Team Number: _____ Student 1: _____ Student 2:_____

2011 - 2012 METEOROLOGY

Part I. Multiple Choice: Answer the following questions by selecting the best answer. (2 points each)

Which of the statements below about El Nino or La Nina is correct ?

a) In normal, non-El Niño conditions , the trade winds blow towards the east across the tropical Pacific.
b) The meteorological effects related to El Niño and La Niña extend throughout the Pacific Rim to eastern Africa and beyond.
c) El Niño is normally accompanied by a change in atmospheric circulation called the Northern Oscillation.
d) La Niña is preceded by a buildup of warmer-than-normal subsurface waters in the tropical Pacific.

Which of the following statements is correct about cyclones?

a) cyclones are huge storms caused by winds blowing around a central area of high atmospheric pressure.
b) for a cyclone to develop the sea surface temperature must be below 25 degrees Celsius.
c) in the southern hemisphere their winds blow In a clockwise circle.
d) They do not form storm surges.

According to Coriolis Effect ,_____

a) Objects deflect to the right in the Southern Hemisphere.
b) Objects deflect to the left in the Northern Hemisphere.
c) Objects deviate from their path, but they appear to not do so because of the motion of the coordinate system.
d) if a cannon were fired northward from a point on the Equator, the projectile would land to the east of its due north path.

One Location can exhibit a cooler average climate than a second location of similar latitude as a result of this factor.

a) Urban Heat island
b) Global Warming
c) Higher Elevation
d) Form of government.

In degrees Fahrenheit, the world's all-time warmest and coldest temperatures are about:

a) 100F and -70F
b) 120F and -80F
c) 104F and -50F
d) 135F and -120F

Clouds begin to form when water vapor in the air reaches the correct ____.

a) altitude
b) temperature
c) dew point
d) all of the above

Shortwave radiation comes primarily from our sun; this is because:

a) The sun is much hotter than the earth and tends to radiate at shorter wavelengths.
b) The sun only radiates light during the daytime period which is shorter.
c) The sun is composed of helium that only produces shortwave radiation.
d) The sun is a much larger celestial body than Earth, so it stands to reason that its total radiation would be greater.

What keeps the atmosphere around Earth and prevents it from moving into space?

a) Heavy air masses high in the atmosphere trap air near Earth's surface.
b) Pressure from space keeps the atmosphere close to Earth's surface.
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An infrared weather satellite image depends on:

a) Shortwave radiation reflected by clouds and the Earth's surface.
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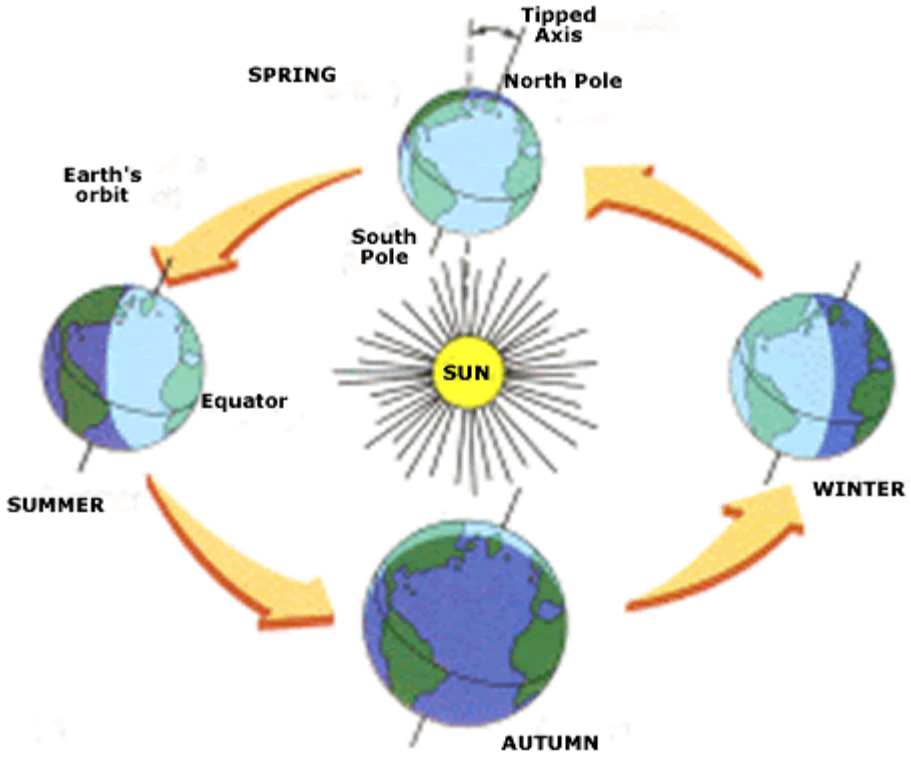
Use the illustration to answer following two questions.



Complete the sentence.
If the axis of the Earth was not tilted, _____

a) many places on Earth wouldn't receive much light.
b) there would be four seasons on the North Pole.
c) people would suffer harsh winters in North Africa.
d) there would be no equinoxes.

Which of these statements is **not true** about seasons on Earth?

a) During the summer solstice the South Pole is inclined towards the Sun.
b) On March 21 , days and nights are equal in America.
c) It is summer on January 1st in Australia.
d) June 21 is the day when Australia receives the most sunshine.

On average, altitude is _____ related with mean yearly temperature.

a) Directly
b) Inversely
c) Not
d) Un

Which layer of the atmosphere makes long-distance communication possible?

a) exosphere
b) ionosphere
c) stratosphere
d) troposphere

Mitigation of inadvertent climate change means what:

a) Migration of people towards cooler climates.
b) Trying to reverse or undo factors that led to the inadvertent climate change.
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The best conditions for snow and ice build-up over time (conditions leading to glaciations or ice-ages) are:

(warm/cold/wet/dry means 'more than normal for that season')

a) Warm summer and cold winters
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All of the following are major classification types in the Koeppen Classification System EXCEPT

a) Continental
b) Moist Tropical
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The Milankovich Theory deals with

a) Global Warming due to non-understood mechanisms
b) The changing of the axis of rotation of the Earth over time
c) The cycle of El Nino/La Nina in the Pacific Ocean
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A student is writing a report about molecules. She describes the way fast-moving molecules transfer energy to slower-moving molecules when they bump into each other. What is the subject of her report?

a) Conduction
b) Convection
c) Humidity
d) Precipitation

Which is a type of stratus cloud that is in contact with the ground?

a) cirrostratus
b) fog
c) humidity
d) nimbostratus

Part II. True or False (2 points each)

___ An El Nino winter in Southern California is typically dryer and warmer than normal.

___ West coast climates often have rainy seasons in the summer.

___ Southern Chile's warmest month of the year would be in January or February.

___ A monsoon climate only occurs in places like India and Pan-Asia.

___ The world's deserts tend to be clustered near 30N and 30S latitudes.

___ The main distinction between the Koppen climate classification and that of Thornthwaite is that Thornthwaite's system is based on precipitation or humidity and Koppen is based on temperature.

___ The last important glaciation of the Northern Hemisphere is called the Wisconsin Ice Age.

___ NO_2 is the most abundant atmospheric constituent.

___ The mid-latitude westerlies are replaced with mid-latitude easterlies in the Southern Hemisphere

___ Circulation around a low pressure in the Southern Hemisphere is clockwise.

___ CO_2 concentration varies quite a bit seasonally (by approximately 2-3%).

___ Reducing total ice and snow cover on the Earth's surface decreases the amount of reflected sunlight (i.e. it decreases ther Earth's albedo).

___ The Earth is closest to the sun in early January and farthest away about 6 months later.

___ The tilt of the Earth's axis is about 10 degrees.

___ Sunspots are patches of relatively cooler surface sun temperature compared to their surroundings.

Part III. Climate Acronyms or abbreviations: (2 points each)

L (as on a weather map) _____

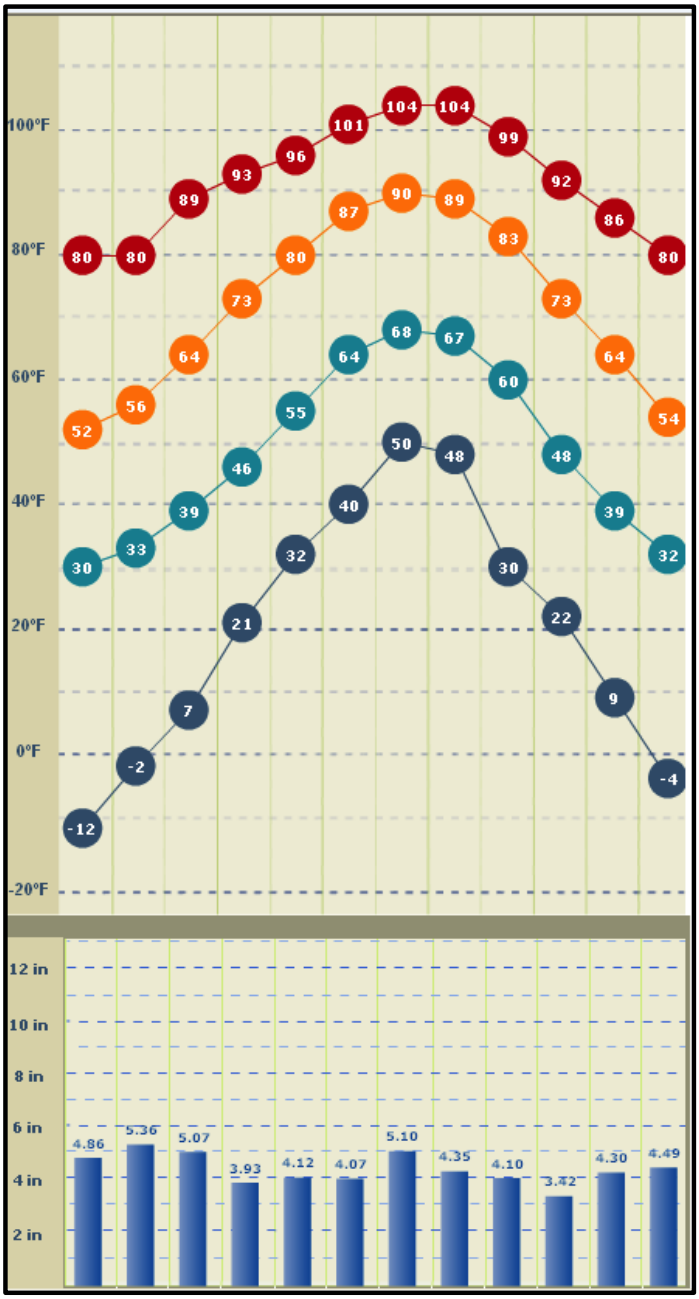
mT (air mass abbreviation) _____

IPCC _____

RH _____

ENSO _____

Part IV. Consider the following ***yearly*** Climograph:



D

C

B

A

E

(2 points each)

What does the dark blue line (A) and numbers represent? _____ (qty) ___ (units)

What does the light blue line (B) and numbers represent? _____ (qty) ___ (units)

What does the orange line (C) and numbers represent? _____ (qty) ____ (units)

What does the red line (D) and numbers represent? _____ (qty) _____ (units)

What does the blue bars (E) and numbers represent? _____ (qty) _____ (units)

Part V. Short Answer. Complete sentences are not necessary.

- What is the difference between water vapor and visible clouds?

Match the information below with the atmosphere layers in the box.

STRATOSPHERE, MESOSPHERE, EXOSPHERE, TROPOSPHERE

- _____: The lower portion has a nearly constant temperature with height but in the upper portion the temperature increases with altitude because of absorption of sunlight by ozone. (1 point)

- _____: A cold layer where the temperature generally decreases with increasing altitude. (1 point)

- _____: Closest to the Earth's surface. (1 point)

- _____: The upper limit of our atmosphere. (1 point)

- Which type of air mass originate over the warm waters of the tropics and Gulf of Mexico, where heat and moisture are transferred to the overlying air from the waters below? (2 points)

- What are the three principal types of heat transfer? (6 points)

- Why does the stratosphere warm with height? (3 points)

- Describe three primary effects in the continental U.S. during an El Nino period (6 points).

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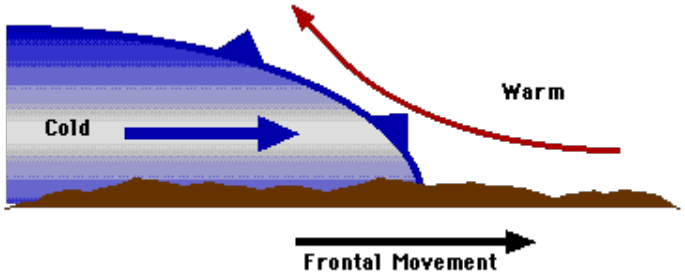
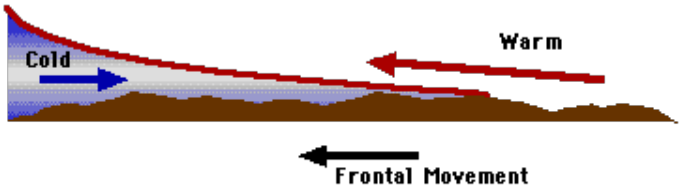
State if the pictures show a cold or warm front.



- _____(2 points)



- _____(2 points)

Tie Breaker:

- Dendochronology is the study of _____. (0.1 points)

- What is the dew point? (0.2 points)

Team Number: _____ Student 1: _____ Student 2:_____

2011 - 2012 METEOROLOGY

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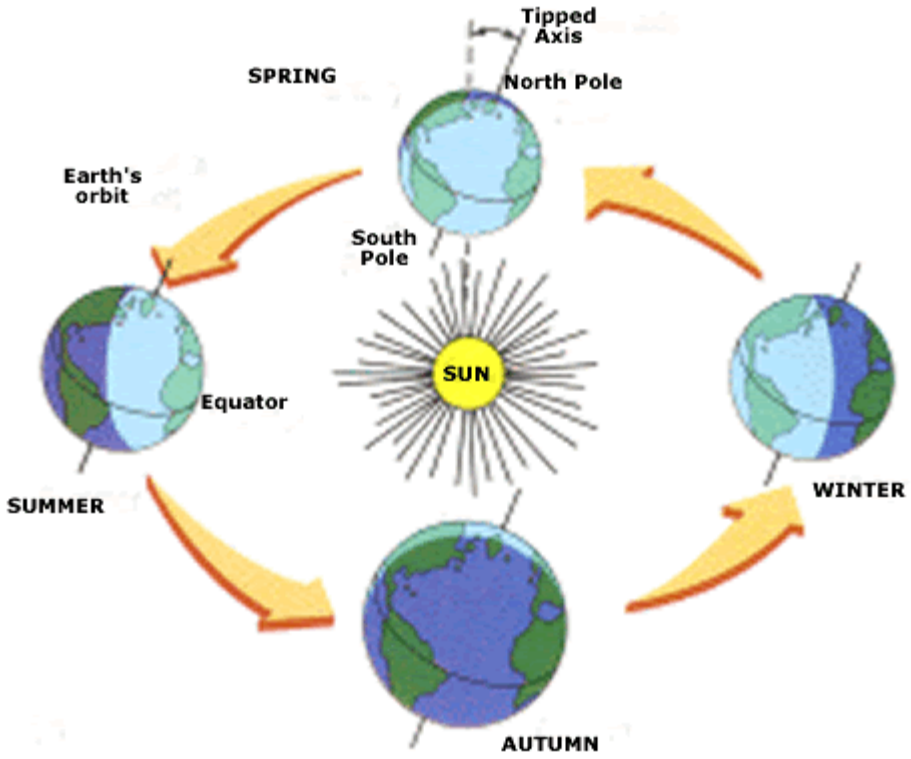

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mT (air mass abbreviation)	**Maritime Tropical**
IPCC	**Intergovernmental Panel on Climate Change**
RH	**Relative Humidity**
ENSO	**El Nino – Southern Oscillation**

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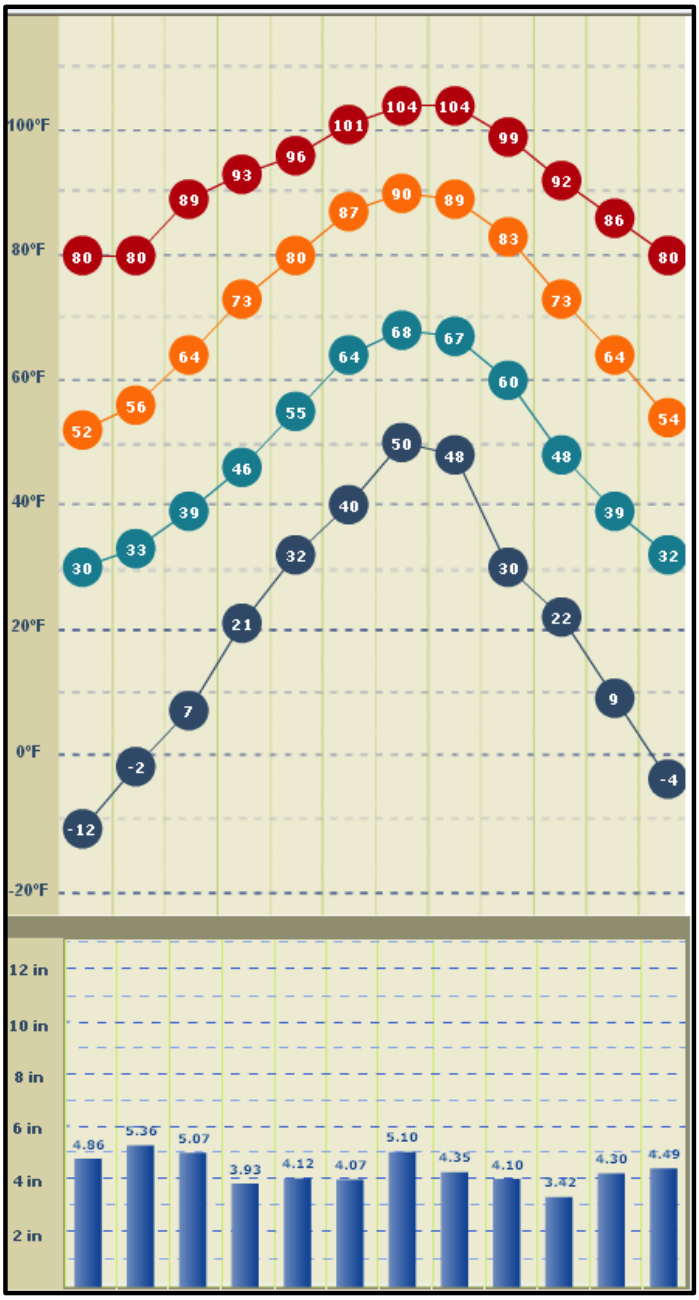

D

C

B

A

E

What does the dark blue line (A) and numbers represent? **Monthly record Low in deg-F**

What does the light blue line (B) and numbers represent? **Monthly Low in deg F**

What does the orange line (C) and numbers represent? **Monthly High T in deg F**

What does the red line (D) and numbers represent? **Monthly record High in deg F**

What does the blue bars (E) and numbers represent? **Monthly precip in inches**

Note: This is just one example of information that may be included on an exam. Information on future exams is not limited to the scope or topics covered here.

Part V. Short Answer. Complete sentences are not necessary.

- What is the difference between water vapor and visible clouds?

  Water vapor is a gas and visible clouds are made up of liquid molecules condensed water vapor.

Match the information below with the atmosphere layers in the box.

STRATOSPHERE, MESOSPHERE, EXOSPHERE, TROPOSPHERE

- STRATOSPHERE: The lower portion has a nearly constant temperature with height but in the upper portion the temperature increases with altitude because of absorption of sunlight by ozone.
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- Which type of air mass originate over the warm waters of the tropics and Gulf of Mexico, where heat and moisture are transferred to the overlying air from the waters below? (2 points)
  Maritime Tropical Air Masses

- What are the three principal types of heat transfer? (6 points)

  Conduction, Convection, Radiation

- Why does the stratosphere warm with height? (3 points)

  Ozone Reaction absorbs heat

- Describe three primary effects in the continental U.S. during an El Nino period (6 points).

  Fewer Atlantic Hurricanes

  Wetter Summer in West

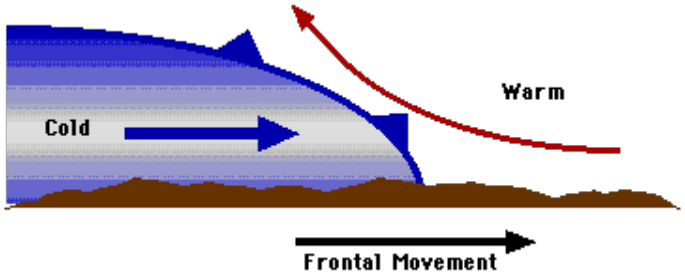
  Warmer/Drier Winters in West

  Reduced Snowfall in winter

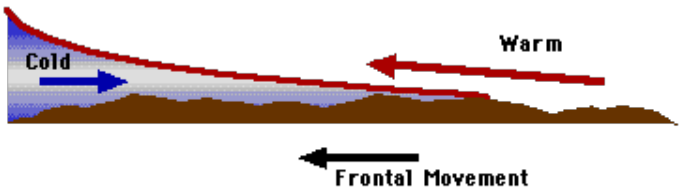
- Describe the prevailing westerlies.(3 points)

  Prevailing westerlies are winds located between 30° and 60° latitude north and south of the equator. They blow from the west and act as boundaries between the cold polar and milder equatorial air.

State if the pictures show a cold or warm front.



- _cold front _(2 points)



- _ warm front __(2 points)

Tie Breaker:

- Dendochronology is the study of tree rings related to climatology. (0.1 points)

- What is the dew point? (0.2 points)
  The dew point is the temperature at which air is saturated and condensation can occur.