**Storm Trackers: Tropical Storms Around the World**

Students learn the physical characteristics and conditions of regions around the world that lead to the formation of tropical storms while using proportions to estimate time.

<table>
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<tr>
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<tbody>
<tr>
<td>Grade Level</td>
<td>6-8</td>
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<tr>
<td>Duration</td>
<td>2 class periods</td>
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### National Geography Standards

**ELEMENT TWO: PLACES & REGIONS**

#### 4. The physical and human characteristics of places.

### Arizona Geography Strand

#### Concept 2 Places and Regions

**GRADE 6**

- PO 1 Identify regions studied in Strand 2 using a variety of criteria.

**GRADE 7**

- PO 1 Describe the human and physical characteristics of places and regions.

**GRADE 8**

- PO 1 Identify common characteristics of contemporary and historical regions on the basis of climate, landforms, ecosystems, and culture.

#### Concept 3 Physical Systems

**GRADE 6**

- Science Strand 3 Concept 1
  - Evaluate the effects of, and describe how people plan for and respond to natural disasters.

**GRADE 7**

- Science Strand 6 Concept 2
  - Relate plate tectonics to the resulting landforms and earthquakes.

### Arizona Math Standards

#### STRAND 4 Geometry and Measurement

**CONCEPT 4 Measurement**

**GRADE 8**

- PO 2 Solve geometric problems using ratios and proportions.

#### STRAND 5 Structure and Logic

**CONCEPT 2 Logic, Reasoning, Problem Solving and Proof**

**GRADE 6**

- PO 3 Analyze and compare mathematical strategies for efficient problem solving; select and use one or more strategies to solve a problem.

**GRADE 7**

- PO 2 Analyze and compare mathematical strategies for efficient problem solving; select and use one or more strategies to solve a problem.

**GRADE 8**

- PO 1 Create an algorithm to solve problems involving indirect measurements, using proportional reasoning, dimensional analysis, and the concepts of density and rate.
  - PO 2 Analyze and compare mathematical strategies for efficient problem solving; select and use one or more strategies to solve a problem.

### 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 regional conditions present to occur: pre-existing weather disturbance, warm tropical oceans, moisture, and relatively light winds.

### Purpose
In this lesson, students will learn to identify the regions in which tropical storms occur, the characteristics/conditions of those regions which result in tropical storms, and practice using the cross product method to solve proportions of travel 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**
- Storm Tracker Information Sheet
- Prior Knowledge Chart
- Prior Knowledge Chart Answer Key
- Tropical Storms map as a transparency
- Geography and Math Student Assessments and Answer Keys
- 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 characteristics/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. Have students look at the "Tropical Storms" map showing where tropical storms occur.

2. Have students share prior knowledge about hurricanes, typhoons, and cyclones using the prior knowledge chart. Include definitions, regions, and characteristics/conditions of the region that lead to the formation and estimation 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 students movie clips.

4. Have students read silently the selection entitled “Storm Trackers”. Have them read for the purpose of adding to the Prior Knowledge Chart. They can take notes on their charts while reading.

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 understanding that 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 approximately $80^\circ$ F, moisture in the air, and light winds.

**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
Storm Trackers: Tropical Storms Around the World

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?

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

\[
31 \times a = 1 \times 975
\]

\[
a = 975 \div 31
\]

\[
a = 31.5 \text{ hours}
\]

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

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

\[
18 \times 28 = 1 \times b
\]

\[
b = 504 \text{ miles}
\]

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. Students should complete assessment worksheet to test for comprehension of geography knowledge as well as math skills.

Assessment

Assessment Worksheet items 1-5 assess geography knowledge while items 6-10 assess proportions 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 yearly by tropical storms.