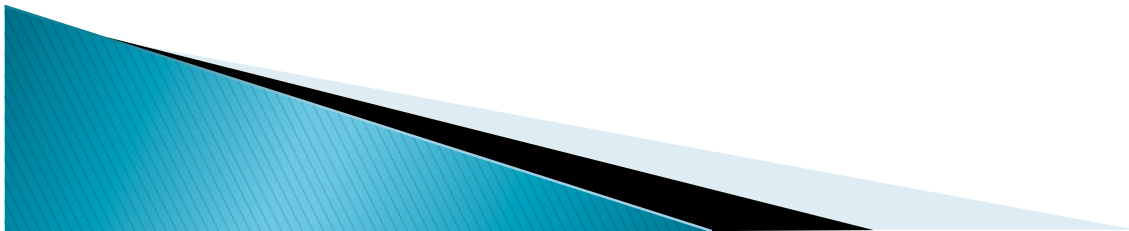
- Number of response options is limited
- Child knows what the choices are

▶ Limited sets

- Response options are defined by the situation or context
- Child is *not* informed which *specific* words might occur

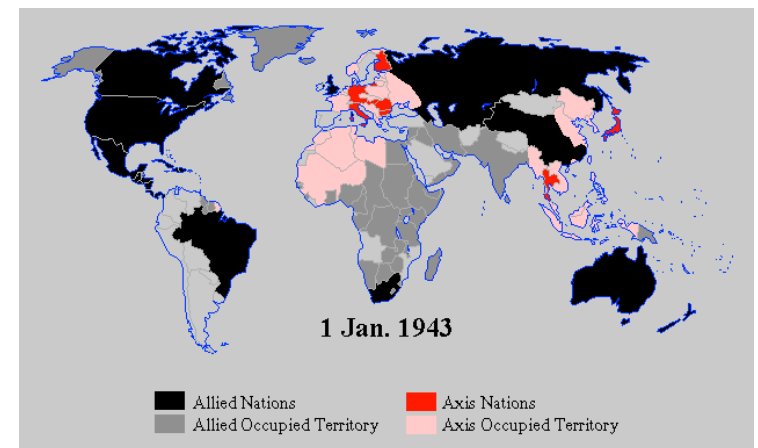
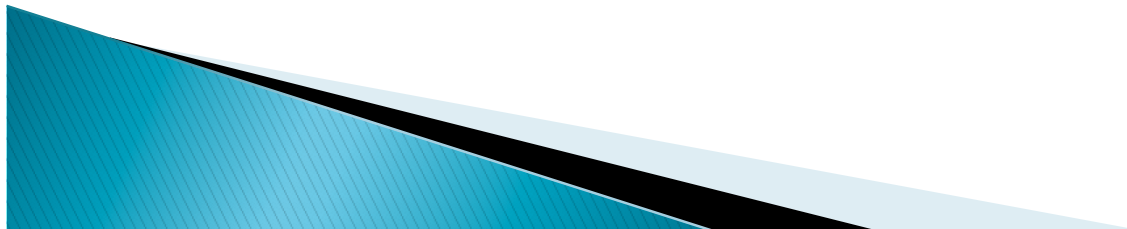
▶ Open sets

- No established limit on the number of response options



► Closed set or open set?

- The children have a world map from 1943
- They each have a black crayon (for the Allies) and a red crayon (for the Axis Powers)
- There is a list of country names on the board
- Children know that the teacher will say, "Color [country] black/red"
- They will listen for the country name and color word and then color the correct country with the correct color



Order of difficulty

- ▶ When a student is using listening only, which task is hardest? Which task is easiest? Put these tasks in rank order from easiest to hardest.

1 = Easiest

8 = Hardest

___ Student works with a study partner while other groups of children work around him.

___ Student follows the instruction: Read chapter 14, write an outline, and answer the first three questions at the end of the chapter.

___ Student answers the question: How are you?" as she enters the classroom first thing in the morning.

___ Student follows the instruction: Write a poem on 'The Sounds of a Springtime Walk'.

___ Student follows the instruction: Put your homework papers on my desk.

___ Student follows the instruction: Open your math books to page 324.

___ Student answers the story question: Why was the father angry?

___ Student answers the story question: Was the father a mean man or a kind man?



Order of difficulty answers

1 = Easiest

8 = Hardest

1. Familiar expression

How are you?" as she enters the classroom first thing in the morning.

2. Single direction

Put your homework papers on my desk.

3. Two directions

Open your math books to page 324.

4. Multiple-element direction

Read chapter 14, write an outline, and answer the first three questions at the end of the chapter.

5. Closed-set question about a story

Was the father a mean man or a kind man?

6. Open-set question about a story

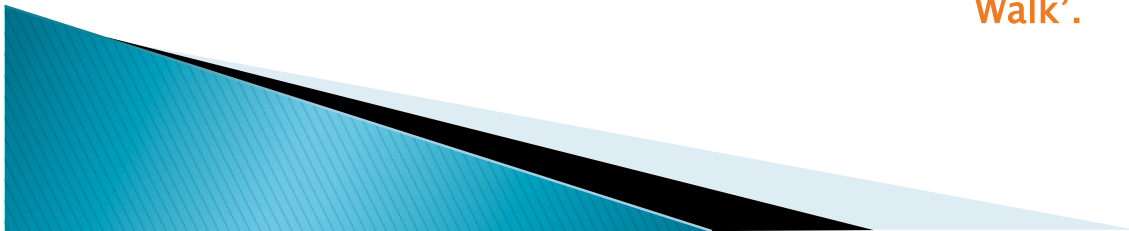
Why was the father angry?

7. Comprehension activity in noisy environment

Student works with a study partner.

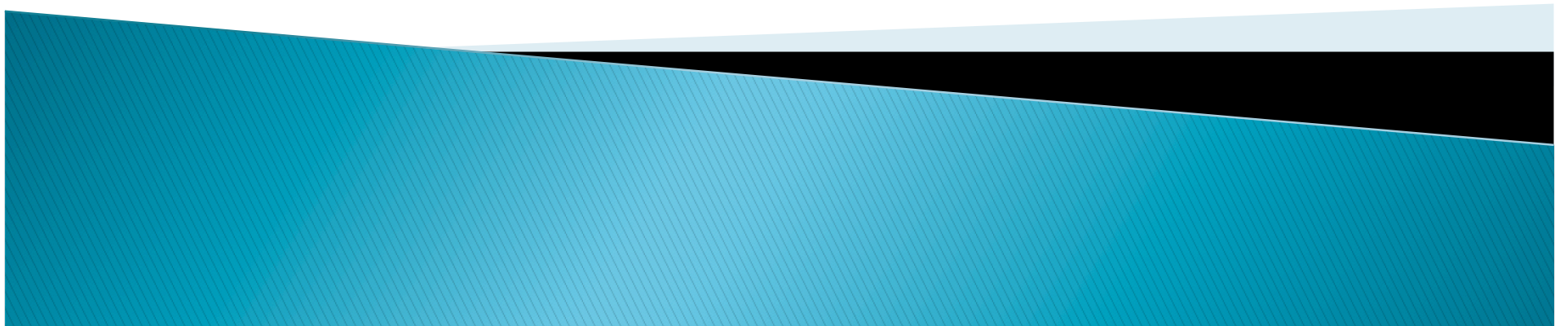
8. Onomatopoeic words

Write a poem on 'The Sounds of a Springtime Walk'.



Auditory Skill Development Practice

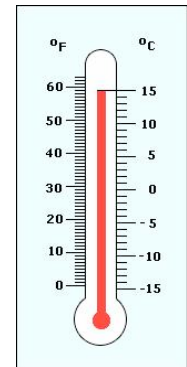
What is the developmental level?

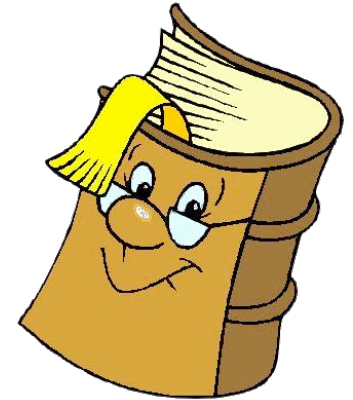


- ▶ I will say one of these words
- ▶ You say back the word that you hear

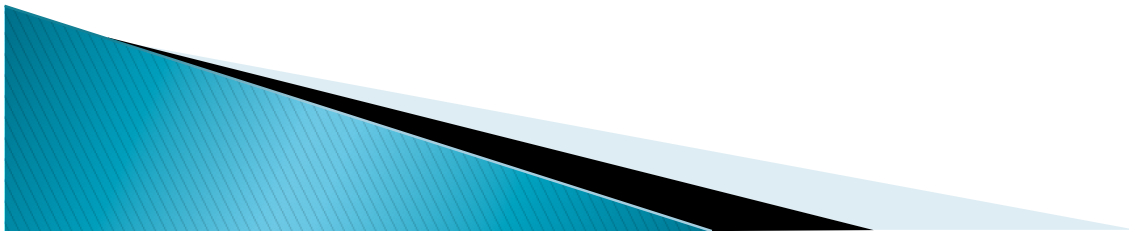
Centigrade

Graduated cylinder



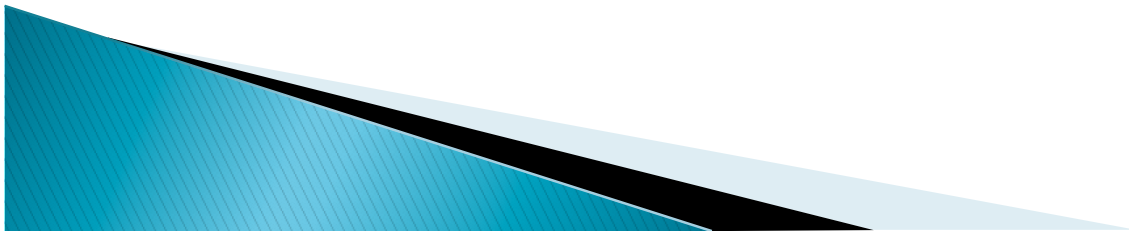


- ▶ Teacher sits next to Jane and reads a book out loud
- ▶ Jane has a printed vocabulary list in front of her (she has been using these words in other lessons)
 - ▶ When Jane hears one of her vocabulary words, she raises her hand
 - ▶ Jane says the word that she heard and then writes the word in her daily journal
- ▶ Teacher then continues with the story



▶ Practice vocabulary definitions

- The students have a vocabulary list in front of them
- The teacher reads the definition
- Students finds the word that matches the definition



- ▶ Display the day's lunch menu
- ▶ Choose three items that can be described with different acoustic patterns

- Example:

- Ham
- Pizza
- Burger and fries



- Write these words on the board
 - Teacher conducts a vote for the students' favorite item and records the vote (listening and lipreading)
- ▶ Then teacher stands behind the class and names each item, one at a time
 - ▶ Teacher again conducts a vote (from the back of the classroom – listening only)
 - ▶ Do the votes match?

- ▶ “I will name some things that our class will use in our experiment on acceleration tomorrow. You make a list as I go along.”

- ▶ _____
- ▶ _____
- ▶ _____
- ▶ _____
- ▶ _____
- ▶ _____
- ▶ _____

(marbles)

(toy cars)

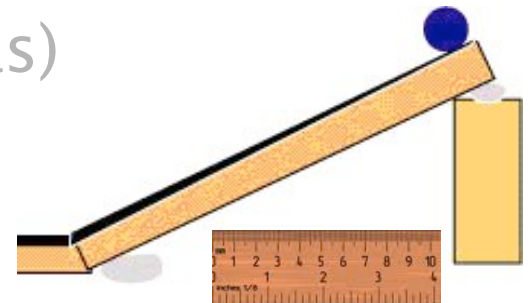
(measuring stick)

(ramp)

(stop watch)

(camera)

(formulas)



- ▶ Teacher creates a chart of related sentences on a topic
 - ▶ Student faces the chart
 - ▶ Teacher stands next to the student and says one of the sentences from the chart
- ▶ Student points to the sentence that was heard
- ▶ Student reads the sentence out loud



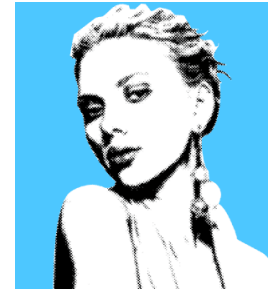
Obama's plan to reform health care is disliked by Republicans, so he will have a fight on his hands.

Did Obama give a good speech?

People complain about taxes, taxes, and more taxes.

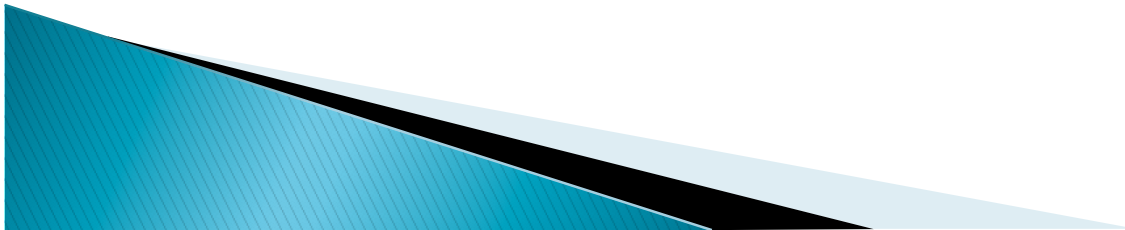
"Give us jobs!"

- ▶ Let's demonstrate how to create perspective. We will modify 6 elements of this picture. I will tell you where to add shading. You find the object and give it perspective.



In the rowboat
On the water
Next to the people
Underneath the dock
Behind the flagpole
Around the big white sailboat

- Now it's your turn. You tell me where to put the shading.



Always include a spoken response:

Receptive + Expressive Practice

- ▶ Interweave auditory training and speech production practice
 - To build associations between the auditory and the audiovisual representation of speech elements
 - To accelerate the learning process
 - Most children will initially recognize more when they can both see and hear the talker
 - To use listening to monitor speech production
 - Monitoring speech uses their perceptual skills
 - Monitoring speech develops their speech production skills
 - Monitoring speech develops awareness of communication effectiveness (speech patterns and individual phonemes)



Always include a spoken response:

Receptive + Expressive Practice

- ▶ Speech perception and speech production are linked
 - Have a common underlying linguistic structure
 - Phonological (system of speech sounds)
 - Syntactic (grammatical functions of language elements)
 - Hearing a sound adds to the child's internal knowledge about the function of that sound
 - Example: in English, /s/ is a signal for plural and possessive (“**dogs**” “the **dog's** tail”)
 - /s/ is a *phonological cue* to a *grammatical function*
 - When the child produces the cue, perception of that cue is further developed and refined

