

Material Science Quiz

Answer the following questions without the assistance of a neighbor, friend or teacher.

1. For each material, indicate its material class.

- | | |
|--------------------------|-------|
| quartz | _____ |
| steel | _____ |
| Teflon® | _____ |
| aluminum | _____ |
| plywood | _____ |
| fiber glass | _____ |
| diamond | _____ |
| Zip Lock® bag material | _____ |
| paper clip | _____ |
| polyvinyl chloride (PVC) | _____ |
| concrete | _____ |
| paper | _____ |

Material Classes:

1. polymer
2. metal
3. ceramic
4. composite

2. Connect each material to the corresponding material class.

- | | |
|---------------------------|--|
| ductility _____ | 1. Hard, covalently bonded material |
| brittle _____ | 2. Describes displacement of particles in a deforming body |
| lattice _____ | 3. Measured stress at onset of plastic deformation |
| ceramic _____ | 4. The brand of science that deals with metal properties |
| stress _____ | 5. Irreversible alteration of a solid body under stress |
| plastic deformation _____ | 6. Reversible alteration of a solid body under stress I |
| yield strength _____ | 7. 3D geometric arrangement of atoms composing a crystal |
| elastic deformation _____ | 8. Ability of material to undergo permanent deformation without fracture |
| strain _____ | 9. Ability of material to break, or crack easily when subjected to a force |
| metallurgy _____ | 10. Force exerted on an object over a defined cross-sectional area |

3. What type of bonding makes up ceramic materials?

- a. covalent bonds
- b. London dispersion forces
- c. metallic bonds
- d. ionic bonds

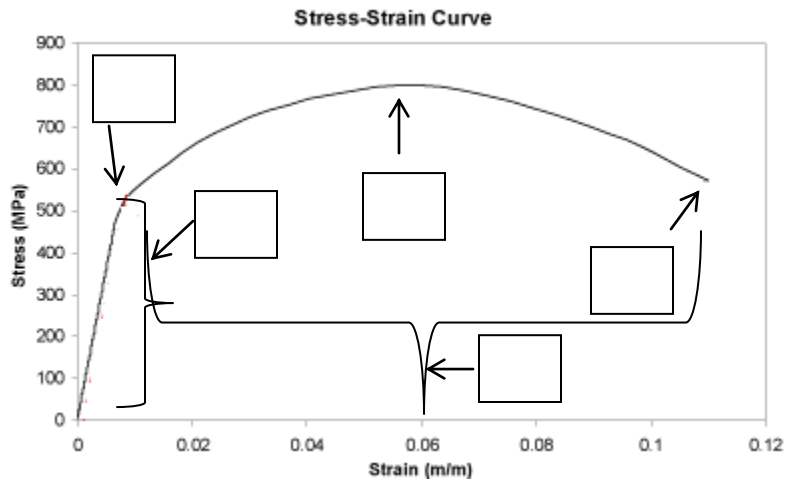
4. How many lattice structures exist?

- a. 2
- b. 14
- c. 7
- d. 5

5. **How many Bravais lattice structures exist?**
 - a. 2
 - b. 14
 - c. 7
 - d. 5
6. **The maximum attainable stress for a metal is called:**
 - a. yield stress
 - b. fracture stress
 - c. maximum stress
 - d. ultimate tensile stress
7. **All are attributes of ceramics, except:**
 - a. covalent bonded
 - b. low melting point
 - c. high stiffness
 - d. High hardness
8. **All are not attributes of metals, except:**
 - a. electrical insulators
 - b. thermal insulators
 - c. high melting points
 - d. ductile
9. **Below are examples of plastic deformation, except:**
 - a. a wire coiled 10 times around a magnetic core
 - b. broken glass
 - c. bent nail in wood
 - d. molded clay
10. **What class of material might be useful at temperatures 1100°C (2150°F)?**
 - a. pure metals
 - b. polymer-polymer composites
 - c. ceramics-ceramic composites
 - d. lead-tin metal alloy

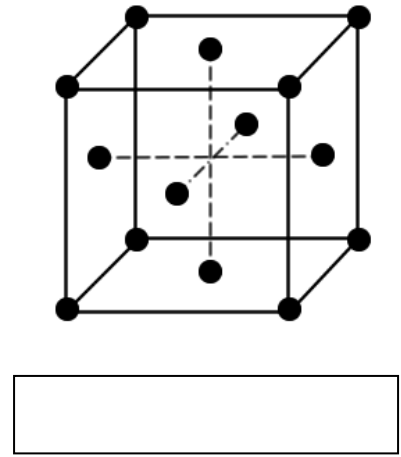
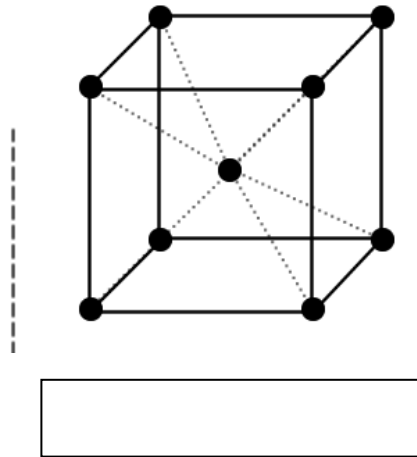
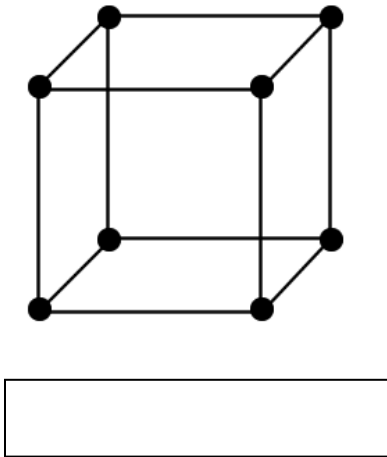
11. **Label the stress strain plot below:**

- a. yield stress
- b. ultimate tensile stress
- c. fracture stress
- d. elastic deformation region
- e. plastic deformation region



Name: _____ Date: _____

12. Label the lattice and packing below.



- 13. True or False? Aluminum alloy has an FCC structure.
- 14. True or False? Brittle materials typically fail fast and with excessive plastic deformation.
- 15. True or False? Strain is the measure of force per unit cross-sectional area.
- 16. True or False? Type of bonding dictates whether a material is electrically conductive or not.
- 17. True or False? Metallurgy is the study of metals and their behavior.
- 18. True or False? I like materials science and engineering.