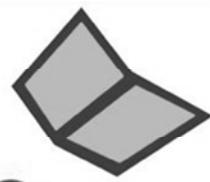


Review  
masters



# UPCAT Review

## GENERAL SCIENCE

VOLUME 6

**Violeta V. Quintana**

**Lorna A. Aporto**

**Neb L. Perez**

**Michael Leonardo C. Delomen**

**[www.upcatreview.com](http://www.upcatreview.com)**

**UPCAT Review – Science Review 1  
Downloadable e-Book**

Copyright © 2011 Review Masters™.

REVIEW MASTERS, upcatreview.com, Online UPCAT Review and other related  
indicia are trademarks of KB Tutorial and Consulting Corp.  
All rights reserved worldwide

This book cannot be redistributed without permission from KB Tutorial and Consulting Corp.  
More info at: <http://www.upcatreview.com>

For INFO and UPDATES, check out [upcatreview.com](http://www.upcatreview.com), the official  
website of Review Masters and the Online UPCAT Review®

Keep updated about UPCAT materials, reviewers, tips and news  
Copyright © 2011 Review Masters™ - <http://www.upcatreview.com>

# PREFACE

---

## **Believe That You Can Pass the UPCAT!**

by Leopold Laset

Do you sometimes find it hard to believe that your dream to pass the UPCAT can become a reality? If so, then there is something very important that you need to know.

UPCAT is for dreamers like you.

Every student who passed the UPCAT began thinking or dreaming of passing the UPCAT.

Your near-perfect or perfect score in a quarterly test, your cellphone, PSP, or any gadget, your out-of-town (or out-of-country) vacation, your new pair of shoes, and any other stuff that you desired and now possess - are all the result of your 'dream come true'.

What this means is that throughout your lifetime, you have had an idea, you have desired for many things and worked hard for them, overcome problems and ultimately transformed your dream into reality.

And if hundreds and thousands of students have been able to pass the UPCAT in the past, by starting with a dream, then it stands to reason, that you can do it too.

Often we make the mistake of thinking that UPCAT is for a small number of bright students who have the brains and intelligence that we don't possess.

But this is simply not true.

The fact that thousands of average students have brought their dreams of passing the UPCAT to fruition in the past demonstrates that the opportunity to qualify in the UPCAT is something that is available to each UPCAT aspirant – average or bright.

Right now, hundreds of UPCAT dreamers are taking the steps necessary to achieve the goals of passing the UPCAT. Some are studying this early, some are joining community of fellow dreamers, and some are attending review classes. What is it that you need to do?

In order to achieve your goal of passing the UPCAT, the only things you really need are:

- (1) A crystal clear picture that you already passed the UPCAT
- (2) An unshakeable determination to do whatever it takes to make your dream of passing the UPCAT a reality

As soon as you take these two steps, passing the UPCAT becomes achievable. If you need a help – you look for it. If you encounter a difficult concept – you find a way to understand it. If you can't solve a math problem – you try and try and practice more.

And gradually, step-by-step, you bring your UPCAT dream into reality to join the dreams of the thousands of UPCAT dreamers who have gone before you.

So today I'd like to encourage you to believe in yourself and appreciate the fact that you live in a world where 'dreams do come true'.

Understand that thousands of students have made their UPCAT dream a reality in the past – Thousands more will make their UPCAT dream a reality in the near future and you CAN be one of them.

---

## GENERAL SCIENCE CONTENTS

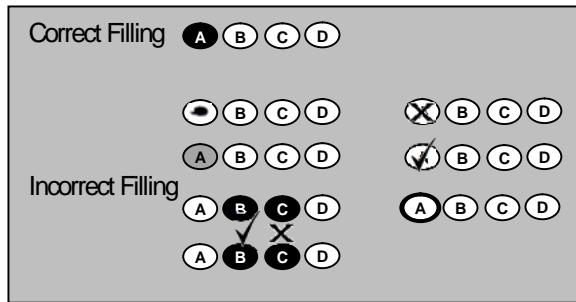
- *Structure of the Earth*
- *Theory of Continental Drift*
- *Seafloor Spreading*
- *Theory of Plate Tectonics*
- *Plate Boundaries*
- *Earthquakes*
- *Volcanoes*
- *Minerals*
- *Rocks*
- *Weathering and Erosion*
- *Change and Earth's History*
- *The Atmosphere*

## TABLE OF CONTENTS

	page
<u>REVIEW TEST</u>	----- 4
<u>ANSWERS AND EXPLANATIONS</u>	----- 15

## ANSWER SHEET - GENERAL SCIENCE

PLEASE DETACH ALONG PERFORATION



**Please use No. 2 Pencil**

- |                     |                     |                     |                      |
|---------------------|---------------------|---------------------|----------------------|
| 1. (A) (B) (C) (D)  | 26. (A) (B) (C) (D) | 51. (A) (B) (C) (D) | 76. (A) (B) (C) (D)  |
| 2. (A) (B) (C) (D)  | 27. (A) (B) (C) (D) | 52. (A) (B) (C) (D) | 77. (A) (B) (C) (D)  |
| 3. (A) (B) (C) (D)  | 28. (A) (B) (C) (D) | 53. (A) (B) (C) (D) | 78. (A) (B) (C) (D)  |
| 4. (A) (B) (C) (D)  | 29. (A) (B) (C) (D) | 54. (A) (B) (C) (D) | 79. (A) (B) (C) (D)  |
| 5. (A) (B) (C) (D)  | 30. (A) (B) (C) (D) | 55. (A) (B) (C) (D) | 80. (A) (B) (C) (D)  |
| 6. (A) (B) (C) (D)  | 31. (A) (B) (C) (D) | 56. (A) (B) (C) (D) | 81. (A) (B) (C) (D)  |
| 7. (A) (B) (C) (D)  | 32. (A) (B) (C) (D) | 57. (A) (B) (C) (D) | 82. (A) (B) (C) (D)  |
| 8. (A) (B) (C) (D)  | 33. (A) (B) (C) (D) | 58. (A) (B) (C) (D) | 83. (A) (B) (C) (D)  |
| 9. (A) (B) (C) (D)  | 34. (A) (B) (C) (D) | 59. (A) (B) (C) (D) | 84. (A) (B) (C) (D)  |
| 10. (A) (B) (C) (D) | 35. (A) (B) (C) (D) | 60. (A) (B) (C) (D) | 85. (A) (B) (C) (D)  |
| 11. (A) (B) (C) (D) | 36. (A) (B) (C) (D) | 61. (A) (B) (C) (D) | 86. (A) (B) (C) (D)  |
| 12. (A) (B) (C) (D) | 37. (A) (B) (C) (D) | 62. (A) (B) (C) (D) | 87. (A) (B) (C) (D)  |
| 13. (A) (B) (C) (D) | 38. (A) (B) (C) (D) | 63. (A) (B) (C) (D) | 88. (A) (B) (C) (D)  |
| 14. (A) (B) (C) (D) | 39. (A) (B) (C) (D) | 64. (A) (B) (C) (D) | 89. (A) (B) (C) (D)  |
| 15. (A) (B) (C) (D) | 40. (A) (B) (C) (D) | 65. (A) (B) (C) (D) | 90. (A) (B) (C) (D)  |
| 16. (A) (B) (C) (D) | 41. (A) (B) (C) (D) | 66. (A) (B) (C) (D) | 91. (A) (B) (C) (D)  |
| 17. (A) (B) (C) (D) | 42. (A) (B) (C) (D) | 67. (A) (B) (C) (D) | 92. (A) (B) (C) (D)  |
| 18. (A) (B) (C) (D) | 43. (A) (B) (C) (D) | 68. (A) (B) (C) (D) | 93. (A) (B) (C) (D)  |
| 19. (A) (B) (C) (D) | 44. (A) (B) (C) (D) | 69. (A) (B) (C) (D) | 94. (A) (B) (C) (D)  |
| 20. (A) (B) (C) (D) | 45. (A) (B) (C) (D) | 70. (A) (B) (C) (D) | 95. (A) (B) (C) (D)  |
| 21. (A) (B) (C) (D) | 46. (A) (B) (C) (D) | 71. (A) (B) (C) (D) | 96. (A) (B) (C) (D)  |
| 22. (A) (B) (C) (D) | 47. (A) (B) (C) (D) | 72. (A) (B) (C) (D) | 97. (A) (B) (C) (D)  |
| 23. (A) (B) (C) (D) | 48. (A) (B) (C) (D) | 73. (A) (B) (C) (D) | 98. (A) (B) (C) (D)  |
| 24. (A) (B) (C) (D) | 49. (A) (B) (C) (D) | 74. (A) (B) (C) (D) | 99. (A) (B) (C) (D)  |
| 25. (A) (B) (C) (D) | 50. (A) (B) (C) (D) | 75. (A) (B) (C) (D) | 100. (A) (B) (C) (D) |

## GENERAL SCIENCE REVIEW TEST

For questions 1-3 please refer to the following choices:

- A. Gold and silver
- B. Iron and nickel
- C. Oxygen and silicon

1. What materials are abundant in the crust?
2. What does the mantle contain?
3. The metals \_\_\_\_\_ make up most of the earth's core.
4. Which does not belong to the group?
  - A. asthenosphere
  - B. mesosphere
  - C. lithosphere
  - D. troposphere
5. Movement of tectonic plates is due to the hot, flowing condition of the asthenosphere. What is the term for semi-liquid condition?
  - A. fluidity
  - B. malleability
  - C. plasticity
  - D. rigidity
6. The outer core is \_\_\_\_\_ because \_\_\_\_\_ is the controlling factor.
  - A. solid – temperature
  - B. liquid – pressure
  - C. liquid – temperature
  - D. solid – pressure
7. The inner core is \_\_\_\_\_ because \_\_\_\_\_ is the controlling factor.
  - A. solid – temperature
  - B. liquid – pressure
  - C. liquid – temperature
  - D. solid – pressure
8. Energy in the mesosphere moves slowly by \_\_\_\_\_.
  - A. conduction
  - B. convection
  - C. radiation
  - D. conduction and radiation
9. The crust is made up of two separate layers: the oceanic crust and the continental crust. Which of the following characterizes the oceanic crust?
  - A. exhibits folded mountain formation
  - B. composed of basalt and gabbro
  - C. composed of granite and rhyolite
  - D. composed of rocks with low density
10. Which make up continental crust?
  - A. basalt and gabbro
  - B. granite and rhyolite
  - C. limestone and sandstone
  - D. granite and basalt
11. Which make up the lithosphere?
  - A. crust
  - B. crust and upper mantle
  - C. upper mantle
  - D. upper and lower mantle

- 12. The shadow zone is the boundary between the \_\_\_\_\_?**
- A. crust and upper mantle      C. lower mantle and outer core  
B. upper mantle and lower mantle      D. outer core and inner core
- 13. Which best describes primary waves?**
- A. compress and expand particles that lie in their path  
B. resemble the wavelike motion that results when a rope is stretched from side to side  
C. both A and B  
D. none of the above
- 14. Which illustrates a surface wave?**
- A. compress and expand particles that lie in their path  
B. resemble the wavelike motion that results when a rope is stretched from side to side  
C. both A and B  
D. none of the above
- 15. Where do the seismic waves from an earthquake go? Seismic waves spread out in**
- A. a straight line      C. all directions  
B. a perpendicular pattern      D. no particular direction
- 16. Why can earthquakes be not detected at the shadow zone?**
- A. It is too deep within the earth.  
B. The outer core stops P waves and bends S waves.  
C. The outer core bends P waves and stops S waves.  
D. The outer core bends L waves.
- 17. Why are P waves bent as they strike the mantle?**
- A. The core and the mantle have identical properties.  
B. The core and the mantle have different properties.  
C. The crust and the mantle have identical properties.  
D. The crust and the mantle have different properties.
- 18. A change in direction of a wave as it moves through rock layers of different densities is known as**
- A. deflection      B. reflection      C. refraction      D. diffraction
- 19. What is the principle of uniformitarianism?**
- A. The geologic processes that occurred in the past are very much different from today's processes.  
B. The same processes that shaped the earth are still at work today.  
C. The laws of nature changes very much over time.  
D. Only sedimentation occurred.

**20. Which supported the continental drift theory?**

- 1. fossils
- 2. rock formations
- 3. continental edges
- 4. glaciers

A. 1 only                      B. 1 and 2                      C. 1, 2, and 3                      D. 1, 2, 3, and 4

**21. All of the following are associated with seafloor spreading except:**

- A. divergent plate boundaries                      C. old age of oceanic crust compared to continental crust  
B. mid-oceanic ridges                              D. rising of magma from the asthenosphere

**22. Which of the following occurs when two oceanic plates collide?**

- A. folded mountain formation                      C. subduction  
B. seafloor spreading                                D. tension

**23. Any plate boundary where the plates collide is called a \_\_\_\_\_ boundary.**

- A. convergent                      B. divergent                      C. strike-slip                      D. transform

**24. The theory of \_\_\_\_\_ explains all known major surface geological phenomena.**

- A. continental drift                                C. sea-floor spreading  
B. plate tectonics                                 D. none of the above

**25. What are formed when two continental plates collide?**

- A. folded mountains                                C. trenches  
B. rift valleys                                        D. volcanoes

**26. Which of the following global locations best shows the action of divergent plate boundaries?**

- A. African rift valley                                C. Marianas trench  
B. Himalayan mountain range                      D. Mayon volcano

**Questions 27 and 28 are related.**

**27. The type of stress that can form a trench is \_\_\_\_\_.**

- A. compression                                    C. shear                                      D. tension

**28. What kind of fault results from # 27?**

- A. gravity                                        C. normal                                    D. reverse

**29. In a \_\_\_\_\_ fault, the hanging wall moves upward in relation to the footwall, while in a \_\_\_\_\_ fault, the hanging wall moves downward in relation to the footwall.**

- A. normal.....reverse                              C. reverse.....thrust  
B. reverse.....normal                                D. uplift.....thrust

**30. Arrange the following in the correct sequence**

1. oceanic crust melts
2. magma rises through the earth's crust
3. pool of magma forms under the earth's surface
4. magma solidifies forming a pluton
5. oceanic crust subducts at boundary with continental plate

A. 1, 2, 3, 4, 5      B. 5, 4, 3, 2, 1      C. 5, 1, 3, 2, 4      D. 2, 5, 1, 4, 3

**31. What kind of fault is formed by tension?**

A. normal      B. reverse      C. lateral      D. transform

**32. On the other hand, what kind of fault is formed by compression?**

A. normal      B. reverse      C. lateral      D. transform

**33. Volcanic eruptions usually occur at the \_\_\_\_\_ of continents where forces between adjoining tectonic plates are usually the strongest.**

A. bottom      B. edges      C. middle      D. surface

**34. What kind of energy do seismic waves carry?**

A. kinetic      B. light      C. potential      D. radiant

**35. The earth has \_\_\_\_\_ energy and is changed into \_\_\_\_\_ energy during an earthquake.**

A. kinetic.....potential      C. mechanical.....light  
B. potential.....kinetic      D. light.....radiant

**36. The energy transformation in # 35 occurs at the \_\_\_\_\_.**

A. epicenter      B. focus      C. Moho      D. Shadow zone

**37. What happens to the amount of kinetic energy carried by the wave as the wave moves away from the focus?**

A. decreases  
B. increases  
C. remains the same  
D. fluctuates depending on the substance that the wave passes thru

**38. Which earthquake waves are called body waves?**

A. P and L      B. L only      C. P and S      D. L and S

**39. The area along a fault where rocks first break and move is the\_\_\_\_\_.**

A. epicenter      B. focus      C. Moho      D. Shadow zone

**40. The point on the earth's surface where an earthquake's shaking is generally the strongest is\_\_\_\_\_.**

A. epicenter      B. focus      C. Moho      D. Shadow zone



51. Moh's scale is used to determine the \_\_\_\_\_ of a mineral.  
A. Hardness      B. luster      C. malleability      D. magnetism
52. A mineral scratches all the other minerals. What is its hardness number in Moh's scale?  
A. 9      B. 10      C. 11      D. 12
53. The "lead" in pencil is actually  
A. charcoal      B. graphite      C. halite      D. quartzite
54. What minerals maybe used to make porcelain?  
A. borax and feldspar      C. talc and halite  
B. quartz and sulfur      D. graphite and gypsum
55. The \_\_\_\_\_ of a mineral leaves even surface while \_\_\_\_\_ of a mineral leaves uneven plane.  
A. fracture.....cleavage      C. hardness.....streak  
B. cleavage....fracture      D. specific gravity....streak
56. You have two mineral samples that vary in color but are identical in all other properties. What can you infer about the two samples?  
A. different mineral, different impurities      C. same mineral, different impurities  
B. different mineral, same impurities      D. same mineral, same impurities

**Questions 57 and 58 are related.**

57. A sample of a mineral has a mass of 64 g and a volume of 16 cm<sup>3</sup>. What is its density?  
A. 48 g x cm<sup>3</sup>      B. 80 g x cm<sup>3</sup>      C. 4 cm<sup>3</sup>/g      D. 4 g/cm<sup>3</sup>
58. What is its specific gravity?  
A. 4      B. 8      C. 16      D. 32
59. Which does NOT belong to the group?  
A. marble      B. sandstone      C. schist      D. quartzite
60. Which is an igneous rock?  
A. conglomerate      B. gneiss      C. obsidian      D. phyllite
61. Which is a metamorphic rock?  
A. schist      B. dolomite      C. pumice      D. limestone
62. Igneous rocks are formed by the \_\_\_\_\_ of magma.  
A. cooling and solidifying      C. depositing and cementing  
B. cooling and cementing      D. solidifying and depositing

63. The process by which new rocks are formed thru intense heat and pressure is called \_\_\_\_\_.  
A. crystallization      B. lithification      C. metamorphism      D. plastic deformation
64. Both sedimentary rocks are metamorphic foliated rocks have layers. Sedimentary rocks are formed by \_\_\_\_\_ while foliated rock layers consist of \_\_\_\_\_.  
A. particles of different sizes.....different minerals  
B. particles of the same size.....same minerals  
C. organisms of different sizes.....same minerals  
D. different minerals.....particles of different sizes
65. When magma cools rapidly, the rocks that form \_\_\_\_\_.  
A. have small or no minerals      C. have large mineral crystals  
B. are glassy      D. are fractured
66. A rock with two very different textures means that the rock probably  
A. is sedimentary      C. is metamorphic  
B. formed at two different depths      D. formed as two different rocks fused
67. The oldest rock layers lie on the bottom according to the principle of  
A. crosscutting      B. faunal succession      C. superposition      D. uniform process
68. The parent rock of gneiss is \_\_\_\_\_.  
A. clay      B. shale      C. limestone      D. granite
69. Breakdown of rocks due to daily fluctuations in temperature is a form of \_\_\_\_\_.  
A. chemical weathering      C. mechanical weathering  
B. leaching      D. oxidation
70. Which is NOT a factor of weathering?  
A. heat      C. plants and animals  
B. temperature and pressure      D. magnetic field
71. Frost action breaks rocks apart due to \_\_\_\_\_.  
A. the expansion of water as it expands      C. the sharp edges of the ice  
B. the dissolution of minerals by water      D. none of the above
72. Which mineral will resist weathering the most?  
A. calcite      B. feldspar      C. iron oxide      D. quartz
73. The most important product of weathering is \_\_\_\_\_.  
A. another rock      B. mineral      C. soil      D. fine particle of rock

74. Daily temperature changes affect rocks due to the \_\_\_\_\_ of the outer surface layer of the rock which causes rocks to crack.
1. *expansion*
  2. *contraction*
  3. *convection*
- A. 1 only      B. 2 only      C. 1 and 2      D. 2 and 3
75. Which is not a form of chemical weathering?
- A. carbonation      B. exfoliation      C. hydration      D. oxidation
76. Why is carbonic acid a significant weathering agent?
- A. it is a strong acid      C. it is common in nature
- B. it can be artificially synthesized      D. it is naturally occurring
77. What forces break / split parent rock into blocks or boulders?
1. *mechanical weathering*
  2. *chemical weathering*
  3. *cementation*
  4. *lithification*
- A. 1 only      B. 2 only      C. 1 and 2      D. 3 and 2 and 4

*Classification of rivers depends on how much they erode the areas around them. There are three stages of river erosion: young, mature and old.*

**For questions 78 and 79 refer to the following:**

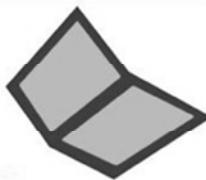
- A. little erosion at the bottom of the river, steep slope, swift flow,  
B. presence of rapids and waterfalls V-shaped valleys  
C. broad, flat floodplain, oxbow lake  
D. gentle slope, presence of meanders  
E. rapids and waterfalls, oxbow lake, meanders

78. Which characterizes an old river?
79. Which best describes a young river?
80. Which of the following best explains why nitrogen is the most common gas in the atmosphere?
- A. it is inert      C. it is needed to produce fertilizers  
B. it is required for respiration      D. it is a vital component of amino acids
81. In Northern Hemisphere, air in a cyclone blows \_\_\_\_\_.  
A. clockwise      C. counterclockwise  
B. from west to east      D. into an area of high pressure
82. The least dense air is found in the \_\_\_\_\_.  
A. mesosphere      B. stratosphere      C. thermosphere      D. troposphere

83. The layer of the atmosphere which contains the ozone gas is \_\_\_\_\_.  
A. mesosphere      B. stratosphere      C. thermosphere      D. troposphere
84. In what part of the atmosphere do average sized and large meteors burn in during atmospheric entry?  
A. exosphere      B. ionosphere      C. mesosphere      D. stratosphere
85. Why don't we feel pressure of air?  
A. Pressure inside and outside our bodies are equal.  
B. Pressure inside our body is greater than the pressure outside our body.  
C. Pressure inside is lesser than the pressure outside.  
D. Air pressure is negligible.
86. How are the density of air and the air pressure related to the height above the surface of the earth?  
A. Density and pressure increases as the height increases.  
B. Density and pressure decreases as the height increases.  
C. Density increases with altitude while pressure decreases.  
D. Density decreases with altitude while pressure increases.
87. Energy that powers weather comes from the sun. How is this energy transferred among the different air masses in the earth?  
A. convection      B. radiation      C. conduction      D. radiation and conduction
88. The warming of the atmosphere due to the trapping of heat from the sun by carbon dioxide and other gases is known as \_\_\_\_\_.  
A. coriolis effect      B. ozone depletion      C. smog      D. greenhouse effect
89. The gas in the stratosphere that absorbs UV radiation is \_\_\_\_\_.  
A. oxygen      B. neon      C. ozone      D. carbon
90. The layer of the atmosphere where most airline planes travel in is the \_\_\_\_\_.  
A. Stratosphere      B. ionosphere      C. exosphere      D. troposphere
91. The temperature at which air is saturated with water vapor is called the \_\_\_\_\_.  
A. saturation point      C. freezing point  
B. evaporation point      D. dew point
92. Air mass A is 80% saturated, while air mass B is 60% saturated. Assuming that air temperature is constant, which of the following statements is true?  
A. Air mass A has lower dew point than air mass B.  
B. Air mass A has higher dew point than air mass B.  
C. Air mass A and air mass B have equal dew points.  
D. No conclusion regarding dew points can be made.

93. Air mass A has a water vapor amount of 25ppm while air mass B has 50ppm. Assuming air temperature is constant, which of the following statements is true?
- A. Air mass A would exhibit rain first.  
B. Air mass B would exhibit rain first.  
C. Both air masses will exhibit rain at the same time.  
D. No conclusive statement about rain can be made.
94. Sea and land breezes are caused by \_\_\_\_\_.  
1. uneven heating  
2. local changes in air pressure  
3. changes in air density  
A. 1 only                      B. 2 only                      C. 1 and 2                      D. 1, 2 and 3
95. The \_\_\_\_\_ corresponds to the solar surface.  
A. chromosphere      B. corona      C. photosphere      D. radiation zone
96. The \_\_\_\_\_ is the origin of the solar wind.  
A. chromosphere      B. convection zone      C. core      D. corona
97. After billions of years, the sun would eventually use up its hydrogen fuel and “die”. It would then become a  
A. black hole      B. red giant      C. supernova      D. white dwarf
98. new moon → \_\_\_\_\_ → waxing quarter → \_\_\_\_\_ → full moon → \_\_\_\_\_ → waning quarter  
→ \_\_\_\_\_ → new moon  
A. waxing gibbous → waxing crescent → waning gibbous → waning crescent  
B. waxing crescent → waxing gibbous → waning crescent → waning gibbous  
C. waxing gibbous → waxing crescent → waning crescent → waning gibbous  
D. waxing crescent → waxing gibbous → waning gibbous → waning crescent
99. Which of the following does not belong to the group?  
A. Jupiter      B. Neptune      C. Pluto      D. Saturn
100. Earth's axis is tilted at an angle of \_\_\_\_\_.  
A.  $21.5^{\circ}$       B.  $23.5^{\circ}$       C.  $30.2^{\circ}$       D.  $40.1^{\circ}$

Review  
m a s t e r s



# UPCAT Review

## GENERAL SCIENCE

**VOLUME 6**

***Answers and  
Explanations***

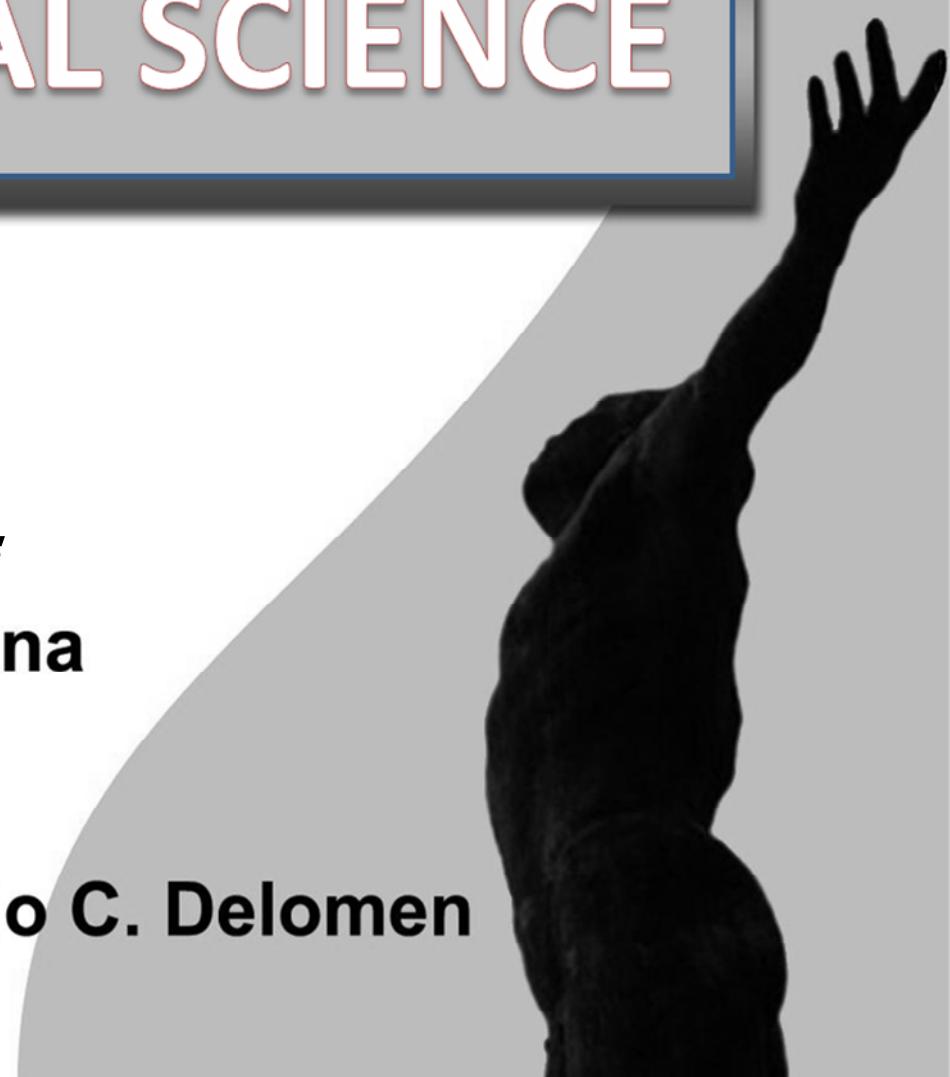
**Violeta V. Quintana**

**Lorna A. Aporto**

**Neb L. Perez**

**Michael Leonardo C. Delomen**

**[www.upcatreview.com](http://www.upcatreview.com)**



## GENERAL SCIENCE REVIEW TEST – ANSWER KEY

1. Given the abundance of **oxygen and silicon** in the crust, it should not be surprising that the most abundant minerals in the *earth's crust* are the silicates.

Element	Approximate % by weight
Oxygen	46.6
Silicon	27.7
Aluminum	8.1
Iron	5.0
Calcium	3.6
Sodium	2.8
Potassium	2.6
Magnesium	2.1
All others	1.5

Thus, the answer is C.

2. The crust is, in fact, a product of mantle melting. So there is also an abundance of **oxygen and silicon** in the *earth's mantle*.

Element	Approximate % by weight
Oxygen	44.8
Silicon	21.5
Magnesium	22.8
Iron	5.8
Aluminum	2.2
Calcium	2.3
Sodium	0.3
Potassium	0.03

Thus, the best answer is C.

3. The earth's core is made up of **90% iron and 10% nickel**.

Thus, the answer is B.

4. The first three choices belong to the physical layers of the Earth. Physical layers are determined by the phase of matter in which they exist. They are determined by a balance of heat and pressure.

There are *five physical layers*:

1. The outer most physical layer is the **lithosphere**. Physically it is cool and solid. It is made up of the crust and a small part of the mantle.
2. Next is the **asthenosphere**. Physically it is hot and semiliquid. This state is often referred to as having plasticity. It is made of a thin part of the upper mantle. This layer is responsible for movement of plates of the lithosphere which results from convection currents.
3. The rest of the mantle makes the third layer called the **mesosphere**. It is hot and solid.
4. The fourth layer is the **outer core**. Physically it is hot and liquid. Currents in this layer cause the earth to have a magnetic field. This gives us a magnetic north pole. It is determined by the direction a compass points. We also have a geographic north pole which is determined by the axis of rotation of the earth.
5. The fifth layer is the **inner core**. Physically it is extremely hot and solid. The pressure is so great at this point that even though it is very hot, the pressure keeps it solid.

The **troposphere** is the lowest portion of Earth's **atmosphere**.

Thus, the answer is D.

5. As mentioned in the previous item, physically the **asthenosphere** is **hot and semiliquid**. This state is often referred to as having **plasticity**.

The **plasticity** of the **asthenosphere** is due to its being semi-liquid. Due to the presence of areas with solid rock and areas of magma, the **asthenosphere** as a whole flows slowly but consistently due to **convection**.

Thus, the answer is C.

- 6.** Temperature inside the earth increases as depth increases. These high temperatures are more than enough to melt rock. The **outer core**, being one of the deeper layers of the earth is **liquid** because of the **high temperatures** present at its location.

Thus, the answer is **C**.

- 7.** The **inner core** is the innermost layer of the earth. It is therefore located at the hottest part of the earth's interior. However, it remains **solid** because of the **great pressure** exerted by the other earth layers lying above the inner core. The intense pressure compresses the molecules of the inner core and prevents their movement. (movement of molecules is characteristic of liquids and gases)

Thus, the answer is **D**.

- 8.** Energy is transferred between the earth's surface and the atmosphere via conduction, convection, and radiation.

**Conduction** is the process by which heat energy is transmitted through contact with neighboring molecules. Energy in the **mesosphere** moves slowly by **conduction**.

**Convection** transmits heat by transporting groups of molecules from place to place within a substance. **Convection** occurs in fluids such as water and air, which move freely.

**Radiation** is the transfer of heat energy without the involvement of a physical substance in the transmission. **Radiation** can transmit heat through a vacuum.

Thus, the answer is **A**.

- 9.** The **oceanic crust** is more dense than **continental crust**. The **oceanic crust** is made up of heavier elements (**basalt and gabbro**).

Thus, the answer is **B**.

- 10.** High percentages of silicon, oxygen and aluminum in the **continental crust** contribute to a lower density as these elements have small atomic masses. **Granite and rhyolite (continental crust)** are less dense than **basalt and gabbro (oceanic crust)**.

Thus, the answer is **B**.

- 11.** The **lithosphere** is composed of the **upper crust**, 5 km thick in the oceans and 65 km thick on the continents, and the **upper mantle**, which makes up the remainder.

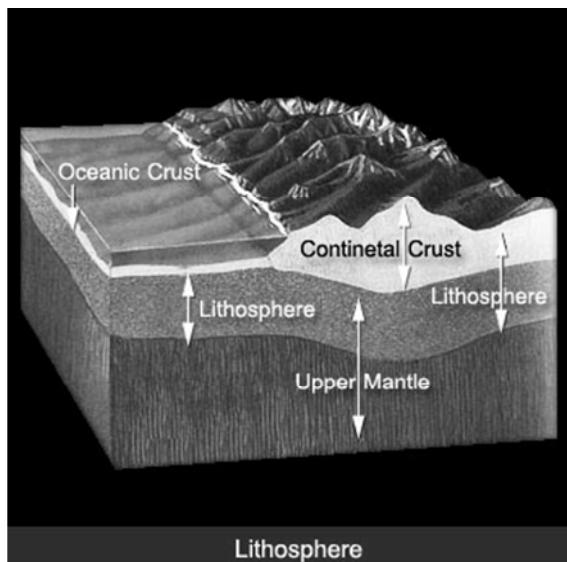


Image from <http://stloe.most.go.th>

Thus, the answer is **B**.

#### GENERAL SCIENCE TIP:

- **Ocean crust** is thin, dense and basaltic.
- **Continental crust** is thick, less dense and granitic.

- 12.** The **shadow zone** is the boundary between the **solid lower mantle** and the **liquid outer core**.

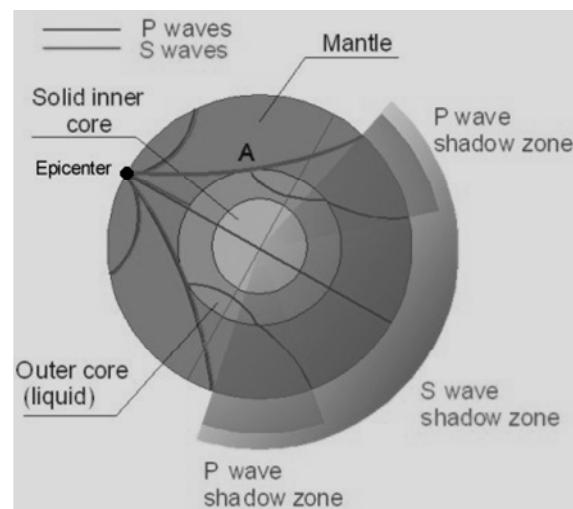


Image from <http://www.matter.org.uk>

Thus, the answer is **C**.

- 13.** The **P wave** is a longitudinal wave, wherein the wave vibrates forward and backwards as it travels forward. As it passes through rocks, the rock particles go with the motion of the wave; **some are stretched (expanded) and some are compressed**.

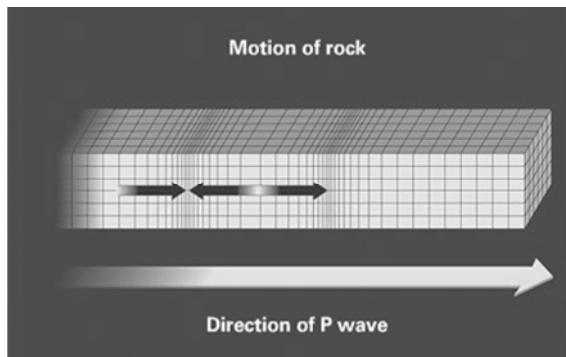


Image from <http://www.mnh.si.edu>

Thus, the answer is **A**.

- 14.** The motion of **surface waves** is complex. They **compress and expand particles that lie in their path**. They resemble **ocean waves**, only in rocks. They have **side-to-side motion** as well that is why they are very damaging to buildings.

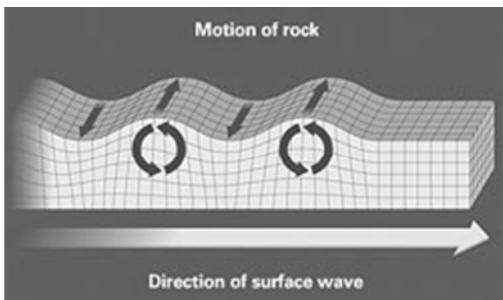


Image from <http://www.mnh.si.edu>

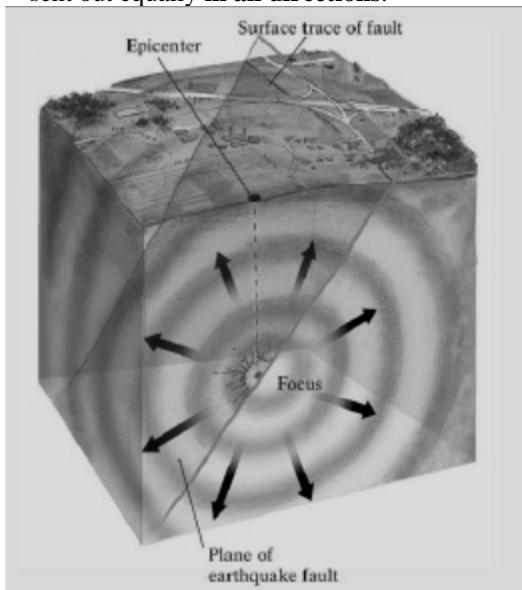
Thus, the answer is **C**.

#### GENERAL SCIENCE TIP:

- **P waves** are faster than **S waves**.
- **P waves** pass through liquids, solids and gases (**that's why people hear earthquakes**) **S waves** travel through "**S**" **solids only**.



- 15.** As rocks break at the focus, **seismic waves** are sent out equally **in all directions**.



Thus, the answer is **C**.

- 16.** As mentioned in **Item #12**, the **shadow zone** is the boundary between the **solid lower mantle** and the **liquid outer core**. **P waves** can pass thru both solid and liquid rock. **S waves** can ONLY pass thru solid rock. When P waves hit the shadow zone, they bend due to the difference in composition of the mantle and core. When S waves hit the liquid outer core, they stop. **The absence of the S wave makes it impossible for seismologists to detect earthquakes at the shadow zone**.

Thus, the answer is **C**.

- 17.** Though the **P wave** can pass through both solid and liquid rock, it will **change direction** if it passes through the boundary between two earth layers (**core and mantle**), if these 2 layers have **different properties**.

Thus, the answer is **B**.

#### 18. Wave behavior:

- **Reflection** (bouncing back of a wave from a surface)
- **refraction** (bending of a wave as it passes through a certain substance)
- **diffraction** (a wave is scattered if it passes through a certain substance)

Thus, the answer is **C**.

**19.** The processes that shaped the earth in ancient times (*plate tectonics, volcanic activity, weathering, erosion, etc.*) are still shaping the earth today.

Thus, the answer is **B**.

**20.** Continuity of fossil remains and rock formations among separate continents suggest that the present continents were once fused into a single landmass, **Pangaea**.

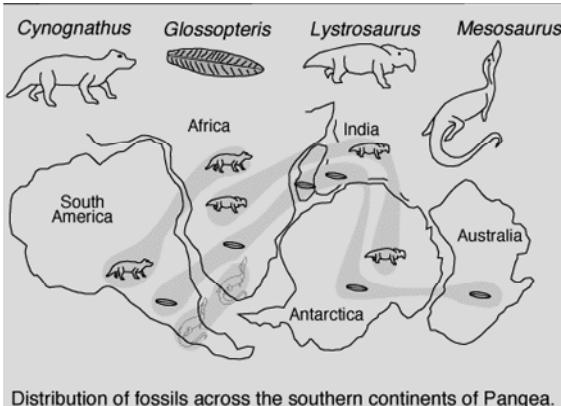


Image from <http://www.volcano.oregonstate.edu>

Thus, the answer is **C**.

**21.** Sea-floor spreading occurs where *oceanic plates are diverging from one another*. This lengthening of the crust allows *magma from the upper mantle* to rise to the surface and cool, commonly forming *basalt*. As a result, the *age of the rocks increases* as one moves away from the rift zone. The *midoceanic ridge* is the primary site for sea-floor spreading. Earthquakes and volcanoes are where sea floor spreading is occurring.

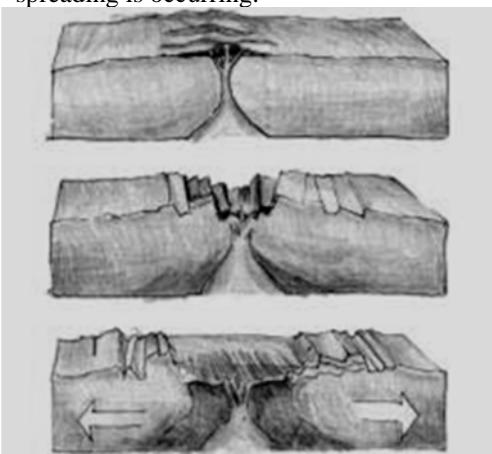


Image from <http://library.thinkquest.org>

Thus, the answer is **D**.

**22.** When *two plates collide*, the denser plate will move under the other plate. This is **subduction**. The plate that subducts will then sink into the mantle and melt.

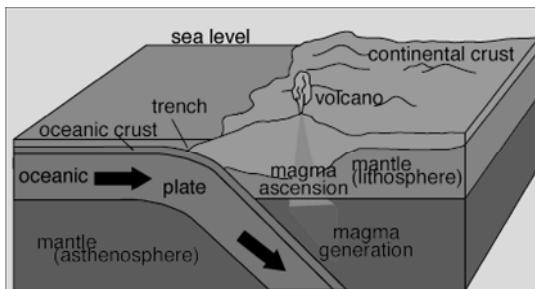
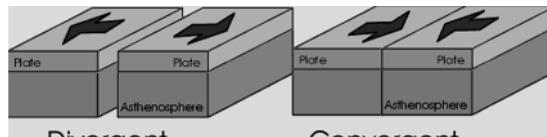


Image from <http://www.platetectonics.com>

Thus, the answer is **C**.

**23.** There are three types of plate boundary, each related to the movement seen along the boundary.

- **Divergent boundaries** are where plates move away from each other
- **Convergent boundaries** are where the plates move towards each other
- **Transform boundaries** are where the plates slide past each other.



Divergent                                  Convergent

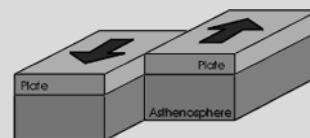


Image from <http://geology.csupomona.edu>

Thus, the answer is **A**.

#### GENERAL SCIENCE TIP:

- **Mid-oceanic ridge** → new earth being created → sea floor spreading
- **Trenches** → earth being destroyed → **subduction zone**

**24.** The **theory of plate tectonics** has done for geology what Charles Darwin's **theory of evolution** did for biology. It provides geology with a comprehensive theory that explains "**how the Earth works.**" The theory was formulated in the 1960s and 1970s as new information was obtained about the nature of the ocean floor, Earth's ancient magnetism, the distribution of volcanoes and earthquakes, the flow of heat from Earth's interior, and the worldwide distribution of plant and animal fossils.

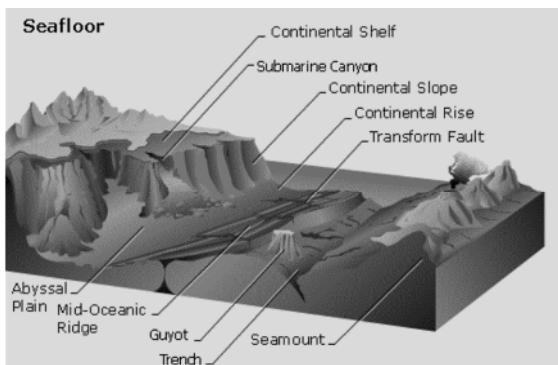
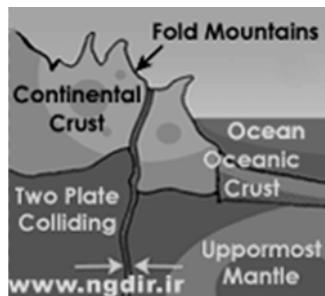


Image from <http://pacificislandtravel.com>

Thus, the answer is **B.**

**25.** When two continental plates collide, one plate will be forced only slightly under the other, but no subduction will take place. Thus, the pressing together of two plates will **fold the crust** and forms what we known as **folded mountains**.



Thus, the answer is **A.**

#### **GENERAL SCIENCE TIP:**

- **Plate tectonics** states the earth's crust is broken into plates which can move.



**26.** **Divergent plate boundaries** are locations where plates are moving away from one another. This occurs above rising convection currents. The rising current pushes up on the bottom of the lithosphere, lifting it and flowing laterally beneath it. This lateral flow causes the plate material above to be dragged along in the direction of flow. At the crest of the uplift, the overlying plate is stretched thin, breaks and pulls apart.

The **East Africa Rift Valley** is a classic example of this type of plate boundary. The East Africa Rift is in a very early stage of development. The plate has not been completely rifted and the rift valley is still above sea level but occupied by lakes at several locations.

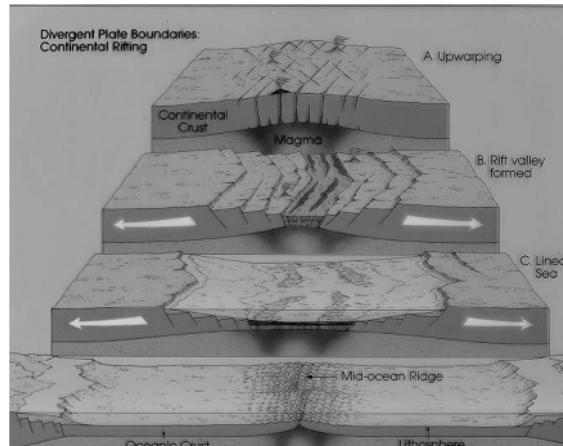


Image from <http://blue.utb.edu>

Thus, the answer is **A.**

**27.** Refer to the table below:

Type of Stress	Fault Type	Plate Boundary Type
Shear	Strike-Slip	Transform
Tension	Normal	Divergent
Compression	Reverse	Convergent

**When two oceanic plates converge**, because they are dense, one runs over the top of the other causing it to sink into the mantle and a subduction zone is formed. The subducting plate is bent down into the mantle to form a deep depression in the seafloor called a **trench**. Trenches are the deepest parts of the ocean and remain largely unexplored.

Thus, the answer is **A.**

**28.** Based on the table in #27, the answer is **D**.

**29.** A **normal fault** occurs when the crust is extended. The **hanging wall moves downward, relative to the footwall**.

A **reverse fault** is the opposite of a normal fault — the **hanging wall moves up relative to the footwall**. Reverse faults are indicative of shortening of the crust.

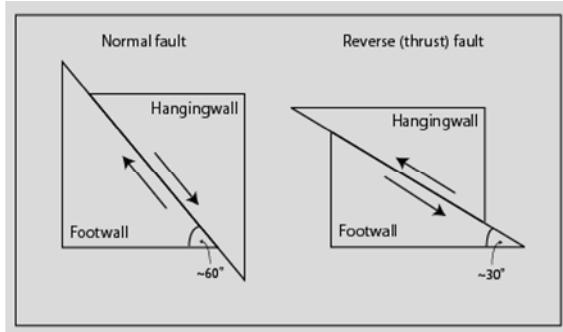


Image from <http://en.wikipedia.org>

Thus, the answer is **B**.

**30.**

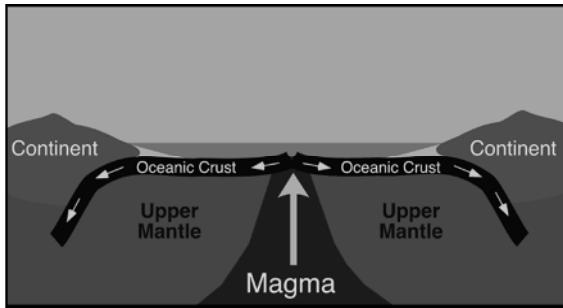


Image from <http://www.physicalgeography.net>

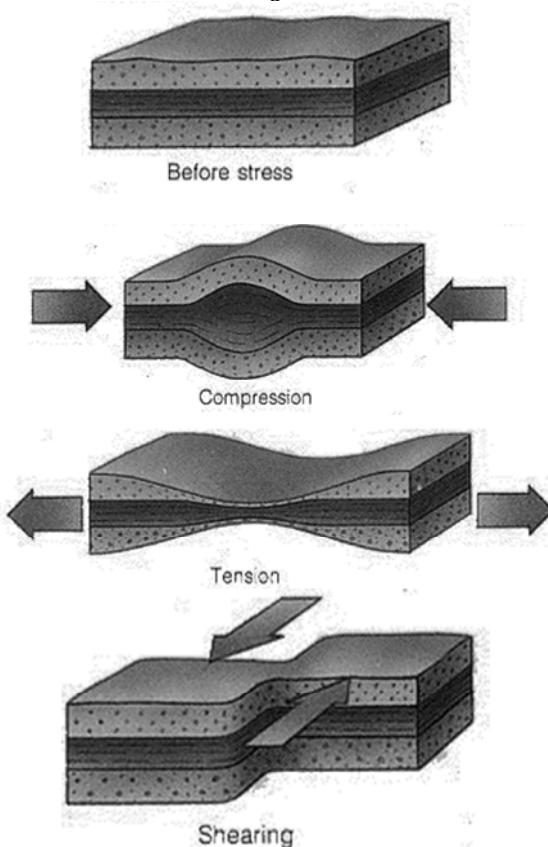
The answer is **C**.

#### GENERAL SCIENCE TIP:

#### **What are Seismic Waves ???**

- **Seismic waves** are the vibrations from earthquakes that travel through the Earth.
- They are the waves of energy suddenly created by the breaking up of rock within the earth or an explosion.
- They are the energy that travels through the earth and is recorded on **seismographs**.

**31.** There are three basic types of **stress**, each of which deforms the crust in a different way. The three types of stress are **compression**, **tension**, and **shearing**.



Images from <http://www.cgrove417.org>

Each of the different forms of stress deforms the crust in a different way. The large arrows show the directions of the forces acting on the rocks.

Refer to the table below:

Type of Stress	Fault Type	Plate Boundary Type
Shear	Strike-Slip	Transform
Tension	Normal	Divergent
Compression	Reverse	Convergent

The answer is **A**.

**32.** As shown in the table:

Type of Stress	Fault Type	Plate Boundary Type
Shear	Strike-Slip	Transform
Tension	Normal	Divergent
Compression	Reverse	Convergent

The answer is **B**.

- 33.** The **theory of plate tectonics** explains that the majority of **geological phenomena** are concentrated along the **edges of plates**. It is at the **edges** or boundaries that plate to plate interactions occur.

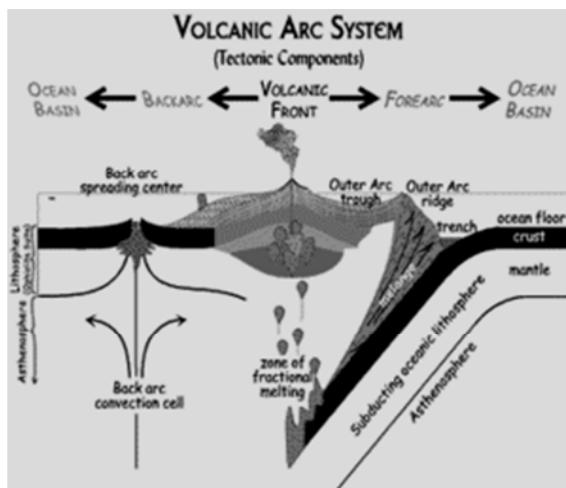


Image from <http://upload.wikimedia.org>

The answer is **B**.

- 34.** The presence of **tension**, **compression** or **shear** in faults results in a buildup of **kinetic energy** in the rocks. When rocks break, this **potential energy** is released as **kinetic energy (energy in motion)** in the form of **seismic waves**.

#### Seismic Waves Radiate from the Focus of an Earthquake

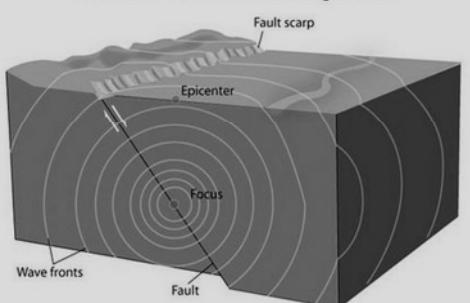


Image from <http://www.sciencelearn.org.nz>

The answer is **A**.

- 35.** See explanation in the previous item.

The answer is **B**.

- 36.** The **focus** is the point within the earth's interior where rocks first break. This is the starting point of the earthquake and the source of the body waves, **P** and **S**.

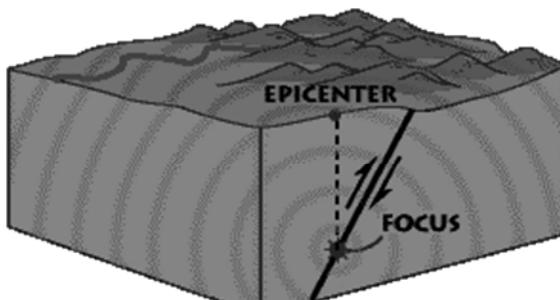


Image from <http://www.Ifccj.cc.fl.us>

The answer is **B**.

- 37.** As it travels, **kinetic energy decreases** until it completely stops.

The answer is **A**.

- 38.** **P and S waves** are called **body waves** because they can travel through the earth's interior.

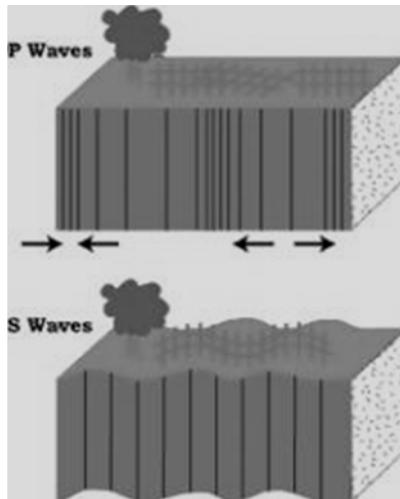


Image from <http://www.mysciencebox.org>

The answer is **C**.

- 39.** See explanation in item#6.

The answer is **B**.

- 40.** The **epicenter** is the point on the earth's surface corresponding to the focus. **IT IS NOT THE ORIGIN OF THE EARTHQUAKE.** It is also the starting point of the **L wave** or **surface wave**. L waves are produced when body waves from the focus hit the **epicenter**.

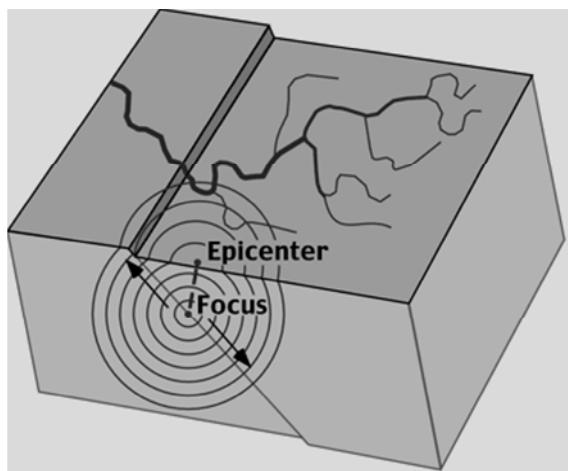


Image from <http://www.physicalgeography.net>

The answer is **A**.

- 41.** **Heat** ensures that the **magma** stays liquid, so that it can flow. **Pressure** forces the **magma** to exit the vent. It moves from an area of high pressure (*inside a volcano or vent*) to an area of low pressure (*outside the volcano or on the earth's surface*).

The answer is **C**.

- 42.** **Cinder cone volcano** is formed when ash and cinder are violently spewed out from an erupting volcano and blown to great heights. This type of volcano is **hardly composed of any lava**, most cinder and ash. The ash and cinder cone volcano normally have **steep sides and a small crater**.

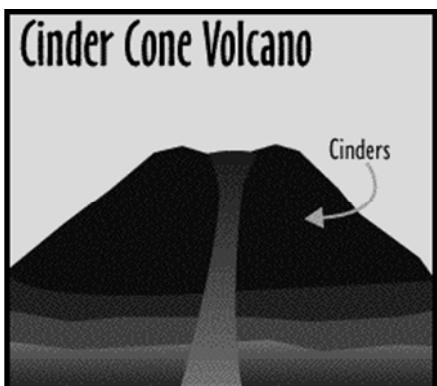


Image from <http://library.thinkquest.org>

The answer is **B**.

- 43.** **L waves** or **surface waves** are seismic waves originating from the epicenter when the latter is reached by body waves traveling from the focus.

### Seismic Waves Radiate from the Focus of an Earthquake

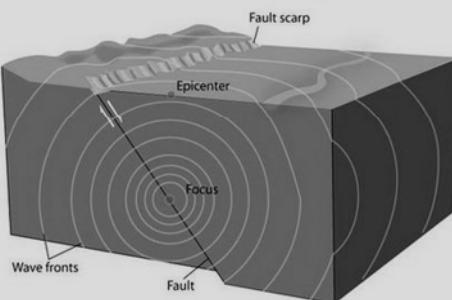


Image from <http://www.sciencelearn.org.nz>

The answer is **B**.

- 44.** Choices **1, 2, 3 and 5** are the **criteria** required by a substance for it to be called a **mineral**.

The answer is **B**.

- 45.** **Coal** is the result of the cementation of fossilized plant parts; therefore it is **organic** in origin. For a material to be classified as a **mineral** it must have an **inorganic** origin.

The answer is **A**.

- 46.** **Quartz** is **silicon dioxide** ( $\text{SiO}_2$ ).

The answer is **A**.

- 47.** **Iron(II) oxide**, also known as **ferrous oxide**, are chemical compounds composed of **iron and oxygen**.

The answer is **C**.

- 48.** **Halite** is a **mineral** produced by precipitation. The others are rocks, which are composed of several kinds of minerals.

The answer is **A**.

- 49.** The **streak** refers to the **color of the powder line** of a **mineral**. The powder is left on an unglazed white tile when a mineral is rubbed on the tile. The color of this powder is **constant for a given mineral**.

The answer is **C**.

- 50.** *Specific gravity* is the ratio of the weight of a mineral to the weight of an equal volume of water. **Ratios do not have units of measurements.**

The answer is A.

- 51.** The **Moh's scale of hardness** has a rating of **1 – 10**, with **1 being the lowest and 10 being the highest**. **Talc**, with a rating of **1**, is the **softest mineral**. **Diamond** has rating of **10**. It is the **hardest mineral** and can scratch all other minerals.

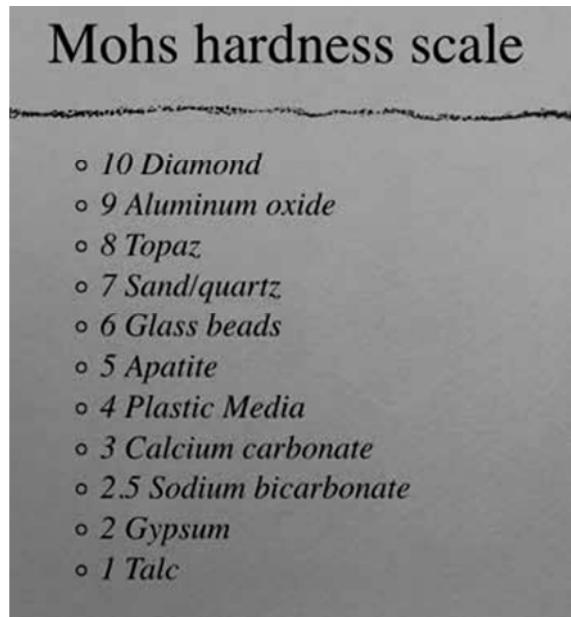


Image from <http://www.sodablastingservices.com>

The answer is A.

- 52.** See the explanation in the previous item.

The answer is B.

- 53.** **Graphite** is a mineral composed of a specific crystal arrangement of **carbon atoms**. Note that different crystal arrangements of the same atom could lead to entirely different minerals with unique characteristics. For example, **graphite** and **diamond** are both composed of **carbon atoms**, yet their properties are entirely different.

The answer is B.

- 54.** **Borax and feldspar** maybe used to make **porcelain**.

The answer is A.

- 55.** **Cleavage planes** are specific planes or angles of cutting a mineral that result in a **smooth edge**. Minerals have **fracture** if, when they are cut, they have **uneven surfaces** that can either be jagged, conchoidal, fibrous or irregular.

The answer is B.

- 56.** **Two samples** of the same mineral may have **different color** due to **differences in impurities**. **Impurities** are **foreign substances** that are incorporated in a mineral.

The answer is C.

- 57.** The **density** of a substance is the **amount of mass** of that substance **for every specific unit of its volume**. In this example, we divide the mass (64g) by the volume (16cm<sup>3</sup>) to get 4g/cm<sup>3</sup>.

The answer is D.

- 58.** *Specific gravity is the ratio of a mineral's density to the density of water.*

$$\text{Specific Gravity} = \frac{\text{min eral's density}}{\text{density of water}} = \frac{1}{4}$$

The answer is A.

- 59.** **Marble, schist, and quartzite** are all **metamorphic rocks**. **Sandstone** (sometimes known as **arenite**) is a **sedimentary rock** composed mainly of sand-sized minerals or rock grains.

The answer is B.

#### **GENERAL SCIENCE TIP:**

- **Mineral properties** depend on **internal atomic arrangement**.

**60.** Obsidian (see figure below) is a dark-colored volcanic glass that forms from the very rapid cooling of molten rock material. It cools so rapidly that crystals do not form. It is an example of an **igneous rock**.

Conglomerate is a **sedimentary rock** composed from the deposition and cementation of sediments of different sizes.

Gneiss rocks are **metamorphic**. These rocks may have been granite, which is an igneous rock, but heat and pressure changed it.

Phyllite is a foliated **metamorphic** rock composed of fine grained sheet silicate minerals.

The answer is C.

**61.** Dolomite and limestone are **sedimentary rocks**. Pumice is an **igneous rock**.

Schist rocks are **metamorphic**. These rocks can be formed from basalt, an **igneous rock**; shale, a **sedimentary rock**; or slate, a **metamorphic rock**. Through tremendous heat and pressure, these rocks were transformed into this new kind of rock.

The answer is A.

**62.** Igneous rocks are crystalline or glassy rocks formed by the **cooling and solidification of molten magma**. There are three types of **igneous rocks** depending on the depth where magma cooled and solidified. **Intrusive or plutonic igneous rocks** cooled slowly at great depths, therefore they have large crystals. **Extrusive or volcanic igneous rocks** solidified rapidly on the earth's surface, producing small or no crystals. **Hypabyssal igneous rocks** solidify at medium depths.

The answer is A.

**63.** Metamorphism is the process wherein rocks are subjected to **intense temperature and pressure**. Metamorphism induces a chemical change in the mineral composition of these rocks. New rocks (**metamorphic rocks**) are then formed.

The answer is C.

**64.** The stratification in **sedimentary rocks** is the result of sediments with **different sizes segregating**. A single layer in sedimentary rock is composed of sediments of relatively same size. Another layer would have also have sediments of a particular size. But the sediments between these two layers are different.

For **foliated metamorphic rocks**, the mineral grains in an individual rock are composed of **minerals segregating**. A mineral grain would be a band composed of the same mineral. Another grain would also have a specific mineral. But the minerals between two separate grains are different.

The answer is A.

**65.** For atoms to arrange themselves in a crystal structure, they must be able to move. In **liquid magma**, this is possible. If magma cools slowly, the atoms spend more time in the liquid state; they have more time to move and arrange themselves in crystals. If magma cools rapidly, atoms would be quickly bound in immovable states (solid); they can't rearrange into crystals anymore.

The answer is A.

**66.** Texture would refer to the **crystal composition of igneous rocks**. Depending on the depth where the rock is formed, it may have no crystals (glassy), microscopic crystals (aphanitic), large crystals (phaneritic), or combinations of large and small crystals (porphyritic, aphanitic-porphyritic). **Fragmental igneous rocks** also occur as ejected igneous mineral.

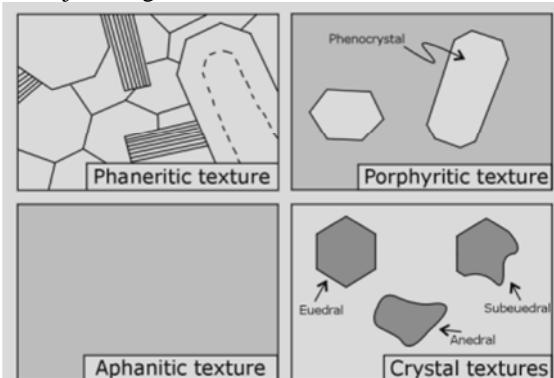


Image from <http://www.knowledgerush.com>

The answer is B.

- 67.** Superposition states that the **oldest sedimentary rock layers lie at the bottom**, while the **youngest rock layers are at the top**.

The answer is C.

- 68.** Clay is **not** a rock, it is a **sediment**. Shale is a sedimentary rock that metamorphoses into **slate**. Limestone is another sedimentary rock that metamorphoses into **marble**. Granite is an igneous rock that metamorphoses into **gneiss**.

The answer is D.

- 69.** Mechanical weathering takes place when **rocks are broken down** without any change in the chemical nature of the rocks. The rocks are essentially torn apart by **physical force**, rather than by chemical breakdown. The most common type of **mechanical weathering** is the **constant freezing**, and **thawing of water**.

The answer is C.

- 70.** Choices A, B and C are major factors that cause **mechanical weathering**.

The answer is D.

- 71.** As water freezes in joints or cracks in rocks, it **expands**. As it requires more space, the cracks grow larger, eventually breaking apart the rock. This process is called **frost wedging**, a form of **mechanical weathering** as it breaks apart a rock without changing its mineral composition.

### Frost Wedging

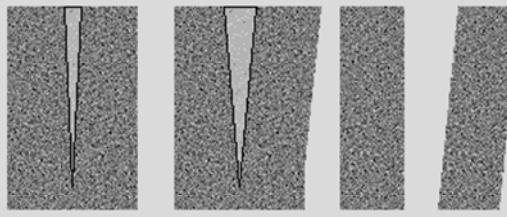


Image from <http://mail.colonial.net>

The answer is A.

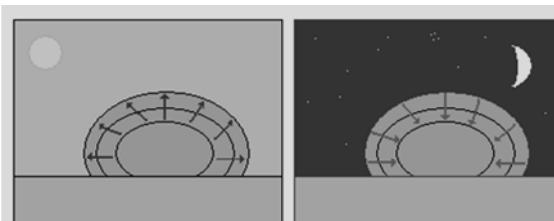
- 72.** Quartz can resist weathering as it is the **hardest common mineral**.

The answer is D.

- 73.** As rocks weather into smaller sediments, these sediments are eroded and can **combine with organic debris**. This produces **soil**, a **nutrient-rich medium** where most terrestrial **autotrophs** get their water and minerals. It also serves as a habitat for most terrestrial **heterotrophs**.

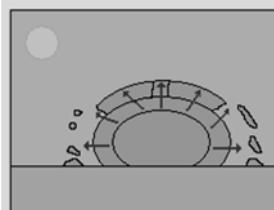
The answer is C.

- 74.** Exfoliation is a form of **mechanical weathering** due to **uneven contraction and expansion of rock**.



During the day the sun heats up the surface layers of the rock and they expand which forces them outwards.

At night the rock cools down and the surface layers contract and are pulled inwards.



After many daily cycles of expansion and contraction the surface layer eventually breaks up and thin layers of rock 'peel off'.

Image from <http://geodat.co.uk>

The answer is C.

### GENERAL SCIENCE TIP:

- **Chemical weathering** dominates in **warm, humid climates**.
- **Physical weathering** dominates in **cold, humid climates** (good for **frost wedging**).

- 75.** As explained in the previous item, **exfoliation** is a form of mechanical weathering.

**Chemical weathering** happens when the minerals of which the rock is made are changed, leading to the **disintegration of the rock**. It tends to affect certain minerals selectively, and although there are several **different types of chemical weathering**, including **oxidation, hydration, hydrolysis, carbonation, solution, chelation** and the **effects of acid rain**, the different forms tends to operate together.

**Oxidation**, as the name suggests, occurs upon contact of the rock with oxygen, from the air or from water. A common effect is the **rusting of rocks** containing iron, as blue-grey becomes reddish-brown when ferrous compounds are oxidised. The chemical structure of the rock is altered by oxidation, making it more susceptible to other forms of weathering.

**Hydration** simply involves the **absorption of water** into the existing minerals of the rock, causing the expansion of the mineral, leading to eventual weakening. It is less severe than hydrolysis, the most significant chemical weathering process, whereby  $H^+$  and OH ions in water react with the mineral ions.

**Carbonation** is a result of the **reactions of rainwater and carbon dioxide to produce carbonic acid** ( $H_2CO_3$ ), which slowly dissolves any rocks made of calcium carbonate, such as limestone.

The answer is **B**.

- 76.** The **main agent** responsible for **chemical weathering** reactions is **water** and **weak acids** formed in water.

- An **acid** is solution that has abundant free  $H^+$  ions.
  - The **most common weak acid** that occurs in surface waters is **carbonic acid**.
  - **Carbonic acid** is produced in rainwater by **reaction of the water with carbon dioxide** ( $CO_2$ ) gas in the atmosphere.
- $$\begin{array}{ccccccc} H_2O & + & CO_2 & \longrightarrow & H_2CO_3 & \longrightarrow & H^+ + HCO_3^- \\ \text{water} & & \text{carbon dioxide} & & \text{carbonic acid} & & \text{hydrogen ion} \quad \text{bicarbonate ion} \end{array}$$
- $H^+$  is a small ion and can easily enter crystal structures, releasing other ions into the water.

The answer is **C**.

- 77.** Both **physical weathering** and **chemical weathering** reduce the structural integrity of rock. The result is that these rocks may **break up into smaller pieces**.

The answer is **C**.

- 78.** The **flat floodplain** signifies that the land around the river has been **well eroded**. The river, which is the main agent of erosion in this case, must have been present for a long time. The **oxbow lake** is lake produced when the curve of a meander is separated from the main river body. The lake has a characteristic crescent shape.

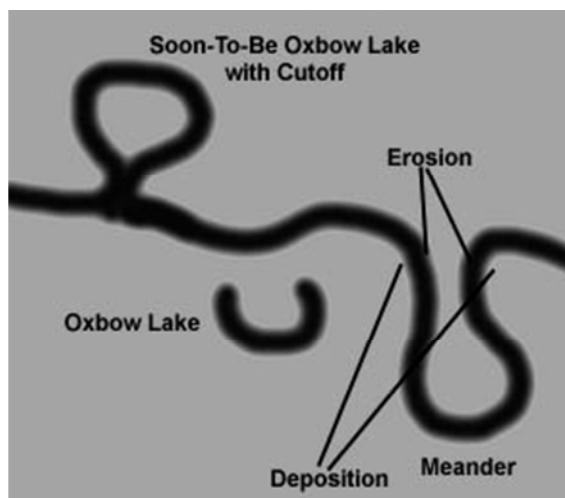


Image from <http://z.about.com>

The answer is **C**.

- 79.** A **young river** will have **less erosion**, as it has been present for only a short time. The riverbanks will then be **steep**. The sloping terrain can contribute to **increased speed of the river**.

The answer is **A**.

#### GENERAL SCIENCE TIP:

- **Gravity** is the force that drives erosion.
- **Streams** are currently the **number one agent of erosion** in New York State.
- **Stream velocity** depends on slope (gradient) and discharge.
- **Velocity** is greatest on the outside of meander bend.

- 80.** Because nitrogen is inert, it can compose a large percentage of our atmosphere without causing negative effects to life and, thus largely contributes to the air pressure on Earth necessary to support our bodies.

The atmosphere is composed of 78.08% nitrogen, 20.95% oxygen, 0.93% argon, 0.03% carbon dioxide and 0.01% of other gases like neon, helium, methane, krypton, nitrous oxides and hydrogen.

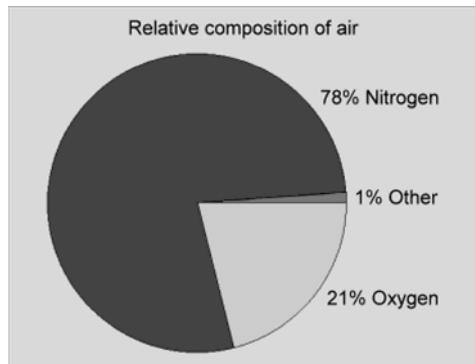


Image from <http://www.sdm.scot.nhs.u>

The answer is A.

- 81.** When cold air moving up from the poles encounters warm moist air moving down from the tropics, a cold front develops and the warm moist air rises above the cold front. This rising moist air cools as it rises causing the condensation of water vapor to form rain or snow. Note that the cold air masses tend to circulate around a low pressure center in a **counterclockwise fashion in the northern hemisphere** and **clockwise in the southern hemisphere**. Such circulation around a low pressure center is called a **mid-latitude cyclone**.

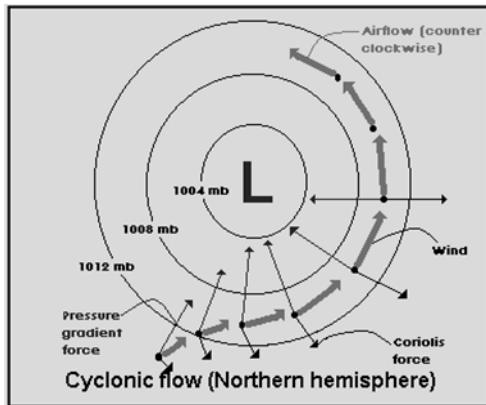


Image from <http://www.inthewakeofthebelgica.com>

The answer is C.

- 82.** The layer of the atmosphere that contains the **thinnest (least dense) air** is the **thermosphere**. It is also the **hottest layer (due to ions, H + and He - , that directly absorb the sun's radiation)**.

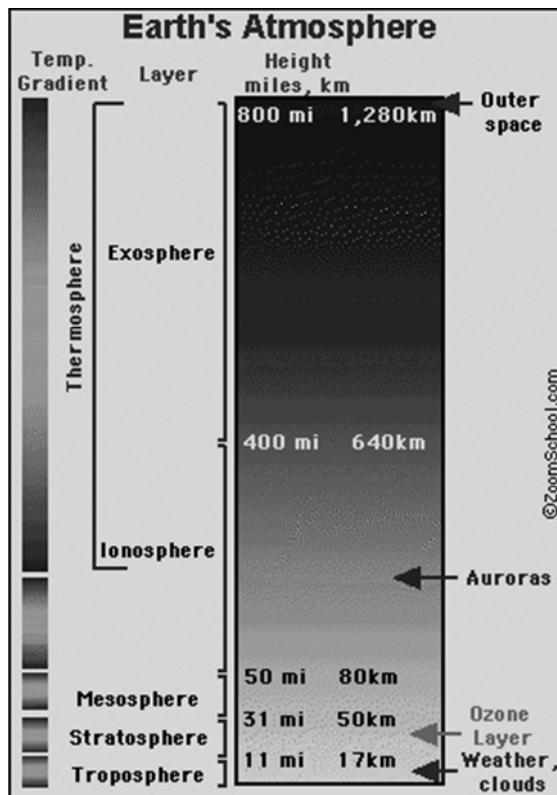


Image from <http://www.enchantedlearning.com>

The answer is C.

- 83.** The **presence of ozone** in the **stratosphere** results to an increase in temperature as altitude increases. **Ozone ( $O_3$ )** is formed from the union of  $O_2$  and single  $O$  molecules. Solitary  $O$  molecules are generated when **UV light** breaks down  $O_2$ .

The answer is B.

- 84.** The **mesosphere** is the **coldest layer** of the earth's atmosphere and it is where **most meteors burn up**.

The answer is C.

#### GENERAL SCIENCE TIP:

- Winds curve to the **right** in the **northern hemisphere** and to the **left** in the **southern hemisphere** due to the earth rotation – called the **Coriolis Effect**.

85. This **equilibrium** causes in **zero net flow of gases in or out of the body**. If pressure outside is greater, air would rapidly flow into our bodies (*which, if it happens, will certainly be felt*). If pressure inside our bodies is greater, there would be a rapid flow of air out of the body.

Air pressure never has this effect because **our bodies are hollow** and **our lungs are full of air**, so the air presses **equally on the inside and outside of our body at the same time**. That's why we don't feel **air pressure** in the same way we feel **water pressure**.

The answer is A.

**GENERAL SCIENCE TIP:**

- As **temperature increases**, air pressure decreases.
- As **atmospheric moisture (humidity) increases**, atmospheric pressure decreases.
- **Air pressure decreases with altitude**.
- **Cooler and drier air generally exerts higher pressure**.
- **Warm, moist air generally exerts lower pressure**.

87. In the atmosphere, **convection** includes large- and small-scale **rising and sinking of air masses and smaller air parcels**. These vertical motions effectively distribute heat and moisture throughout the atmospheric column and contribute to **cloud and storm development** (where rising motion occurs) **and dissipation** (where sinking motion occurs).

The answer is A.

Both air pressure and air density decrease with increasing altitude.

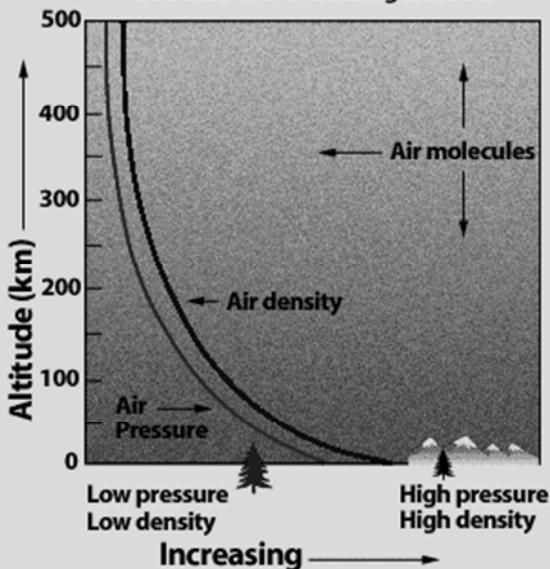
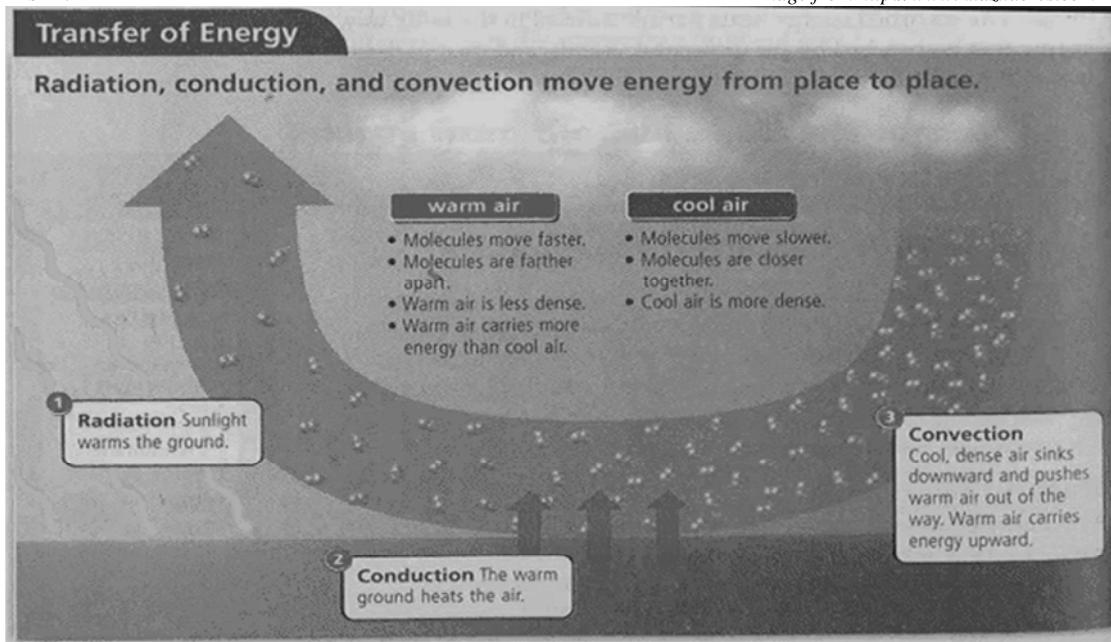


Image from <http://eo.ucar.edu>

The answer is B.

Image from <http://www.kudzuacres.com>



- 88.** Under normal conditions, excess heat from the sun (in the form of **radiation**) is reflected by the earth's surface back to space. However, accumulation of **carbon dioxide** in the atmosphere prevents this process. The reflected heat by the earth's surface is bounced back by the **CO<sub>2</sub>** in the atmosphere back to the earth. This is the **greenhouse effect**.

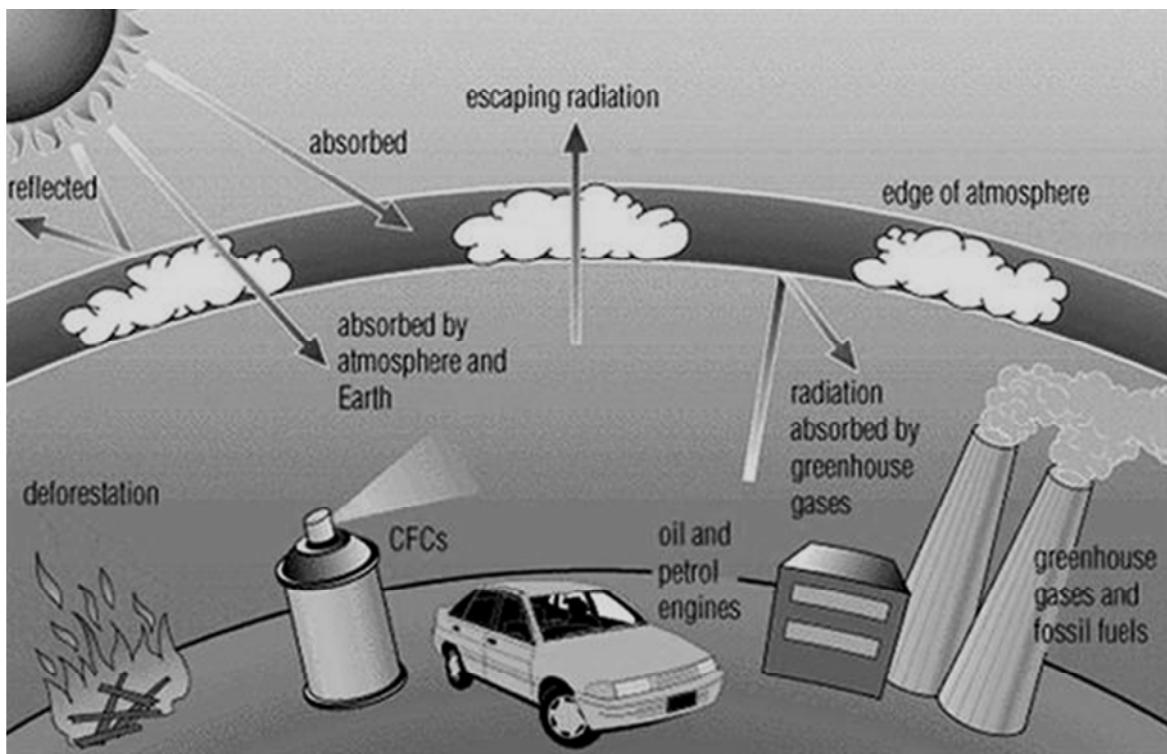


Image from <http://www.myclimatechange.net>

The answer is **D**.

- 89.** Most **UV light** is lost when it hits the **ozone layer** as its energy is consumed in the splitting of **ozone** into **O<sub>2</sub>** and **O**. The **O<sub>2</sub>** and **O** recombines back to **ozone**.

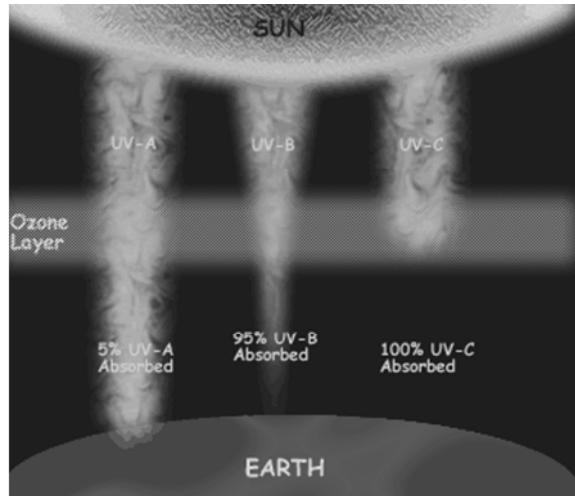


Image from <http://ozone.gi.alaska.edu>

The answer is **C**.

- 90.** *Modern jet planes fly in the bottom portion of the stratosphere.*

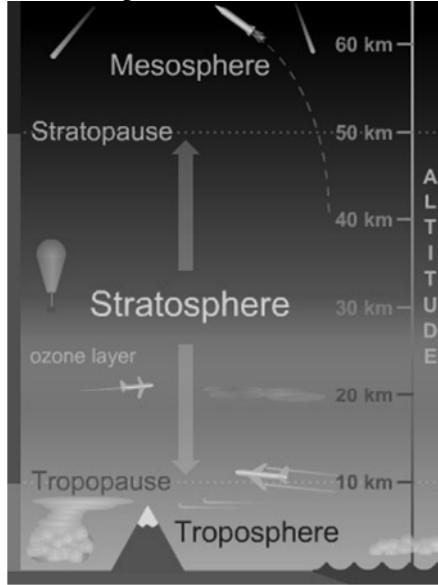
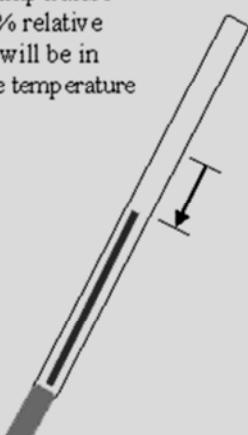


Image from <http://www.windows.ucar.edu/>

The answer is **A**.

If sensible heat is removed from the air, the air temperature will drop. When the air becomes saturated (100% relative humidity), the number of molecules condensing will be in equilibrium with the number evaporating and the temperature will be at the Dew point Temperature



*Image from <http://biomet.ucdavis.edu>*

- 91.** At a specific temperature, **the dew point, water vapor in the air would begin to condense.**

**Dew point** would differ according to the amount of water vapor in the air. If there is little water vapor in the air, the dew point is lower. If the water vapor amount is high, the dew point is also high.

The answer is **D**.

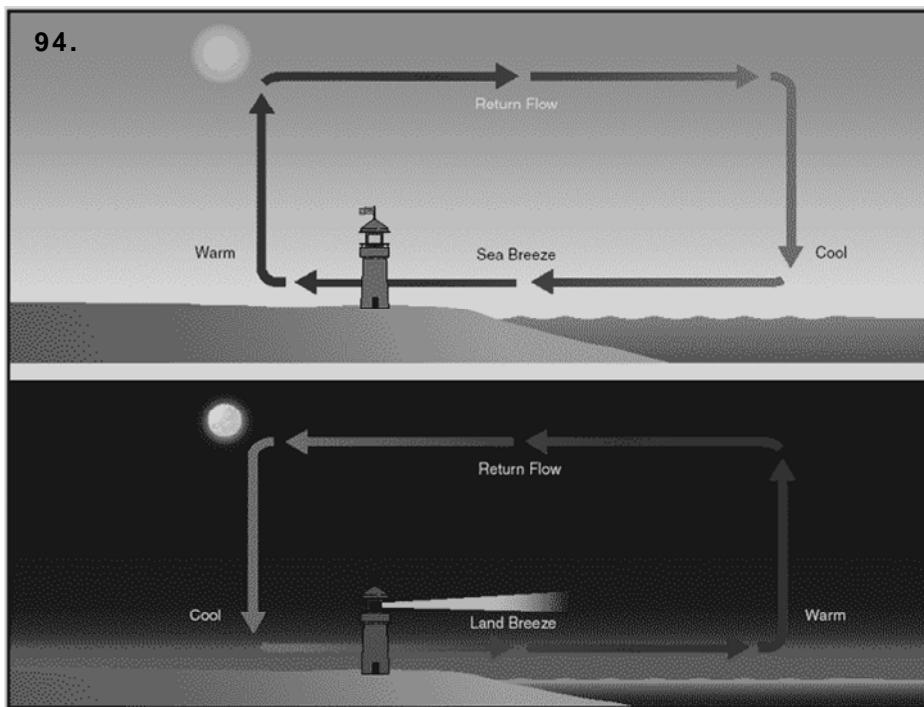
- 92.** The **dew point** is used a lot by TV meteorologists and seen on most current weather conditions because it's a great indicator of the moisture content of the air, or humidity. **The higher the dew point temperature, the higher the humidity.** Since Air mass A has higher humidity (80% saturated), it means that it has higher dew point.

The answer is **B**.

- 93.** No conclusive statement about rain can be made.

The answer is **D**.

**94.**

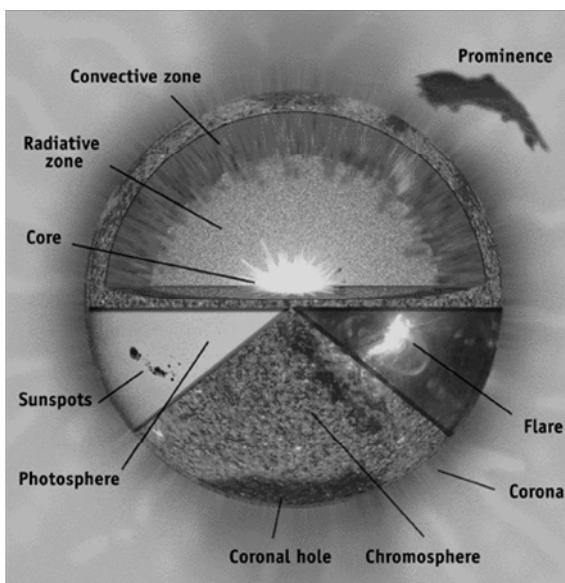


*Image from <http://www.free-online-private-pilot-ground-school.com>*

If you have spent much time at the beach during the summer at the beach, absorbing **UV radiation** to darken your skin or just beachcombing, you've probably noticed that at around 3:00 p.m. there often is a strong steady wind blowing in from the water. This steady wind, the **sea breeze**, is a result of the **uneven heating** during the daytime between the land and the adjacent water. At night the wind often reverses direction and blows from the land to the water (a land breeze). **Land and sea breezes** are referred to as **direct thermal circulations**.

The answer is **D**.

- 95.** When we speak of the *surface of the Sun*, we normally mean the **photosphere**.

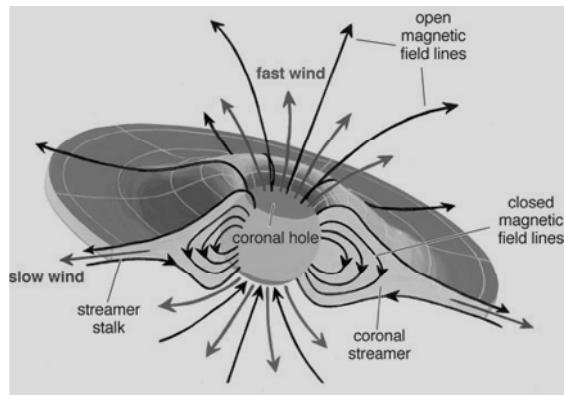


*Image from <http://stargazers.gsfc.nasa.gov>*

The answer is **C**.

- 96.** The **solar wind** is a stream of **energized, charged particles**, primarily **electrons** and **protons**, flowing outward from the Sun, through the solar system at speeds as high as **900 km/s** and at a temperature of **1 million degrees (Celsius)**. It is made of **plasma**.

The **solar wind** is caused by the hot solar **corona**, which is the outermost layer of the solar atmosphere, expanding into space. The **corona** is the "rim" of the Sun that is visible to the naked eye during a **solar eclipse**.



*Image from <http://www.americanscientist.org>*

The answer is **D**.

- 97.** The sun was born about **4.6 billion years ago** and will remain much as it is for another **5 billion years**. Then it will grow to become a **red giant**. Late in the sun's lifetime, it will cast off its outer layers. The remaining core is called a **white dwarf**. Eventually, the **white dwarf** will slowly fade to become a **black dwarf**.

The answer is **D**.

#### **98. Phases of Moon**



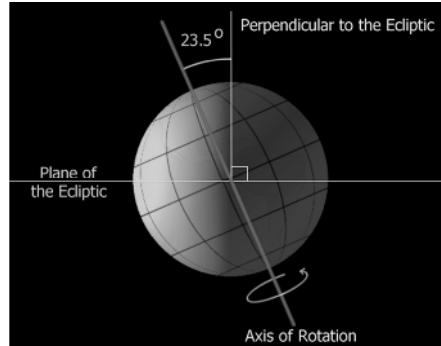
*Image from <http://www.theplanetexpert.com>*

The answer is **D**.

- 99.** Pluto orbits beyond the orbit of Neptune (usually). It is much smaller than any of the **official planets** and now classified as a "**dwarf planet**".

The answer is **C**.

- 100.** Earth's axis is **tilted** at an **angle of 23.5°**.



*Image from <http://divulgience.net>*

The answer is **B**.