

Changing Rocks

Task Information

Subject: Earth Science

Content:

- N.Y.S. Earth Science Syllabus(1970) - Topic IX - A1 - Erosional Processes
- Earth Science Pro. Mod. - Unit 4 - A - 1 - Surface Processes
- Framework - standard 4 - Science - Many of the phenomenon that we observe on Earth involve interactions among air, water, and land components.
- Middle Level Science Block D - II Changes in the Earth's Surface

Format: Manipulative

Purpose: Using a model, the student will study the effects of abrasion.

Skills:

Primary: Observing, Generalizing, inferring, predicting

Secondary: Interpreting data

Time: 30 minutes

Materials:

Per Student:

- 10 rocks
- 1 plastic jar
(Recommend large mouth peanut butter jars)
- water
- laminated test card
- plastic spoon
(to remove rocks from jar)
- paper towels
- metric ruler

Teacher:

- 1 - 5lb bag of Plaster of Paris
- 500 mL of fine gravel
- 500 mL sand
- 2 or 3 aluminum (13" x 9") trays
- water - to mix
- hammer (to break up the rocks into smaller pieces)
- bucket to mix plaster
- laminated test card
- newspaper
- small baggies or plastic containers

Preparation:

*** Rocks should be prepared two (2) days prior to the test. ***

1. Mix: plaster, sand, gravel, water to a pudding consistency.
2. Pour into tray to height of 2 -3 cm (1"); shake down so that it dries flat.
3. When dried, place on newspaper and break into equal chunks of about 2 -3 cm in size.
4. Sort out 10 "rocks" (per student) of similar size and place in a baggie.
5. Recommendation - laminated/plastic covered test card be taped down at the student test station.
6. Check plastic jars for leaks - use only plastic jars to shake.

Safety: N/A

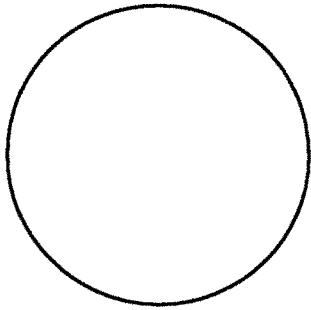
Extensions/Modifications:

Depending on availability of materials; use different actual rock materials. Data may be collected as a team and individual analysis may be done.

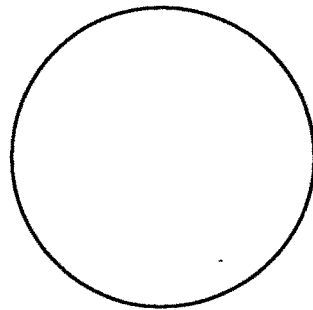
Credit/Source:

Rock Recipe: Ted Anderson; Pembroke High School.
Earth Science Supplement (1970) - Rock Abrasion

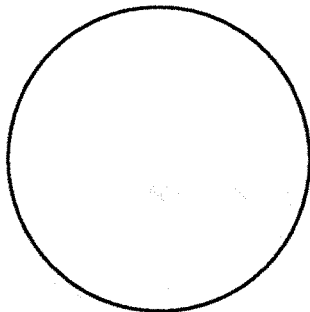
TEST CARD



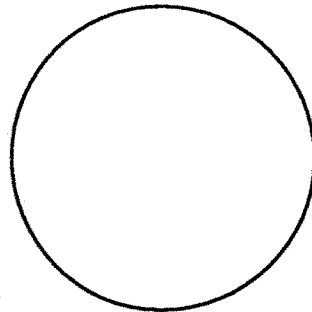
0 Shakes



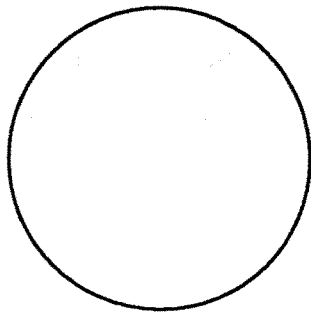
50 Shakes



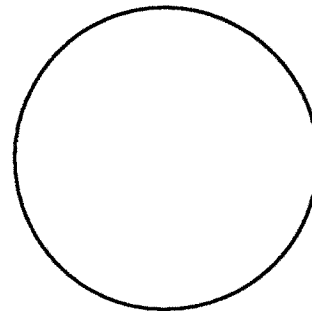
150 Shakes



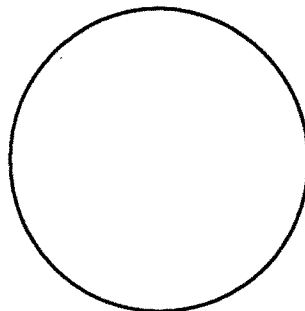
100 Shakes



200 Shakes



250 Shakes



300 Shakes

Changing Rocks - Scoring Rubric

Maximum score - 11 points

Task 1 - 7 Directions

No credit

Task 8. Line Graph

2 points total

Standard: The student will indicate a direct relationship between 2 variables on a graph including the number of shakes and the amount of rounding

Criteria:

- Allow 1 point if both axes are labeled correctly.
- Allow 1 point for line drawn indicating a direct relationship

Task 9. Change in Rocks With Shaking

2 points total

Standard: The student will describe observed changes.

Criteria:

- Allow 2 points for a correct statement that describes the change of the rock as being rounder and/or smoother in complete sentences.
- Allow only 1 point if the is answer is correct but not in a complete sentence.
- No credit is given for an incorrect answer even if it is written in a sentence.

Task 10. Sketch

1 point total

Standard: The student will describe his/her prediction of a change using a drawing as a model.

Criteria:

- Allow 1 point for a drawing that shows a smaller, more rounded particle after 600 shakes

Task 11. Prediction

4 points total

Standard: The student will make a prediction based on the observations made.

Criteria:

- A.
 - Allow 2 points for a logical prediction based on the data collected, using complete sentences.
 - Allow 1 point for a logical prediction not in complete sentences.
- B.
 - Allow 2 points for supporting (explaining) the prediction with observations using complete sentences.
 - Allow 1 point for an explanation not in complete sentences.
(See Comment 1)

Task 12. Description

2 points total

Standard: The student will make a statement based on his/her observations.

Criteria:

- Allow 2 points for 2 reasonable answers.
- Allow 1 point for 1 reasonable answer.
- No credit is given for unreasonable answers or no answers.

Comments:

Comment 1:

- a. The student's answer should state that the rock would be more rounded and might be smaller after 600 shakes.
- b. The student's answer should refer to observations of the rock which related to a change in a.

Highest possible score - 11 points

Student ID _____
Male or Female(circle one)

Changing Rocks - Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	0	1	
B. drawing of line	0	1	
9. Change in Rocks	0	1	2
10. Sketch	0	1	
11. Prediction			
A. logical prediction	0	1	2
B. supporting explanation	0	1	2
12. Description	0	1	2

TOTAL SCORE _____
Total possible score - 11 points

Student ID _____
Male or Female(circle one)

Changing Rocks - Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	0	1	
B. drawing of line	0	1	
9. Change in Rocks	0	1	2
10. Sketch	0	1	
11. Prediction			
A. logical prediction	0	1	2
B. supporting explanation	0	1	2
12. Description	0	1	2

TOTAL SCORE _____
Total possible score - 11 points

Student ID ES - CR #1

Scoring Form - Changing Rocks

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

	No Credit		
1 - 7. Directions			
8. Line Graph			
A. both axes labeled	0	(1)	
B. drawing of line	0	(1)	
9. Change in Rocks	0	1	(2)
10. Sketch	0	(1)	
11. Prediction			
A. logical prediction	0	1	(2)
B. supporting prediction	0	1	(2)
12. Description	0	1	(2)
TOTAL SCORE	<u>11</u>		
	(Total possible score - 11 points)		

Student ID _____

Scoring Form - Changing Rocks

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

	No Credit		
1 - 7. Directions			
8. Line Graph			
A. both axes labeled	0	1	
B. drawing of line	0	1	
9. Change in Rocks	0	1	2
10. Sketch	0	1	
11. Prediction			
A. logical prediction	0	1	2
B. supporting prediction	0	1	2
12. Description	0	1	2
TOTAL SCORE	<u>11</u>		
	(Total possible score - 11 points)		

Changing Rocks

Task: In nature, rocks are changed by abrasion due to movements by streams, glaciers, and wind. In this task, you will be using a model to study some of the effects of this abrasion. You will be observing and recording some of these effects and making generalizations and predictions.

Materials:

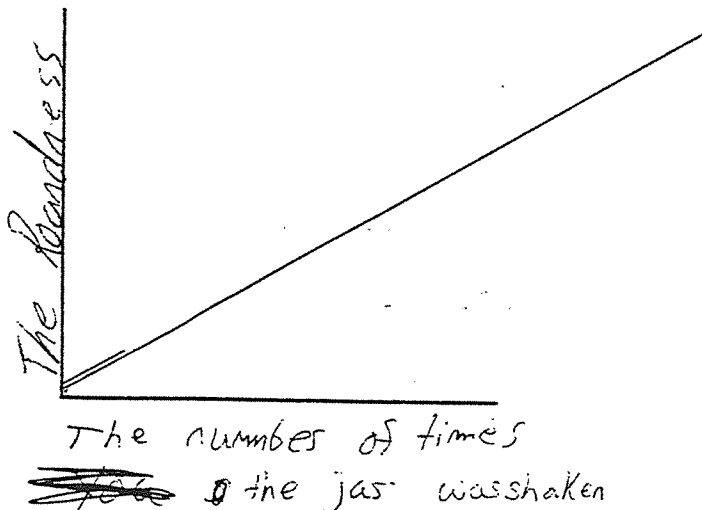
- 10 rocks
- plastic jar
- water
- test card [laminated or plastic covered]
- paper towels
- metric ruler
- plastic spoon

+11

11

Directions:

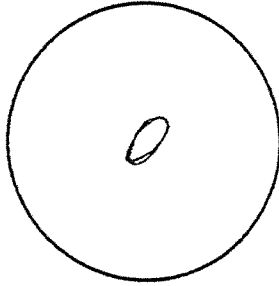
1. Place one rock on the test card in the 0 shakes circle.
2. Put the 9 remaining rocks in the jar.
3. Fill the jar about half-full with water and close the lid tightly.
4. Shake the jar **VIGOROUSLY** 50 times. Remove one rock, dry it, and place it on the test card in the 50 shakes circle.
5. Shake the jar **VIGOROUSLY** another 50 times. Remove one rock, dry it, and place it on the test card in the 100 shakes circle.
6. Repeat step 5, shaking **VIGOROUSLY**, removing a rock after 150, 200, 250, and 300 shakes.
7. Look carefully at all of your rock samples on the test card.
8. Using the graph below, draw a line representing the relationship between number of shakes and "degree of roundness" of the rocks. Be sure to carefully label both axes.



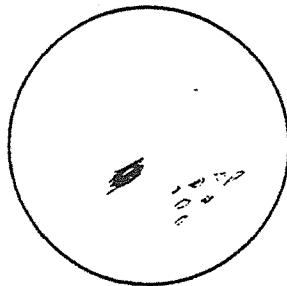
9. Using complete sentences, write a statement that describes what happened to a single rock as it went from 0 to 300 shakes.

*As the ~~rock~~ rocks were shaken,
The rocks got rounder and smaller
even smoother.*

10. In the space below, draw a sketch of the size and shape of the rock after 300 shakes. Predict and sketch what the size and shape of the rock would be after 600 shakes.



300 shakes



600 Shakes

11. a. In the space below, use one or more complete sentences to describe what you think a rock will look and feel like after 600 shakes.

*The rocks ~~may~~ after 600 shakes
may not even be rocks at all. All that
would be left is sediment.*

b. Using complete sentences, support your prediction with observations from this activity.

*In the jar I observed ~~as~~ more and more
sediment at the bottom of the jar the more and more
I shook it.*

12. All of the rocks you have been shaking have changed in some way. Describe at least two ways the rocks and pieces at the bottom of the jar have not changed.

*One of the ways the rocks and pieces at the
bottom have not changed is chemically. They
have all physically got smaller or rounder
but no chemical change took place in the jar.
The way they have physically not changed is ~~the~~
everything has a ~~granular~~ granular texture*

Student ID ES. CR # 3
Male or Female(circle one)

Scoring Form - Changing Rocks

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	0	1	
B. drawing of line	0	1	
9. Change in Rocks	0	1	2
10. Sketch	0	1	
11. Prediction			
A. logical prediction	0	1	2
B. supporting prediction	0	1	2
12. Description	0	1	2

TOTAL SCORE 5
(Total possible score - 11 points)

Student ID _____
Male or Female(circle one)

Scoring Form - Changing Rocks

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	0	1	
B. drawing of line	0	1	
9. Change in Rocks	0	1	2
10. Sketch	0	1	
11. Prediction			
A. logical prediction	0	1	2
B. supporting prediction	0	1	2
12. Description	0	1	2

TOTAL SCORE _____
(Total possible score - 11 points)

Changing Rocks

Task: In nature, rocks are changed by abrasion due to movements by streams, glaciers, and wind. In this task, you will be using a model to study some of the effects of this abrasion. You will be observing and recording some of these effects and making generalizations and predictions.

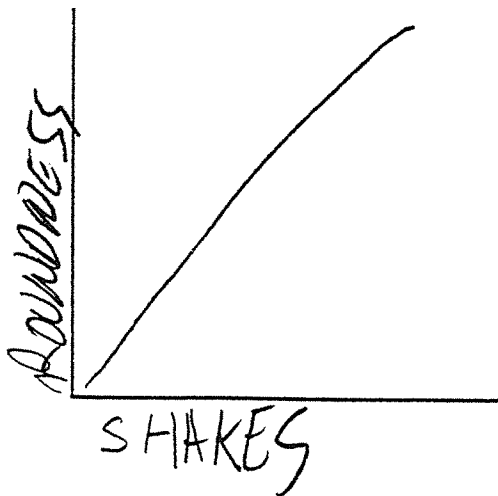
Materials:

- 10 rocks
- plastic jar
- water
- test card [laminated or plastic covered]
- paper towels
- metric ruler
- plastic spoon

+8 / 11

Directions:

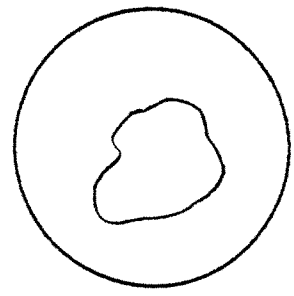
1. Place one rock on the test card in the 0 shakes circle.
2. Put the 9 remaining rocks in the jar.
3. Fill the jar about half-full with water and close the lid tightly.
4. Shake the jar **VIGOROUSLY** 50 times. Remove one rock, dry it, and place it on the test card in the 50 shakes circle.
5. Shake the jar **VIGOROUSLY** another 50 times. Remove one rock, dry it, and place it on the test card in the 100 shakes circle.
6. Repeat step 5, shaking **VIGOROUSLY**, removing a rock after 150, 200, 250, and 300 shakes.
7. Look carefully at all of your rock samples on the test card.
8. Using the graph below, draw a line representing the relationship between number of shakes and "degree of roundness" of the rocks. Be sure to carefully label both axes.



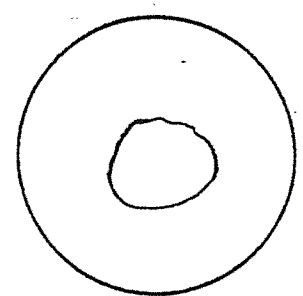
9. Using complete sentences, write a statement that describes what happened to a single rock as it went from 0 to 300 shakes.

+2 The roundness of the rock increased as it went from 0 to 300 shakes

10. In the space below, draw a sketch of the size and shape of the rock after 300 shakes. Predict and sketch what the size and shape of the rock would be after 600 shakes.



300 shakes



600 Shakes

11. a. In the space below, use one or more complete sentences to describe what you think a rock will look and feel like after 600 shakes.

+2 The rock will be twice as round as the rock after 300 shakes. The texture will also be smoother.

b. Using complete sentences, support your prediction with observations from this activity.

+2 The more you shake the rock the rounder it will get.

12. All of the rocks you have been shaking have changed in some way. Describe at least two ways the rocks and pieces at the bottom of the jar have not changed.

0 They have not changed because they stayed at the bottom and did not hit as many other rocks to smooth them. This experiment shows erosion.

Student ID ES-CR-#8
Male or Female (circle one)

Scoring Form - Changing Rocks

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	<input type="radio"/> 0	<input type="radio"/> 1	
B. drawing of line	<input type="radio"/> 0	<input type="radio"/> 1	
9. Change in Rocks	<input type="radio"/> 0	<input type="radio"/> 1	2
10. Sketch	<input type="radio"/> 0	<input type="radio"/> 1	
11. Prediction			
A. logical prediction	<input type="radio"/> 0	<input type="radio"/> 1	2
B. supporting prediction	<input type="radio"/> 0	<input checked="" type="radio"/> 1	2
12. Description	<input type="radio"/> 0	<input type="radio"/> 1	2
TOTAL SCORE <u>4</u>			
(Total possible score - 11 points)			

Student ID _____
Male or Female (circle one)

Scoring Form - Changing Rocks

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1 - 7. Directions	No Credit		
8. Line Graph			
A. both axes labeled	<input type="radio"/> 0	<input type="radio"/> 1	
B. drawing of line	<input type="radio"/> 0	<input type="radio"/> 1	
9. Change in Rocks	<input type="radio"/> 0	<input type="radio"/> 1	2
10. Sketch	<input type="radio"/> 0	<input type="radio"/> 1	
11. Prediction			
A. logical prediction	<input type="radio"/> 0	<input type="radio"/> 1	2
B. supporting prediction	<input type="radio"/> 0	<input type="radio"/> 1	2
12. Description	<input type="radio"/> 0	<input type="radio"/> 1	2
TOTAL SCORE _____			
(Total possible score - 11 points)			

level
stude

Changing Rocks

Task: In nature, rocks are changed by abrasion due to movements by streams, glaciers, and wind. In this task, you will be using a model to study some of the effects of this abrasion. You will be observing and recording some of these effects and making generalizations and predictions.

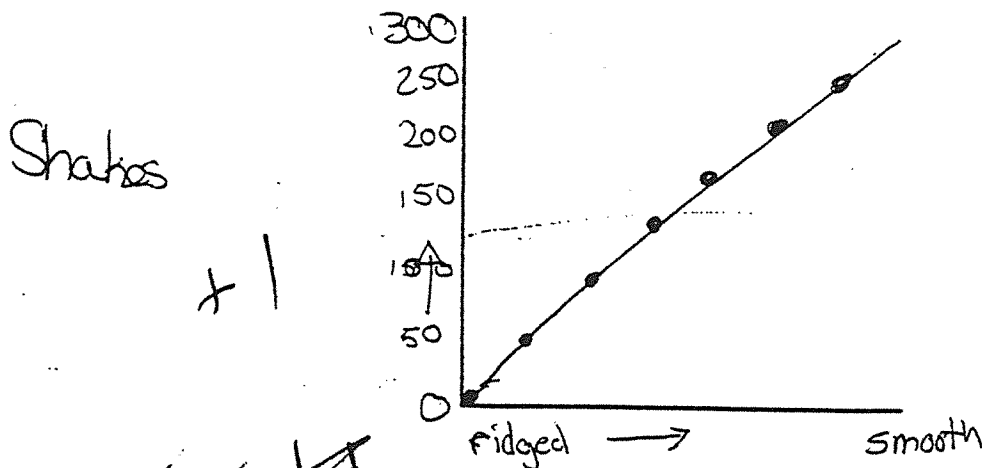
Materials:

- 10 rocks
- plastic jar
- water
- test card [laminated or plastic covered]
- paper towels
- metric ruler
- plastic spoon

+4
11-

Directions:

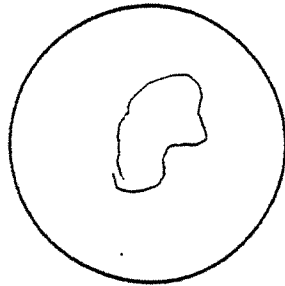
1. Place one rock on the test card in the 0 shakes circle.
2. Put the 9 remaining rocks in the jar.
3. Fill the jar about half-full with water and close the lid tightly.
4. Shake the jar **VIGOROUSLY** 50 times. Remove one rock, dry it, and place it on the test card in the 50 shakes circle.
5. Shake the jar **VIGOROUSLY** another 50 times. Remove one rock, dry it, and place it on the test card in the 100 shakes circle.
6. Repeat step 5, shaking **VIGOROUSLY**, removing a rock after 150, 200, 250, and 300 shakes.
7. Look carefully at all of your rock samples on the test card.
8. Using the graph below, draw a line representing the relationship between number of shakes and "degree of roundness" of the rocks. Be sure to carefully label both axes.



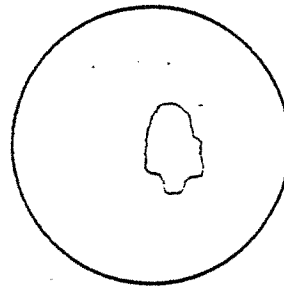
9. Using complete sentences, write a statement that describes what happened to a single rock as it went from 0 to 300 shakes.

+2
The Rock had broken down from all the shaking and dissolved that's why it got smoother rounder and smaller.

10. In the space below, draw a sketch of the size and shape of the rock after 300 shakes. Predict and sketch what the size and shape of the rock would be after 600 shakes.



300 shakes



600 Shakes

11.

a. In the space below, use one or more complete sentences to describe what you think a rock will look and feel like after 600 shakes.

I think the Rock would be more jagged.

b. Using complete sentences, support your prediction with observations from this activity.

Pieces broke off

12. All of the rocks you have been shaking have changed in some way. Describe at least two ways the rocks and pieces at the bottom of the jar have not changed.

+1
they are both the same compound and they are both the same material.