



*Exploring the World of Science*

# Meteorology

HOLT INVITATIONAL 2018

SCHOOL: \_\_\_\_\_ TEAM # \_\_\_\_\_

TEAM MEMBERS: \_\_\_\_\_ & \_\_\_\_\_

SCORE: \_\_\_\_\_ TIME COMPLETED: \_\_\_\_\_

PLACE: \_\_\_\_\_

**DIRECTIONS:**

All answers must be written on the Meteorology Answer Sheet. All other answers will not be graded.

There are two pre-identified tiebreakers on the test. If a tie is not broken with the tie breakers, then team that completed the test in the shortest amount of time will place above the other team.

# Meteorology Answer Sheet

# Holt Invitational 2018

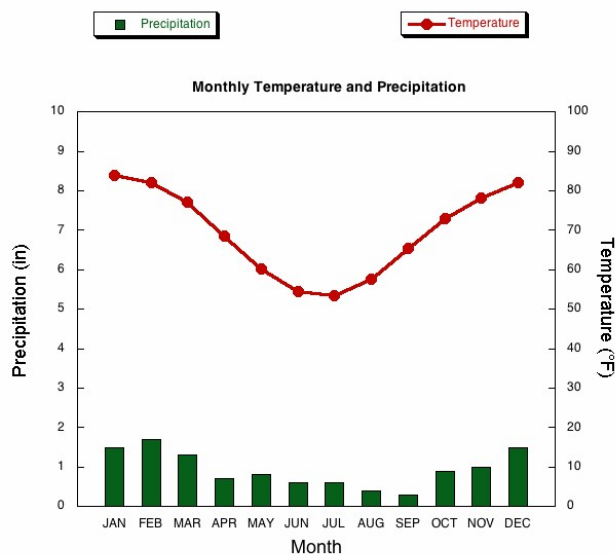
- 1.   D
- 2.   C
- 3.   A
- 4.   C
- 5.   D
- 6.   D
- 7.   A
- 8.   E
- 9.   D
- 10.  E
- 11.  B
- 12.  C
- 13.   A
- 14.   A
- 15.   E
- 16.   D
- 17.   A
- 18.   D
- 19.   C
- 20.   D
- 21.   D
- 22.   D
- 23.   B
- 24.   A

- 25.   B
- 26.   A
- 27.   A
- 28.   B
- 29.   B
- 30.   A
- 31.   D
- 32.   B
- 33.   D
- 34.   B
- 35.   B
- 36.   B
- 37.   A
- 38.   D
- 39.   B   \*
- 40.   A
- 41.   A
- 42.   A
- 43.   B
- 44.   C
- 45.   A

\* Tiebreaker Question

## Short Answer:

Use the climate graph for the following city to classify the climate according to the Köppen Classification system. Provide an explanation. (3 points) (Tiebreaker #2)



Classification:   BWh  

Explanation:  
 Potential evaporation exceeds precipitation. Desert. Average annual temperature is above 18 degrees Celsius (64 F)

In reference to the equator, where would you find this city? Use evidence from the graph to support your answer. (2 points)

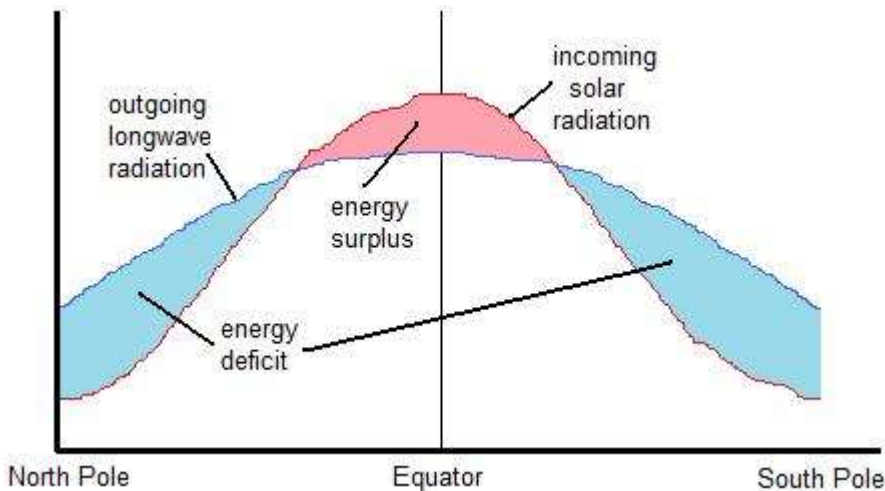
This city is in the Southern hemisphere because the highest temperatures are in January and February



Explain how the ocean is a large factor in shaping climate zones on earth.

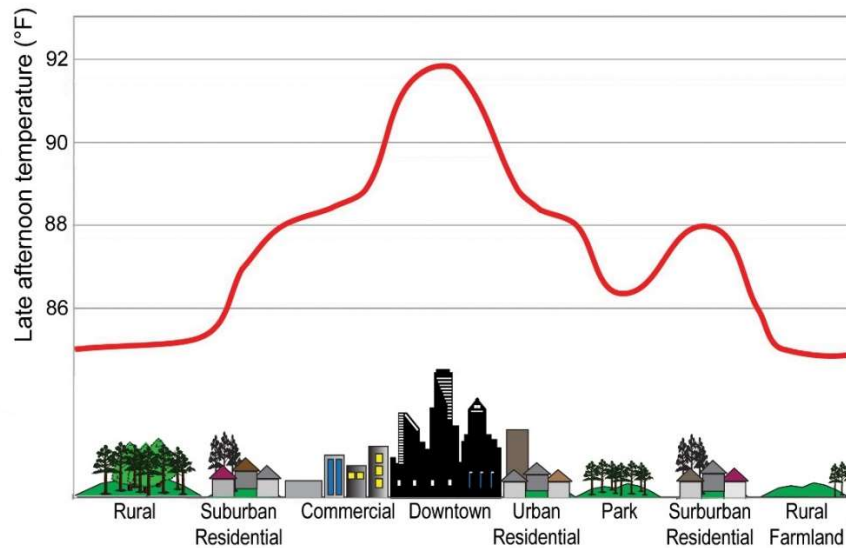
The world's ocean is crucial to heating the planet. While land areas and the atmosphere absorb some sunlight, the majority of the sun's radiation is absorbed by the ocean. Particularly in the tropical waters around the equator. The ocean doesn't just store solar radiation; it also helps to distribute heat around the globe. When water molecules are heated, they exchange freely with the air in a process called evaporation. Ocean water is constantly evaporating, increasing the temperature and humidity of the surrounding air to form rain and storms. The tropics are particularly rainy because heat absorption, and thus ocean evaporation, is highest in this area.

### Annual Radiation Budget



From the graph above of the annual radiation budget, your classmate makes a claim that the tropics are getting hotter and the poles are getting colder. Do you agree with your classmate? Provide an explanation.

No, the atmosphere and the oceans effectively transfer surplus heat from the tropics to the poles. This imbalance is what drives winds and ocean currents.



Provide an explanation for the above profile. What is the term used to describe this phenomenon? What factors cause this effect? (4 points)

- The urban areas air and surface temperatures are higher than the nearby rural areas. This is called the heat island effect.
- The principal reason for the nighttime warming is that buildings block surface heat from radiating into the relatively cold night sky.
- Tar, asphalt, brick and concrete absorb insolation and release it as heat, rather than reflecting it (without heat) like soil does.
- In cities, where there is less vegetation, the buildings, streets and sidewalks absorb the majority of solar energy input.
- Tall building prevent heat from dissipating reduce air flow

Using the three cell model, label the global circulation patterns below: (3 points)

