Grade 2	Lesson: Falling Objects Part 2	Reference to English Interconnections Falling Objects pg. 62

Standard(s): 3.1 Physical Science

Content Objective(s):	Language Objective(s):
Students will experiment and identify things that prevent objects from reaching the ground. ***I can tell one thing that prevents objects from falling so quickly.***	Students will predict which object has more air resistance to a partner. ***I can say my prediction about air resistance to my partner.***
Essential Questions: What can we learn about non-living things?	**Academic Vocabulary for Word Wall:** **Listen:** prevent, fall, drop, resist **Read:** **Write:** gravity, fall **Speak:** gravity, prevent , fall, flat tissue, ball tissue **Sentence Frame:**

Materials:
• objects
  ○ hammer
  ○ feather
  ○ box of tissues
  ○ paper helicopter patterns (big & little per student)
  ○ 2 paper clips per student
	Additional Lesson Vocabulary:
	drop, flat, ball, book, tissue, pencil, air resistance, faster, slower, bigger, smaller

Lesson: Falling Objects	Instructional Time: 30 minutes

Opening: (3 minutes)

T: "Last time we did some experiments to see if objects fall because of gravity at the same time. What did we learn?"

S: "Objects fall to the ground at the same speed because of gravity."

T: "That's right. Gravity pulls objects to the earth at the same speed no matter their weight. So why do we see things that sometimes fall slower?

S: "I don't know." "They're lighter?"

Introduction to New Material (Direct Instruction): (10 minutes)

T: "Sometimes things are lightweight enough that the air helps them resist gravity. The air prevents the objects from falling as fast as gravity could pull them. If there wasn't air, they would still fall as fast as the other objects. Let me show you."

T: "This is a movie of an experiment done on the moon where there is no air but still some gravity. The astronaut has a hammer in one hand and a feather in the other. Watch as he drops them to see what happens."

- Movie of astronaut dropping hammer and feather
  http://teachertube.com/viewVideo.php?video_id=41342&title=Hammer_and_Feather_Drop_on_Moon

T: "What did you notice?"

S: "They fell at the same time."

T: "Why?"

S: "Because gravity pulls them at the same rate."

T: "Now watch what happens when I do the same experiment on earth."

- Teacher holds up a hammer and a feather and drops them at the same time.

T: "Why didn't they fall at the same time? If gravity pulls them the same no matter their weight, what is different?"

S: "I'm not sure."

T: "It's because the air slows the object as it falls. It prevents it from falling so fast. Many times this is because of its shape. Let's try another experiment.

T: "I have two tissues. Do they weigh the same?"

S: "Yes!"

T: "Yes they do. Now I'm going to change the shape of one of the tissues. I'm going to crumple it in a ball."

- Teacher crumples one tissue in a ball but leaves the other one flat.

T: "Now do they weigh the same?"

S: "Yes."

T: "Yes, they still weigh the same. All I did was change its shape. Watch what happens now."

- Teacher drops the crumpled tissue and the flat tissue.

T: "Wow! The ball tissue fell faster than the flat tissue! I thought gravity was supposed to pull them at the same speed. Why did the ball tissue fall faster?"
S: "Because it was in a ball?"
T: "Yes. Since it was in a ball, there was less area for the air to catch it. The air prevented the flat tissue from falling so fast."

- Place a word card "prevent" on the board.

T: "Shape can often prevent gravity from pulling it to the ground so fast. In our experiment with the feather and the hammer, the feather was flatter and could catch more air so it fell slower.

T: "Let's look at some things that prevent objects from falling to the ground quickly."

- Show a picture of the following items. With each one ask, **"What prevents this object from falling so quickly?"**
  - Parachute
  - Handkerchief
  - Paper airplane,
  - Paper helicopter

T: "What do all of these objects have in common? They all have something that prevents gravity from pulling it down so quickly. Turn to your neighbor and tell them one thing that prevents objects falling to the ground so quickly."
S: "parachute, shape, wings, etc."

Guided Practice: (7 minutes)
T: "Now we will apply both ideas we learned. 1. Gravity pulls objects to the earth at the same rate. 2. Some things can prevent objects from falling so quickly. To do that, we will build a paper helicopter."

- Here are instructions to make a paper helicopter and some ideas of how to experiment with them. **http://www.primaryscience.ie/media/pdfs/col/paper_helicopters.pdf**

Use the modeling cycle:
Teacher Does:
T: "Let me show you what you are going to do. First I'm going to cut out the big helicopter. We cut on the solid lines and fold on the dotted lines. Which lines do we cut on?"
S: "The solid lines!"
T: "And which ones do we fold on?"
S: "The dotted lines!"

- The teacher demonstrates how to cut out the big paper helicopter.

T: "Now we fold the base on the dotted lines like this and put a paper clip on it to hold them together and provide some weight."

- Teacher demonstrates how to fold the base and put the paper clip on it.

Teacher Does with Student:
T: "Who thinks they were watching closely enough to come up and help me make the little helicopter?"

- Call one or two students up to help make the little helicopter.

T: "Remember we cut on the solid lines and fold on the dotted lines.
T: "Now that we have one big helicopter and one little helicopter, we can experiment to see which ones falls first. If I hold mine up like this, and you hold yours at the same height, we can count to three and let them go at the same time. We can watch to see which ones falls first and mark it on our paper. "

- They let them drop and mark which one falls first.

Two Students Do:
T: "A good scientist will always try things many times to see if they get the same results. Let's have 2 students come up and try it. One will drop the big helicopter and the other will drop the small helicopter."

- Two students come up. One holds the big helicopter. The other holds the smaller helicopter.
- They drop them to see which one falls first and marks it on the paper.

T: "Great work."

All Students Practice:
T: "Now I'm going to let you try it out and see which one falls first. First build your big and small helicopters. Then get

in to pairs and try dropping them four times to see which ones falls first. Be sure to mark it on your paper. "

- Teacher assigns the students into pairs.
- Students make their big and small helicopters in pairs. Then they drop their helicopters 4 different times and mark which one fell first on their papers.

Closing: (10 minutes)

- The teacher needs to get the students' attention and bring them back together.

T: "Tell me what you noticed."
S: "The small helicopter fell first."
T: "Why do think that happened?"
S: "It is smaller."
T: "Yes, the smaller one has smaller wings. The larger wings prevent the helicopter from being pulled to the earth. So it falls slower. The smaller wings don't prevent it as much."

Assessment:

Extension:

- Make parachutes and do experiments with what works best to slow an object.

Preventing Gravity Recording Sheet

With a partner drop both helicopters and mark which one falls first.

Big Helicopter	Small Helicopter

Why did it fall first?