

SI Environmental Science - Full Discipline Demo

Weather and the Atmosphere

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Environmental Science - Full Discipline Demo
Course	SI Environmental Science - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term to the best description.

Terms to match:

- Conduction
- Convection
- Solar radiation
- Tropical cyclone
- Troposphere
- Weather

Descriptions to match:

- 1 The state of the atmosphere at a given place and time
- 2 The lowest region of the atmosphere
- 3 Heating of earth's surface by the sun's energy
- 4 A warm-core, low pressure system with an organized circulation that develops over water
- 5 Transfer of heat energy from objects to surrounding air molecules
- 6 The vertical transport of heat and moisture in the atmosphere

Correct answers:

- 1 Weather 2 Troposphere 3 Solar radiation 4 Tropical cyclone
5 Conduction 6 Convection

Classify each statement as true or false.

<input type="checkbox"/> In the tropics, day-to-day pressure changes only occur from approaching cyclones.	
<input type="checkbox"/> The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based only on a hurricane's maximum sustained wind speed.	
<input type="checkbox"/> In general, an increase in barometric pressure signals an approaching storm.	
<input type="checkbox"/> The term typhoon is used for tropical cyclones occurring in the North Atlantic.	
True	False
1	2

Correct answers:

1

In the tropics, day-to-day pressure changes only occur from approaching cyclones.

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based only on a hurricane's maximum sustained wind speed.

2

In general, an increase in barometric pressure signals an approaching storm.

The term typhoon is used for tropical cyclones occurring in the North Atlantic.

Exploration

Weather involves ____.

- temperature
- pressure
- wind
- all of the above



_____ currents are responsible for many weather patterns in the troposphere.

- Radiation
- Convection
- Conduction
- Electrical

Day-to-day barometric pressure changes are associated with approaching weather systems.

- True
- False

A category _____ hurricane has max sustained wind speeds in excess of 252 kph.

- 1
- 3
- 5
- 7

Exercise 1

What was the date that Hurricane Matthew reached category 5 status? What was the storm's approximate location at that time? Reference Data Table 2 in your explanation.

Hurricane Matthew reached category 5 status on October 1 with maximum sustained winds of 259.28 kph as recorded in Data Table 2. The hurricane was off the northern coast of South America at this time.

What was the classification ranking of Hurricane Matthew when the storm claimed the most human lives? Reference Data Table 2 in your explanation.

Hurricane Matthew was a category 4 storm on October 4 when it reached Haiti and claimed 545 lives. The maximum sustained winds on October 4 were 240.76 kph as referenced in Data Table 2.

What was the relationship between wind speed and barometric pressure during Hurricane Matthew? Reference Graph 1 in your explanation.

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Data Table 1: Hurricane Matthew Facts
(SAMPLE ANSWER BELOW)

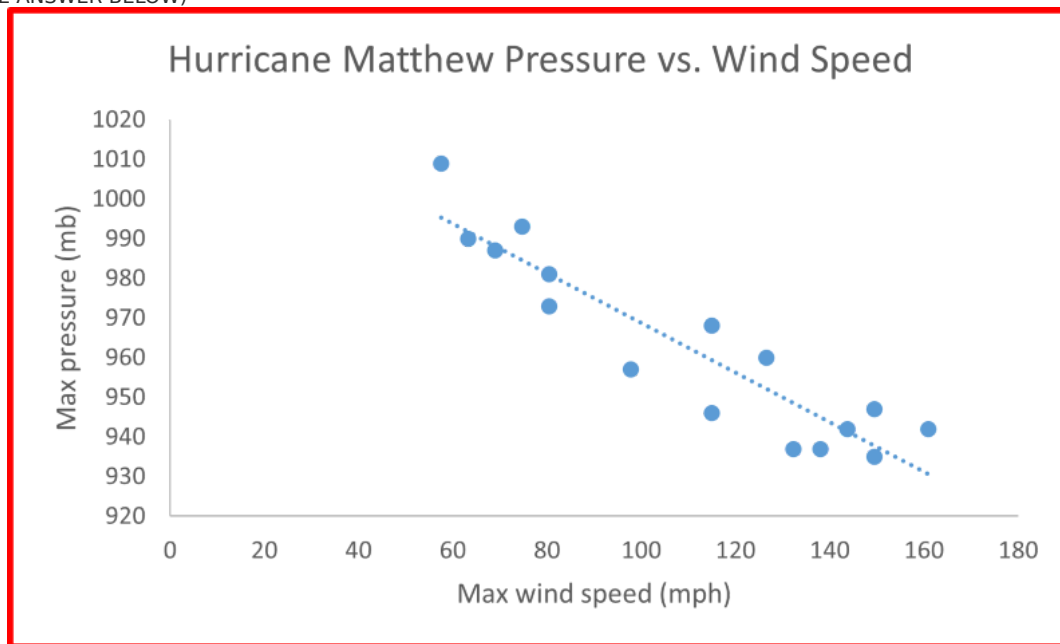
Formation location	Near Lesser Antilles
Total deaths	603
Total costs	\$16.5 billion
Downgrade location	North Carolina coast

Data Table 2: Hurricane Matthew Wind Speeds
(SAMPLE ANSWER BELOW)

Date	Max pressure (mb)	Max wind speed (knots)	Max wind speed (kph)	Category
09/28/2016	1009	50	92.6	-
09/29/2016	993	65	120.38	1
09/30/2016	968	100	185.2	3
10/01/2016	942	140	259.28	5
10/02/2016	947	130	240.76	4
10/03/2016	942	125	231.5	4
10/04/2016	935	130	240.76	4
10/05/2016	960	110	203.27	3
10/06/2016	937	120	222.24	4
10/07/2016	937	115	212.98	4
10/07/2016	946	100	185.2	3
10/08/2016	957	85	157.42	2

10/08/2016	973	70	129.64	1
10/09/2016	981	70	129.64	1
10/09/2016	987	60	111.12	-
10/10/2016	990	55	101.86	-

Graph 1: Pressure vs. Wind Speed
(SAMPLE ANSWER BELOW)



Competency Review

Almost all weather occurs in the ____.

- mesosphere
- stratosphere
- troposphere
- exosphere

Heated air and moisture rise through the atmosphere by ____.

- radiation
- convection
- conduction
- transduction

Tropical cyclones are fueled by ____.

- warm, humid ocean air
- arctic air
- desert winds
- cold ocean currents

In general, a decrease in barometric pressure signals an approaching storm.

- True
 - False
-

Cyclones with sustained winds 119 kph or higher in the North Atlantic are called ____.

- severe tropical cyclones
- typhoons
- tropical depressions
- hurricanes

✓

General hazards associated with hurricanes include ____.

- storm surge
- heavy precipitation
- wind damage
- All of the above

✓

Hurricane Matthew reached a category ____ classification at its peak sustained windspeeds.

- 1
- 3
- 5
- 7

✓

Barometric pressure is inversely related to wind speeds during a tropical cyclone.

- True
- False

✓

Extension Questions

Sam, a citizen of Haiti, has recently relocated to Seattle, WA for work. The local weather forecast is for a low pressure system storm to arrive in the Seattle area within 24 hours. Sam is worried about the possibility of a hurricane similar to Hurricane Matthew that he endured in his native country of Haiti. **Apply your knowledge of weather and tropical cyclones to explain to Sam why he should not be concerned about hurricanes in Seattle. Provide at least two reasons hurricanes do not occur in Seattle in your explanation.** (SAMPLE ANSWER BELOW)

Hurricanes do not occur in Seattle for the following reasons:

1. Hurricanes require warm ocean water of at least 26°C to form.
2. Hurricanes form over tropical or subtropical water and Seattle is located in the northern temperate latitudes.
3. Subtropical winds in the troposphere travel east to west so that Seattle would be unlikely to be influenced from a storm originating in the subtropical Pacific Ocean.