



OASIS

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GREGORY GRAMBO

CLAY BOATS

September/October 1993
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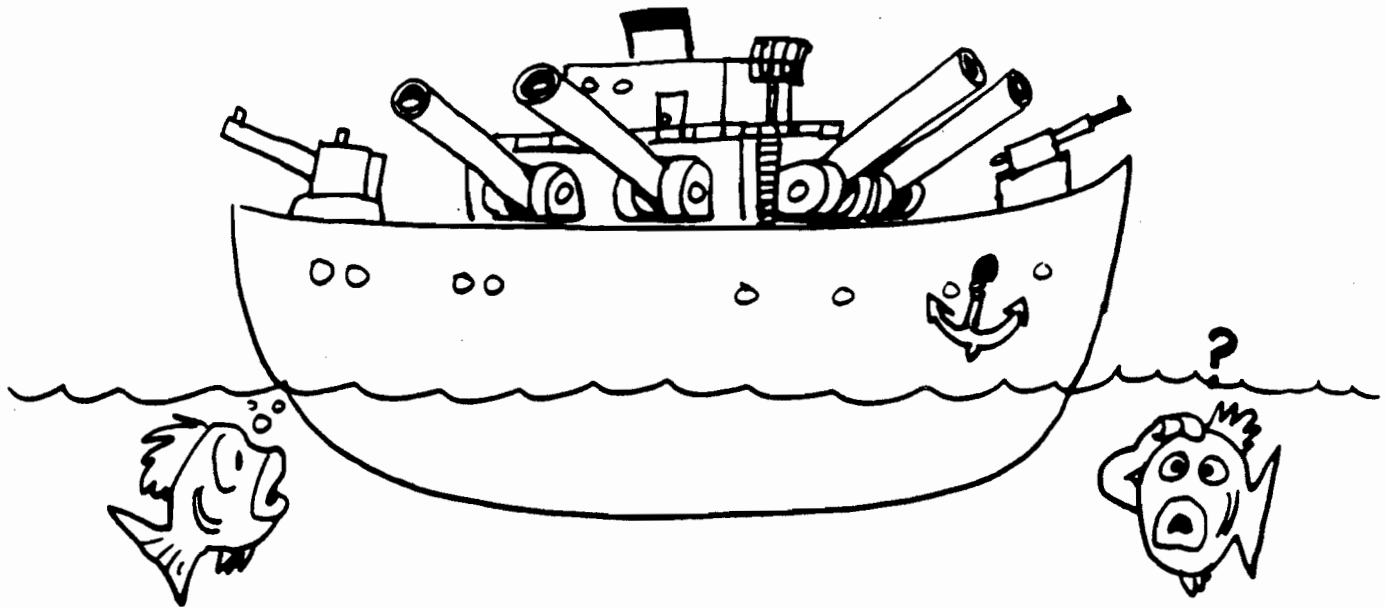
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Clay Boats

by Gregory Grambo



If you place a penny into a glass of water you will see it sink to the bottom of the glass. Gravity will put it there, especially since the penny is heavier than the water in the glass. When we talk about how heavy one item is compared to another, we use the term *density*. Water is lighter and less dense than the penny (whose molecules are packed much tighter together than the molecules in water thereby creating the higher density). Steel is also denser than water. Place a nail or screw into a glass of water and it, too, will sink to the bottom. How, then, can a battleship or aircraft carrier float? They are made of steel, a material much denser than water. The laws of physics and chemistry tell us that these materials should sink. How, then, is it possible that this heavy material, which is denser than water, can be made to float?

A glass jar and its metal lid are both denser than water. If you put the lid on the jar and

peer into its contents, you may see that the jar is "empty." Place this empty jar into a basin of water and watch it float. Ask yourself why it is floating. The key to this problem is what is really inside the so-called empty jar. Trapped air inside an object will keep it afloat. Air is much less dense than water.

In the following two experiments, students will take a material that is more dense than water, called Plasticine™ (an oil-based clay) and make it float. They will also play a game to see which floating object built can support the most weight. Since these experiments can get a bit messy, it is advisable to cover the tables with newspaper or plastic sheeting. Aluminum foil can be substituted for the clay in these experiments. If you prefer to use the foil, you will need a much larger supply of paper clips for experiment two, as the aluminum boats can hold more weight than the Plasticine™ boats.

Clay Boats

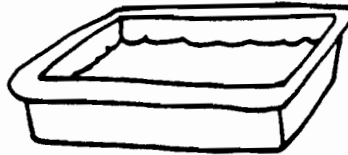
Experiment 1

How can you make something heavier than water float?

1
Begin with



BASIN OF WATER



CLAY



PLASTICINE

2
You are going to use a special type of clay called Plasticine™. Take a piece of Plasticine™ and a piece of regular clay from the teacher's desk.

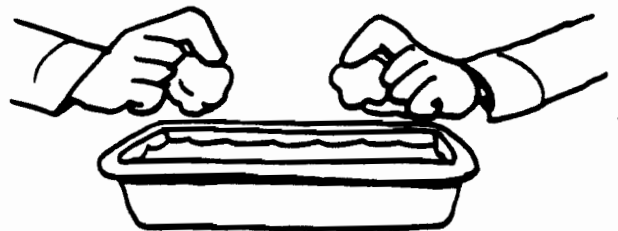
3
How are they different?

4
How are they similar?

5
How do they make your hands feel?



6
Put a piece of each in water. Describe what happens.



7

Which could not be used in water? Why?

8

Take the other clay and make it float on the water.

9

You may bend, fold, and cut.

10

Ways it works (Draw pictures.)

Why do these ways work?

11

Ways it does not work (Draw pictures.)

Why don't these ways work?

Homework:

How can we take a material (like clay or steel, for example) which is heavier than water and make it float on top of water?

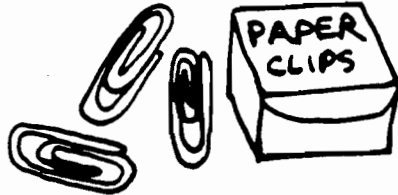


Clay Boats

Experiment 2

How much weight can a boat hold? How can we find out?

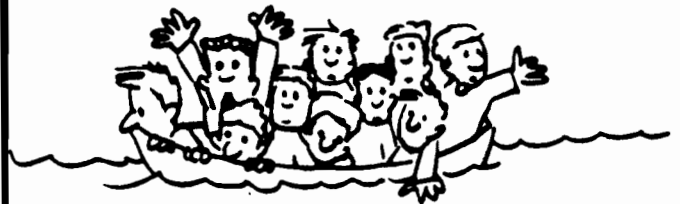
1
Begin with



2
If you ever go on a boat you may notice a sign that says you can only put so much weight in the boat. Why would a boat have a sign like that?



3
Why should you not put ten people into a rowboat?

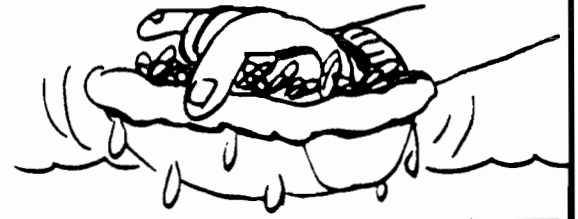


4
How can we find out how much weight a boat can hold?

5
Float your boat from Experiment 1 in a basin of water or make another boat and float it. Fill the boat with paper clips until it sinks. Record your results on the chart on the back of this sheet.

6

Do this experiment four times.
Dry off the boat and clips each time.



7

Why must you dry off the boat and clips?

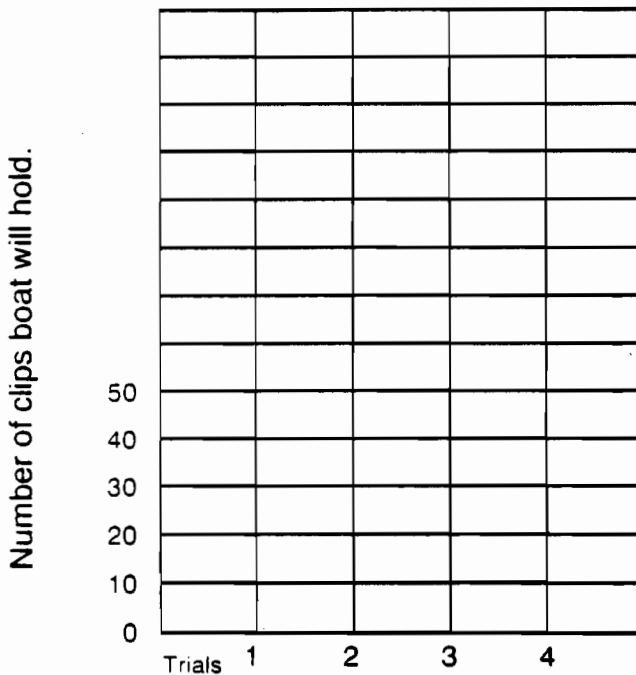
8

Trial

	1	2	3	4	Average
Number of clips boat will hold.					

9

Bar Graph



10

Do your results come out the same every time?

Why or why not?

11

Does everyone else's boat hold the same number of paper clips?

Why or why not?

Homework:

1. What does *variable* mean?
2. How can variables hurt an experiment?

3. How can you get rid of variables?
4. Which boats worked best? Why?

**These are the
Hand Written
experiments
used in class.**

With Answer Key

Clay Boats

Name _____

Class _____ Group No _____

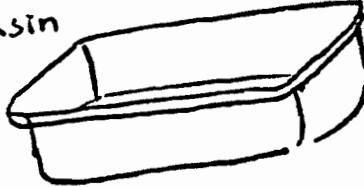
How can you make something heavier than water float?

Experiment 1

1) Begin With



Basin
of
Water



Clay



plasticine

2) You are going to use a special type of clay called plasticine. Take a piece of plasticine and a piece of regular clay from the teachers desk.

3) How are they different?

4) How are they similar?

5) How do they make your hands feel?

6) Put a piece of each in water. Describe what happens.



7) Which could not be used in water? Why?

8) Take the other clay and make it float on the water

9) You may bend, fold and cut it

10) Ways it works. (Draw pictures)

Why do these ways work?

11) Ways it does not work. (Draw pictures)

Why don't these ways work?

Homework -

1- How can we take a material, (like clay or steel for example) which is heavier than water, and make it float on top of water?

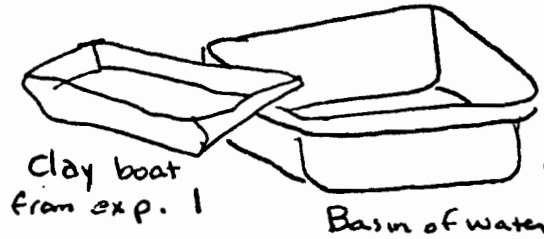
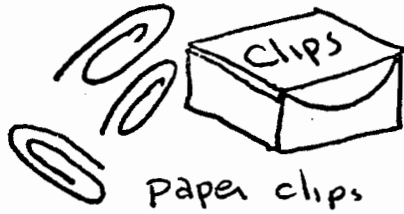
Clay Boats

Name _____
Class _____ Group No _____

How much weight can a boat hold? How can we find out?

Experiment 2

1) Begin With



2) If you ever go on a boat you may notice a sign that says you can only put so much weight on the boat. Why would a boat have a sign like that?

3) Why shouldn't you put 10 people into a row boat?



4) How can we find out how much weight a boat can hold?

5) Float your boat from experiment 1 in a basin of water or make another boat and float it. Begin to fill the boat with paper clips until it sinks. Record your results on the chart on the back of this sheet.

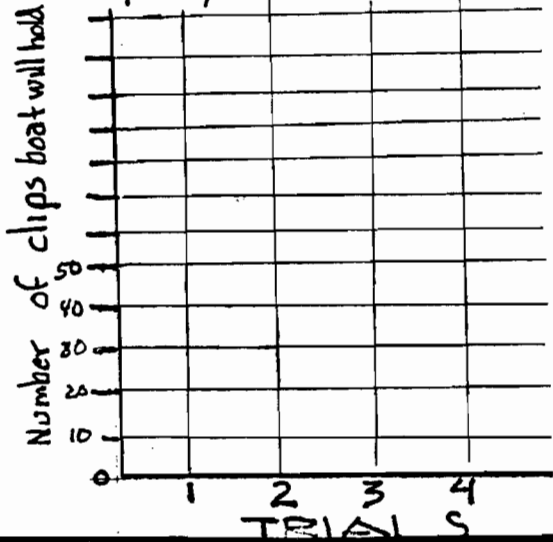
6) Do this experiment 4 times. Dry off the boat and clips each time.

7) Why must you dry off the boat and clips?

8)

TRIAL					
	1	2	3	4	Average
No of clips boat will hold					

9) Graph your results



BAR GRAPH

10) Do your results come out the same every time?

Why or Why not?

11) Does every one else's boat hold the same number of paper clips?

Why or Why not?

Homework -

1- What does variable mean?

2- How can variables hurt an experiment?

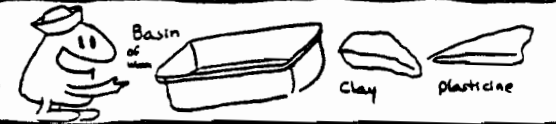
3- How can you get rid of variable?

4- Which boats worked best? Why?

Clay Boats

Name _____
Class _____ Group No _____

How can you make something heavier than water float? Experiment 1

1) Begin With  Basin of water, clay, plasticine


2) You are going to use a special type of clay called plasticine. Take a piece of plasticine and a piece of regular clay from the teachers desk.

3) How are they different?
Clay feels wet,
Plasticine feels oily.

4) How are they similar?
Both can be molded into something, and they weigh about the same.

5) How do they make your hands feel?
Plasticine makes your hands feel slimy.

6) Put a piece of each in water. Describe what happens.
The clay falls apart.



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7) Which could not be used in water? Why?
Clay is partially soluble so it falls apart in water.

8) Take the other clay and make it float on the water

9) You may bend, fold and cut it

10) Ways it works. (Draw pictures)
Why do these ways work?
1) rests on the surface of the water
2) holds air inside it.

11) Ways it does not work. (Draw pictures)
Why don't these ways work?
No air is inside and this allows the plasticine to sink.


Homework -

1- How can we take a material (like clay or steel for example) which is heavier than water, and make it float on top of water?
If air can be trapped or fit inside the object it will float.

Clay Boats


Name _____
Class _____ Group No _____

How much weight can a boat hold? How can we find out? Experiment 2

1) Begin With  paper clips, Clay boat from exp. 1, Basin of water

2) If you ever go on a boat you may notice a sign that says you can only put so much weight on the boat. Why would a boat have a sign like that?
The boat will sink too low allowing water to come over the sides and fill the boat. It will then sink.

3) Why shouldn't you put 10 people into a row boat?
It would sink too low into the water



4) How can we find out how much weight a boat can hold?
Keep putting weight in a boat until it sinks.

5) float your boat from experiment 1 in a basin of water or make another boat and float it. Begin to fill the boat with paper clips until it sinks. Record your results on the chart on the back of this sheet

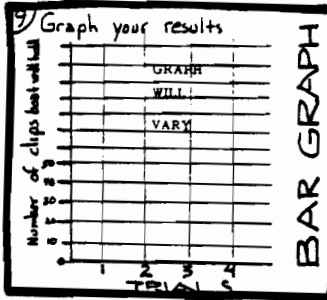
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6) Do this experiment 4 times. Dry off the boat and clips each time.

7) Why must you dry off the boat and clips?
The water on the clips will give an untrue reading.

8) TRIAL

	1	2	3	4	Average
No of clips boat will hold	NUMBERS WILL VARY				



10) Do your results come out the same every time?
No.
Why or Why not?
Everytime you do things a little differently, results will change.

11) Does every one else's boat hold the same number of paper clips?
Flat boats hold less clips and some boats had holes in them.
Why or Why not?
The higher the sides of the boat, the more clips it will hold.

Homework -

- 1- What does variable mean?
Things that mess up your experiment.
- 2- How can variables hurt an experiment?
They cause changes in your results.
- 3- How can you get rid of variable?
Do the same all the time.
- 4- Which boats worked best? Why?
Higher side boats hold more air and therefore more weight.

Clay Boats

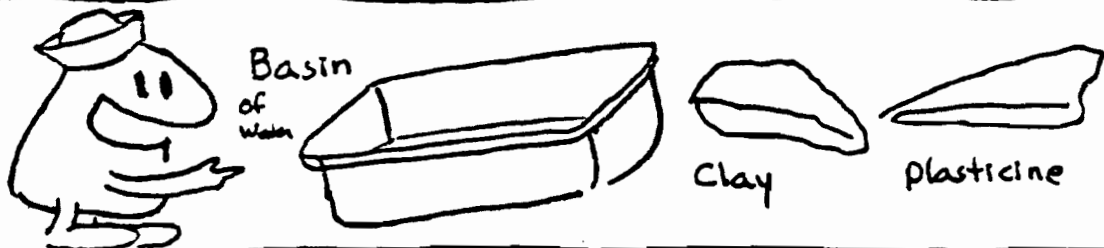
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Class _____ Group No _____

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1) Begin With



Basin of Water

Clay

plasticine

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Both can be molded into something, and they weigh about the same.

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Plasticine makes your hands feel slimy.

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The clay falls apart.



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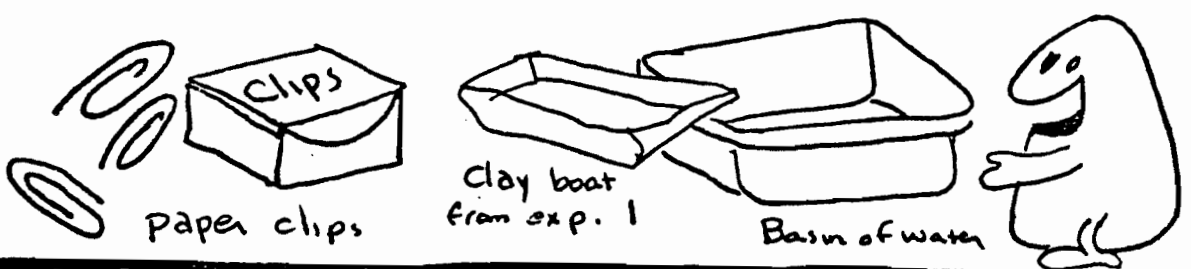
Clay Boats

Name _____
Class _____ Group No _____

How much weight can a boat hold? How can we find out?

Experiment 2

1) Begin With



paper clips

clay boat from exp. 1

Basin of water

2) If you ever go on a boat you may notice a sign that says you can only put so much weight on the boat. Why would a boat have a sign like that?

The boat will sink too low allowing water to come over the sides and fill the boat. It will then sink.

3) Why shouldn't you put 10 people into a row boat?

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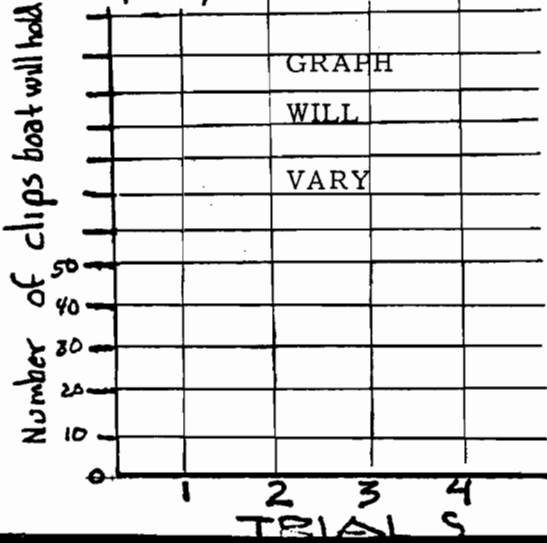
7) Why must you dry off the boat and clips?

The water on the clips will give and untrue reading.

8)

		TRIAL				
		1	2	3	4	Average
No of clips boat will hold		NUMBERS WILL VARY				

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BAR GRAPH

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