

Storm Trackers: Tropical Storms Around the World

Author	Gretchen Loken and Denise Dorn
Grade Level	6-8
Duration	2 class periods

National Standards

GEOGRAPHY

Element 1: The World in Spatial Terms

1. How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

Element 2: Places and Regions

4. The physical and human characteristics of places.

5. People create regions to interpret Earth's complexity

Element 5: Environment and Society

15. How physical systems affect human systems

Element 6: The Uses of Geography

17. How to apply geography to interpret the past

18. How to apply geography to interpret the present and plan for the future

AZ Standards

MATHEMATICS

Ratios and Proportional Relationships

6.RP.A.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

b. Solve unit rate problems including those involving unit pricing and constant speed.

7.RP.A.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Expressions and Equations

6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.

b. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

6.EE.B.7. Solve mathematical problems and problems in real-world context by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers

7.EE.B.4. Use variables to represent quantities in mathematical problems and problems in real-world context, and construct simple equations and inequalities to solve problems.

a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

8.EE.C.7. Solve linear equations in one variable.
a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Arizona Social Science Standards

The use of geographic representations and tools helps individuals understand their world.

6.G1.1 Use and construct maps, graphs, and other representations to explain relationships between locations of places and regions.

7.G1.1 Use and construct maps and other geographic representations to explain the spatial patterns of cultural and environmental characteristics.

7.G1.2 Analyze various geographic representations and use geographic tools to explain relationships between the location of places and their environments.

8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events.

Global interconnections and spatial patterns are a necessary part of geographic reasoning.

6.G4.1 Explain why environmental characteristics vary among different world regions.

7.G4.1 Analyze cultural and environmental characteristics among various places and regions of the world.

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SCIENCE

Earth and Space Standards

8.E1U3.7 Obtain, evaluate, and communicate information about data and historical patterns to predict natural hazards and other geological events.

Overview

Whether a tropical storm is called a hurricane, typhoon, or cyclone depends on where in the world the storm occurs. These storms must have certain conditions present to occur such as a pre-existing weather disturbance, warm tropical oceans, moisture, and relatively light winds. Students cannot stop these storms from happening, but they can learn about their causes and effects.

Purpose

In this lesson, students will identify the regions where tropical storms occur and the conditions that can result in a tropical storm. Students will also practice using the cross-product method to solve proportions of speed of tropical storms to estimate the time it will hit a specified location, the distance it will travel, or its rate of travel.

Materials

- Prior Knowledge Chart and Answer Key
- Storm Tracker Information Sheet
- Tropical Storms map as a transparency
- Geography and Math Assessment Worksheet and Answer Key
- Calculators (optional)
- Tropical Storms map
- Storm Trackers Movie Clips

Objectives

The student will be able to:

1. Define a hurricane, typhoon, and cyclone.
2. Analyze the given physical conditions of a region and conclude whether tropical storms are likely to occur in the region.
3. Use a proportion of travel speed to estimate the time a tropical storm will hit a specified location, the distance it will travel, or its rate of travel.

Procedures

Students should have had experience in proportions and using cross products to solve.

SESSION ONE

1. Project the "Tropical Storms" map showing where tropical storms occur and distribute the Prior Knowledge Chart.

2. Have students share prior knowledge about hurricanes, typhoons, and cyclones by recording on the chart any definitions, regions, characteristics or conditions of the region that lead to the formation of tropical storms, and estimations of wind/travel speed. The chart can be done individually or cooperatively. Mention the terms "region" and "rate of miles per hour" if they have not already been mentioned.

3. Show the following YouTube videos.

Hurricane Michael Category 5 (show first 1 min)

<https://www.youtube.com/watch?v=wSXvcveNSTQ>

Hurricanes 101 (2.57 min)

<https://www.youtube.com/watch?v=LIXVikDkyTg>

4. Have students read silently the selection entitled "Storm Trackers". Have them read for the purpose of adding to the Prior Knowledge Chart.

5. After students have completed the reading, lead a class discussion addressing tropical storm definitions, regions, characteristics/conditions of the region that lead to tropical storm formation, and estimation of wind/travel speed of tropical storms.

Class discussion should include:

- Typhoon, cyclone, hurricane are all names for tropical storms.
- Most tropical storms occur between the Tropic of Capricorn and the Tropic of Cancer between June and November with the exception of cyclones occurring in the Indian Ocean between December and April.
- Such storms occurring west of the International Date Line in the western Pacific Ocean are called typhoons.
- Such storms occurring in the Indian Ocean, the Coral Sea, Bay of Bengal, and Arabian Sea are called cyclones.
- And such storms occurring in the Atlantic Ocean and eastern Pacific Ocean are called hurricanes.
- Physical characteristics/ conditions of the region include a preexisting weather disturbance, warm tropical ocean water of

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approximately 80° F, moisture in the air, and light winds.

6. If there is time remaining, show the Top 10 Most Destructive Storms (10.08 min)

<https://www.youtube.com/watch?v=SfmhrRrEk0A>

SESSION TWO

1. Review with students how to use a proportion involving travel speed to estimate the time a tropical storm will hit a specified location, the distance it will travel or its rate of travel. To solve the problems set up a proportion. Then use cross products to solve. For example: A cyclone traveling at 31 miles per hour will take how many hours to reach a coast 975 miles away?

$$\frac{31 \text{ miles}}{1 \text{ hour}} = \frac{975 \text{ miles}}{a \text{ hours}}$$

$$31 \times a = 1 \times 975$$

$$31a = 975$$

$$a = 975 \div 31$$

$$a = 31.5 \text{ hours}$$

For example: A hurricane traveling at 18 miles per hour will travel how many miles in 28 hours?

$$\frac{18 \text{ miles}}{1 \text{ hour}} = \frac{b \text{ miles}}{28 \text{ hours}}$$

$$18 \times 28 = 1 \times b$$

$$504 = 1b$$

$$b = 504 \text{ miles}$$

For example: A typhoon that has traveled 754 miles in 24 hours is traveling at what rate of speed?

$$\frac{c \text{ miles}}{1 \text{ hour}} = \frac{754 \text{ miles}}{24 \text{ hours}}$$

$$c \times 24 = 1 \times 754$$

$$24c = 754$$

$$c = 754 \div 24$$

$$c = 31.4 \text{ mph}$$

2. Distribute the Geography and Math Assessment Worksheet to test for comprehension of geography knowledge as well as math skills.

Assessment

Science, Geography and Mathematics

Use the Assessment Worksheet items 1-5 to assess geography and science knowledge while items 6-10 assess knowledge of mathematics. Geography mastery is considered 4/5 or 80%. Mathematical ratio/proportion mastery is considered 4/5 or 80%.

Extensions

Students could:

- Investigate the origin of the words: hurricane, cyclone, and typhoon.
- Investigate the naming of tropical storms.
- Create a cause/effect graphic organizer for tropical storms.
- Investigate the monetary damage done by tropical storms.
- Compare before and after photos of hurricane events.