REGENTS EARTH SCIENCE
TOP 55 FOR THE MIDTERM

These facts/concepts are guidelines to help you study. Memorization of these facts alone does not mean you have mastered the concept.
Make sure you look back at previous exams and review questions in your notes packets to see how questions related to these concepts are asked.

MEASUREMENT AND GRAPHING – Topic 1

1. Know how to construct a graph (determine an appropriate interval for each axis, labeling axes)

2. Know how to calculate density. **(ESRT page 1 – Density Formula)**

3. Understand the concept of relative densities: when substances are mixed, the more dense material sinks while the less dense material floats/rises.

4. As temperature increases, the density of a substance decreases.

5. Different sizes and shapes of a uniform substance have the same density.

6. The steeper the slope on a graph, the greater the rate of change.

7. Know how to calculate rate of change (could be a word problem, data table, or a line graph). **(ESRT page 1 – Rate of Change Formula)**

8. Be able to interpret all graphed relationships (direct, inverse, unaffected, cyclic) – even if it is a graph you haven't seen before

9. Cyclic changes repeat and are predictable (astronomy stuff) and non-cyclic do not repeat and are unpredictable (natural disasters, weather)

MODEL OF THE EARTH – Topic 2

10. Latitude ("flatitude") units are degrees N or S and longitude (run long-ways) units are degrees W or E. – Know how to find latitude and longitude using a grid, map, ESRT (including the degrees and minutes system)
(**ESRT page 3, 4, and 5 all have maps with latitude and longitude– make sure you understand them)**

11. The altitude of Polaris (height above the horizon) equals the latitude of the observer in the Northern Hemisphere.

12. Longitude lines separate time zones - Remember: every 15^{o} in longitude changes the time by 1 hour and "left is less"

13. The lithosphere is solid rock, the hydrosphere all the water on Earth, and atmosphere the shell of gases.
(**ESRT page 1 – Average Chemical Composition Chart tells the abundances of elements in each)**

14. Know how to read and interpret the **Properties of Earth's Atmosphere Chart in the ESRT on page 14.**

15. Ozone is important because it protects us from harmful UV rays which can cause cancer. CFC's (chlorofluorocarbons) released into the atmosphere over time by human activities has destroyed ozone.

FIELD MAPS AND ISOLINES – Topic 3

16. Know how to calculate gradient. **(ESRT page 1 – Gradient Formula)**

17. Be able to draw isolines and construct a topographic profile.

18. The closer the isolines (contour lines, isotherms, isobars) the steeper the gradient (slope).

19. Rivers always flow from high to low elevations. Remember that contour lines bend upstream (and our fish trick).

MODERN ASTRONOMY – Topic 4 (Part 1)

20. The Milky Way is a spiral galaxy and our Solar System is located on one of the spiral arms.

21. Evidence for the Big Bang Theory is provided by: the presence of cosmic background radiation and red shift of distant galaxies

22. **ESRT page 15 – Luminosity v. Temperature of Stars (H-R Diagram) –** Know it …. Live it …

23. The solid terrestrial planets are smaller and more dense than the Jovian (gas giant) planets – use **ESRT page 15 – Solar System Data**

24. **ESRT page 15 – Solar System Data –** There's lots of info on the chart - know when to refer to it.

25. Stars make their own energy by the process of nuclear fusion (H + H → He + energy).

EARTH MOTIONS – Topic 4 (Part 2)

26. Rotation is the spinning of the Earth (W→E) in 24 hours at a rate of 15^{o}/ hour and causes day and night changes.

27. Foucault's pendulum and the Coriolis Effect (the deflection of the winds and ocean currents) are the best evidences for Earth's rotation.

28. Revolution is the Earth orbiting the Sun in one year at a rate of 1^{o}/day and is related to seasonal changes.

29. Evidence for revolution is provided by the fact that we see different constellations in different seasons.

30. Be able to interpret the celestial sphere: altitudes, directions, time of day

31. Shadows always point in the opposite direction of the Sun. The higher the altitude of the Sun the shorter the shadow length.

32. Geocentric model places the Earth at the center of the solar system while the presently accepted heliocentric model places the Sun at the center.

LAWS OF PLANETARY MOTION and THE MOON – Topic 5 (Part 3)

33. Be able to calculate eccentricity. Understand that the higher the eccentricity value, the more elliptical (oval) the orbit is. (**ESRT page 1 – Eccentricity Formula and ESRT page 15 – Solar System Data)**

34. When a planet is closest to the Sun, its orbital velocity is the fastest.

35. Newton's Law of Universal Gravitation: two objects will have the most gravitational attraction when their masses are large and the objects are closer together

36. Moon phases are caused by the revolution of the Moon around the Earth –
Know how to determine the phase of the Moon occurring in a diagram and to sketch each phase..

37. High tide is located on the side of the Earth facing the Moon and on the opposite side as well.
Remember the "special tides" trick for spring and neap tides - "SSS" and "NNN"

38. Solar eclipses – Sun gets blocked by Moon during the day
Lunar eclipses – Earth's shadow gets cast on Moon at night

ENERGY – Topic 5

39. Energy travels from high temperatures (source) to low (sink) temperatures.

40. Be able to convert temperatures using **ESRT page 13**.

41. Convection is heat transfer in liquids and gases as a result of differences in density.
(Arrows in a diagram showing circulation of air or liquid is indicating a convection cell) – Hot air/liquid rises because it is less dense!

42. Radiation is heat energy transfer by waves and can travel through empty space **(ESRT page 14 – Electromagnetic Spectrum)**

43. Water has a high specific heat - it heats up and cools down slowly - it requires a lot of heat to change its temperature.
(ESRT page 1 – Specific Heats of Common Materials)

44. Heat is required to melt ice (s ->l) and vaporize water (l->g).
Heat must be removed to freeze water (l->s) and condense water vapor (g->l). **(ESRT page 1 – Properties of Water)**

45. Light is absorbed by dark, rough surfaces and reflected by light-colored, smooth surfaces.

46. Know the greenhouse effect diagram - visible light is incoming, (shorter wave) and infrared (heat) energy is outgoing, (longer wave)

47. Carbon dioxide, water vapor, and methane are greenhouse gases: they are good absorbers of infrared heat energy.

INSOLATION AND THE SEASONS – Topic 6

48. Be able to determine seasons based on tilt of the Earth -
the Northern Hemisphere is tilted toward the Sun in the summer and away from the Sun in the wintertime.

49. Perihelion is the earth closest to the Sun (our winter) and aphelion is when the earth is farthest from the Sun (our summer).

50. As angle of insolation increases, intensity of insolation increases (the higher the Sun, the stronger the rays).

51. The Sun's rays are more direct in the tropic zone (near the Equator) and at low angles at the poles.

52. The angle/intensity of insolation for a location in the northern hemisphere is greatest at noon and on June 21st.
and is least at sunrise or sunset and on December 21st.

53. The duration of insolation (daylight hours) varies greatly on the Earth with latitude and season. There are times during the year that the poles get 24 hours of daylight and other times, total darkness. Know how many daylight hours the North Pole, South Pole, New York, and the Equator experience on the solstices and equinoxes and the seasonal trends at each location

54. Know the following chart of information:

	June 21	September 23	December 21	March 21
Name Given to the Date:	Summer Solstice	Autumnal Equinox	Winter Solstice	Vernal Equinox
Direct Ray of the Sun Hits:	Tropic of Cancer (23.5°N)	Equator	Tropic of Capricorn (23.5°S)	Equator
In New York the Sun Rises/Sets:	north of east / north of west	due east / due west	south of east / south of west	due east / due west
Daylight Hours in NY:	15	12	9	12
Daylight Hours at North Pole:	24	12	0	12
Daylight Hours at South Pole:	0	12	24	12

55. Be able to identify/draw the seasonal paths of the Sun on a celestial sphere
Remember our: **E**quinox, Ju**NE**, and De**SE**mber trick