

# LOOPS

## Logging Opportunities in Online Programs for Science

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Kimberle Koile

The Concord Consortium

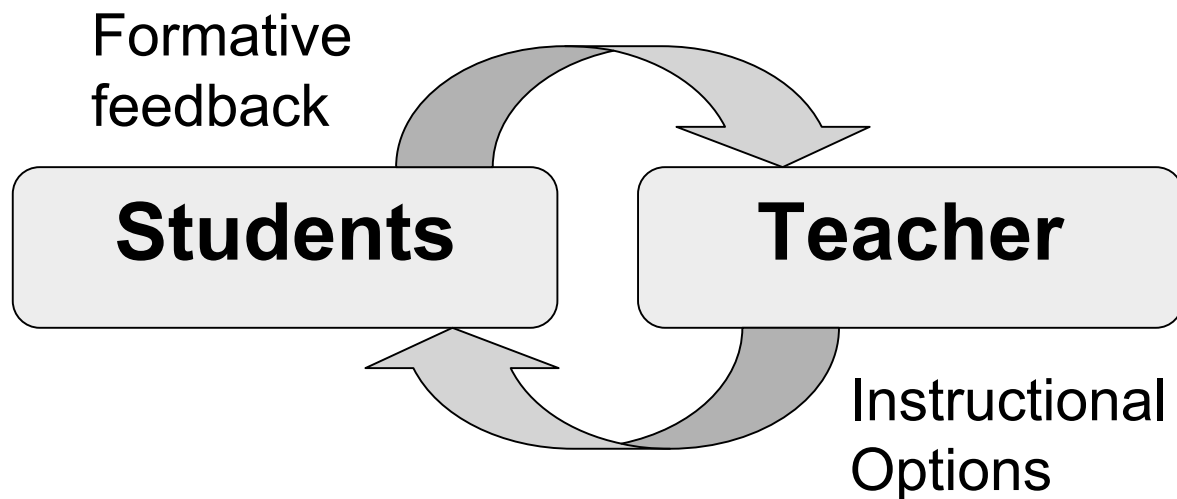


NSF DRK-12



# What is LOOPS?

- 5-year NSF-funded program, in year 2
  - Concord Consortium, Univ CA Berkeley, Univ Toronto
  - focus on 8th grade science
- Investigates how technology can support formative assessment
  - providing teachers with timely data about student interactions and learning
  - enabling teachers to modify instruction to improve learning





# Research Questions



- What LOOPS data gives insight into student learning?
- How can LOOPS evidence help teachers make instructional decisions?
- How can LOOPS instructional features impact student learning?

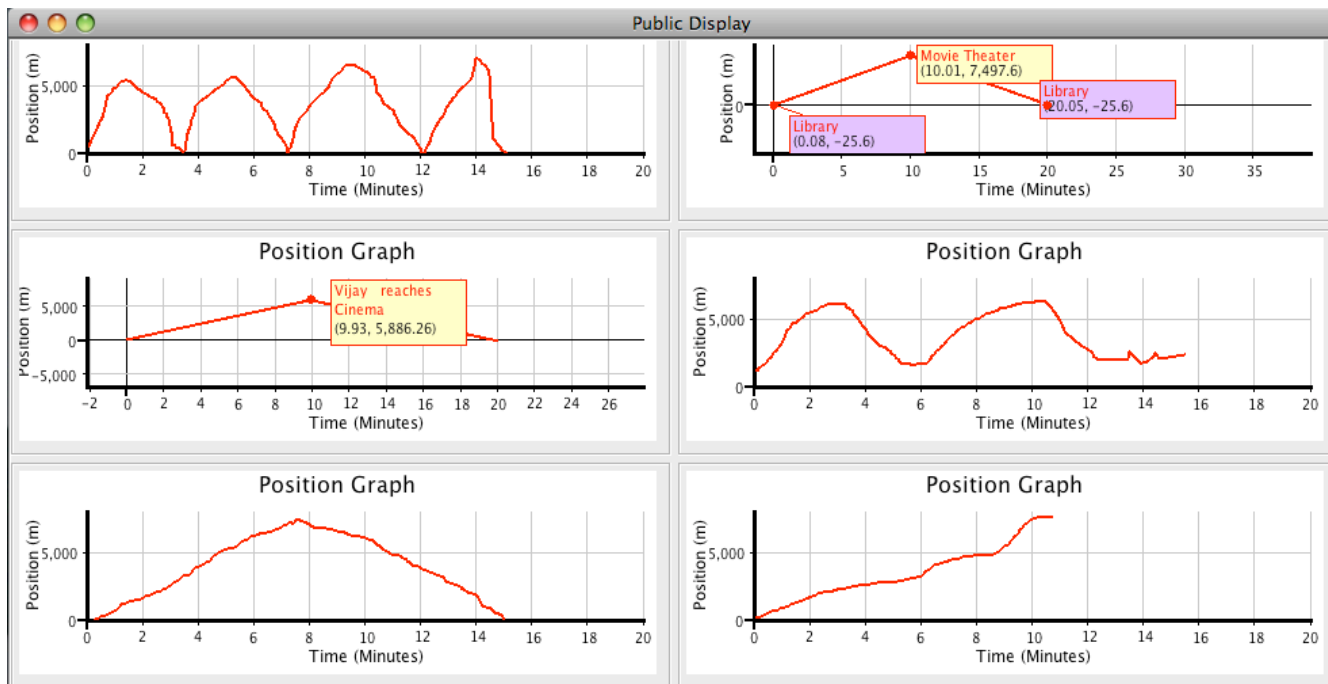
# Data and Feedback



- Log inquiry activities
  - Students interact with computational models, sensors, graphs, drawing tools
- Give teacher feedback
  - View and select student work, histograms, progress
- Teacher tailors instruction
  - During class, between classes, between uses of curriculum unit

# Teacher Tools

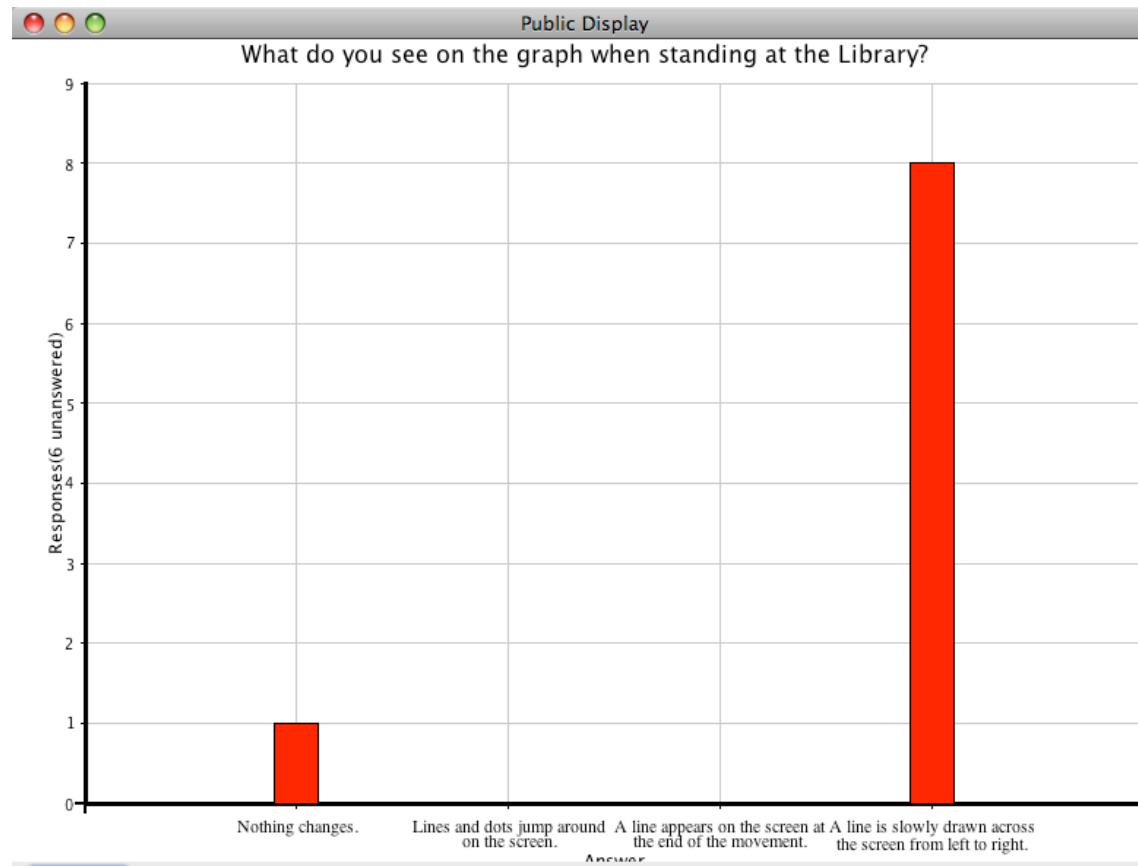
- Pick N
  - students submit work in class
  - teacher chooses several for anonymous sharing



*Motion prediction graphs, 8th grade Albany MS*

# Teacher Tools (cont'd)

- Poll
  - students submit answers to multiple choice questions
  - teacher gets and can display a histogram of responses



*8th grade student work from Albany MS*

# Teacher Tools (cont'd)

- Student Progress

Student progress

1 – Let's Graph With Probes

2 – Telling a Story

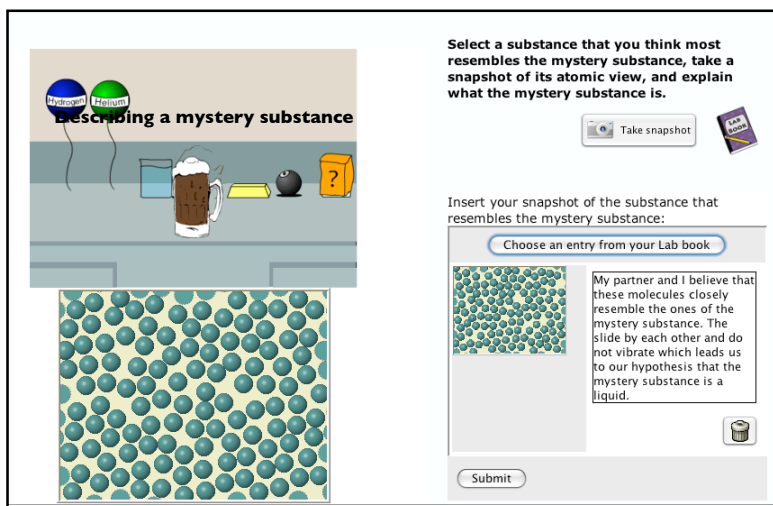
Student progress:

	Demo	Prediction	Discussion	Ref Point	Probe
	2	5	6	7	8
Aaron Scott	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Dana Michael	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Paul Lauren	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Kate Ed	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Carolyn Andy	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Sue Bob	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
John Nathan	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Margaret Pamela	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Bob Barbara	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>

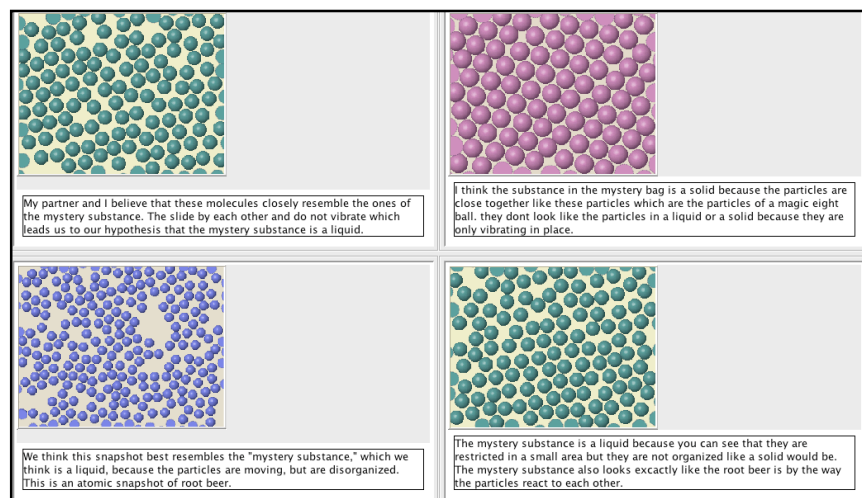
*8th grade student work from Foothill MS*

# Current Status

- Classrooms: CA Albany MS, Foothill MS, Martinez JHS, Pine Hollow MS
- Curriculum: Force & Motion, Chemistry
  - Motion: motion probe activities for velocity
  - Force: space rescue game
  - Chemistry: simulations, visualizations for chemical reactions



*Student explores visualization.*



*Teacher chooses student responses.*

# INK-12

## Interactive Ink Inscriptions in K-12

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Kimberle Koile

MIT Center for Educational Computing Initiatives



NSF DRK-12



MIT CECI



TERC

# INK-12: Interactive Ink Inscriptions in K-12

- NSF exploratory



NSF DRK-12

- PIs: KKoile



MIT CECI

, Andee Rubin



TERC

- Evaluator: David Reider

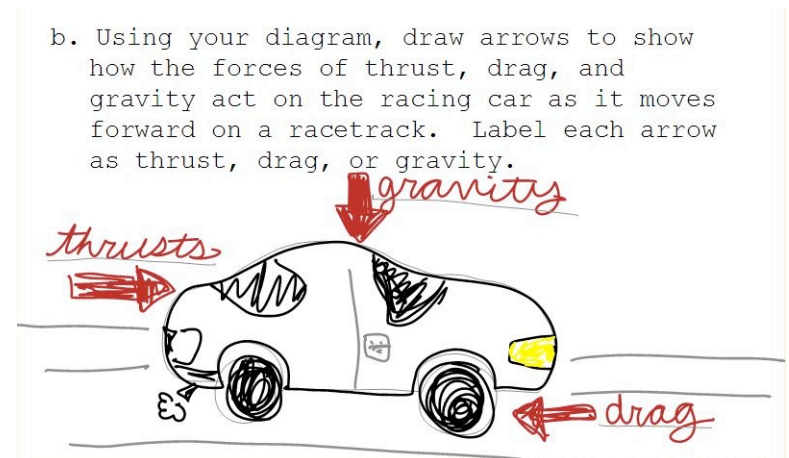


- 2-years, Sept 2008 to Sept 2010



## INK-12: Interactive Ink Inscriptions in K-12

- Explore in science and math:
  - **Inscriptions:** What kinds of “ink” inscriptions are useful?
  - **Classroom communication:** How can technology support in-class communication between teachers and students?
  - **Inclusion:** Do we see differences in technology use with students having different learning needs?
- Technology: set of Tablet PCs
  - **pen-based interface:** draw and write to create “ink” inscriptions
  - **wireless communication:** share in-class work anonymously



## INK-12: Fourth and eighth graders

- Cambridge, Lexington, Waltham; in each district:
  - two 4th grade
  - one 8th grade science, one 8th grade math
  - total of 12 teachers



## Fourth grade in Lexington

- Fiske (22 students)
- Bridge (21 students)



**Our Crayfish Data**

name	M/F	weight (g)	length (cm)
Money Maker	M	18	7.5
Mr. Extreme	M	20	8.5
Philip	M	18	8.5
Old Feisty	M	18	8.5
Hermes	F	16	7.0
Bobby	M	18	7.5
Tommy	M	16	7.5
Tickles	M	16	7.5
Twitch	M	16	7.0
Small Claws	F	17	8.5
Bobbert	M	17	7.5
Waver	M	23	9.0
Snapper	M	18	7.0
Hurt Leg	M	18	7.0
Sir Bonkers	M	21	7.5
Sir Edward Henry "Eddie"	M	23	8.5
Night Crawler	M	22	8.5



# Fourth grade science (no technology) Fiske, Lexington

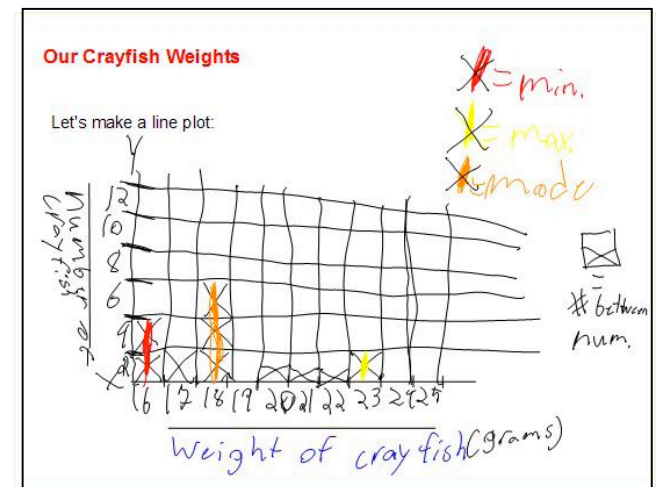
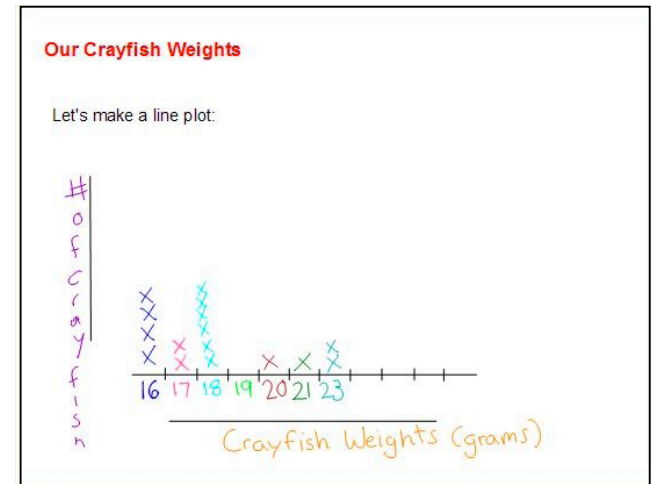


# Fourth grade science (with tablets) Fiske, Lexington



*Teacher:* The children absolutely loved it for many reasons but I believe that once they sent me their info and I displayed it on the board, they were more likely to pay attention because their work was coming. They also liked to see what others came up with.

*Teacher:* Once children are engaged in such a way, they are motivated to participate, and they care about doing their best work because it will be displayed for all to see. I absolutely loved what it does for my teaching.





# Fourth grade science Bridge, Lexington

## Our Crayfish Lengths

What is the minimum length?

8

What is the range of length?

4.5

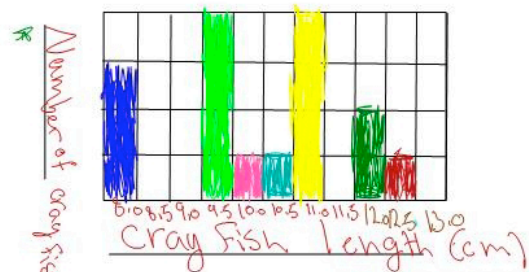
What is the maximum length?

12.5

What is the mode?

9.5, 11.0

Bar graph:



## Our Crayfish Lengths

What is the minimum length?

8

What is the range of length?

4.5

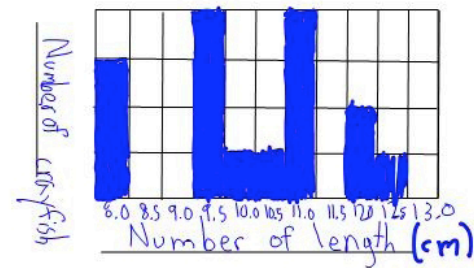
What is the maximum length?

12.5

What is the mode?

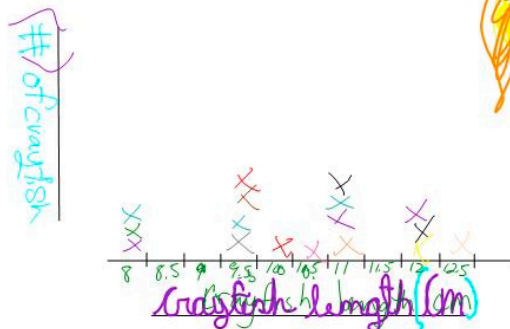
9.5, 11.0

Bar graph:



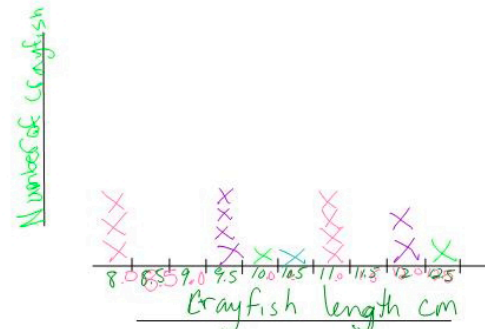
## Our Crayfish Lengths

Now let's try a line plot:



## Our Crayfish Lengths

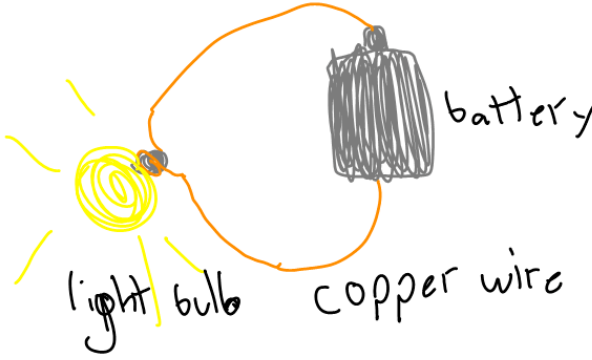
Now let's try a line plot:



# Fourth grade Baldwin, Cambridge

Classroom Learning Partner 2.3.43 Elementary Student View Disconnected [No active presentation]

File Tools Role Help



Draw a Simple Circuit

light bulb

battery


copper wire

Current: 1 / 23 Slides: 23 Slide 2

The diagram shows a simple circuit. A battery is represented by a grey, scribbled rectangle. A yellow spiral represents a light bulb. An orange line, representing copper wire, forms a loop connecting the battery to the light bulb. The text 'Draw a Simple Circuit' is at the top. Labels 'light bulb', 'battery', and 'copper wire' are next to their respective components. The interface includes a toolbar with drawing tools and a status bar at the bottom.

Classroom Learning Partner 2.3.43 Elementary Student View Disconnected [No active presentation]

File Tools Role Help



Draw a circuit with 2 Bulbs

light bulb

wire

battery

-wire

Current: 17 / 37 Slides: 37 Slide 5

The diagram shows a circuit with two light bulbs. A battery is represented by a rectangle at the bottom. Two light bulbs are represented by yellow spirals at the top. Wires connect the battery to the bulbs. The text 'Draw a circuit with 2 Bulbs' is at the top. Labels 'light bulb', 'wire', 'battery', and '-wire' are next to their respective components. The interface includes a toolbar with drawing tools and a status bar at the bottom.

# Fourth grade Baldwin, Cambridge

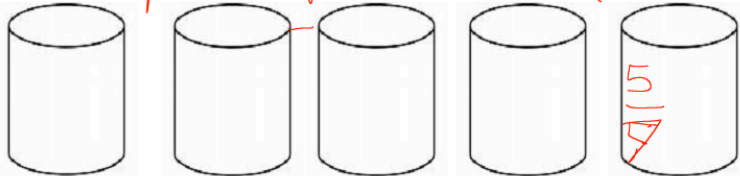
**Special needs: some students more distracted, some less**

Classroom Learning Partner 2.3.43 Elementary Student View Disconnected [No active presentation]

File Tools Role Help

Write each fraction in the container in which it belongs. Cross out each fraction when you use it. There are five fractions in each container

Need Help



Less than one half      One half      Between one half and one whole      One whole      More than One whole

$\frac{3}{6}$ ,  $\frac{5}{5}$ ,  $\frac{1}{4}$ ,  $\frac{5}{2}$ ,  $\frac{1}{5}$ ,  $\frac{2}{3}$ ,  $\frac{2}{2}$ ,  $\frac{3}{5}$ ,  ~~$\frac{5}{7}$~~ ,  $\frac{6}{3}$ ,  $\frac{2}{5}$ ,  $\frac{2}{4}$ ,  $\frac{3}{3}$ ,  $\frac{10}{20}$ ,  
 $\frac{3}{10}$ ,  $\frac{10}{5}$ ,  $\frac{2}{6}$ ,  $\frac{3}{2}$ ,  $\frac{9}{10}$ ,  $\frac{6}{5}$ ,  $\frac{10}{10}$ ,  $\frac{4}{8}$ ,  $\frac{4}{5}$ ,  $\frac{8}{8}$ ,  $\frac{6}{12}$

Current: 13 / 22 Slides: 22 Slide 2

Student figured out that he could communicate with the teacher...



# Fourth grade Baldwin, Cambridge

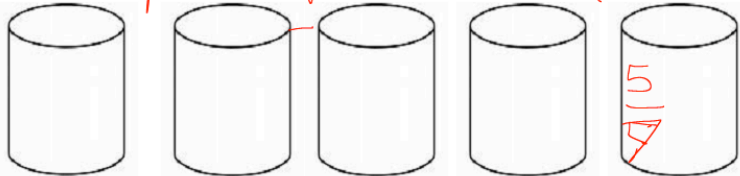
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File Tools Role Help

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Need Help



Less than one half    One half    Between one half and one whole    One whole    More than One whole

$3/6, 5/5, 1/4, 5/2, 1/5, 2/3, 2/2, 3/5, 5/7, 6/3, 2/5, 2/4, 3/3, 10/20,$   
 $3/10, 10/5, 2/6, 3/2, 9/10, 6/5, 10/10, 4/8, 4/5, 8/8, 6/12$

Current: 13 / 22 Slides: 22 Slide 2

Student figured out that he could communicate with the teacher...

... so did another one.

Classroom Learning Partner 2.3.43 Elementary Student View Disconnected [No active presentation]

File Tools Role Help

Mrs. Butler

this is fuh! 😊

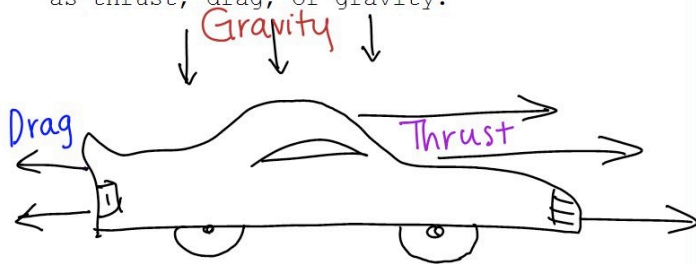
Current: 23 / 37 Slides: 37 Slide 5

# Eighth grade science Clarke, Lexington

(24, 23, 21, 16 students) 2 days in each class

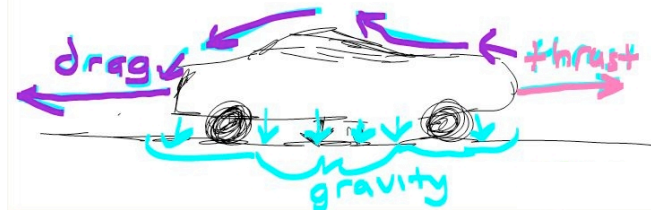
a. Draw a simple diagram of a racing car in your Student Answer Booklet.

b. Using your diagram, draw arrows to show how the forces of thrust, drag, and gravity act on the racing car as it moves forward on a racetrack. Label each arrow as thrust, drag, or gravity.

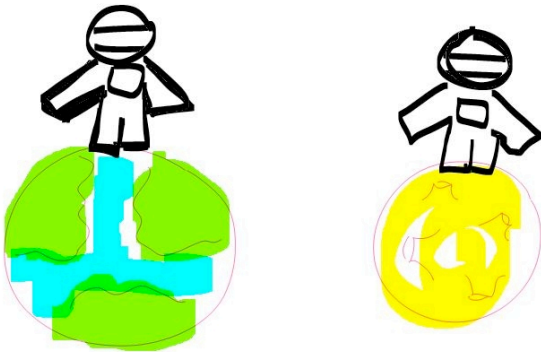


a. Draw a simple diagram of a racing car in your Student Answer Booklet.

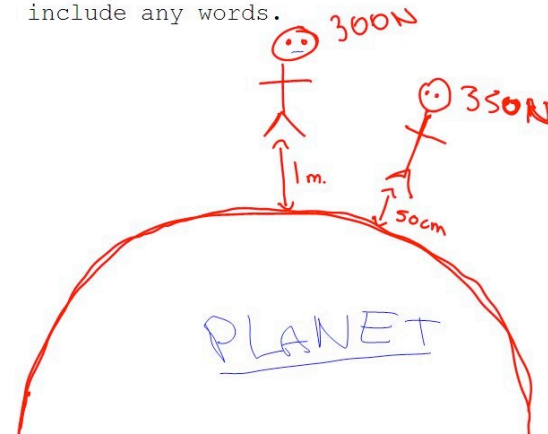
b. Using your diagram, draw arrows to show how the forces of thrust, drag, and gravity act on the racing car as it moves forward on a racetrack. Label each arrow as thrust, drag, or gravity.



Draw two astronauts who have the same mass but different weights. Please do not include any words.




Draw two astronauts who have the same mass but different weights. Please do not include any words.



# Eighth grade math Clarke, Lexington

(28, 27, 24, 11 students) 2 days in each class


We can look at this house as a prism sliced like cheese. What would be the area of a single slice? First, write the length of each of the dimensions on the drawing. Then figure out the area. Show all the steps of your process. Remember your answer to use on the next slide.



$A_{\triangle} = \frac{9 \times 24}{2} = \frac{216}{2} = 108$   
 $A_{\square} = 24 \times 10 = 240$   
 $A_{\triangle} + A_{\square} = 108 + 240 = 348$

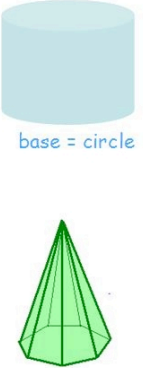
348 ft<sup>2</sup>

We can look at this house as a prism sliced like cheese. What would be the area of a single slice? First, write the length of each of the dimensions on the drawing. Then figure out the area. Show all the steps of your process. Remember your answer to use on the next slide.



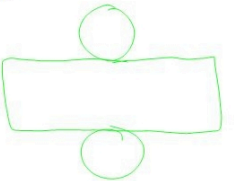
$\frac{9 \cdot 24}{2} = 9 \cdot 12 = 108 \text{ ft}^2 = \text{area of triangle}$   
 $24 \cdot 10 = 240 \text{ ft}^2 = \text{area of square}$   
 $240 + 108 = 348 \text{ ft}^2 = \text{area of the slice}$

Now construct the net of these solids:



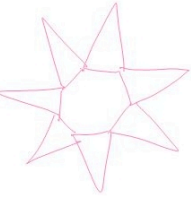
base = circle

cylinder




base = heptagon

heptagonal pyramid



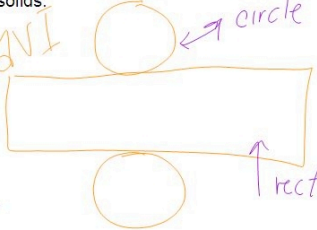
Now construct the net of these solids:



base = circle

Manavi

cylinder

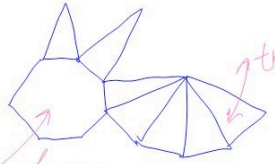


circle

rectangle

base = heptagon

heptagonal prism



heptagon

triangle

# LOOPS and INK-12

- **Ideal for:**

- Immediate feedback, sharing of student work
- Many subject areas



- **Need:**

- Streamlined/automatic set-up
- Teacher training in using immediate feedback
- Teacher reports with summary info
  - e.g., Inquiry index: infer learning from actions
- Teacher mobility
- Support of differentiated instruction



- **Potential obstacles:**

- Lack of tech support in the classroom
- Lack of good networking
  - \* LOOPS is server-based, requires internet
  - \* INK-12 uses peer-to-peer for now

