

UNDERSTANDING CLIMATE FACTORS - *Score Sheet*

GROUP PROJECT #: _____

Directions: Part I.

Each group will be assigned an area near a city/town. Working in groups of no more than four and no less than two, use the data sheets provided to create a diorama of the geographic area assigned to your group. Be prepared to explain your group's diorama to the class.

Directions: Part II.

Working in the same groups, use the same geographic area plus guided outline to create a second diorama illustrating changes that would occur if two climate factors (randomly chosen) were altered. Be prepared to explain and justify your diorama to the class.

Group Members

- a) _____
- b) _____
- c) _____
- d) _____

DIORAMA #1: Region/Date/time _____

DIORAMA #2: (same region/date/time)

Two climate factors changed: 1) _____

2) _____

GRADING RUBRIC:

- 1) PRE-TEST COMPLETED (5) _____
- 2) POST-TEST COMPLETED WITH A GRADE OF 95% OR HIGHER (5) _____
- 3) GUIDED OUTLINE COMPLETE (15) _____
- 4) DIORAMA #1 ACCURATE AND COMPLETE (1-15) _____
 - CREATIVE (1-5) _____
 - EXCEPTIONAL EFFORT TO ACHIEVE SCIENTIFIC DETAIL (0 - 10) _____
 - CONTRIBUTION TO GROUP (0 - 5) _____
- 5) DIORAMA #2 ACCURATE AND COMPLETE (1- 15) _____
 - CREATIVE (1-5) _____
 - EXCEPTIONAL EFFORT TO ACHIEVE SCIENTIFIC DETAIL(0 - 10) . _____
 - CONTRIBUTION TO GROUP (0 - 5) _____
- 6) USE OF MATERIALS (NEATNESS, ORGANIZATION) (0 - 5) _____

TOTAL POINTS POSSIBLE: 100

UNDERSTANDING CLIMATE FACTORS - *Data Sheet*

(Page 1 of 6)

LOCATION: London, Great Britain

FEATURE	DESCRIPTION
Latitude/ Longitude	51°30' N 0°10' W
Sunrise/sunset	rise set
June 21	3:44 20:22
September 21	5:46 18:02
December 21	8:04 15:54
Elevation (ft. above sea level)	51
Bodies of water nearby	Atlantic Ocean, North Sea , English Channel
Affected by ocean current?	GULF STREAM (WARM)
Flora	Celtic broadleaf forests
Fauna	small mammals
Human population density	very high
Climate	Tropical marine avg. temp 50-60° avg. precip. 30-50"
other notes	Gulf Stream keeps climate mild. Typical winter temp is 45° London largely urbanized; farmlands; some forests

LOCATION: Seattle, Washington

FEATURE	DESCRIPTION
Latitude/ Longitude	47°36' N 122°20' W
Sunrise/sunset	rise set
June 21	4:12 20:11
September 21	5:56 18:09
December 21	7:55 16:21
Elevation above sea level	14
Bodies of water nearby	Pacific Ocean Puget Sound
Affected by ocean current?	California Current (cold)
Flora	red cedar, Pacific fir
Fauna	small mammals, deer, giant salamanders, variety of birds
Human population density	high
Climate	Temperate marine avg. rain 60-80" avg. temp 50°-60°
other notes	Cold ocean current keeps summers cool. Precipitation blows from west to east from Pacific Ocean to northwest coast of U.S. The Cascade mountains, located east of Seattle hold weather causing Seattle area to be rainy

LOCATION: Warsaw, Poland

FEATURE	DESCRIPTION
Latitude/ Longitude	52°15' N 21°00' E
Sunrise/sunset	rise set
June 21	4:16 21:01
September 21	6:21 18:37
December 21	8:43 16:26
Elevation above sea level	354
Bodies of water nearby	(inland)
Affected by ocean current?	no
Flora	Grasslands, hills, forests
Fauna	small mammals, birds
Human population density	moderate-high
climate	humid mid-latitude avg. temp 40°-50° avg. precip. 20-40"
other notes	typical winter temp is 32°

LOCATION: Lhasa, China (near Himalayas)

FEATURE	DESCRIPTION
Latitude/ Longitude	29°40' N 91°09' E
Sunrise/sunset	rise set
June 21	8:50 19:05
September 21	7:47 19:51
December 21	6:52 20:56
Elevation above sea level	11,975
Bodies of water nearby	(inland)
Affected by ocean current?	no
Flora	scattered shrubs, grasses
Fauna	large mammals: bear, blue sheep, wolves, geese, yaks
Human population density	very low
Climate	high altitude avg. temp 10-30° avg. precip. 10-20"
other notes	due to altitude, temps are low

LOCATION: New Orleans, Louisiana

FEATURE	DESCRIPTION
Latitude/ Longitude	29°58' N 90°57' W
Sunrise/sunset	rise set
June 21	5:00 19:05
September 21	5:49 17:58
December 21	6:53 17:06
Elevation above sea level	-8 to 25
Bodies of water nearby	GULF OF MEXICO
Affected by ocean current?	no
Flora	Temperate broadleaf forest, hardwood swamp forest
Fauna	migratory birds, deer, small mammals
Human population density	very high
Climate	humid subtropical avg. precip. 40- 60" avg. temp 60-70°
other notes	city is lower than sea level surrounded by a wall to prevent flooding

UNDERSTANDING CLIMATE FACTORS - Data Sheet**LOCATION:** Goose Bay, Canada

FEATURE	DESCRIPTION
Latitude/ Longitude	53°20' N 60°25' W
Sunrise/sunset	rise set
June 21	3:34 20:22
September 21	5:46 18:02
December 21	8:15 15:45
Elevation above sea level	160
Bodies of water nearby	Atlantic Ocean
Affected by ocean current?	LABRADOR CURRENT (COLD)
Flora	mixed conifer forests, wild flowers
Fauna	deer, wolves, bear, caribou, lynx
Human population density	moderate
Climate	sub arctic avg. temp 30-40° avg. precip. 40-60"
other notes	cold, raw climate

LOCATION: Bismarck, North Dakota

FEATURE	DESCRIPTION
Latitude/ Longitude	46°48' N 100°47' W
Sunrise/sunset	rise set
June 21	4:49 20:41
September 21	6:29 18:43
December 21	8:26 16:58
Elevation above sea level	1677
Bodies of water nearby	(inland)
Affected by ocean current?	No
Flora	northern mixed grassland
Fauna	water birds, deer, rattlesnakes
Human population density	moderate
Climate	Semi-arid mid latitude avg. rain 10-20" avg. temp 50°-60°
other notes	grasslands are being destroyed

LOCATION: Nome, Alaska

FEATURE	DESCRIPTION
Latitude/ Longitude	64°43' N 165°24' W
Sunrise/sunset	rise set
June 21	2:13 23:55
September 21	6:43 19:05
December 21	11:07 15:04
Elevation above sea level	36
Bodies of water nearby	Bering Sea
Affected by ocean current?	Alaska Current (warm)
Flora	grasses, wild flowers
Fauna	moose, falcons, fox, bear
Human population density	moderate
climate	sub arctic / yearly avg temp 30-40°/ 20-40" rain per year
other notes	Ocean currents keep climate mild

LOCATION: Manaus, Brazil (near Amazon jungle)

FEATURE	DESCRIPTION
Latitude/ Longitude	3°08' S 66°30' W
Sunrise/sunset	rise set
June 21	6:30 18:27
September 21	6:16 18:23
December 21	6:15 18:34
Elevation above sea level	279
Bodies of water nearby	on Amazon River
Affected by ocean current?	no
Flora	mahogany, jungle canopy
Fauna	monkeys, parrots, anaconda
Human population density	moderately high
climate	rainy tropical/ 80°F year round 60-80" of rain per year
other notes	lush rainforest is endangered due to clearing (logging activities)

LOCATION: Cape Town, South Africa

FEATURE	DESCRIPTION
Latitude/ Longitude	33°55' S 18°22' E
Sunrise/sunset	rise set
June 21	7:52 17:46
September 21	6:38 18:43
December 21	5:33 19:58
Elevation above sea level	151
Bodies of water nearby	Atlantic Ocean
Affected by ocean current?	Benguela Current (cold)
Flora	rich forests and flowering shrubs
Fauna	ground birds, small mammals
Human population density	moderate
Climate	dry subtropical avg. temp 60°-70° avg. precip. 10-40"
other notes	sub-tropical latitude, but cool climate due to ocean currents

LOCATION: Visson Massif (mountain), Antarctica

FEATURE	DESCRIPTION
Latitude/ Longitude	78°35' S 85°25' W
Sunrise/sunset	rise set
June 21	(---no sunrise!---)
September 21	8:29 20:45
December 21	(sun stays above the horizon all day)
Elevation above sea level	5140
Bodies of water nearby	(inland)
Affected by ocean current?	no
Flora	lichens
Fauna	penguins
Human population density	uninhabited (scientists only)
Climate	Arctic margin avg. temp less than -10°F avg. precip less than 10 inches
other notes	harshest climate on Earth

UNDERSTANDING CLIMATE FACTORS - Data Sheet**LOCATION:** (Central Park) New York City, New York

FEATURE	DESCRIPTION
Latitude/ Longitude	40°43' N 74°01' W
Sunrise/sunset	rise set
June 21	7:29 16:44
September 21	5:56 18:00
December 21	4:29 19:35
Elevation above sea level	13
Bodies of water nearby	Atlantic Ocean, East River, Hudson River
Affected by ocean current?	Gulf Stream (warm) and Labrador Current (cold)
Flora	maple trees, oak, dogwood
Fauna	urban mammals, birds
Human population density	very high
Climate	Humid mid-latitude avg. temp. 50-60° avg. precip. 40-60"
other notes	entire area is urbanized

LOCATION: (Everglades National Park) , Florida

FEATURE	DESCRIPTION
Latitude/ Longitude	25°27' N 80°53' W
Sunrise/sunset	rise set
June 21	5:34 19:18
September 21	6:12 18:21
December 21	7:06 18:04
Elevation above sea level	9
Bodies of water nearby	Gulf of Mexico Atlantic Ocean
Affected by ocean current?	Gulf Stream (warm)
Flora	Mangroves, grasses, cypress, water lily
Fauna	alligators, small reptiles, and mammals
Human population density	National park-nonresidential
Climate	Humid subtropical avg. temp 70-80° avg. precip. 40-60"
other notes	"sheet flow" of water

LOCATION: Torreon, Mexico

FEATURE	DESCRIPTION
Latitude/ Longitude	32°12' N 114°59' W
Sunrise/sunset	rise set
June 21	6:04 19:48
September 21	6:42 18:51
December 21	7:36 18:09
Elevation above sea level	3707
Bodies of water nearby	(inland)
Affected by warm or cold ocean current?	no
Flora	scruffy shrubs and cacti
Fauna	small mammals, reptiles, coyotes
Human population density	high
Climate	dry subtropical avg. temp 60-70° avg. precip. 10-20"
other notes	grazing farm animals hurt this area

extra data grids:

LOCATION: _____

FEATURE	DESCRIPTION
Latitude/ Longitude	
Sunrise/sunset June 21 September 21 December 21	rise set
Elevation above sea level	
Bodies of water nearby	
Affected by warm or cold ocean current?	
Flora	
Fauna	
Human population density	
Climate	
other notes	

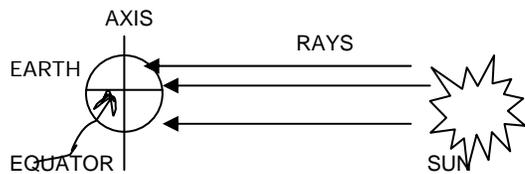
LOCATION: _____

FEATURE	DESCRIPTION
Latitude/ Longitude	
Sunrise/sunset June 21 September 21 December 21	rise set
Elevation above sea level	
Bodies of water nearby	
Affected by warm or cold ocean current?	
Flora	
Fauna	
Human population density	
Climate	
other notes	

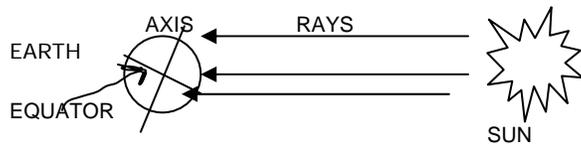
Name _____ (answer key) _____

Understanding Climate Factors Guided Outline

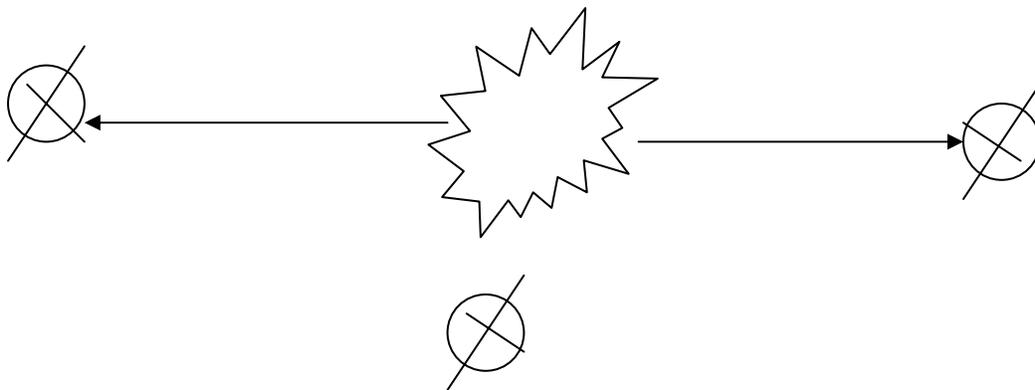
1. The rays of the sun move away from it in fairly straight lines
2. These rays pass through the Earth's atmosphere and hit the Earth
3. The region where the sun's rays are at a 90° angle to the Earth will be the warmest.
4. The smaller the angle of sun's rays and Earth, the cooler the region.
5. The Earth rotates on an axis that causes the sunrise-sunset phenomenon.
6. If the axis were perfectly vertical, regional temperatures would be constant. The Earth would not have seasons.



7. Actually, the Earth's axis is tilted about 23° from vertical.



8. As the Earth revolves around the sun, the tilted axis remains the same. Therefore, as the Earth moves around the sun, the angle of the sun's rays hitting the Earth changes.

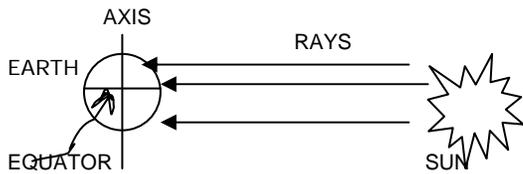


9. The sun's rays strike the Earth most directly at the Equator. The sun's rays strike at the greatest angle at both the north and south pole. Therefore, the regions near the Equator tend to be the warmest and the regions near the Poles tend to be the coolest.
10. The sun's rays pass through the atmosphere and are absorbed some energy into the earth's surface. The remainder re-emits as infrared rays (feels warm).
11. The influence of latitude is modified by one or more secondary factors
12. Secondary influences include:
 - a) altitude - low altitudes tend to be warmer than high altitudes at same latitude.
 - b) topography - mountains or plains will affect wind currents
 - c) oceans - moderate or slow temperature changes
 - d) ocean currents - a warm ocean current passing a cool region will warm the region. An inland region tends to have temperature extremes, while coastal regions tend to have milder climates.
 - e) global winds - caused by the rotation of the earth; they move ocean currents, high and low atmospheric pressure areas, and are a factor in cyclonic storms.
 - g) natural activities - volcano eruptions where smoke blackens sky and blocks sun's rays
- natural variations in atmospheric ozone levels
 - f) human activity - clearing forests, industry, automobile and machine exhaust change composition of gases in the atmosphere which changes the amount of solar energy passing through the atmosphere.
13. The Greenhouse Effect is caused by a layer of gas, such as carbon dioxide. The carbon dioxide traps infrared rays coming from the earth's surface. Since the heat cannot escape, it builds within the atmosphere causing Global Warming.
14. Most research supports the idea that humans are partially the cause of the increase speed of Global Warming. Global Warming is also occurring naturally.
15. Global Warming is causing the Polar Ice Caps to melt. Significant melting of the ice caps will cause oceans to cover all land at low elevations.
16. The combined climate factors create specific climates around the world. Each region has a community of plants unique to that region. The term biome is used to describe these plant communities. Scientists have identified at least eleven biomes around the world.
17. An ecoregion is a geographically distinct area characterized by a distinctive climate, ecological features, and plant and animal communities.

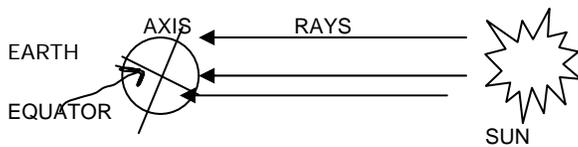
Name _____

Understanding Climate Factors Guided Outline

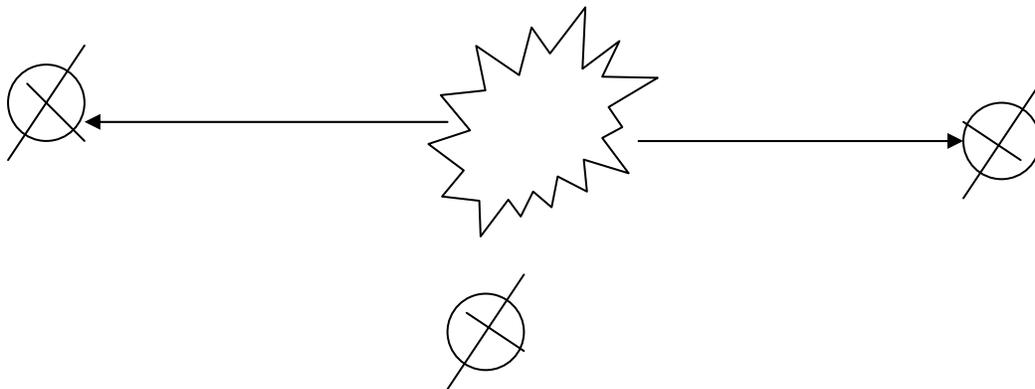
1. The rays of the sun move away from it in _____
 2. These rays pass through the Earth's atmosphere and hit the Earth
 3. The region where the sun's rays are at a 90° angle to the Earth _____.
 4. The greater the angle between sun's rays and Earth's surface, _____.
 5. The Earth rotates on an axis that causes _____.
 6. If the axis were perfectly vertical, _____
-



7. Actually, the Earth's axis is tilted about _____.



8. As the Earth revolves around the sun, the tilted axis remains the same. Therefore, _____
-



9. The sun's rays strike the Earth most directly at the _____. The sun's rays strike at the greatest angle at _____. Therefore, the regions near the Equator tend to be the _____ and the regions near the Poles tend to be the _____.
10. The sun's rays pass through the atmosphere and are absorbed into the earth's surface. The remainder re-emits from the earth's surface as _____ (feels warm).
11. The influence of latitude is modified by _____.
12. Secondary influences include:
- _____ - low altitudes tend to be warmer than high altitudes at same latitude.
 - _____ - mountains or plains will affect wind currents
 - _____ - moderate or slow temperature changes
 - _____ - a warm ocean current passing a cool region will warm the region. An inland region tends to have _____, while coastal regions tend to have _____.
 - _____ - caused by the rotation of the earth; they move ocean currents, high and low atmospheric pressure areas, and are a factor in cyclonic storms.
 - _____ - volcano eruptions where smoke blackens sky and blocks sun's rays
 _____ - natural variations in atmospheric ozone levels
 - _____ - clearing forests, industry, automobile and machine exhaust change composition of gases in the atmosphere which changes the amount of solar energy passing through the atmosphere.
13. _____ is caused by a layer of atmospheric gas, such as carbon dioxide. The carbon dioxide traps infrared rays coming from the earth's surface. Since the heat cannot escape, it builds within the atmosphere causing _____.
14. _____ the idea that humans are partially the cause of the increase speed of Global Warming. Global Warming is also occurring naturally.
15. Global Warming is causing the _____. Significant melting of the ice caps will cause oceans to cover all land at low elevations.
16. The combined climate factors create specific regions around the world. Each region has _____. The term _____ is used to describe these plant communities. Scientists have identified _____ around the world.
17. An _____ is a geographically distinct area characterized by a distinctive climate, ecological features, and plant and animal communities.



Teacher notes: You'll need topographic or relief maps for reference. If you want to download a map go to ClipArt online.

Group assignments (suggestions) for diorama #1:

Group #1: London, Great Britain -Dec. 21-3:00pm 42°F

Group #2 Goose Bay, Canada-Dec. 21-3:00pm 28°F

Group #3 Cape Town, South Africa-Dec. 21-3:00pm 74°F

Group #4 Visson Massif (mountain), Antarctica-Dec.21-midnight 26°F

Group #5 Lhasa, China -June 21-5:00pm 40°F

Group #6 New Orleans, USA -June 21-5:00pm 82°F

Group #7 Bismarck, North Dakota, USA-June 21-noon 78°F

Group #8 Seattle, Washington, USA -June 21-noon 68°F

Group #9 Nome, Alaska,-Dec. 21-3:30pm 32°F

Group #10 Everglades, Florida-Sept. 21-10:00am 88°F

Group #11 Manaus, Brazil. -Dec. 21-3:30pm 80°F

Group #12 Torreon, Mexico -Sept.21-10:00am 96°F

Group #13 (Central Park) New York City, June 21, 1:00pm 85°F

Group#14 Lhasa, China -Dec.21-1:00pm -10°F

Group#15 New Orleans, Louisiana USA -Dec.21-1:00pm

CHANGES IN FACTORS SHEET FOR DIORAMA #2

- A. The earth's axis is no longer tilted 23° -It is now vertical
- B. Three volcanoes simultaneously erupt around the world spewing smoke into the sky
- C. The tilts further so that its axis is now horizontal
- D. Your topography reverses: if you had mountains now you're flat. If you were flat, now you have high mountains.
- E. The polar ice caps melt, raising the sea level 70 feet.
- F. The earth's axis completely flips upside down (still 23° tilt)
- G. The earth's plates shift so that if you were near an ocean, now you're not. If you were not near an ocean, now you are.
- H. The temperature increases in your area by 20° year round
- I. The precipitation in your area decreases by 20 inches per year
- J. Coal burning industries move into your area
- K. The temperature decreases by 20° year round
- L. The precipitation in your area increases by 20" per year

A.H	A.B.
B.I	C. E.
C.J	D. J.
D.K	E. A.
E.L	F. D.
F.H	G. B.
G.I	B. K.

Name _____

Understanding Climate

Pre-test

Short response 25 points each

1. Draw or write an explanation of why the earth has seasons.
2. What is Global Warming? How does it affect the earth?
3. What factors determine an ecoregion?
4. What is the primary factor that determines climate? List three secondary factors and describe how they determine climate.

Name _____

Understanding Climate

Post-test

Short response 25 points each

5. Draw or write an explanation of why the earth has seasons.

6. What is Global Warming? How does it affect the earth?

7. What factors determine an ecoregion?

8. What is the primary factor that determines climate? List three secondary factors and describe how they determine climate.