

NAME: _____

Climates

1. Define climate. _____
2. How thick is the atmosphere? _____
3. What region of the atmosphere does our weather occur? _____
4. What factors are used to measure weather? _____, _____
_____, _____, _____, and _____
10. What is the cause of all weather activity? _____
11. Where are the sun's rays most direct? _____
12. Why do the tropics receive the heaviest amount of rainfall? _____

13. Where are the sun's rays least direct? _____
14. What is air temperature affected by? _____
15. What is the difference between the ability of land and water to absorb heat?

16. Areas that are far from water have what type of climate? _____
17. How does a mountainous area influence climate? _____

18. How do ocean currents and wind patterns influence climate? _____

19. What caused the "Little Ice Age?" _____
20. How are humans' influencing climate changes worldwide? _____

21. What two factors are used to classify climates? _____ and _____
23. What are the three basic earth climate zones? _____,
_____ and _____

26. Describe the Ice Cap classification. _____

27. Describe the Polar or Tundra classification. _____

28. Describe the Subpolar or Subarctic classification. _____

29. Describe the Humid Continental classification. _____

30. Describe the Humid Subtropical classification. _____

31. Describe the Marine or West Coast classification. _____

32. Describe the Steppe classification. _____

33. Describe the Desert classification. _____

34. Describe the Mediterranean classification. _____

35. Describe the Rain Forest classification. _____

36. Describe the Wet/Dry Savannah classification _____

37. Describe the Mountain classification. _____

The Koeppen Climate Classification System

Directions: Explain what each letter in the classification system means.

25. A _____

26. B _____

27. C _____

28. D _____

29. E _____

30. H _____

31. f _____

32. m _____

33. s _____

34. w _____

35. a _____

36. b _____

37. c _____

38. d _____

39. h _____

40. k _____

Additional Designations

41. BSh _____

42. BSk _____

43. BWh _____

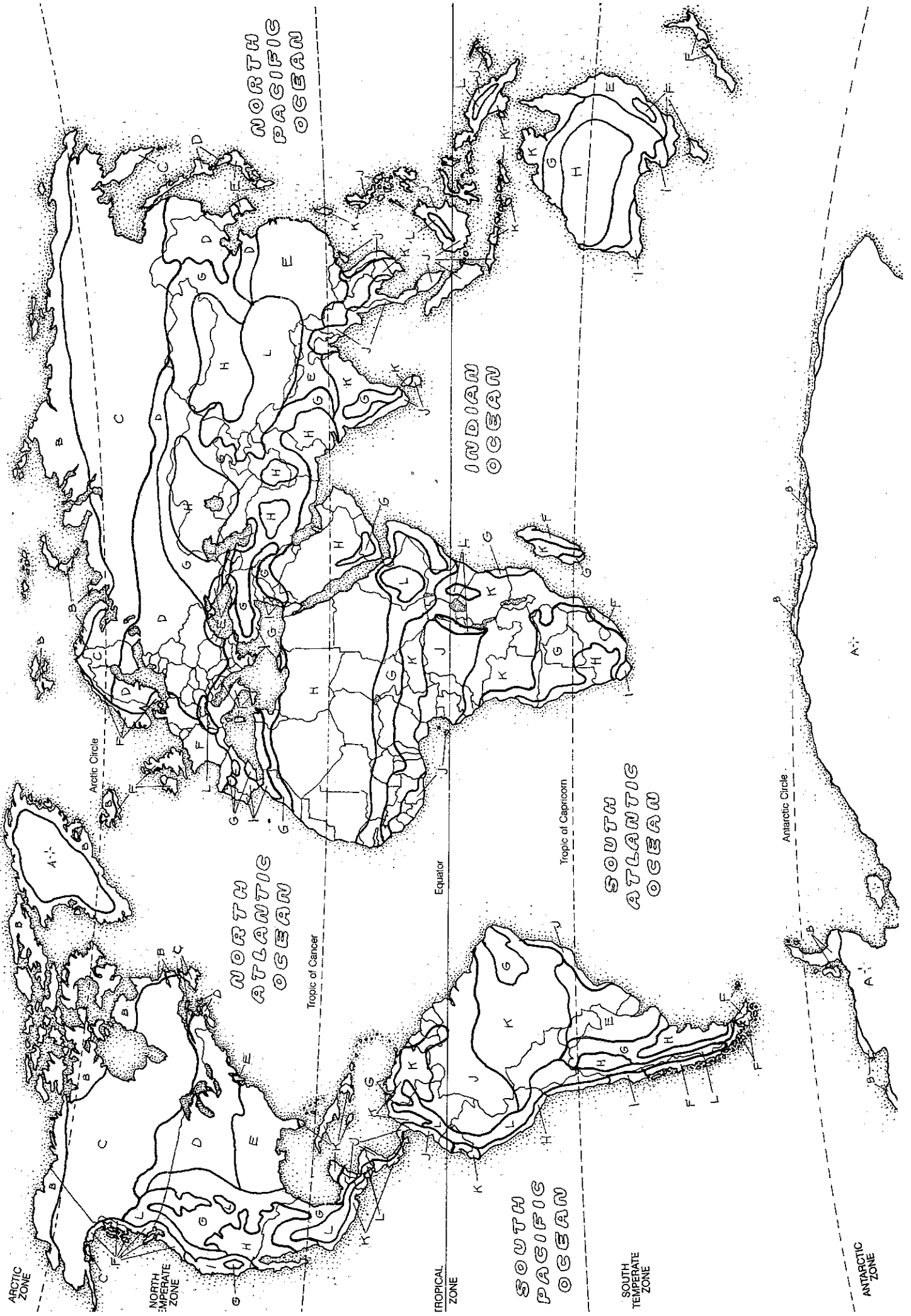
44. BWk _____

45. ET _____

46. EP _____

47. H _____

ARCTIC OCEAN



WORLD CLIMATE REGIONS

CN: (1) On the World Thematic Plates (55-60), color over the lightly drawn boundary lines of countries located within each area outlined by darker lines. Use light colors so that those boundaries remain visible. Test your recall by trying to identify the nations in a particular region. Keep in mind that there are no clear divisions between one region and another. Climate changes are transitional and are not as abrupt as indicated on a map of this kind. (2) Do not color any lakes. (3) Do not color the names of the oceans. (4) You may wish to color one climate region on all continents first or you may prefer to color all the regions on one continent before going on to the next continent. (5) Note that the ice-cap climates (A) are left uncolored. Antarctica, shown at the bottom of the map, has been stretched far beyond its actual size in order to indicate its relationship to the three continents of the Southern Hemisphere (see p. 44 for a more accurate depiction).

POLAR ZONES
ICE CAP (A)
POLAR (TUNDRA) B
TEMPERATE ZONES
SUBPOLAR (SUBARCTIC) C
HUMID / CONTINENTAL D
HUMID / SUBTROPICAL E
MOIST / COASTAL F
STEPPE G
DESERT H
MEDITERRANEAN I
TROPICAL ZONES
RAINFORREST J
WET & DRY SAVANNA K
MOUNTAIN L

Climate is weather considered over a long period of time. Weather is the short-term condition of the atmosphere. The atmosphere is a layer of air 100 mi. (160 km) thick, surrounding the earth. Weather only occurs in the warmer and denser bottom 6 mi. (9.6 km) of the atmosphere. Air temperature, precipitation, wind velocity, air pressure, cloudiness, and humidity are the elements by which weather is measured.

The uneven heating of the Earth's surface is the cause of all weather activity. These variations in the amount of radiation received from the Sun largely depend on latitudinal position. In the Tropics, the Sun stays more or less overhead, creating eternal summer. The intense heat from the Sun's direct rays causes ocean water to evaporate (warm air absorbs the most moisture), and the Tropics receive the heaviest rainfall. The amount of sunlight in the Temperate Zones varies according to season (see the diagram on p. 41). The resulting fluctuation in heat creates the most variable weather on the planet. The Sun's rays are the least direct in the Polar Regions, and the result is almost constantly cold weather.

Climate, particularly air temperature, is also affected by the proximity of large bodies of water, because water is colder than land during the summer and warmer than land during winter (water heats up more slowly than land in the summer and cools down more slowly than land in the winter). This explains why regions such as the British Isles and Western Europe have much milder climates than other areas at similar latitudes. Because the interiors of Asia and North America are far from the influence of any ocean or sea, they tend to experience great temperature extremes, from the hottest summers to the coldest winters. This type of climate is usually referred to as "continental."

Another major influence on climate is altitude. Mountain elevations are generally much cooler, wetter, and windier than adjacent regions. Because air is less dense at higher altitudes, it contains fewer elements capable of retaining heat. This explains the presence of snow-capped mountains (Mt. Kilimanjaro in Africa) in the Tropics. Mountains are generally wetter on their windward sides; warm, moist air is swept upslope, cools down, and releases its moisture before reaching the peaks.

Other factors that influence climate are wind patterns and ocean currents, which transfer heat and cold around the globe, and certain natural phenomena such as volcanic activity. Cataclysmic volcanic explosions and sustained periods of volcanic activity can spew enough dust into the atmosphere to block the Sun's radiation, causing a drop of several degrees in global temperature. It is believed that the "Little Ice Age" of 1550-1880, the coldest period since the end of the most recent Ice Age (10,000 years ago), was the result of intense volcanic activity. Major Ice Ages, which periodically have covered much of the Northern Hemisphere with ice, are thought to follow changes in the Earth's orbit around the Sun.

Human beings are changing the world's climate through their activities. Scientists are growing concerned about an apparent rise in the earth's temperature. This "greenhouse effect" is caused by the increased production of carbon dioxide from the burning of fossil fuels (oil, coal, and natural gas). The excess carbon dioxide prevents the radiation of the sun's heat back into space. The widespread destruction of rainforests around the globe is intensifying the problem, since plants absorb carbon dioxide. Plants may further be endangered by another byproduct of modern life, the thinning of the ozone layer in the atmosphere (see discussion of the "ozone hole" over Antarctica, p. 44).

The following classification of climates is based on temperature and precipitation, the two most important weather factors. They are treated separately on Plate 56. Most climates are generally found in one of the three basic earth zones: Polar, Temperate, and Tropical. Some climates, such as Desert or Mountain, are present in more than one zone.

POLAR ZONES. Ice cap is a below-freezing climate found in most of Greenland and all of Antarctica. The air is too cold to hold much moisture; the only precipitation is in the form of light snow. Dryness and the absence of plants—almost nothing can grow on ice—give these regions a true desert status. Polar or Tundra climate is always cold, although some regions experience brief, chilly summers of above-freezing temperatures. There is little precipitation. In the summer the upper inches of permafrost thaw. Cold air holds little moisture, so evaporation is slow and the environment becomes wet and marshy. Wildflowers and low-growing plants make their appearance during this brief period.

TEMPERATE ZONES. Subpolar or Subarctic climate is characterized by long, very cold winters and short, cool summers. Precipitation is light to moderate, and because of low evaporation, the latter areas, with poor drainage, stay wet during the summer months. Coniferous trees cover parts of the landscape, and limited farming is possible. This is the climate of most of Canada and northern Russia. Humid/continental climate is characterized by wide extremes in tem-

perature (particularly in the interior regions of broad continents). Summers are normally mild but also can get quite hot; winters are subject to periods of severe cold. Continental climate has moderate precipitation, most of it falling during the warm summer. Humid/subtropical climate has warm to hot summers and cool to cold winters and is subject to frequent cyclonic storms and highly variable weather. Rainfall is moderate, but summers can be very wet. These regions are found on the eastern sides of continents and in the lower latitudes of the Temperate Zone; the southeastern United States, southeastern South America, southern Japan, and eastern China and Australia. Moist/coastal, also called maritime or marine west coast climate, is moderately wet and is characterized by frequent cloudiness and light rain. Summers are milder and winters are less severe than in other regions within the same latitudes. This climate is generally found on the west coasts of continents and in the upper latitudes of the Temperate Zone; western Europe, the British Isles, Canada, and the American Northwest. In the southern Hemisphere it is found in southern Chile, southeastern Africa and Australia, and New Zealand. Steppe is a dry climate with hot summers; it can have very cold winters, depending upon the latitude. There is a wide variation between day and evening temperatures. These transitional regions between deserts and the moister climates often are deprived of precipitation by adjacent mountain ranges. Steppes are found in large areas of the American West and Mexico, across the widest part of Africa (south of the Sahara), in southcentral Asia, and encircling the western desert in Australia. Desert climates have very limited precipitation, which is likely to fall in isolated downpours followed by long dry periods. The deserts of the higher temperate latitudes can experience very cold winters; those further to the south, such as the enormous Sahara, are hot all year long. A desert is a barren region with little or no rainfall. It is not necessarily sandy—only 20% of the Sahara is sandy. Some of the tropical deserts, such as those along the coasts of Peru, Chile, and Namibia, can go for many years without measurable rainfall. But since they are adjacent to the coast, these unusual deserts are often shrouded in fog. They are deprived of rain by cold ocean currents that cool the atmosphere, wringing moisture from the clouds before they can reach land. Mediterranean regions take their name from the climate in lands surrounding the Mediterranean Sea, which have very warm, dry summers and mild, wet winters. This climate is also found along parts of the west coasts of continents in the lower temperate latitudes: Central and Southern California, central Chile, the Cape Town region of South Africa, and the southern coast of Australia. These climates of moderate temperatures, low humidity, and plentiful sunshine are generally viewed as very desirable places to live. Native trees and shrubs in these regions can survive long dry periods.

TROPICAL ZONE. Rainforest temperatures are uniformly warm throughout the year. In the very humid rainforest climate, precipitation is heavy, varying from the Amazon Basin's almost daily afternoon downpours to the seasonal monsoons of Southeast Asia. Other wet Equatorial areas are the Caribbean coast of Central America and the west coast of Africa. This hot and wet environment creates the lushest vegetation on earth. Wet and dry savanna climates are found in the Tropics and are at times hotter than the rainforest. Rainfall is heavy only during the brief wet season. For the remainder of the year the savanna is dry. This climate characterizes large regions surrounding the rainforests of central Africa and the Amazon Basin in South America. Mountain climates can be found in any latitude. They are the result of cold or cool temperatures found in high altitudes. Mountains are generally wetter and windier than surrounding environments, and many are permanently covered by snow and ice. Mountain climates are found in northwestern North America, central Mexico, the Andes in South America, the Tibetan Plateau and central Asia, and regions of Ethiopia and Eastern Africa.

Major Climate Classifications

- A - Tropical coolest month above 64.4°F
- B - Dry
- C - Mesothermal (Marine) coldest month above 32°F but below 64.4°F with warmest month above 50°F
- D - Microthermal (Continental)) coldest month below 32°F with warmest month above 50°F
- EI - Tundra warmest month below 50°F but above 32°F
- EF - Ice Cap all months below 32°F

Temperature

- a- warmest month above 71.6°F
- b- warmest month below 71.6°F
- c- less than four months over 50°F
- d- less than four months over 50°F but coldest month below -36.4°F
- h) hot and dry all months above 32°F
- k) cold and dry at least one month below 32°F

Mositure

- f) moist with precipitation year round
- m) monsoon rain, short dry season
- s) dry season in summer
- w) dry season in winter

**Interpreting the Map
Climates**

1. What two climates dominate South America?

a. _____

b. _____

3. Alaska has three climates:

a. _____

b. _____

c. _____

6. What two climates dominate Australia?

a. _____

b. _____

8. The continent of _____ has the most variation of climates.

9. Northern Asia is dominated by a _____ climate.

10. Most of the western states in the U.S. have a _____ climate.

11. Looking at the map, the climate that occurs most across the world and covers the most area is probably the _____ climate.

12. A _____ climate covers the most area in the United States.

13. Africa is dominated by a _____ climate.

14. Japan two climates:

a. _____

b. _____

16. Along the equator one can find how many _____ climates?

a. _____

b. _____

c. _____

20. Canada for the most part has a _____ climate.

21. Antarctica has two climates:

a. _____

b. _____

23. A _____ climate can be found where we live in Indiana.

24. Excluding Antarctica, the continent of _____ has the least number of climates.

25. The _____ climate dominates Western Europe.

26. The southern end of South America and Africa share a _____ climate.

27. Most of the islands off the coast of Asia have a _____ climate.

29. Which two continents have a desert climate on both its eastern and western coasts?

a. _____

b. _____