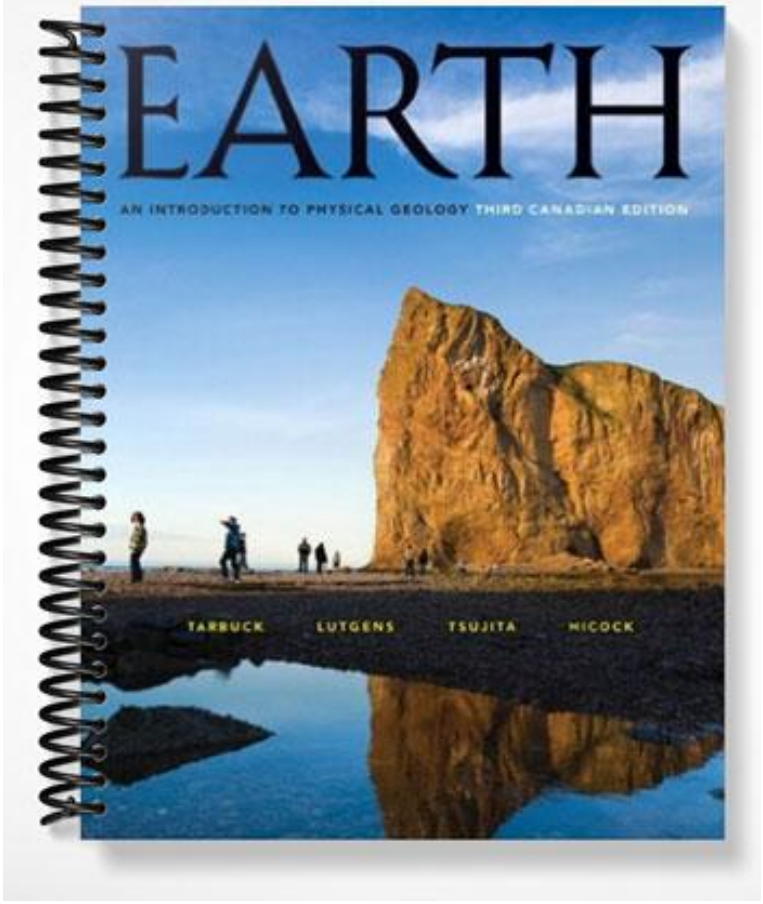
TEST BANK


EARTH
AN INTRODUCTION TO PHYSICAL GEOLOGY THIRD CANADIAN EDITION
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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which manufactured products contain minerals or elements extracted from mineral resources? 1) _____
A) jacket
B) wooden chair
C) beer
D) aluminum pop cans, "pencil lead," baby powder, concrete

2) Which of the following best defines a mineral and a rock? 2) _____
A) A rock has an orderly, repetitive, geometric, internal arrangement of minerals; a mineral is a lithified or consolidated aggregate of rocks.
B) A rock consists of atoms bonded in a regular, geometrically predictable arrangement; a mineral is a consolidated aggregate of different rock particles.
C) In a mineral the constituent atoms are bonded in a regular, repetitive, internal structure; a rock is a lithified or consolidated aggregate of minerals.
D) A mineral consists of its constituent atoms arranged in a geometrically repetitive structure; in a rock, the atoms are randomly bonded without any geometric pattern.

3) Which is not a requirement? To be a mineral it must be or have _____. 3) _____
A) naturally occurring
B) definite chemical composition
C) orderly regular atomic or ionic structure
D) well formed external crystal shapes

4) Minerals consist of an ordered array of atoms or ions that are _____. 4) _____
A) chemically bonded in a regular crystalline structure
B) all the same size and charge
C) always packed together in cubes or octahedra
D) physically attached to each other by shared protons

5) Which one of the following is false for minerals? 5) _____
A) They can be a liquid, solid, or glass.
B) They have a specific, internal, crystalline structure.
C) They have a specific, predictable chemical composition.
D) They can be identified by characteristic physical properties.

6) Which of the following rock types are not comprised mostly of minerals. 6) _____
A) sandstone and conglomerate
B) coal, obsidian, and pumice
C) granite and basalt
D) limestone and rock salt

7) While there are 90 naturally occurring elements, these combine in various proportions and structures to make nearly _____ minerals. 7) _____
A) 40,000
B) 4,000
C) 400
D) 400,000

8) Which of the following is not a fundamental particle found in atoms? 8) _____
A) electron
B) selectron
C) protons
D) neutron

9) Which of the following denotes the tiny, but very massive, central part of an atom? 9) _____
A) valence shell
B) inner shell
C) core mass
D) nucleus

10) Which of the following denotes the massive, positively charged, nuclear particles? 10) _____
A) neutrons
B) electrons
C) isotrons
D) protons

11) What, basic, atomic particles occupy space in an atom outside of the nucleus? 11) _____

A) morons B) neutrons C) protons D) electrons

12) What are the lightest or least massive of the basic atomic particles? 12) _____
A) neutrons B) electrons C) protons D) uranium nuclei

13) Atoms of the same element, carbon for example, always have the same _____. 13) _____
A) atomic weight
B) number of electrons in the nucleus
C) number of neutrons in its chemical bonds
D) number of protons in the nucleus

14) In a neutral atom such as helium or native copper, the number of protons in the nucleus _____. 14) _____
A) is equal to the number of electrons in the outer shells
B) is usually greater than the number of neutrons
C) is different for each isotope
D) increases from element to element by even multiples of 8

15) Which element is the first and lightest element in the periodic chart? 15) _____
A) oxygen B) helium C) sodium D) hydrogen

16) The electrons in the outermost shell of an element are referred to as _____. 16) _____
A) aberrant electrons
B) non-bonding electrons
C) valence electrons
D) positrons

17) When two or more elements combine to form a mineral, they do so in definite proportions represented by a simple chemical formula for that _____. 17) _____
A) polymorph B) isotope C) isomer D) compound

18) Generally ions end up with the stable, noble-gas, configuration having _____ electrons in their outermost shell. 18) _____
A) two B) eight C) no D) twelve

19) An atom's mass number is 13 and its atomic number is 6. How many neutrons are in its nucleus? 19) _____
A) 7 B) 6 C) 13 D) 19

20) What is the name given to an atom that gains or loses electrons in a chemical reaction? 20) _____
A) proton B) molecule C) nucleon D) ion

21) In _____ compounds one atom gives up electrons to another that receives them. 21) _____
A) covalent B) polymorphic C) metallic D) ionic

22) Which of the following is an accurate description of ionic bonding? 22) _____
A) Nuclei of two different atoms share electrons and the resulting compound is tightly bonded by the very strong, induced, ionic nuclear bonds.
B) Atoms of two different elements share electrons and protons; the resulting compound is bonded together by the strong, binding energy of shared protons.
C) Atoms of different elements, having gained or lost electrons, are held together by their opposite charges.
D) Nuclei of bonding atoms exchange electrons; the resulting ions are bonded together by the attractive forces between the two electrons.

23) The two main types of bonding that form the structures in minerals are _____. 23) _____

A) radioactive and unstable
B) magnetic and gravitational
C) covalent and ionic
D) double and triple

24) In ionic compounds, _____ have lost one or more electrons to acquire positive charge and a smaller radius than their neutral atom, while _____ have gained one or more electrons to acquire a negative charge and a larger radius than their neutral atom. 24) _____
A) daughter isotopes, parent isotopes
B) cations, anions
C) anions, cations
D) stable isotopes, unstable isotopes

25) In which type of chemical bonding are electrons shared between adjacent atoms? 25) _____
A) ionic
B) subatomic
C) isotopic
D) covalent

26) When elements or compounds combine in the same proportions but in more than one structural arrangement, relative to each other, those mineral structures are called _____. 26) _____
A) isotopes
B) bimorphs
C) amorphous
D) polymorphs

27) Minerals like diamond and graphite exist because of _____. 27) _____
A) the metamorphism of coal
B) the law of polymorphism
C) amorphous crystallization
D) different physical and chemical conditions or environments within the earth

28) _____ is the external expression of orderly internal arrangement of atoms in a mineral crystal. 28) _____
A) Habit
B) Colour
C) Streak
D) Lustre

29) Which of the following describes the light reflecting characteristics of a mineral? 29) _____
A) lustre
B) fluorescence
C) virtual absorption
D) streak

30) The quality of light reflected from a mineral surface is called _____. 30) _____
A) lustre
B) translucency
C) polish
D) reflectance

31) The true colour of a mineral as seen in its powdered form is called it's _____. 31) _____
A) iridescence
B) streak
C) chatoyancy
D) birefringence

32) A mineral's hardness is determined by the number and the strength of chemical bonds, but how is it actually determined? 32) _____
A) by weighing it on a Mohs scale.
B) by whether or not it cleaves.
C) by its resistance to scratching or abrasion by other materials of known hardness.
D) by looking at its streak.

33) What mineral is the hardest known substance in nature? 33) _____
A) muscovite
B) native gold
C) silicate
D) diamond

34) Which minerals that make up the Mohs scale are harder than a glass plate? 34) _____
A) feldspar, quartz, topaz, corundum, diamond
B) calcite, fluorite, apatite
C) gypsum and talc
D) beryl, garnet, tourmaline

35) Which minerals that make up the Mohs scale are softer than your fingernail? 35) _____

A) beryl, garnet, tourmaline
B) gypsum and talc
C) feldspar, quartz, topaz, corundum, diamond
D) calcite, fluorite, apatite

36) Which minerals that make up the Mohs scale are softer than a glass plate but harder than your fingernail? 36) _____
A) beryl, garnet, tourmaline
B) calcite, fluorite, apatite
C) gypsum and talc
D) feldspar, quartz, topaz, corundum, diamond

37) Which one of the following minerals has the greatest hardness on the Mohs hardness scale? 37) _____
A) topaz B) feldspar C) gypsum D) calcite

38) The property of _____ is controlled by planes of few or weak bonds within the mineral structure. 38) _____
A) absorbency B) bondage
C) well formed crystal faces D) cleavage

39) The strong tendency of certain minerals to break along smooth, parallel planes is known as _____. 39) _____
A) flat busted B) streak C) cleavage D) crystal form

40) Which one of the following describes a mineral's response to mechanical impact? 40) _____
A) lustre B) streak C) cleavage D) crystal form

41) Cleavage is determined by _____ and _____ well formed planes of weakness in a stressed mineral structure 41) _____
A) the number, angles between B) the iridescence, shape of
C) the twinning, separation of D) the hardness, thickness of

42) The tendency for a mineral like quartz to break in a smoothly curved manner is termed _____. 42) _____
A) spherical cleavage B) elliptical breakage
C) anomalous cleavage D) conchoidal fracture

43) _____ is the ratio of a weight of mineral to a volume of water of equal weight. 43) _____
A) Characteristic volume B) Wet weight
C) Specific gravity D) Absolute mass

44) Minerals like native gold or galena have high specific gravities because _____. 44) _____
A) they both lack any cleavage
B) both are very strong and hard
C) they contain heavy elements
D) they are too dense for any water or air to fit into their structures

45) A cubic centimetre of quartz, olivine, and gold weigh 2.5, 3.0, and 19.8 grams respectively. This indicates that _____. 45) _____
A) olivine and quartz powders are harder than metallic gold
B) gold has a higher specific gravity than quartz and olivine
C) gold and olivine are silicates, quartz is elemental silicon

D) gold is six to seven times harder than olivine and quartz

46) Which of the following has the highest specific gravity? 46) _____
A) wood B) water C) quartz D) gold

47) Which of the following denotes the purity of gold used in jewelry? 47) _____
A) carnot B) carlot C) carette D) karat

48) Which mineral is easily soluble in water at room temperature conditions? 48) _____
A) olivine B) talc C) halite D) diamond

49) Which carbonate mineral reacts readily with cool, dilute hydrochloric acid to produce visible bubbles of carbon dioxide gas? 49) _____
A) dolomite B) plagioclase C) calcite D) quartz

50) Which of the following will react readily with acids such as hydrochloric? 50) _____
A) talc B) diamond C) quartz D) calcite

51) Real kryptonite is a(n) _____ while jadarite is a(n) _____ . 51) _____
A) element, mineral B) metal, rock
C) meteorite, moon D) mineral, element

52) Jadarite is similar to the fictional mineral kryptonite but lacks _____ in its chemical composition. 52) _____
A) lithium B) sodium C) fluorine D) boron

53) What element is the most abundant in the Earth's crust by weight? 53) _____
A) oxygen B) sodium C) carbon D) chlorine

54) The eight most abundant elements in the Earth's crust by weight are: _____. 54) _____
A) C, K, N, P, S, Sc, Ti,V B) Ba, Ca, Cl, Cu, F, H, Li, U
C) Pb, Mo, Ag, Pt, Au, Ni, Cr, Zr D) O, Si, Al, Fe, Ca, Na, K, Mg

55) Which group of minerals are the most abundant in the Earth's crust? 55) _____
A) carbonates B) sulphides C) chlorides D) silicates

56) All silicate minerals contain which two elements? 56) _____
A) silicon, oxygen B) iron, silicon C) oxygen, carbon D) silicon, sodium

57) Chrysotile, crocidolite, and amosite are different mineralogic forms of what industrial commodity? 57) _____
A) asbestos B) metallic sulphide ores
C) Portland cement D) gemstones

58) Which of the following diseases has been linked directly to prolonged inhalation of asbestos dust? 58) _____
A) glaucoma B) muscular dystrophy
C) diabetes D) lung cancer

59) The ion at the centre of a silicon-oxygen tetrahedron is surrounded by _____. 59) _____
A) 4 oxygen ions B) 6 sodium ions C) 6 oxygen ions D) 4 sodium ions

60) Which response describes the geometric attributes of a tetrahedron? 60) _____
A) 6 plane faces, each a rectangle, 4 edges, and 8 corners
B) 6 plane faces, each a square, 12 edges, and 8 corners
C) 4 plane faces, each an equilateral triangle, 6 edges, and 4 corners
D) 8 plane faces, each an equilateral triangle, 12 edges, and 6 corners

61) Which group of silicates has the most sharing of corner oxygen atoms? 61) _____
A) single chain like pyroxene
B) framework like feldspar
C) sheet like mica
D) double chain like amphibole

62) Aluminum ions have what charge in most rock-forming minerals? 62) _____
A) 2+ B) 4- C) 4+ D) 3+

63) Which element forms the strongest bonds with oxygen, based on its size and charge? 63) _____
A) aluminum B) calcium C) potassium D) silicon

64) Which common group of rock forming minerals has simultaneous double substitution of Na^{+} for Ca^{+2} and Si^{+4} for Al^{+3} in its structure and chemical formula? 64) _____
A) micas
B) carbonates
C) pyroxenes
D) plagioclase feldspars

65) In feldspars, what element can be thought of as substituting for silicon in the tetrahedral ionic sites? 65) _____
A) sodium B) potassium C) carbon D) aluminum

66) Plagioclase feldspars contain significant, variable percentages of which elements? 66) _____
A) sodium and sulphur
B) iron and magnesium
C) calcium and magnesium
D) sodium and calcium

67) Which of the following minerals are silicates? 67) _____
A) hematite, magnetite, and corundum
B) calcite, aragonite, and dolomite
C) muscovite, hornblende, and plagioclase
D) anhydrite, gypsum, and barite

68) Which common rock forming minerals exhibit cleavage planes at nearly 90°? 68) _____
A) amphiboles like hornblende
B) feldspars like plagioclase and orthoclase
C) pyroxenes like augite
D) both B and C are correct

69) Which common rock forming minerals exhibit cleavage planes at nearly 60°/120°? 69) _____
A) amphiboles like hornblende
B) micas like muscovite and biotite
C) feldspars like plagioclase and orthoclase
D) pyroxenes like augite

70) Which of the following is a single-chain, ferromagnesian silicate mineral? 70) _____
A) clay B) pyroxene C) mica D) olivine

71) Hornblende and the other amphiboles have what type of silicate structure? 71) _____
A) double chains
B) 3-D framework
C) metallic
D) sheet

72) Which common rock forming minerals exhibit a perfect single basal cleavage? 72) _____
A) feldspars like plagioclase and orthoclase
B) amphiboles like hornblende
C) micas like muscovite and biotite
D) pyroxenes like augite

73) Which of the following best characterizes ferromagnesian silicates? 73) _____
A) They are dark and have a Mohs hardness greater than 7.
B) They contain iron and magnetite, are black in colour, and they have metallic lustres.
C) They are mostly dark, heavy, and rich in the elements manganese and ferron.
D) They are high temperature black to dark-green minerals containing iron and magnesium.

74) All ferromagnesian minerals contain which two elements? 74) _____
A) calcium, sodium
B) iron, potassium
C) chlorine, silicon
D) iron, magnesium

75) Ferromagnesian minerals generally exhibit which of the following properties? 75) _____
A) one perfect cleavage, colourless
B) dark colour, specific gravity higher than quartz
C) nonmetallic lustre, light colour
D) a light colour, metallic lustre

76) Which of the following minerals is a ferromagnesian silicate? 76) _____
A) muscovite B) hornblende C) quartz D) orthoclase

77) Hornblende and the other amphiboles have what type of silicate structure? 77) _____
A) sheet
B) metallic
C) 3-D framework
D) double chains

78) What is the name of dark-coloured mica? 78) _____
A) biotite B) calcite C) olivine D) quartz

79) In silicate minerals, cleavages occur _____. 79) _____
A) across the dominant silicate structures
B) in between mineral crystals
C) in between the dominant silicate structural units
D) in random directions, unrelated to the silicate framework

80) Garnet, a common hard metamorphic mineral used for abrasives, has an internal crystal structure most similar to which other silicate mineral? 80) _____
A) biotite
B) augite
C) olivine
D) plagioclase feldspar

81) Which one of the following is a sodium and calcium feldspar with twinning striations? 81) _____
A) plagioclase B) sanidine C) microcline D) orthoclase

82) Small, parallel grooves (twinning striations) are visible on cleavage surfaces and characteristic of which mineral? 82) _____
A) quartz
B) plagioclase feldspar
C) hornblende
D) olivine

83) The only sure way to identify a plagioclase feldspar from a potassium feldspar on large enough specimen to see with the naked eye is to _____. 83) _____
A) compare their colours, plagioclase is always darker
B) find wormy exsolution lamellae going obliquely across the cleavages
C) measure their exact cleavage angles, plagioclases have 120°
D) find multiple parallel twinning striations on a cleavage face

84) Which mineral is composed of silicon dioxide (SiO_2)? 84) _____

A) olivine B) calcite C) diamond D) quartz

85) Why doesn't quartz have any cleavages, only fractures? 85) _____

A) All oxygens are shared between strongly bonded silicons in a 3-D framework.
B) It is made of pure silicon which is very strong.
C) All of the metallic cations form strong webs between the silicate chains.
D) It has strong helical chains in three perpendicular directions.

86) Which of the following minerals is a silicate? 86) _____

A) hematite B) calcite C) halite D) muscovite

87) Which common silicate mineral was used as window glass in the Middle Ages? 87) _____

A) halite B) calcite C) quartz D) muscovite

88) Which of the following minerals is in the mineral group known as mica? 88) _____

A) orthoclase B) olivine C) augite D) muscovite

89) Which of the following is not a rock-forming silicate mineral? 89) _____

A) calcite B) orthoclase C) garnet D) quartz

90) Which of the following silicate minerals have 3-dimensional framework structures? 90) _____

A) micas and gypsum B) quartz and halite
C) hornblende and olivine D) feldspars and quartz

91) Which one of the following mineral groups exhibits a sheet-like silicate structure? 91) _____

A) feldspars B) pyroxenes C) clays D) carbonates

92) Most _____ minerals are microscopic crystals of sheet silicates that form by the chemical weathering of feldspars, pyroxenes, amphiboles and micas. 92) _____

A) hydroxide B) salt C) carbonate D) clay

93) Which one of the following is a typical product of chemical weathering of other silicates? 93) _____

A) clays B) feldspars
C) micas D) ferromagnesians

94) The principal ore of mercury is _____. 94) _____

A) cinnabar B) galena C) anhydrite D) sylvite

95) The main calcium sulphate mineral gypsum is used to _____. 95) _____

A) make cement B) extract the metal Ca
C) spread directly on soils as a fertilizer D) make plaster and wallboard

96) Which mineral is used to make drilling muds denser to prevent blowouts? 96) _____

A) halite B) pyrite C) barite D) galena

97) The main use for most diamond, corundum and garnet is _____. 97) _____

A) semiconductors for the electronics industry
B) gemstones of the semiprecious variety
C) fillers in industrial products like paint and pharmaceuticals
D) industrial abrasives

98) The main use of bauxite is _____. 98) _____
A) acid production for batteries B) the ore of copper
C) the ore of aluminum D) a food additive

99) These *non-silicate* minerals are found predominantly in sedimentary rocks. 99) _____
A) graphite, chromite, and ilmenite B) calcite, gypsum, and halite
C) amphibole, clays, and quartz D) feldspar, fluorite, and malachite

100) Ruby and sapphire are red and blue forms of the mineral _____. 100) _____
A) emerald B) turquoise C) corundum D) diamond

101) The term *precious gemstone* is reserved for stones of the following types: _____, that are prized for their: rarity, beauty, durability and size. Everything else is considered semi-precious. 101) _____
A) alexandrite, cats-eye, jade, topaz, and zircon
B) agates, alaska black diamonds, carborundum, chrysoberyls, and spinels
C) diamonds, emeralds, rubies, sapphires, and fire opals
D) diamonds, garnets, moonstones, onyx, and peridots

102) Emeralds and aquamarines are gem quality single crystals of the more ordinary mineral _____. 102) _____
A) epidote B) augite C) beryl D) olivine

103) Amethyst, chalcedony, and citrine are gemstone varieties of this common mineral. 103) _____
A) topaz B) quartz C) corundum D) alexandrite

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

104) Rocks are aggregates of one or more minerals. 104) _____

105) Coal is a rock formed mostly from fine grained carbon minerals. 105) _____

106) All atoms of the same element have the same atomic number. 106) _____

107) Electrically neutral atoms have equal numbers of electrons and protons. 107) _____

108) Most of the elements in the periodic table are metals. 108) _____

109) Positive ions are atoms that have gained electrons during a chemical reaction. 109) _____

110) In the compound sodium chloride, the negative ions are chlorine. 110) _____

111) Graphite and diamond have the same chemical composition and different crystalline structures. 111) _____

112) Diamond and quartz are both minerals composed of a single element. 112) _____

113) Graphite is used as a natural abrasive. 113) _____

114) The external expression of internal atomic arrangement in a mineral is called its crystal habit. 114) _____

115) Mineral lustre is broadly classified as either metallic or opaque. 115) _____

116) Colour is one of the most diagnostic properties of minerals. 116) _____

117) Diamond is the hardest mineral; calcite is the softest known mineral. 117) _____

118) Rock-forming silicate minerals have higher specific gravities than water. 118) _____

119) Micas like muscovite and biotite have flexible cleavage flakes that will bend, and when the strain is taken off they relax back to their original position and shape. 119) _____

120) Pyrrhotite (iron sulphide) is the only mineral to exhibit natural magnetism. 120) _____

121) When treated with hydrochloric acid, powdered carbonate minerals release bubbles as a fizz of odorless carbon dioxide. 121) _____

122) Optically transparent calcite exhibits the special property of "double refraction." 122) _____

123) In a silicon-oxygen structural unit, silicon atoms occupy corners of a tetrahedron. 123) _____

124) Oxygen ions are larger in size than silicon ions. 124) _____

125) As silicate tetrahedra link together in larger units, more oxygens are shared and the size of the negative charge per silicon decreases. 125) _____

126) Compared to the 1.4 angstrom size of the O^{2-} anion, most common metallic cations are double to triple that size. 126) _____

127) Ferromagnesian silicate minerals contain some magnesium and/or iron. 127) _____

128) The micas, biotite and muscovite, both exhibit one direction of cleavage. 128) _____

129) Orthoclase and plagioclase feldspars have quite different forms of cleavage. 129) _____

130) Nonmetallic minerals like halite and gypsum have no industrial uses. 130) _____

131) Calcite and dolomite are both carbonate minerals. 131) _____

132) Calcite and halite react with dilute acids to evolve carbon dioxide. 132) _____

133) Trace impurities of chromium make corundum into ruby, while traces of titanium and iron make it into sapphire. 133) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

134) Name a characteristic of a mineral. 134) _____

135) What major characteristic differentiates minerals from natural glasses? 135) _____

136) Rocks are aggregates of one or more what? 136) _____

137) What is the smallest particle of matter that exhibits and defines the distinctive chemical characteristics of the individual elements? 137) _____

138) The massive but tiny central core region of an atom is called the what? 138) _____

139) In atoms, which electrons are involved in chemical bonding? 139) _____

140) A compound is a stable chemical substance composed of two or more what? 140) _____

141) Where can one view a list of known elements? 141) _____

142) What is the basic difference between ionic and covalent bonds? 142) _____

143) What are two or more minerals called if they have the same chemical composition but different physical properties? 143) _____

144) Diamonds are hard because all carbon atoms are held together by equally strong _____ bonds arranged in a face centred cubic structure. 144) _____

145) Graphite has (weak, strong) bonds within its layers but (weak, strong) bonds between its layers. 145) _____

146) What is the chemical composition of graphite and diamond? 146) _____

147) The external expression of the internal arrangement of atoms in a mineral is called what? 147) _____

148) _____ is the appearance or quality of light reflected from the crystal face of a mineral. 148) _____

149) What physical property denotes the colour of a powdered mineral? 149) _____

150) The Mohs scale is a relative measure of which physical property of minerals? 150) _____

151) What is the hardest mineral known? 151) _____

152) The physical property denoting a mineral's tendency to crack along parallel, planar surfaces is known as what? 152) _____

153) Most glasses and some minerals exhibit a type of fracture characterized by nested and curved, crack surfaces. What term describes this property? 153) _____

154) What are the two most abundant elements, which by themselves account for approximately 75% by weight of the Earth's crust? 154) _____

155) The real kryptonite is not a mineral but a(n) _____. 155) _____

156) The real mineral jadarite has the same chemical composition as fictional kryptonite except for what? 156) _____

157) Which is the most common mineral class? 157) _____

158) The silicon-oxygen tetrahedron has a net charge of _____. 158) _____

159) _____ oxygen ions occupy the corners of the silicon-oxygen tetrahedron. 159) _____

160) _____ forms the strongest bond with oxygen anions. 160) _____

161) What ferromagnesian silicate mineral is named for its green colour? 161) _____

162) What is the most common member of the pyroxene group of ferromagesian minerals? 162) _____

163) _____ is the most common variety of the mineral group amphibole. 163) _____

164) Parallel, straight, linear imperfections visible on the cleavage surfaces of plagioclase feldspar are called what? 164) _____

165) _____ is the light coloured member of the mica group of sheet silicate minerals. 165) _____

166) _____ is a common pink variety of the feldspar group of framework silicate minerals. 166) _____

167) What mineral class forms by the breakdown and weathering of rock-forming silicate minerals and are important constituents of soils? 167) _____

168) Name a common carbonate mineral. 168) _____

Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

169)	A) gaseous structure	B) naturally occurring	C) solid	D) orderly	169) _____
170)	A) electron	B) atom	C) proton	D) neutron	170) _____
171)	A) ionic	B) cation	C) anion	D) nucleus	171) _____
172)	A) hardness	B) streak	C) lustre	D) cleavage	172) _____
173)	A) muscovite	B) biotite	C) clay	D) olivine	173) _____
174)	A) sodium	B) fluorine	C) lithium	D) boron	174) _____
175)	A) feldspars	B) silicates	C) carbonates	D) evaporites	175) _____
176)	A) quartz	B) olivine	C) feldspar	D) calcite	176) _____
177)	A) sulphides	B) oxides	C) garnets	D) halides	177) _____
178)	A) olivine	B) quartz	C) amphibole	D) pyroxene	178) _____
179)	A) galena	B) calcite	C) gypsum	D) halite	179) _____
180)	A) diamond	B) opal	C) ruby	D) zircon	180) _____

ESSAY. Write your answer in the space provided or on a separate sheet of paper.
Use complete sentences, correct spelling, and the information presented in Chapter 2 to answer the question(s) below.

181) Considering the composition and structure of Earth discussed in Chapter 1, do you think all of the possible silicate (and even mineral) structures have been identified by scientists? Explain. Also, does this same reasoning apply to all possible chemical elements of Earth?

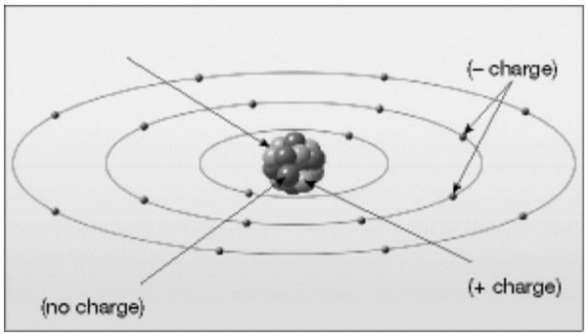
182) Based on the brief discussion of chemistry and chemical bonding, why do minerals rarely exhibit pure chemical compositions (100% always the same chemical composition)?

183) Overall, the physical properties of minerals provide a reliable means to identify common minerals. However, certain properties can exhibit a range of characteristics or values making them less useful for identification purposes. Choose three physical properties that might vary considerably between samples of the same mineral and explain why such variability would exist.

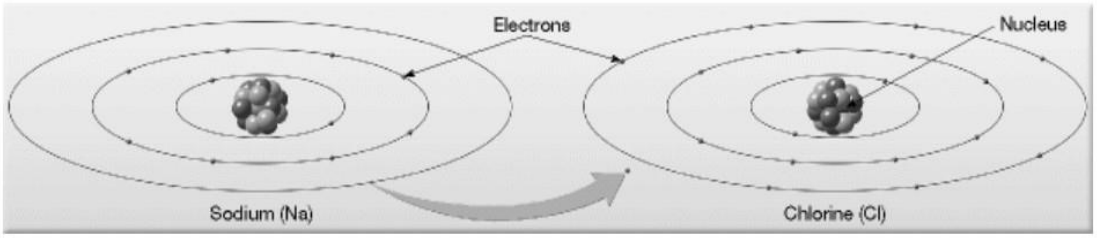
184) Given the similar chemical compositions of the real mineral jadarite and the fictional mineral kryptonite, what is different about real kryptonite?

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

185) Label the various parts of an atom in the diagram below. 185) _____



186) What type of chemical bonding is shown in the diagram below? 186) _____



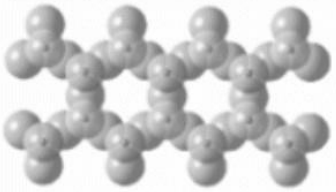
a) covalent b) ionic c) metallic d) hybrid

187) For each illustration below, note the number of cleavage directions. 187) _____

a) b) c)

188) Fill in the table below on silicate minerals.

188)

Silicate structure	Oxygen to silicon ratio	mineral	cleavage
	4:1	olivine	(a)
	(b)	(c)	two planes at right angles
	(d)	(e)	(f)

1) D
2) C
3) D
4) A
5) A
6) B
7) B
8) B
9) D
10) D
11) D
12) B
13) D
14) A
15) D
16) C
17) D
18) B
19) A
20) D
21) D
22) C
23) C
24) B
25) D
26) D
27) D
28) A
29) A
30) A
31) B
32) C
33) D
34) A
35) B
36) B
37) A
38) D
39) C
40) C
41) A
42) D
43) C
44) C
45) B
46) D
47) D
48) C
49) C
50) D
51) A

52) C
53) A
54) D
55) D
56) A
57) A
58) D
59) A
60) C
61) B
62) D
63) D
64) D
65) D
66) D
67) C
68) D
69) A
70) B
71) A
72) C
73) D
74) D
75) B
76) B
77) D
78) A
79) C
80) C
81) A
82) B
83) D
84) D
85) A
86) D
87) D
88) D
89) A
90) D
91) C
92) D
93) A
94) A
95) D
96) C
97) D
98) C
99) B
100) C
101) C
102) C
103) B

104) TRUE
105) FALSE
106) TRUE
107) TRUE
108) TRUE
109) FALSE
110) TRUE
111) TRUE
112) FALSE
113) FALSE
114) TRUE
115) FALSE
116) FALSE
117) FALSE
118) TRUE
119) TRUE
120) FALSE
121) TRUE
122) TRUE
123) FALSE
124) TRUE
125) TRUE
126) FALSE
127) TRUE
128) TRUE
129) FALSE
130) FALSE
131) TRUE
132) FALSE
133) TRUE
134) natural, solid, usually inorganic, orderly structure, definite composition
135) internal arrangement of atoms
136) minerals
137) atom
138) nucleus
139) valence
140) elements
141) periodic table of the elements
142) electrons are given up by one atom and received by the other with ionic, but are shared in covalent
143) polymorphs
144) covalent
145) strong, weak
146) carbon
147) crystal habit
148) Lustre
149) streak
150) hardness
151) diamond
152) cleavage
153) conchoidal
154) oxygen, silicon
155) element

156) fluorine
157) the silicates
158) 4^-
159) 4
160) Silicon
161) olivine
162) augite
163) Hornblende
164) striations
165) Muscovite
166) Orthoclase
167) clays
168) calcite, dolomite
169) gaseous
170) atom
171) nucleus
172) lustre
173) olivine
174) fluorine
175) feldspars
176) calcite
177) garnets
178) quartz
179) galena
180) zircon
181) No. Every year new minerals are discovered. As new outcrops of crustal rocks are studied there are bound to be new rocks, new minerals and new even elements discovered as a result of gravitational accretion (Nebular hypothesis) and lighter elements having migrated outwards from Earth's interior during its formation. Also, as minerals transform in the rock cycle, new combinations of elements will be created. Furthermore, as drilling attempts reach into the mantle, new discoveries are also bound to be made.
182) Many cations have similar sizes and can freely substitute for each other as the mineral is forming, resulting in varying compositions of the mineral.
183) Colour. Some minerals like quartz exhibit different colours due to tiny amounts of impurities. Crystal habit. Some minerals have multiple habits depending on whether or not they can grow in free space, or the pressure-temperature conditions under which they formed.
Fracture. Most minerals break unevenly along surfaces other than cleavage planes.
184) Real kryptonite is an element in the periodic table, not a mineral.
185) See figure 2.4B
186) b) ionic
187) a) 3 b) 3 c) 4
188) a) none
b) slightly more than 3:1
c) pyroxene group□augite
d) slightly less than 3:1
e) amphibole group□hornblende
f) two planes at 60 and 120 degrees