

Gadget Inspector

Age Group: grades 5-6

Topic: How click pens and other appliances work

Lesson Overview: Students will disassemble click pens in order to determine the function of each piece of the pen and to also draw a cross-sectional diagram of the pen. After this, the students will then reassemble their pens and take a look at another object (ie. a telephone). They must also fill out the attached worksheets for their experiments/exercises.

Sources Consulted:

1. Future Scientists and Engineers of America <<http://www.fsea.org>>
2. Barr, George. Science Research Experiments for Young People. Dover. 1989.
3. Pre K-12 Engineering. Massachusetts Science and Technology/Engineering Curriculum Frameworks © 2001-2003 <www.prek-12engineering.org>

Objectives:

After this presentation, students will be able to:

1. Identify and explain the components of a mechanical object and how they work.
2. Explain the needs that drive design.
3. Identify and draw a cross-sectional view of an object.

Content Standards:

Constructing new Scientific Knowledge (C) I.1

- Constructs charts and graphs and prepares summaries of observations

Reflecting on Scientific Knowledge (R) II.1

- Describe ways in which technology is used in everyday life

Matter and Energy (PME) IV.1

- Identify properties of materials which make them useful

List of All Materials Needed

- One click pen per student
- One pencil per student
- Two handouts (attached) per student
 - click pen investigation question sheet
 - click pen cross section sheet
- One telephone (or other object to take apart) for every 3-4 students
- One tool kit with appropriate tools per group
- Examples of cross sectional diagrams to hold up

Room Arrangement:

The room should be arranged with tables/desks in small groups of three to four with enough working area.

Procedure:

Introduction: (2.5 min) (welcome participants, introduce yourself & assistant, intro your topic)
Hi and welcome to Family Science Night! Family Science Night is sponsored by the Western U.P. Math & Science Center. My name is Jason Laabs and I am a forth year Civil Engineering Student at Michigan Tech. This is my last semester here at Tech and when I finish my degree I'm going to work in the transportation field. And what I'd really like to get into is traffic safety, which is taking an existing road and changing it to make it safer to drive on. Other civil engineers can design and build buildings, roads, airports, or bridges.

Attention-getter: (2.5 min)

(Count the number of students in the room.) Now I just need to record the number of students in here tonight. (With an *unclicked* pen try to write the number of students and make a big scene because you can't figure out why the pen isn't writing. Shake the pen and ask the students if they know what's wrong with my pen, until one of them sees it isn't the ink portion isn't protracted. Then record the number.) Oh wow, how embarrassing! Thanks for helping me out there.

Well what we're going to do tonight is become gadget inspectors! We're going to take apart some simple machines to see what's inside and learn about and draw cross-sectional diagrams.

Has anyone ever seen a cross-sectional diagram before? What a cross-sectional diagram allows you to do is see the inside of an object or see the same object in multiple views. These multiple views are typically front, top, and side views. Now for some examples:

- an architect or builder will need multiple x-sections a house or building,
- a doctor or nurse uses x-rays to take a peek at someone's arm or brain or
- a geologist or miner would use a soil profile to show what the ground is made of

Activities: (35 min)

Activity #1

The first activity is going to involve the click pens that I'm handing out now and you can work by yourself for this portion. What I want you to do is carefully take your pens apart, careful not to lose any of the pieces, and draw a side view cross-sectional diagram of your pen! When you're finished with that I'd like you to put your pens back together and make sure that it still works. What do your cross-sectional diagrams look like? If someone didn't know what the inside of a pen looks like would your cross-sectional diagram be a good enough descriptor of what it looks like?

Activity #2

Now that we're all finished with the pens, we are going to move onto a little bit bigger and more complex machines. I'd like you to work in groups of 3-4 too. Each group is going to receive a phone (or other object) and a tool kit of screw drivers. Using your tool kit carefully explore your new machine and fill out the GADGET INSPECTOR worksheet. Please make sure that you can put your machine back together so other students can use them.

Summary/Assessment of Student Learning: (5 min)

Ask the following questions about their machines and cross-sectional diagrams:

- What is a cross-sectional diagram?
- How helpful is it to have a cross-sectional diagram and why?
- Give an example of a real life application of a cross-sectional diagram.

I hope you had fun today being gadget inspectors! Thank you for coming. Before you leave, please help straighten up your work area and put the supplies back in the baskets.

Filler: Have each student/group explain their cross-sectional area to the class.

Take Home Handouts and/or materials: Each student can take the sheets they filled out and their pen!

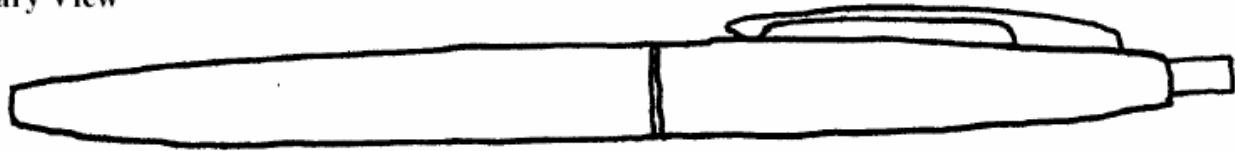
Cleanup: Collect pen parts, re-assemble any we couldn't get back together, dispose of any broken ones.

Safety Considerations: Watch for springs when pens come apart!

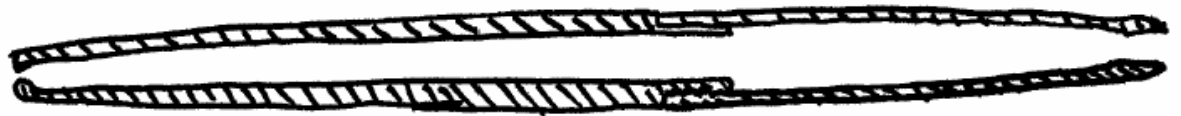
NAME: _____

CLICK PEN

Ordinary View



Cross-sectional View



Parts



NAME: _____ GRADE: _____

GADGET INSPECTOR

Name of your OBJECT: _____

1. What is your object used for?

2. Describe what you had to do to get inside your object:

3. List three things you see inside your object:

i. _____

ii. _____

iii. _____

4. Find a moving part on your object. Describe with words, what this part is and how it works.

5. Draw a X-sectional diagram of your object on the back of this paper, and label the parts.