

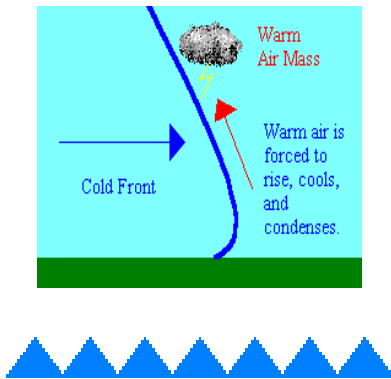
120 Ways to Pass the Earth Science Regents

Post these sheets in a bathroom, near your bed, in the kitchen, and anywhere else you will see it often. Keep reading them until you know them in your sleep!!!

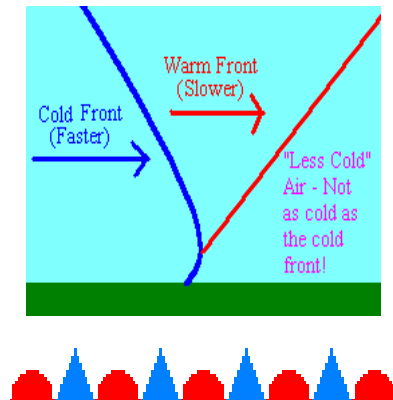
1. Most changes in the environment are cyclic.
2. The true shape of the earth is an oblate spheroid, but the best model of the Earth's shape is a sphere (usually referred to on the regents as a ball).
3. To determine the Earth's circumference, the altitude of the Sun at two locations is needed.
4. The altitude of Polaris equals your latitude.
5. Latitude lines go East to West, but their numbers go up and down (0° at the Equator, and 90° at each pole), and are North or South. They also run from 0° to 90°. For example, 90° North latitude is the North Pole. Remember: "Latitude is Fattitude!" or "The Steps of a Latter!"
6. Longitude lines go North to South, or from pole to pole, but their numbers go side to side, and are either East or West. They also run from 0° to 180°. For example, 75° West longitude.
7. Longitude is based on the observations (or apparent motions) of the Sun.
8. USE THE REFERENCE TABLES!!!
9. The closer isolines (contour-isobar-isotherm) are, the steeper the slope or gradient.
10. The Earth rotates West to East (24 hours per rotation, 15° per hour: $360^\circ / 24 \text{ hours} = 15^\circ / \text{hour}$)
11. The Earth revolves around the Sun counterclockwise, when looking at it from above the North Pole. This takes 365.25 (or $365 \frac{1}{4}$) days.
12. Most celestial objects APPEAR to move from East to West, including the Sun, Moon, planets, and stars.
13. The Moon has phases because of the angle at which we view its surface. (Remember, though, half of the Moon is always lit, and half is not!! Also, only one half of the Moon ever faces the Earth, but there is no real "Dark Side of The Moon.")
14. Planets APPEAR to go backwards (retrograde motion) as the Earth passes them in space.
15. The tilt of the Earth's axis is the cause of the seasons.
16. Summer solstice: June 21: 16 hours of daylight, Sun rises North of East, vertical rays on $23\frac{1}{2}^\circ$ North - the Tropic of Cancer.
17. Winter solstice: December 21: 8 hours of daylight, Sun rises South of East, vertical rays on $23\frac{1}{2}^\circ$ South - the Tropic of Capricorn.
18. Equinoxes: Vernal - March 21: Autumnal - September 23: 12 hours of daylight Sun rises due East, vertical rays on the Equator.
19. Vertical rays (overhead sun) can only occur between $23\frac{1}{2}^\circ\text{N}$ and $23\frac{1}{2}^\circ\text{S}$
20. The Equator always has 12 hours of daylight, and the pole can have 6 months of daylight and 6 months of nighttime.
21. The lower the altitude of the Sun, the longer shadows it creates.
22. The intensity of insolation varies with the angle of the Sun above the horizon.
23. There are six pieces of evidence that the Earth rotates:
 - a. FOCAULTS PENDULUM: appears to change its direction of swing.
 - b. CORIOLIS EFFECT: deflects to the right in the Northern Hemisphere, and to the left in the Southern Hemisphere.
 - c. DAY AND NIGHT: if the Earth did not rotate, we would have day for half a year and night for the other half.
 - d. APPARENT MOTION OF THE SUN: the Sun appears to move from East (rising) to West (setting), even though the Sun does not orbit the Earth, because the Earth turns from West to East.
 - e. APPARENT MOTION OF THE MOON: the Moon appears to move from East (rising) to West (setting), even though it really orbits the Earth from West to East..
 - f. APPARENT MOTION OF THE STARS: The stars appear to circle counterclockwise around Polaris (the North Star) in the Northern Hemisphere, and clockwise in the Southern Hemisphere.
24. The Earth is closer to the Sun when it is in the winter the Northern Hemisphere, and furthest away in the summer (in the Northern Hemisphere, and opposite in the Southern Hemisphere).
25. The closer a planet is to the Sun, the faster it orbits, and the further a planet is from the Sun, the slower it orbits.
26. GEOCENTRIC: Earth centered Universe, HELIOCENTRIC: Sun centered.
27. The Sun, a typical star, is one of billions in the Milky Way Galaxy.
28. Black absorbs energy and white deflects it.
29. Kinetic energy is the energy of motion. It increases as velocity increases. Potential energy is the stored energy. It increases with a higher location.
30. Conduction: When energy is transferred molecule to molecule through collision. (This occurs mostly in solids)
31. Convection: When energy is transferred through fluids (gases, liquids, and some solids) due to density differences.
32. Radiation: When energy is transferred through space (vacuum). For example, light.
33. Energy moves from "source to sink," high to low.
34. Infrared has long wavelengths, Ultraviolet has short wavelengths.
35. Carbon dioxide (CO₂) and water vapor (H₂O_{vapor}) absorb infrared radiation.
36. Good absorbers of energy are good radiators of energy.
37. The hottest part of the year is after June 21 (time lag).
38. The hottest part of the day is after 12 Noon (time lag).
39. As pressure increases, density increases.
40. As temperature increases, density decreases.
41. As temperature increases, air pressure decreases.
42. As moisture content increases, air pressure decreases.
43. USE THE REFERENCE TABLES!!
44. Highs are cool and dry; Lows are warm and wet (feeling low in the rain).
45. Wind is due to air pressure differences. It moves from high pressure to low pressure (Click here to see it!)
46. Wind is named for the direction it is coming from (its origin).
47. When looking at isolines for the wind speed (isotachs), the closer the lines are together, the faster the wind will move away from that area, and the further apart they are, the slower the wind will move.

48. High* (anticyclones) are regions of divergence (clockwise flow). Low* (cyclones) are regions of convergence (counterclockwise flow). * In the Northern Hemisphere. Remember: **DOC** and **ICU**. DOC is **D**ownward, **O**utward, **C**lockwise and ICU is **I**nward, **C**ounterclockwise, **U**pward (Click here to see it!)
49. The closer the air temperature is to the dew point temperature, the greater the chances of precipitation.
50. In our area (between 30° and 60° latitude), weather moves from West to East.
51. Characteristics of an air mass depend upon its geographic origin (where it is formed). Polar is from the poles: cold and tends to be dry. Tropical is from around the Equator: warm and tends to be moist. Maritime is from over a large body of water: it is moist. Continental is from over the land: it is dry.
52. The leading edge of air masses (fronts) are the most likely areas for precipitation to occur.

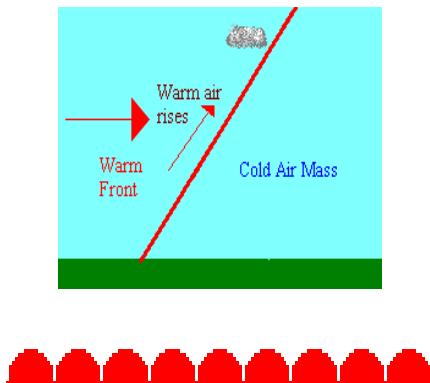
53. Cold Front



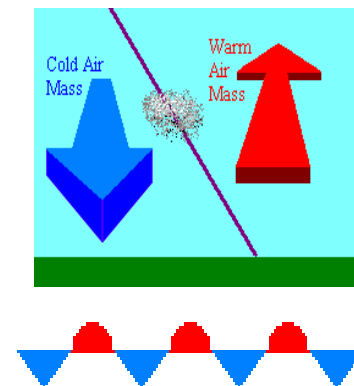
55. Occluded Front



54. Warm Front



56. Stationary Front



57. Cold fronts move faster than warm fronts.
58. Porosity (the amount of holes) DOES NOT depend on particle size.
59. Permeability (connection of holes) increases as particle size increases.
60. Capillarity (movement of water upward) decreases with increasing particle size.
61. Ep (potential evapotranspiration) depends upon temperature.
62. Water bodies moderate temperature (smaller temperature range).
63. Air cools and expands as it rises.
64. Orographic effect (Adiabatic changes)
65. The windward side of a mountain is cool and wet.
66. The leeward side of a mountain is warm and dry.
67. Gravity is the force behind all erosion (causes all erosion).
68. Chemical weathering is most effective in a warm, moist climate (Think about the antacid experiment - "The Rock Called Alka-Seltzer.") and physical (or mechanical) weathering occurs mostly in cold, humid climates (good for frost wedging).
69. Physical (or mechanical) weathering is when a material is broken down into smaller pieces of the same item. For example, if you through chalk against the wall, it is broken into smaller pieces, but is still chalk. Chemical weathering is when a material is broken down into smaller pieces of a different material. For example, if you put iron in water, it rusts (forms iron oxide).
70. Streams are the number one agent of erosion.
71. Stream velocity depends on slope of the land's surface (slope) and the stream's discharged.
72. Velocity is faster on the outside of a meander bend/bend: Where erosion occurs. Velocity is slower on the inside of a meander bend/curve: Where deposition occurs. (Remember how it feels to turn a sharp corner in your car doing 90 mph!)

73. Heavy-dense-round particles settle out of water first.
74. Graded bedding (vertical sorting): biggest sediments on the bottom.
75. Glacial sediments are unsorted and scratched, whereas, stream deposits are sorted, round, and smooth.
76. Glaciers cause a **U**-shaped valley as the "**B**ulldoze" there way through. **R**ivers cause a **V**-shaped valley as they cut their way downward (down cutting).
77. Rocks are classified on the basis of how they were formed:
 - a. Sedimentary rocks: They form in strata, or flat layers. They are fragmental (made of fragments of other rocks, like conglomerate) or evaporites (made from dissolved sediment that was left behind as the liquid evaporated, like rock salt). They are the only group with fossils.
 - b. Igneous rocks: They are intrusive or extrusive. Extrusive rocks are sometimes called volcanic, and are formed on the surface. Intrusive rocks are sometimes called plutonic rocks, and cool beneath the surface of the crust. Extrusive rocks cool faster than intrusive rocks. The faster they cool, the smaller the crystals, and the slower they cool, the larger the crystals. Their texture can be course grained (large crystals), fine grained (small crystals), or glassy (no visible crystals). **Please Note:** When talking about igneous rocks, "glassy" is a texture, not a luster. Even Pumice is a glassy texture, but it does not have a glassy luster. A glassy texture simply means that **NO CRYSTALS CAN BE SEEN**.
 - c. Metamorphic rocks: They have foliation (are foliated) or do not show foliation (are nonfoliated), and could show banding or distorted structures.
78. Mineral properties depend on the internal arrangement of atoms.
79. Most rocks are silicates (SiO_4). The **Silicon-Oxygen tetrahedron** is the basic unit of most rocks. (Note: You do not need to know this, but it is a fun fact: about 30% of all minerals are thought to be silicates, and about 90% of the Earth's crust is thought to be made up of silicates.)
80. Isostasy: The principle that the Earth's crust is in equilibrium - Adding weight will cause it to stretch and sink; removing weight (erosion) will cause it to go back to normal (uplift and subsidence). "The Rubber Band Effect."
81. Mid-ocean ridges: crust is created (divergence/divergent boundary).
82. Trenches: crust is destroyed (convergence/convergent boundary/trench = subduction zone).
83. P-waves are faster than S-waves.
84. P-waves travel through solids and liquids, but S-waves **only** travel through solids.
85. You need **at least 3 seismic station** readings to locate an epicenter.
86. Most earthquakes and volcanoes occur in specific zones on the Earth.
87. In undisturbed strata, the bottom layer is the oldest. This is called the "Law of Superposition." Intrusions and faults are younger than the rock they are in.
88. Geologic time scale units are based on fossil evidence.
89. Most life forms of the geologic past have become extinct.
90. Unconformity: erosional surface. Where evidence of what had formed next is removed or interrupted.
91. An **Arid Landscape** has **steep slopes**, and a **Humid Landscape** has **smooth, rounded slopes**.
92. **USE THE REFERENCE TABLES!!!**
93. Uranium 235 (U^{235}) is used to date old rocks, and Carbon 14 (C^{14}) is used to date recent, once living objects (up to about 75,000 years ago).
94. Convection currents in the mantle move the plates (plate tectonics).
95. Technology increases our quality of life while it often causes stress on the environment.
96. Pollution is the concentration of any material(s) harmful to life.
97. Careful planning and conservation are necessary to preserve our limited resources.
98. Water expands when it freezes.
99. The universe began with a big explosion--"The Big Bang"
100. Our solar system is located on one of the outer arms of our Milky Way Galaxy
101. Earth is closest to the sun in January
102. The half-life of a radioactive element can't be changed
103. Ocean crust is thin and made of basalt
104. Continental crust is thick and made of granite
105. Mountains form by uplift, folding and faulting
106. The accepted value is the correct answer. The measured value is the guess.
107. Dynamic equilibrium means balance
108. Increase in latitude and altitude have the same affect on climate
109. Index fossils are good time markers (widely spread, lived a short time)
110. Calcite fizzes with acid, halite tastes salty, and sulfur smells like rotten eggs.
111. When a rock is broken into smaller pieces, surface area increases and weathering rate increases
112. Water is densest at 40°C , when it is a liquid.
113. Land cools down faster than water, water cools down slower than land.
114. Land warms up faster than water, water warms up slower than land.
115. Igneous intrusions have contact metamorphism on all sides, even the top. Igneous extrusions do not have contact metamorphism on top, even if it is covered by new layers of rock.
116. Water vapor is invisible, and clouds can only form if there is some type of condensation nuclei.
117. Fog is a "cloud on the ground." It forms the same way as a cloud, but is on ground level.
118. Memorize the "DREADED 13" (Below!).
119. Read the Tips For Taking The Regents (Below!).

THE 13 DREADED EARTH SCIENCE FACTS

1. If you cut an object into pieces, you DO NOT change its density.
2. The altitude of Polaris equals your latitude.
3. Coriolis effect deflects things to the right in the Northern Hemisphere.
4. Condensation: Water vapor changing to liquid water (remove heat from water).
5. Evaporation: liquid water changing to water vapor (add heat to the water).
6. There is NO temperature change during a phase change.
7. Low pressure: wet weather (warm)
8. High pressure: dry weather (cold)
9. Weather moves west to east.
10. Porosity DOES **NOT** depend on particle size.
11. Potential evapotranspiration (EP) depends only on temperature.
12. Minerals have different properties because of the way their atoms are arranged.
13. Marine (sea) fossils on mountaintops indicate that the land has been uplifted.

TIPS FOR TAKING THE REGENTS

1. When in doubt, see if the reference tables will help
2. Always try to eliminate two answers
3. When a rock is broken into smaller pieces, surface area increases and weathering rate increases
4. Use complete sentences for the free responses
5. USE THE REFERENCE TABLES!
6. Relax--You've already completed 15% of the exam.
7. Be sure to answer every question. At the end, if you have no idea, take a guess.
8. Take your time. You have three hours to do the exam
9. Read introductory paragraphs and study diagrams before looking at questions. Underline key words.
10. Draw diagrams to help you visualize the questions asked - where possible
11. Use a straight-edge to read graphics, to mark points on a graph and to measure distances.
12. If certain words cause confusion, cross them out and substitute a different word, then read the question again. (example: substitute the word "false" for "not true")
13. If you are not sure of an answer, try to eliminate choices that you think are clearly wrong and narrow down your choices. Then make your most careful guess.
14. Don't leave any questions blank. If you REALLY do not know the answer, guess!!! If you guess, the answer could be right or it could be wrong. If the answer is wrong, then it will be wrong, but if you leave it blank, you will not even have a chance to get it right. (All four choices = a 1 in 4 chance of getting it right. Two choices is a 1 in 2 chance. So, follow tip number 13.
15. Read all choices before deciding on an answer, sometimes a question has a good and an even better answer. Always choose the best answer.
16. Ask yourself: Is it in the reference tables, or can the reference tables help me?
17. Check your test a second time, but only change an answer if you find an obvious mistake. Your first choice is usually correct.
18. Look up formulas, even if you think you know them. Substitute information from the question into the formula. Most are on the back page of the reference tables.
19. Skip over hard questions that are stumping you. Go back to them later. Something else in the test may give you a clue to the harder problems.
20. Have a healthy meal for dinner the night before, and a good breakfast that morning.
21. A good night sleep is as important as the above 120 items.
22. Relax-you've seen all this stuff before.
23. Practice old regents exams. "Practice makes perfect."
24. Know the "Density Triangle." A.K.A.: The DMV Triangle.
25. Read the additional tips to taking the regents.

Definitions:

- Cyclic - goes in cycles.
- Orographic effect - When mountains block the moisture from one of its sides. The side that is blocked is the side opposite the main flow of wind (global wind pattern). The warm air is forced upward, and, therefore, is forced to cool. When it cools, it condenses, forming clouds, and possibly even rain. Note: The side that the wind hits is called the windward side, and tends to be very moist. The opposite side of the mountain is called the leeward side, and tends to be very dry.
- Adiabatic changes - Changes in a gas caused by expansion (cooling) or compression (warming).
- The Dark Side of The Moon - It was once believed that one part of the Moon was always in darkness, and that it would not matter which way that side was facing. In other words, it was thought that one side was never ever reached by sunlight. This is not true! While the side facing the Sun is always lit, and the side facing away from the Sun is always in darkness, the Moon rotates as it orbits. This means that the half of the Moon that is always dark is whichever side is opposite the direction of the Sun at any given time. All parts of the moon will, at sometime during its rotation, have sunlight reaching it. So, the concept that one part of the Moon is constantly dark is not true. All parts of the Moon are reached by sunlight from time to time.

"There's no dark side of the Moon, really. As a matter of fact it's all dark." - Pink Floyd