

LESSON TITLE:	A LONG AND WINDING ROAD
BACKGROUND INFORMATION:	
CREATED BY:	JULI WESTRICH, 2023 TEACHER ON THE TRAIL™
GRADE LEVEL/ SUBJECT:	2-4 MATH, EARTH SCIENCE
ESSENTIAL QUESTION:	HOW CAN I UNDERSTAND THE DEVELOPMENT OF NATURAL LANDFORMS AND THE IMPACT ON HUMAN SOCIETY?
LEARNING OBJECTIVES:	<p>I CAN:</p> <ul style="list-style-type: none"> ● IDENTIFY RIVERS AS AN ESSENTIAL LANDFORM OF INTERIOR ALASKA ● ACCURATELY MEASURE A SPECIFIED LENGTH OF RIVER ● COMPARE AND CONTRAST MEASUREMENTS OF DISTANCE ● EVALUATE THE BENEFIT OF USING RIVERS AS “HIGHWAYS” FOR TRAVEL IN INTERIOR ALASKA
STANDARDS ADDRESSED:	<p><u>NEW YORK STATE K-12 MATH STANDARDS</u></p> <p><i>MEASUREMENT AND DATA</i></p> <ul style="list-style-type: none"> ● RECOGNIZE THE NEED FOR STANDARD UNITS OF MEASURE (CENTIMETER AND INCH) AND USE RULERS AND OTHER MEASUREMENT TOOLS WITH THE

UNDERSTANDING THAT LINEAR MEASURE INVOLVES AN ITERATION OF UNITS

- RECOGNIZE THAT THE SMALLER THE UNIT, THE MORE ITERATIONS NEEDED TO COVER A GIVEN LENGTH
- RECOGNIZE AREA AS AN ATTRIBUTE OF TWO-DIMENSIONAL REGIONS
- MEASURE THE AREA OF A SHAPE BY FINDING THE TOTAL NUMBER OF SAME-SIZE UNITS OF AREA REQUIRED TO COVER THE SHAPE WITHOUT GAPS OR OVERLAPS, A SQUARE WITH SIDES OF UNIT LENGTH BEING THE STANDARD UNIT FOR MEASURING AREA
- MEASURE NECESSARY ATTRIBUTES OF SHAPES IN ORDER TO DETERMINE VOLUMES TO SOLVE REAL WORLD AND MATHEMATICAL PROBLEMS.

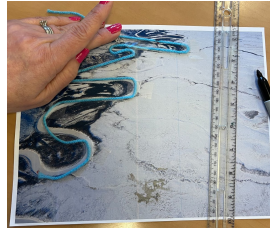
[NEW YORK STATE K-12 SCIENCE STANDARDS](#)

EARTH'S SYSTEMS: THE PROCESSES THAT SHAPE THE EARTH

- USE INFORMATION FROM SEVERAL SOURCES TO PROVIDE EVIDENCE THAT EARTH EVENTS CAN OCCUR QUICKLY OR SLOWLY.
- DEVELOP A MODEL TO REPRESENT THE SHAPES AND KINDS OF LAND AND BODIES OF WATER IN AN AREA.
- ANALYZE AND INTERPRET DATA FROM MAPS TO DESCRIBE PATTERNS OF EARTH'S FEATURES.

<p>MATERIALS NEEDED:</p>	<ol style="list-style-type: none"> 1. READ ALOUD: <u>A RIVER</u> BY MARC MARTIN 2. PRINTED IMAGES OF RIVERS IN ALASKA FOR STUDENT USE (1 SET PER GROUP) <ul style="list-style-type: none"> <u>IMAGE 1</u> <u>IMAGE 2</u> <u>IMAGE 3</u> 3. RULERS 4. STRING 5. TAPE 6. MARKERS 7. WORKSHEET <u>PAGE 1</u> 8. WORKSHEET <u>PAGE 2</u>
<p>PROCEDURE:</p>	
<p>BEFORE TEACHING:</p> <p>ENGAGEMENT: 15 MINUTES</p> <p>LESSON: INDIVIDUAL OR SMALL GROUP</p>	<p>PREP MATERIALS</p> <p>IMAGINE...YOU ARE RACING TO NOME ACROSS THE ALASKAN WILDERNESS. AHEAD OF YOU THE RIVER STRETCHES BEFORE YOU WINDING IT'S WAY FROM VILLAGE TO VILLAGE. IT IS SMOOTH AND CLEAR. BUT YOU KNOW IT ISN'T THE SHORTEST DISTANCE. WHAT SHOULD YOU DO?</p> <p>LET'S EXPERIMENT WITH MEASUREMENT (MATH) AND HOW WATER MOVES SOIL (SCIENCE) TO DISCUSS THE PROS AND CONS OF FOLLOWING THE RIVER AS A "ROAD" THROUGH INTERIOR ALASKA.</p> <p>MEASUREMENT:</p> <ol style="list-style-type: none"> 1. LOOK AT <u>IMAGE 1</u> OF THE RIVER FROM ABOVE.

2. WITH A PARTNER/SMALL GROUP USE THE STRING TO TRACE THE PATH OF THE RIVER.
3. MAKE A MARKER LINE ON THE STRING AT THE END OF THE MEASURED SECTION.



4. MEASURE THE STRING SECTION ON A RULER
5. RECORD YOUR MEASUREMENT ON THE WORKSHEET.
6. NOW MEASURE A STRAIGHT LINE WITH THE STRING FROM START – FINISH OF THE RIVER SEGMENT.
7. MAKE A MARKER LINE ON THE STRING AT THE END OF THE MEASURED SECTION.
8. MEASURE THE STRING SECTION ON A RULER
9. RECORD YOUR MEASUREMENT ON THE WORKSHEET.
10. REPEAT FOR [IMAGE 2](#).

WHOLE CLASS

DISCUSSION: LET'S LOOK AT THE MEASUREMENTS. WHICH ROUTES ARE SHORTER – FOLLOWING THE RIVER? CUTTING ACROSS THE LAND? WHICH ROUTE SHOULD A MUSHER TAKE? WHY?

WHOLE CLASS

LET'S CONTINUE THE EXPLORATION. WHY DOESN'T THE RIVER DOESN'T MOVE IN A STRAIGHT LINE?

1. PLACE MATERIALS IN DIFFERENT TRAYS.
2. PREDICT WHICH MATERIALS (SAND, SOIL, ROCKS) WILL BE MOVED BY THE WATER.
3. POUR WATER THROUGH EACH MATERIAL AND RECORD RESULTS.

<p>EXTENSION:</p>	<p>PROVIDE SMALL GROUPS WITH MATERIALS TO CREATE THEIR OWN "LANDSCAPE" TO FURTHER INVESTIGATE THE WAYS WATER MOVES SOIL.</p> <p>4. WHAT WOULD HAPPEN IF WE ADDED ROOTS/TREES?</p> <p>DISCUSSION: THE RIVER MOVES IN THE PATH OF LEAST RESISTANCE...SAND IS LIGHTER AND EASIER TO MOVE THAN SOIL WHICH SOAKS UP THE WATER (AS WOULD ROOTS), AND ROCKS ARE EVEN MORE DIFFICULT TO MOVE. MORE WATER, MORE POWER COULD MOVE MORE SOIL, BUT IT TAKES TIME FOR WATER TO DO ITS JOB OF WEARING DOWN A PATH.</p> <p>LOOK AT IMAGE 3. WHAT CAN YOU PREDICT WILL HAPPEN TO THIS SECTION OF RIVER OVER TIME? (POSSIBLE WRITTEN RESPONSE)</p>
<p>CONCLUSION:</p>	<p>DISCUSSION: BASED ON THE INFORMATION WE HAVE GATHERED – THE MEASUREMENTS OF RIVERS, THE WAY RIVER WATER CHOOSES THE PATH OF LEAST RESISTANCE AND EROSION TAKES TIME – WHY DO YOU THINK THE RIVER IS THE BEST PATH TO FOLLOW THROUGH THE WILDERNESS? WHAT CAN WE LEARN FROM NATURE ABOUT THE BEST WAY TO TRAVEL?</p>
<p>ASSESSMENT:</p>	<ol style="list-style-type: none"> 1. CLASS DISCUSSION TO IDENTIFY CONCEPTUAL UNDERSTANDING 2. WORKSHEET ANSWERS FOR MEASUREMENT ACCURACY AND COMPETENCE 3. RESPONSE TO IMAGE 3 (ORAL OR WRITTEN)

ENRICHMENT/ SUGGESTIONS:	COMPARE/CONTRAST OLDER RIVERS (MISSISSIPPI), "NEWER" RIVERS (BRAZOS), AND MAN MADE WATERWAYS (ERIE CANAL). EXPLORE ADDITIONAL CONCEPTS OF EROSION, AS WELL AS THE IMPACT ON THE NATURAL ENVIRONMENT WHEN WATERWAYS ARE RE-ROUTED, THE USE OF DAMS, LOCKS, AND THE IMPACT OF DROUGHT OR FLOODING.
OTHER:	TO INTEGRATE TECHNOLOGY AND EXTEND THE LEARNING HAVE STUDENTS LOOK UP SATELLITE IMAGES TO RESEARCH DIFFERENT RIVERS TO COMPARE/CONTRAST. CHECK OUT THIS GREAT IMAGE OF McGRATH, CHECKPOINT ON THE IDITAROD TRAIL! https://www.google.com/maps/@62.9320446,-155.5769147,20047m/data=!3m1!1e3!5m1!1e4