

Earth Science Reference Table Review:

Front Cover

Radioactive Decay Data

1. What is the half- life of Carbon 14? 5.7×10^3 /or/ 5,700 years
2. Which radioactive Isotope can be used to date the age of Earth? Uranium-238
3. Name the two decay products of Potassium-40. Calcium and Argon (Ca and Ar)
4. How much of a 400-gram sample of Rubidium-87 would remain after 1 half- life? 200 grams
5. How much of a 400-gram sample of Rubidium-87 would remain after 2 half- lives? 100 grams
6. How old is a sample the has 25% of Carbon-14 remaining? 11,400 years (went through 2 half-lives)

Specific Heats of Common Material

1. Which material heats up the fastest? Lead
2. Which material takes the most energy to heat up? Water
3. Why does water take longer than land to heat up? Water has a higher specific heat.
4. How many Joules of energy is required to raise one gram of water one degree Celsius? 4.18 Joules/gram • °C
5. How many Joules of energy is required to raise one gram of basalt one degree Celsius? 0.84 Joules/gram • °C

Properties of Water

1. How many Joules of energy is required to melt one gram of water? 334 Joules
2. How many Joules of energy is required to melt two grams of water? 668 Joules
3. How many Joules of energy is required to freeze one gram of water? 334 Joules
4. How many Joules of energy is required to evaporate one gram of water? 2260 Joules
5. How many Joules of energy is required to condense one gram of water? 2260 Joules
6. Which phase change absorbs the most energy? Vaporization (evaporation)
7. Which phase change loses the most energy? Condensation

Equations:

1. What is the orbital eccentricity of a planet if the foci distance is 2.0 cm and the major axis is 19.3 cm? 0.104
$$eccentricity = \frac{\text{distance between foci}}{\text{length of major axis}} = \frac{2.0}{19.3} = 0.1036$$
2. On a topographic map Point A has an elevation of 400 meters in elevation and Point B is 1200 meters. They are located 4 kilometers apart. What is the gradient? 200 m/km
$$gradient = \frac{\text{distchange in field value}}{\text{distance}} = \frac{1200 \text{ m} - 400 \text{ m}}{4 \text{ km}} = 200 \text{ m/km}$$
3. At 7:00 a.m., the air pressure was 1,012 millibars. By 11:00 a.m., the air pressure had dropped to 1,004 millibars. What was the rate of change in air pressure? 2 mb/hr
$$rate \text{ of change} = \frac{\text{change in valuee}}{\text{time}} = \frac{1012 \text{ mb} - 1004 \text{ mb}}{4 \text{ hours}} = 2 \text{ mb/hr}$$
4. A pebble has a mass of 35 grams and a volume of 14 cubic centimeters. What is its density?
$$density = \frac{\text{change in massvaluee}}{\text{timvolumee}} = \frac{35 \text{ grams}}{14 \text{ cubic centimeters}} = 2.5 \text{ g/cm}^3$$

5. A 5.0-milliliter sample of a substance has a mass of 12.5 grams. What is the mass of a 100 milliliter sample of the same substance? $density = \frac{change\ in\ mass\ value}{tim\ volume} = \frac{12.5\ g}{5\ mL} = 2.5\ g/mL$ (mass = volume x density) 100 mL x 2.5 g/mL = 250 grams

Average Chemical Composition of Earth's Crust, Hydrosphere, and Troposphere

1. What is the most abundant element in the troposphere? **nitrogen**
2. Which element is in the crust, hydrosphere and troposphere? **oxygen**
3. What is the composition of the hydrosphere? **66% hydrogen, 33% oxygen**
4. Which two elements are most abundant in Earth's crust by volume? **Silicon & Potassium**
5. Which two elements are most abundant in Earth's crust by mass?. **Silicaon & Oxygen**

Bottom of page 1: What is the name of the New York State fossil? **Eurypterus remipes**

Generalized Landscape Regions of NYS Generalized Bedrock Geology of NYS

Page 2 & 3

1. What landscape region is Old Forge located in? **Adirondack Mountains**
 2. What landscape region is Ithaca located in? **Allegheny Plateau**
 3. What is the elevation of Lake Ontario? **75 m**
 4. What city is located at 42°45' N latitude and 73°45' W longitude? **Albany**
 5. What city is located at 42°20' N latitude and 76°30' W longitude? **Ithica**
 6. Name the river that flows into the Hudson River. **Mohawk**
 7. What is the age of the bedrock in which Jamestown is located? **Devonian**
 8. What rock type is found in the Adirondack Mountains? **Metamorphic**
 9. What is the distance in kilometers from Binghamton to Elmira? **72 km**
 10. Which direction does the Niagara River flow? **North**
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Surface Ocean Currents

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1. Name the continent located at 50°N and 80°E. **Asia (be careful - find the Prime Meridian)**
 2. Name the continent located at 50°N and 100°W. **North America**
 3. What is the latitude of the Arctic Circle? **66.5 °N**
 4. What is the latitude of the Tropic of Capricorn? **23.5 °S**
 5. Name the warm ocean current located on the east coast of Australia. **East Australia Current**
 6. Name the cool ocean current located on the west coast of Africa. **Canary Current**
 7. Name the cool current located at 66.5°S latitude. **Antarctic Circumpolar Current**
 8. Name the warm ocean current located on the northwest coast of North America. **Alaska Current**
 9. Name the warm ocean current located at 20°N latitude and **40°E** longitude. **North Equatorial Current**
 10. Name the warm ocean current located on the east coast of South America. **Brazil Current**
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1. What type of boundary do plates move toward each other? **Convergent boundaries**
 2. What type of boundary do plates move away from each other? **Divergent boundaries**
 3. What type of boundary has plates that move past each other? **Transform boundaries**
 4. What is formed at divergent plate boundaries? **Mid-ocean ridges**
 5. What feature is formed when two ocean plates move toward each other? (What are the dots?) **volcanic islands**
 6. What type of boundary forms a trench? **Convergent boundary**
 7. Name the hotspot located on the Pacific Plate. **Hawaii Hot Spot**
 8. What two plate are on either side of the Southern Part of the Mid- Atlantic Ridge? **South American & African Plates**
 9. Name the mid-ocean ridge located between the Antarctic Plate and the Indian-Australian Plate. **Southeast Indian Ridge**
 10. What is the hot spot located on the North American Plate? **Yellowstone Hot Spot**
 11. Name the plate located on the Northeast of Africa (above the East African Rift). **Arabian Plate**
 12. What type of boundary is located between Eurasian and North American Plates. **Divergent boundary**
 13. Name the fault located on the west coast of the United States. **San Andreas Fault**
 14. Name the plate located between the Scotia Plate and South American Plate (very small). **Sandwich Plate**
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Rock Cycle in Earth's Crust

1. How do Sedimentary rocks form? **Deposition, Burial, Compaction and Cementation of Sediments**
2. How do Igneous rocks form? **Solidification of Magma**
3. How do Metamorphic rocks form? **Heat and or Pressure**
4. What processes cause rocks to become sediments? **Weathering and erosion**
5. What process creates magma? **Melting**
6. Which rock is formed directly from other rocks? **Metamorphic rocks**
7. What three things can happen to any rock? **Melting, Metamorphism (heat/pressure) Weathering and Erosion**
8. Which rock forms from magma? **Igneous**
9. Which rock forms from sediments? **Sedimentary**

Relationship of Transported Particle Size to Water Velocity

1. Name the largest particle listed on the chart. **Boulders**
2. Name the smallest particle listed on the chart. **Clay**
3. What is the largest particle that can be carried in a stream where the water is **.02** cm/s? **Clay**
4. What is the largest particle that can be carried in a stream where the water is 1.0 cm/s? **Sand**
5. What is the largest particle that can be carried in a stream where the water is 100 cm/s? **Pebbles**
6. Name the particle size that is 1.0 cm in diameter. **Pebbles**
7. Name the particle size that is 10 cm in diameter. **Cobbles**

Scheme for Igneous Rock Identification

1. Name the Igneous rock that . . .
 - a. is extrusive, non-vesicular and light in color **Pumice**
 - b. is intrusive, non-vesicular and high in density **Gabbro / Peridotite / Dunite**
 - c. is volcanic, vesicular and contains mostly Plagioclase feldspar **Vesicular Andesite/Scoria/ Vesicular basalt (pumice)**
 - d. is plutonic, has a felsic composition and has a very coarse composition **Pegmatite**
 - e. is intrusive and composed of 100% olivine **Dunite**
 - f. may be intrusive and/or extrusive, and dark in color **Diabase**
 - g. has a glassy texture and may appear black **Obsidian**
 2. What is the general name (composition) of rocks rich in silicon and aluminum? **Felsic**
 3. What is the general name (composition) of rocks rich in iron and magnesium? **Mafic**
 4. What is the environment of formation when a rock cools slowly? **Intrusive**
 5. What is the environment of formation when a rock cools quickly? **Extrusive**
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Scheme for Sedimentary Rock Identification

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1. Name of inorganic land-derived sedimentary rock that contains 0.002cm sized particles. **Siltstone**
 2. Name of inorganic land-derived sedimentary rock that contains mixed sized round fragments. **Conglomerate**
 3. What is the name of the particle size in shale? **Clay**
 4. Name the rock that can be crystalline or bioclastic. **Limestone**
 5. Name the rock that is composed of halite. **Rock salt**
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Scheme for Metamorphic Rock Identification

1. What type of metamorphism forms Schist? **Regional**
2. What rock is formed only from contact metamorphism? **Hornfels**
3. Name the rock that has banding. **Gneiss**
4. Which metamorphic rock may or may not contain pyroxene? **Schist**
5. Name the parent rock of . . .
 - a. Quartzite - **sandstone**
 - b. Marble – **limestone or dolostone**
 - c. Anthracite coal – **bituminous coal**
 - d. Slate - **shale**
 - e. Phyllite – **Slate (or shale)**
6. Which metamorphic rock contains platy mica crystals? **Schist**
7. What is the composition of Marble? **Calcite or dolomites**

1. What is the age of Earth in millions of years? **4600 million years**
 2. What is the age of Earth in billions of years? **4.6 billion years**
 3. Which Eon lasted the greatest amount of geologic time? **Precambrian**
 4. What is the main event that occurred during the early Proterozoic? **Oceanic oxygen begins to enter the atmosphere**
 5. What produced oceanic oxygen? **Cyanobacteria combining with iron**
 6. During which period did Earth's first forests appear? **Middle Devonian**
 7. What appeared during the Oligocene epoch? **Earliest grasses**
 8. Name three periods in which NYS has no rock record. **Neogene, Paleogene, Permian**
 9. What is the name of the only index fossil found in NY that was a dinosaurs. **Coelophysis**
 10. Name the index fossil that is the same age as the Beluga Whale. **Mastodont or Condor**
 11. Between which two periods did the intrusion of Palisades sill occur? **Jurassic and Triassic**
 12. How many millions of years ago was the initial opening of the Iapetus Ocean? **542-580 million years ago**
 13. Where was most of Earth's landmass located 458 million years ago? **Southern hemisphere**
 14. What period can you find the oldest index fossil in **NY state**? **Cambrian**
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Inferred Properties of Earth's Interior

1. What is name of the mountains located between the Pacific Ocean and North America? **Cascades**
2. What two layers make up the lithosphere? **Crust and Rigid Mantle**
3. What type of boundary is located under the Mid-Atlantic Ridge? **Divergent**
4. What causes the plates to move? **Convection currents**
5. Which layer of Earth's interior has a density of 4.0 g/cm³? **Stiffer Mantle**
6. What layer of Earth's interior is called the plastic mantle? **Asthenosphere**
7. What is the pressure at the boundary between the stiffer mantle and outer core? **1.5 atmospheres**
8. What is the temperature between the outer core and inner core? **6200 °C**
9. Which layer of Earth's interior is a liquid? **Outer core**
10. What happens to the density as you increase depth in Earth's interior? **It increases**
11. What happens to the temperature as you increase depth in Earth's interior? **It increases**
12. What happens to the pressure as you increase depth in Earth's interior? **It increases**
13. What layer is located at a depth of 1000 km? **Stiffer mantle**
14. What is the composition and density of the continental crust? **granitic composition, 2.7 g/cm³**
15. What is the composition and density of the oceanic crust? **Basaltic composition, 3.0 g/cm³**
16. Which layer is partially melted? **Asthenosphere / plastic mantle**
17. What is the composition of the inner core? **Iron and nickel**
18. At what depth is the pressure 3 million atmospheres? **5000 km**

1. How long does it take a P-wave to travel 2000 km? **4 min**
 2. How long does it take an S-wave to travel 6000 km? **17 min**
 3. How far does a P-wave travel in 9 minutes? **5,600 km**
 4. How far does an S-wave travel in 10 minutes? **2,900 km (3000 km)**
 5. What is the distance to the epicenter if the difference in arrival times is 4 minutes and 20 seconds? **3000 km**
 6. What is the distance to an epicenter if the difference in arrival times is 8 minutes and 20 seconds? **7000 km**
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Dewpoint and Relative Humidity charts

1. What is the dewpoint temperature if the dry bulb temperature is 10 °C and the wet bulb is 8 °C? **6 °C**
 2. What is the relative humidity if the dry bulb temperature is 16 °C and the wet bulb is 12 °C? **62%**
 3. What is the dewpoint temperature if the dry bulb temperature is 12 °C and the relative humidity is 57 %? **4°C**
 4. What is the relative humidity if the dry bulb temperature is 8 °C and the dewpoint temperature is 1 °C? **62%**
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Temperature / Pressure

1. At what temperature, in degrees Celsius, does water freeze? **0 °C**
 2. At what temperature, in degrees Celsius, does water boil? **100 °C**
 3. How many degrees Celsius is 50 °F? **10 °C**
 4. Which temperature is the coldest? [0 °F, 0 °C, 0 K] **0 K**
 5. What is the value of one atmosphere of pressure in millibars? **1013.2 mb**
 6. What is the value of one atmosphere of pressure in inches of mercury (Hg)? **29.92 in of Hg**
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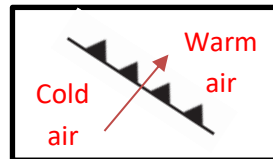
Key to Weather Map Symbols (Station models)

1. What is represented by the number that is located on the top left? **Air temperature**
2. What is represented by the number that is located on the bottom left? **Dewpoint temperature**
3. What does it mean when the dewpoint and relative humidity are close? **Good chance of precipitation**
4. What is shown inside the circle? **Cloud cover**
5. Does the line for wind direction point to where the wind is going or **where the wind is coming from?**
6. How would you write an air pressure of **1012.6** on the weather station? **126**
7. How would you write an air pressure of 952.6 on the weather station? **526**
8. What is the air pressure if the number is 246 on the station model? **1024.6 mb**
9. What is the air pressure if the number is 645 on the station model? **964.5 mb**
10. Draw the present weather symbol for fog. =
11. Draw the present weather symbol for sleet. 

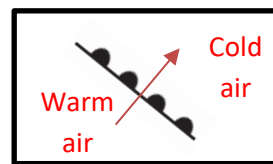
Key to Weather Map Symbols (Air masses)

1. What is the air mass symbol for a dry, cold air mass? **cP**
2. What is the air mass symbol for a dry, warm air mass? **cT**
3. What is the air mass symbol for a wet, cold air mass? **mP**
4. What is the air mass symbol for a wet, warm air mass? **mT**
5. Which types of air masses form over water [Maritime or Continental] ? **Maritime**
6. Which types of air masses form over land [Maritime or Continental] ? **Continental**

7. Draw the cold air mass in the box provided. Label where the cold air mass and warm air mass would be located.



8. Draw the warm air mass in the box provided. Label where the cold air mass and warm air mass would be located.



9. Which front indicates no forward movement of an air mass? **Stationary Front**

Selected Properties of Earth's Atmosphere

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1. What is the temperature at sea level? **15 °C**
2. Name the boundary between the Mesosphere and Stratosphere. **Stratopause**
3. What happens to the temperature in the thermosphere as altitude increases? **Temperature increases**
4. In what layer is most of the water vapor found? **Troposphere**
5. What happens to the air pressure as altitude increases? **Air pressure decreases**
6. At what boundary would the air pressure be approximately .25 atm? **Tropopause**
7. In which layer does all Earth's weather occur? **Troposphere**

Planetary Wind and Moisture Belts in the Troposphere

1. Which direction do the wind belts shift in the summer? **READ – northward in the summer**
2. Which direction do the wind belts shift in the winter? **READ – southward in the winter**
3. Which layer of the atmosphere will you find the polar front jet stream? **Troposphere**
4. Name the latitudes where high pressure is located. (there are 4) **90 °N, 90 °S, 30 °N, 30 °S**
5. Name the latitudes where low pressure is located. (there are 3) **60 °N, 60 °S, 0 ° (equator)**
6. Which direction does the wind blow in a high pressure area (away from the center, toward the center)?
7. Which direction does the wind blow in a low pressure area (away from the center, toward the center)?
8. Name the winds located at 40 °N? **Southwest winds**
9. Name the winds located at 25 °S? **Southeast winds**

Electromagnetic Spectrum

1. Name the radiation with the shortest wavelength. **Gamma rays**
 2. Name the radiation with the longest wavelength. **Radio waves**
 3. Which two types of radiation are on either side of Visible Light? **Ultraviolet (from the sun), Infrared (from Earth)**
 4. Which type of radiation is the most common that reaches Earth? **Visible light**
 5. Name the type of radiation that may cause skin cancer. **Ultraviolet**
 6. Which type of radiation is terrestrial radiation? **Infrared**
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Characteristics of Stars

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1. Name the star similar in size and temperature as the Sun. **Alpha Centauri**
 2. Which classification is the Sun located? **Main Sequence (early stage)**
 3. Which classification is the Betelgeuse located? **Supergiants (intermediate stage)**
 4. Which classification is the Procyon B located? **White Dwarfs (late stage)**
 5. Which is the brightest star listed on the chart? **Deneb**
 6. Which is the hottest star listed on the chart? **Spica**
 7. Which is the coldest star listed on the chart? **Proxima Centaure**
 8. What color is the Sun? **yellow**
 9. What color is Spica? **blue**
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Solar System Data

1. What is the smallest planet? **Mercury**
 2. How long does it take Saturn to orbit around the Sun? **29.5 years**
 3. What is the mass of the Sun? **333,000.00 times the size of Earth**
 4. Which planet has the lowest density? **Saturn**
 5. What is the eccentricity of Mars? **0.093**
 6. How far from the Sun is Neptune? **4,498.3 million km**
 7. How long does it take for the moon to revolve around Earth? **27.3 d**
 8. How long does it take for the moon to go through all of its phases? **29.5 (~ two days longer)**
 9. Which planet has a revolution shorter than its rotation? **Venus**
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Properties of Common Minerals

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1. Which mineral bubbles in acid? **calcite**
2. Which mineral bubbles in acid when powdered? **dolomite**
3. What is the hardness of quartz? **7**
4. Name the mineral that is composed of NaCl. **Halite**