

Station 1:

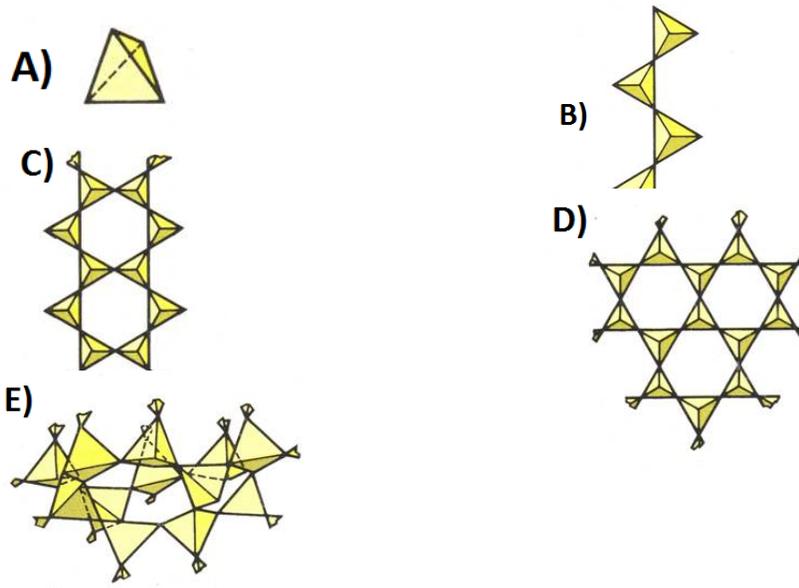
- 1) Identify each specimen.
- 2) Which specimen is magnetic only when heated?
- 3) All of these specimens belong to the same class of minerals. Name that class.
- 4) Name one major economic use of this class of minerals.
- 5) What is the chemical formula of Specimen A?
- 6) Which of the following are properties associated with specimen C?
 - a) Replacement mineral of fossils
 - b) Association with coal beds
 - c) Easily oxidized
 - d) All of the above
 - e) A and B only
- 7) Which specimen is important in the production of ship ballast and pigments?

Station 2:

- 8) Identify 3 minerals in the specimen
- 9) What is the entire specimen collectively known as?
- 10) Based upon the minerals you see, how would you classify the chemistry of the whole specimen?
- 11) In what geological feature would you typically find this specimen?
- 12) Why does the specimen have such large crystals?
 - a. It cooled slowly under the earth's surface, allowing more time for larger crystals to develop.
 - b. Water pockets in magma allow for freer ion movement than in the surrounding magma, resulting in large crystals.
 - c. Intense heat and pressure cause the minerals to recrystallize to form new, larger crystals.
 - d. An explosive eruption caused fragments of phaneritic rocks to mix in with the soon-to-be aphanitic matrix, resulting in crystals of varying sizes.

Station 3:

- 13) Identify each specimen.
- 14) These minerals are part of a group that contain the Earth's two most abundant elements. Which elements are these?
- 15) Which two minerals will **never** be crystallized together in the same rock?
- 16) What was specimen C's historical use for which it was named?
- 17) Which of the following represents the most advanced repeating monomer unit structure for specimen B?



Station 4:

- 18) Identify each specimen.
- 19) Describe the crystal habit of each specimen.
- 20) While crystal habit and crystal structure are similar concepts, they are not exactly the same. What is the difference between these two terms?
 - a. Crystal habit is how the atoms in the mineral tend to arrange themselves and Crystal structure is the external shape of a group of crystals.
 - b. Crystal habit is the overall appearance of an aggregate of a single mineral while Crystal structure is the external shape of a group of crystals.
 - c. Crystal habit is the external shape and arrangement of a crystal group while Crystal structure is the arrangement of molecules in a mineral.
 - d. Crystal habit is how a mineral tends to split when struck along a plane while Crystal structure is the arrangement of molecules in a mineral.
- 21) Name 2 other minerals on minerals on the list that commonly share the same crystal habit as specimen C.

Station 5:

- 22) Identify each specimen
- 23) All the rocks in this station are classified as what type of sedimentary rock?
- 24) Fill in the blanks: The movement of material by moving wind, water, or ice is a process called (a) _____ while the process that breaks down solid rock into loose sediment is called (b) _____.
- 25) List the specimens by letter in order of increasing weathering.
- 26) Generally, sedimentary rocks compositionally contain a lot of quartz. Why?
 - a) Quartz is the most common mineral and therefore is the most common mineral in sedimentary rocks.
 - b) Quartz is hard enough to survive most weathering while softer minerals dissociate completely.
 - c) All rocks contain some amount of quartz, so naturally sedimentary rocks contain high levels of quartz.
 - d) Quartz is the “glue” that binds the grains of sedimentary rocks together.
- 27) True or False: the specimens in this station are vulnerable to dissolution weathering.
- 28) This class of sedimentary rocks are generally low in feldspar. Feldspars commonly break down by acid hydrolysis to form what class of minerals? Hint: these minerals are critical to the diagenesis of sedimentary rocks.

Station 6:

- 29) Identify the two specimens
- 30) What is the chemical formula of specimen B?
- 31) Specimen B has an allotrope, or a mineral that shares its chemical formula but has a different crystal form. What is that allotrope?
- 32) The fibrous aggregates of specimen A display fiber-optic properties commonly seen in synthetic polymers, giving it the nickname “TV stone.” However, there is one other mineral, when polished correctly, that also displays this projective property and is also sold as “TV stone.” What is this mineral?
- 33) Which of the following are NOT uses of specimen B?
 - a. Lenses
 - b. Prisms (like the one used in your physics classes)
 - c. Jewelry
 - d. All of the above
 - e. B & C only
- 34) What is this common name for this variety of specimen B?

Station 7:

- 35) Identify both specimens.
- 36) What locality is known for being abundant in specimen B?
- Kent, England
 - Shark Bay, Australia
 - Lüneburg Heath, Germany
 - British Columbia, Canada
- 37) Which of the following is true about both specimens?
- Both specimens indicate marine environments
 - The porosity of the specimens make them ideal to be used in filtration post heat-activation.
 - The specimens are mostly composed of calcium carbonate
 - None of the above
 - A & C
- 38) Specimen B is made up of the fossilized skeletons of micro-organisms known as _____.
- 39) Which of the following is/are uses of Specimen A?
- Dynamite
 - Fire-retardant materials
 - Insecticide component
 - Hydroponic medium
 - All of the above
- 40) Most commercially important deposits of Specimen A are from what geological era?
- Cretaceous
 - Miocene
 - Triassic
 - Eocene

Station 8:

Describe the luster of each mineral shown in the picture. You do not need to identify the mineral.

Station 9:

Note: Specimen C is not a sample on the list. It is a rock known as a migmatite, which forms from partially melted metamorphic rocks; some of the minerals are made from cooled melt and the others are from metamorphosis. Pretty gneiss, right?

- 47) Order the samples based upon increasing grade of metamorphism.
- 48) The twisted bands of minerals seen in the specimens at this station is a feature of metamorphic rocks known as _____.
- 49) In regional metamorphism the source of increased temperature and pressure is _____.
 - a. A local intrusive heat source
 - b. Tectonic force over a large area
 - c. Increasing depth of burial
 - d. Increasing rates of radioactive decay
- 50) The source of increased temperature and pressure in contact metamorphism is _____.
 - a. A local intrusive heat source
 - b. Tectonic force over a large area
 - c. Increasing depth of burial
 - d. Increasing rates of radioactive decay
- 51) Due to the presence of twisted mineral bands, we can infer that the samples at this station are the result of
 - a. Contact Metamorphism
 - b. Hydrothermal Metamorphism
 - c. Regional Metamorphism
 - d. Cataclysmic Metamorphism
 - e. Extraterrestrial Metamorphism
- 52) Name any two accessory minerals on your list that result from these metamorphic processes.

Station 10:

- 53) Identify each specimen
- 54) While all three specimens are arguably variations of the same mineral, most geologists recognize Specimen A as a different mineral. Give one reason supporting this conjecture.
- 55) Your coach has probably told you at some point that color is not a very reliable property to identify most minerals by, as the same mineral often comes in different color. These colors are due to _____ in the otherwise uniform chemical composition.
- 56) Which of the following elements result in the pink color of Specimen C?
 - a. Copper
 - b. Potassium
 - c. Titanium
 - d. Magnesium
 - e. None of the above
- 57) Where does the white color of specimen B come from?
 - a. Titanium ions
 - b. Inclusions of fluid or gas
 - c. Lead ions
 - d. Densely packed crystalline fibers
- 58) If you take specimens B and C and firmly rub them together (do NOT do this with our specimens!), you will see a brief flash of light. This optical phenomenon is known as:
 - a. Frictoluminescence
 - b. Piezoelectricity
 - c. Triboluminescence
 - d. Photoluminescence
 - e. Piezoluminescence
- 59) Which of the following is not a use of specimen C?
 - a. Lighter ignition
 - b. Gemstone
 - c. Industrial filler
 - d. Glass
 - e. None of the above

Station 11:

- 60) State the volcano type for each volcano shown.
- 61) Low viscosity lava is a characteristic of (1) _____ eruptions, which commonly form a low, gently sloping volcano type called a (2)_____.
- a. (1) explosive (2) shield volcano
 - b. (1) nonexplosive (2) stratovolcano
 - c. (1) explosive (2) composite volcano
 - d. (1) nonexplosive (2) shield volcano
- 62) High viscosity lava is a characteristic of (1) _____ eruptions, which originate from a tall, steep volcano called a (2)_____.
- a. (1) explosive (2) shield volcano
 - b. (1) nonexplosive (2) stratovolcano
 - c. (1) explosive (2) composite volcano
 - d. (1) nonexplosive (2) shield volcano
- 63) Name two types of rock that may originate from Mauna Loa.
- 64) Name two types of rock that may originate from Lassen Peak.
- 65) What type of volcano is pumice most likely to come from?
- 66) What is the Hawaiian term for smooth, mafic lava flows?

Station 12: Anthracite, Bituminous Coal

67) Identify each specimen

68) Which country is the world's largest producer of specimen A?

- a. USA
- b. Russia
- c. China
- d. South Africa
- e. Ukraine

69) Both of these specimens are indicators of a _____ past environment.

- a. Marine
- b. Floodplain
- c. Swampy
- d. Lacustrine

70) Most of the modern deposits of Specimen B come from which geologic period?

- a. Permian
- b. Triassic
- c. Cretaceous
- d. Carboniferous
- e. Quaternary

71) Specimen A is (1) _____ % carbon and Specimen B is (2) _____ % carbon.

72) In 2015, the US generated approximately what percent of its energy from coal and other natural gases?

- a. 25%
- b. 50%
- c. 67%
- d. 75%
- e. 87%

Station 13:

- 73) Identify each specimen
- 74) Write the chemical formula for specimen A
- 75) What happens when you place a small piece of specimen B in a dilute hydrochloric acid solution?
- Nothing happens
 - The sample dissolves and effervesces
 - The sample dissolves and effervesces, leaving an opaque, blue solution
 - The sample dissolves with no effervescence
 - The sample dissolves and effervesces, leaving a clear, blue solution
- 76) Why is specimen A commonly used as in drilling fluids?
- Its smooth texture allows for better lubrication of drilling components
 - Its high specific gravity suppresses high formation pressures and prevents blowouts in drilling equipment
 - Its high specific gravity ensures that the drill proceeds downwards.
 - It helps emulsify the drilling fluid, keeping it from separating.
- 77) Which of the following are uses of specimen C? Circle all that apply
- Fertilizer
 - Hydrofluoric acid synthesis
 - Index mineral
 - Nuclear waste storage
 - None of the above

Station 14:

Directions: Refer to the chart to answer the questions.

- 78) Name the indicated depositional environments A-E
- 79) In which of the 5 indicated depositional environments are you most likely to find fossils?
- 80) Which of the terrestrial environments would produce rocks with the finest grain size?
- 81) Which of the indicated environments may produce sandstone?
- 82) While they are not shown in the diagram, glaciers are crucial in both weathering and erosion. What kind of sediment is indicative of a glacial environment?
 - a. Rounded grains, well sorted
 - b. Angular grains, well sorted
 - c. Rounded grains, poorly sorted
 - d. Angular grains, poorly sorted

Station 15:

83) Identify each specimen

84) All the specimens are indicative of what kind of geologic environment?

- a. Plutonic Igneous
- b. Volcanic Igneous
- c. Evaporite Sedimentary
- d. Contact Metamorphic
- e. Regional Metamorphic

85) The colorful varieties of specimen B are also known as _____.

86) List two uses of Specimen C.

87) As the iron content in specimen A increases, the color becomes increasingly

- a. Red
- b. Blue
- c. Green
- d. White

88) Which specimen is a controversial fireproofing material?

89) Specimen B is able to produce voltage when heated, a property known as _____.

Station 16:

Directions: This is the tie breaker station. No points will be awarded for this station, but you are encouraged to answer all the questions accurately in the case of a tie.

- 90) Who is considered to be the father of modern geology?
- 91) What type of chemical bonding binds the layers of carbon atoms together in graphite?
- 92) Which country is the top producer of bauxite?
- 93) What is the official gemstone of Massachusetts?
- 94) The chemical composition of the New England bedrock is generally _____.
- 95) What mineral is commonly known as “heavy spar?”
- 96) In 1962, a subterranean vein of anthracite caught fire and has been burning ever since in which Pennsylvanian town?
- 97) Another word for “parent rock” is _____.
- 98) Recently, the U.S. energy industry has been criticized for practicing hydraulic fracturing, a method of extracting natural gas and oil from rock deposits. What sedimentary rock is primarily targeted in hydraulic fracturing?
- 99) Which two minerals make formations called “desert roses?”
- 100) The radiolarian protozoans known as Acantharia are made up of what strontium sulfate mineral?