

Session 6b.
Shifting Authority in APE
Labels

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Some APE Label Goals

- Providing Challenge and Support
- Supporting—not Competing with—Experience
- Finding our Voice
- Promoting Social Interaction
- Behavior Goals not Content Goals
- Shift Authority from Museum to Visitor

Label Strategies for Shifting Authority

- Challenges & Hints
- Casual tone of voice
- Rearranging explanation
- Removing explanation?
- Label as Affordance (Multi-Option)

Challenges & Hints


- Challenges + hints

Floating Objects

floating objects


Can you guess?

▶ Will the football float on its side or on its end?




(Hint: If you drop it on the ground, which way does it land?)

▶ Which will float higher, the plastic ball with holes in it, or the one with holes covered with tape?

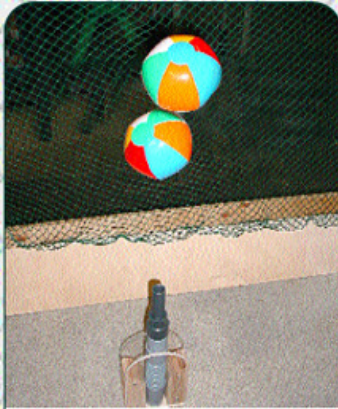


(Hint: Smooth shapes have less air resistance.)

▶ Can you get the basketball to spin really fast?



▶ Can you get two balls to float at the same time?



(Hint: Add the second ball above the first.)

Challenges & Hints

- Challenge + hint
- Free standing hints

Pulley Table

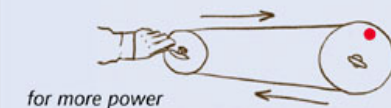
make your own pulley system

Pulley sizes, locations, and belt tension all affect how your system works



The belts in a pulley system act like extensions of muscles (or a motor) to transmit energy from place to place.

Different pulley combinations work in different ways. (You can watch the color dot rotate to compare how fast the pulleys are spinning.)



Challenges & Hints

- Challenge + hint
- Free standing hints
- Progressive Challenges + hints

Visible Vibrations

Casual Tone of Voice

- Titles

Watch Water Freeze

watch water
freeze



Look through a viewer
at the ice crystals.

**Have a few minutes?
Want to see something really cool?**

Use the water squirter to melt away
ALL the ice from the glass.

Then watch and wait.

In one or two minutes, silvery ice
crystals will suddenly appear and
speed across the glass.
It's worth the wait!

Casual Tone of Voice

- Titles
- Informality

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Casual Tone of Voice

- Titles
- Informality
- Technical talk

Downhill Race

downhill race

Which wheel
rolls downhill
the fastest?

- ▶ Choose any two wheels.
Make a prediction: which one will reach the bottom first?
- ▶ Start both wheels at the top of the ramp and let them go at the same time.
- ▶ Please put the wheels back in the rack when you're done.

What's going on?

Believe it or not, when objects roll downhill, it's not their weight or size that determines their speed—it's how their weight is distributed.

When weight is located far from the center of the wheel, the wheel is harder to get rolling. (A physicist would say it has more *rotational inertia*.) So even though they may weigh the same, a metal disk will accelerate down a hill faster than a metal hoop because the hoop's weight is farther from the center.

Rearranging Explanation

- Alternating between active text and hinting at content

Gravity Powered Calculator

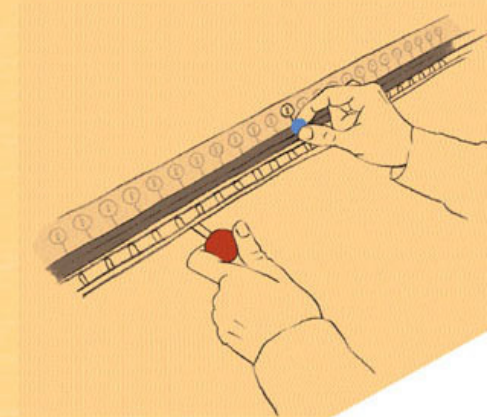
gravity-powered calculator

Believe it or not, this contraption does math.

- 1 Lift the red lever.
- 2 Place a ball on the black ramp, next to a number. (Try 16.) The magnets will hold it there.
- 3 Lower the red lever to release the ball and see where it lands.

- ▶ Can you hit all 6 of the brass targets?

(Hint: Look for a relationship between the number a ball starts at and the number it lands on.)



What's going on

This machine calculates the square of the number you multiply. For example, the ball starts at 4 and lands on 16.

Rearranging Explanation

- Alternating between active text and hinting at content
- Active content and Unfolding explanation

Gravity Powered Calculator

What's going on?

This machine calculates *square roots*. A square root is a number you multiply by itself to get another number. For example, the ball that started on #16 landed on #4. 4 is the square root of 16, because 4 times 4 equals 16.

▶ Test the machine:

Choose a number to launch the ball from.
What number did the ball land on?
Is it the square root?
You can use the calculator to check.
(Press $\sqrt{\quad}$ to get the square root.)

How does this work?

The short answer:

When a ball leaves the ramp, its speed, and thus the distance it travels, depends on the square root of the height you start it from.

(For the long answer, look on the side of the exhibit.)

Rearranging Explanation

- Alternating between active text and hinting at content
- Active content and Unfolding explanation
- Physical placement

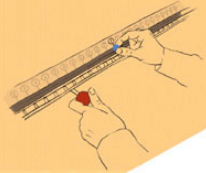
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The long answer
(For math/physics lovers):
When you place the ball on the ramp, you give it potential energy:
Potential Energy = mgh
(mass \times acceleration due to gravity \times height)
The height of the ball is directly proportional to its position on the ramp.
When the rolling ball reaches the bottom of the ramp, the potential energy has been converted to kinetic energy:
Kinetic Energy = $\frac{1}{2}mv^2$
(Half the mass \times velocity squared)
Since energy is conserved, the potential energy at the top of the ramp must equal the kinetic energy at the bottom:
Energy = $mgh = \frac{1}{2}mv^2$
Solving for velocity v , we get:
 $v^2 = 2gh$ so v is proportional to \sqrt{h}
Once they leave the ramp, all the balls have the same flight time. So the distance each ball travels depends only on the velocity, which in turn depends on the square root of the height.

Removing Explanation?

- Standard “Try This” & Explanation

Downhill Race

Which wheel rolls downhill the fastest?

Downhill Race

- Choose any two wheels. Make a prediction: which one will reach the bottom first?
- Start both wheels at the top of the ramp and let them go at the same time.
- Please put the wheels back in the rack when you're done.

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Removing Explanation?

- Standard “Try This” & Explanation
- No Explanation

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Removing Explanation?

- Standard “Try This” & Explanation
- No Explanation
- Multiple Choice Explanation

Downhill Race

Which wheel rolls downhill the fastest?

Downhill Race

Experiment with the wheels to decide which of the following theories seems to hold:

Heavier wheels roll fastest.

Wheels with most of their weight at the hub (center) roll fastest.

?

Wheels with most of their weight at the rim roll fastest.

Lighter wheels roll fastest.

Removing Explanation?

- No Explanation label
 - Longest Holding time
 - Run the most races
 - Most intellectual engagement
 - Problem: Some visitors frustrated
- Multiple Choice label
 - Visitors talk the least about the content
 - Might have felt test-taking anxiety

Label as Affordance (Multi-Option)

- 3D Shapes

Limitations

- Table-top design arena
- Open space
- Behavior not content

Hopes for the future

- Expand design arena
- Apply what we've learned to content-based projects

Expand APE design arena



Apply APE to content

