pTitle:	Just A Little Oil Spill	
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Course: **Grade:**	Environmental Science Geometry Algebra I 9-12	**Duration:** One class period

Objective:
Students will measure how fast oil is spread to simulate an oil spill.

Summary of Lesson:
Using vegetable oil and water, students will determine that a little oil spill covers a large area. They will apply this to an oil spill in the ocean and create a plan for cleanup that will not harm the environment.

Standards: Common Core State Standards, Arkansas State Frameworks

CODE	STANDARD
SP.3.ES.1	Explain the reciprocal relationships between Earth's processes (natural disasters) and human activities
SP.3.ES.2	Investigate the relationships between human consumption of natural resources and the stewardship responsibility for reclamations including disposal of hazardous and non-hazardous waste
SP.3.ES.4	Explain problems related to air quality: • automobiles • industry • natural emissions
SP.3.ES.6	Research how political systems influence environmental decisions
SP.3.ES.7	Investigate which federal and state agencies have responsibility for environmental monitoring and action
SP.3.ES.8	Compare and contrast man-made environments and natural environments
NS.4.ES.2	Use appropriate equipment and technology as tools for solving problems

	(e.g., microscopes, centrifuges, flexible arm cameras, computer software and hardware)
G.GMD.3	Use volume formulas for cylinders, pyramids, cones and spheres to solve problems.
G.MG.1	Use geometric shapes, their measures, and their properties to describe objects.
G.MG.3	Apply geometric methods to solve design problems.
N.Q.1	Use units as a way to understand problems and guide the solution of multi-step problems.
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.
A.CED.1	Create equations and inequalities in one variable and then use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
F.BF.1	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
Teacher Excellence Support System (TESS): 3b: Using questioning/prompts and discussion, 3d: Using assessment in instruction	
Instructional Strategies and Practices Experiment, Lab, Model, Movement, Visualization and Guided Imagery	

Bloom's Level: Highest Level Only
Create

Materials and Resources:

- One aluminum pie plate filled with water for each lab station
- Vegetable oil
- Pipette
- Metric ruler

Formative Assessment:
Exit Slip—how does this experiment relate to an oil spill in the ocean?

Notes to Teacher:
While using dish detergent to break the surface tension, animal habitats could be damaged or destroyed.
Students will need to measure volume of "one drop." (1 mL = 1 cm to third power to allow for easy conversion for gallons to cm to third power).
Formula: $\frac{Ad}{Vd} = \frac{As}{Vs}$ Ad = area of drop
As = area of spill

Student Activity

1. Use a pipette to put one drop of vegetable oil into the center of the pie plate

2. Observe what happens for 15 seconds and record observation.

3. Use a metric ruler to measure the diameter of the oil spill.

4. Determine the area of the oil spill (formula: $A = \pi r^2$)

5. Analyze:
   - If one drop of oil covered this area, predict how much area would be covered by a 500 gallon oil spill in the ocean.

   - Devise a plan to clean the oil from the surface of the water that would not harm animals or vegetation.

6. Exit Slip—how does this experiment relate to an oil spill in the ocean?