Rocks and Minerals—Science Olympiad 2013

Name

1. Order the following in order of increasing carbon content: Lignite, Anthracite, Peat, Bituminous Coal

_____Peat, Lignite, Bituminous, Anthracite_____

2. Identify and order the following minerals from lowest to highest on the Bowen's reaction series.

1. 

2. 

3. 

4. 

_____Muscovite_____ _____Biotite_____ _____Quartz____ __ ____Olivine_

Order: _____4 – 2 – 1 - 3 _____

3. Suppose you come across a black, average-looking mineral on your worldwide travels. Of the following minerals, which is it least likely to be?

Sphalerite, Hornblende, Augite, Limonite

_____Sphalerite_____

4. Name the difference between calcite and aragonite.

____Calcite and Aragonite are pseudomorphs, they have the same chemical composition, but they crystallize in different systems. Aragonite is not thermodynamically stable and will turn into calcite after many years.__

5. Which two elements make up mafic and felsic rocks, respectively?

_____Mafic: rich in magnesium and iron. Felsic: rich in Silicon and Oxygen_____

_____

6. Which clastic rocks are composed of rounded and angular rock fragments, respectively?

_____Rounded: Conglomerate, Angled : Breccia_____

7. Hornfels is created by which metamorphic process?

_____Contact metamorphism_____

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8. Which is the first mineral to crystallize from the very high temperatures as magma first starts to cool? **Olivine**

9. Which is the last mineral to form from the last remaining melt of high silica content? **Quartz**

10. (**T**-F) Bowen's reaction series indicates that minerals with the highest melting temperatures crystallize from a cooling magma before those with lower melting points.

11. (**T**-F) Bowen's reaction series indicates that ferromagnesian minerals in magma crystallize in the sequence shown in the discontinuous branch.

12. (**T**-F) Bowen's reaction series offers an explanation for the differentiation of felsic and mafic minerals in magma.

13. Which bonding occurs at the highest temperatures within the Discontinuous Branch?
    a. ionic b. covalent

The following questions refer to the two branches of the Bowen's Reaction Series.

14. Which reaction series follows a repetitive sequence of stable to unstable pattern, not permitting simultaneous formation of similar minerals?

    a. continuous b. discontinuous

15. Which reaction series follows a gradual transitional pattern of mineral formation thus permitting combinations of minerals to form and exist as the magma cools?
    a. continuous **b. discontinuous**

16. Which list the sequence of ferromagnesian silicate minerals crystallizing from a cooling magma?
a. amphibole, olivine, biotite, pyroxene **c. olivine, pyroxene, amphibole, biotite**
b. biotite, amphibole, pyroxene, olivine d. pyroxene, olivine, amphibole, biotite

17. Of the following, which rock type is most likely to contain calcium-rich feldspar?
    a. basalt b. granite c. pumice d. rhyolite

18. Of the following paired minerals, which are characteristic of lower crystallization temperatures and absent in basalt and gabbro?

    a. pyroxene and olivine c. biotite and olivine
    b. quartz and pyroxene **d. quartz and muscovite**

19. Which rock is composed of finely to coarsely crystalline calcite or dolomite and was formed during metamorphism of limestone or dolomite rock? **Marble**

20. Which rock is composed of fine to coarse crystalline quartz and is derived from metamorphism of quartz sandstone and chert? **Quartzite**

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21. Which rock was derived from regional metamorphism of high-silica igneous rocks and muddy sandstones? **Gneiss**

22. Describe the cleavage angles of a monoclinic, orthorhombic, and triclinic crystal system.

_____Monoclinic: two cleavage angles are 90, one isn't. Orthorhombic: all are 90. Triclinic: none of them are 90_____

23. Classify the following rocks as sedimentary, metamorphic, or igneous.
Gneiss, Gabbro, Phyllite, Breccia, Andesite

Sedimentary: _____Breccia_____

Metamorphic: _____Gneiss, Phyllite_____

Igneous: _____Andesite, Gabbro_____

24. You are asked to identify a mineral. It has a metallic red-to-black color, is not magnetic, and when scratched across a streak plate, it leaves a dark red mark. What is it?

_____Hematite_____

25. You are asked to identify a mineral. It is shiny, metallic, and dense. You notice cubic crystals. What is it?

_____Galena_____

26. You are asked to identify a mineral. It is pale in color and takes the shape of the petals of a rose. Which two minerals could it be?

_____barite rose or selenite rose_____

ROCKS AND MINERALS IDENTIFICATION BONANZA

Identify the following minerals by picture.

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_____epidote____ _____chalcopyrite___ _____Ulexite_____ _____fluorite_____




_____sphalerite_____ ____Galena_____ ____Bornite_____ ____lepidolite_____

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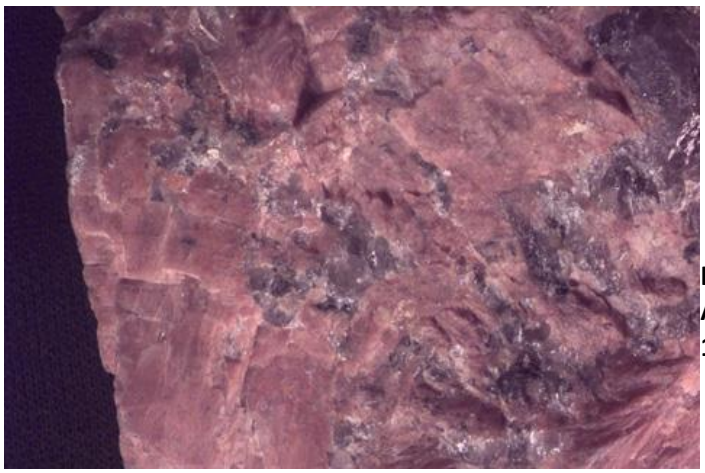
Name

Identify: Coquina **Usage? Building material for forts, also fertilizer**



Identify: granite
Average melting temperature range is: 1215-1260 degrees Celsius

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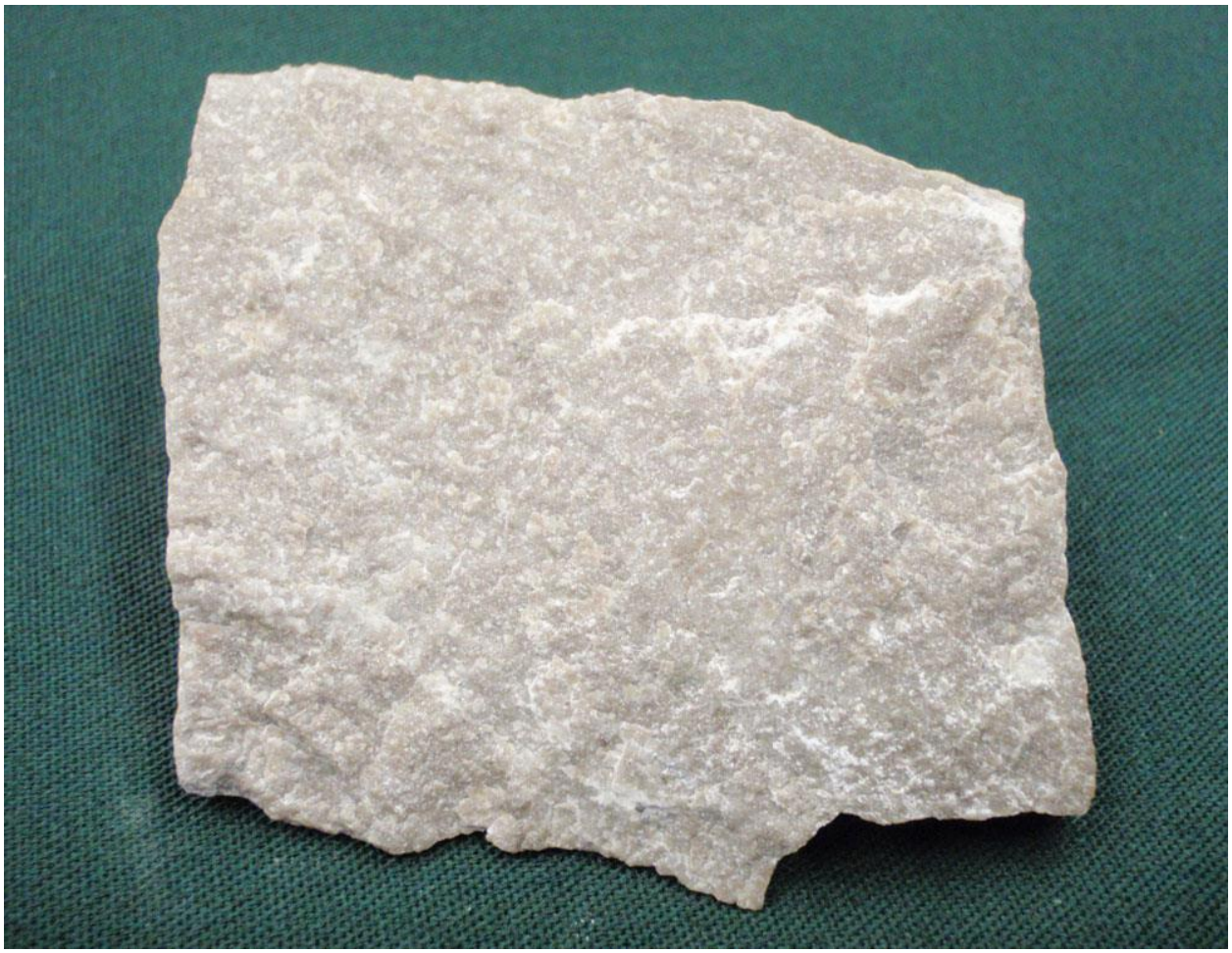

Identify: limestone

This mineral is _____10_ percent of all ____sedimentary_____ rocks in the world.

Identify: Hematite

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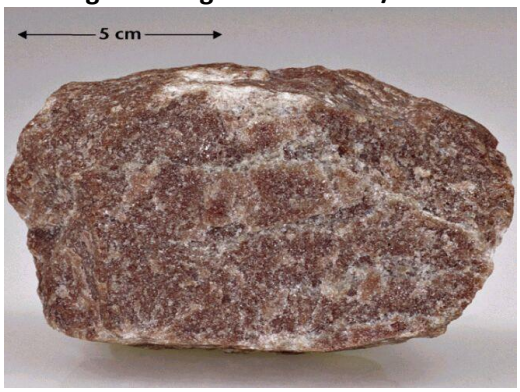
Identify: Shale What minerals is this rock mostly made of? Small small quartz pieces
How big are the grain sizes? < 1/256 mm



Identify: Quartzite
Parent rock? Sandstone

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Identify: Topaz **Crystal form? Orthorhombic**

Commonly found in what kind of rocks? Igneous

Identify: (multiple answers will be accepted, try your best): Chalcedony, agate

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Identify: Limonite
Usage? Pigment, iron ore

Identify: Goethite
Usage? Pigment, iron ore

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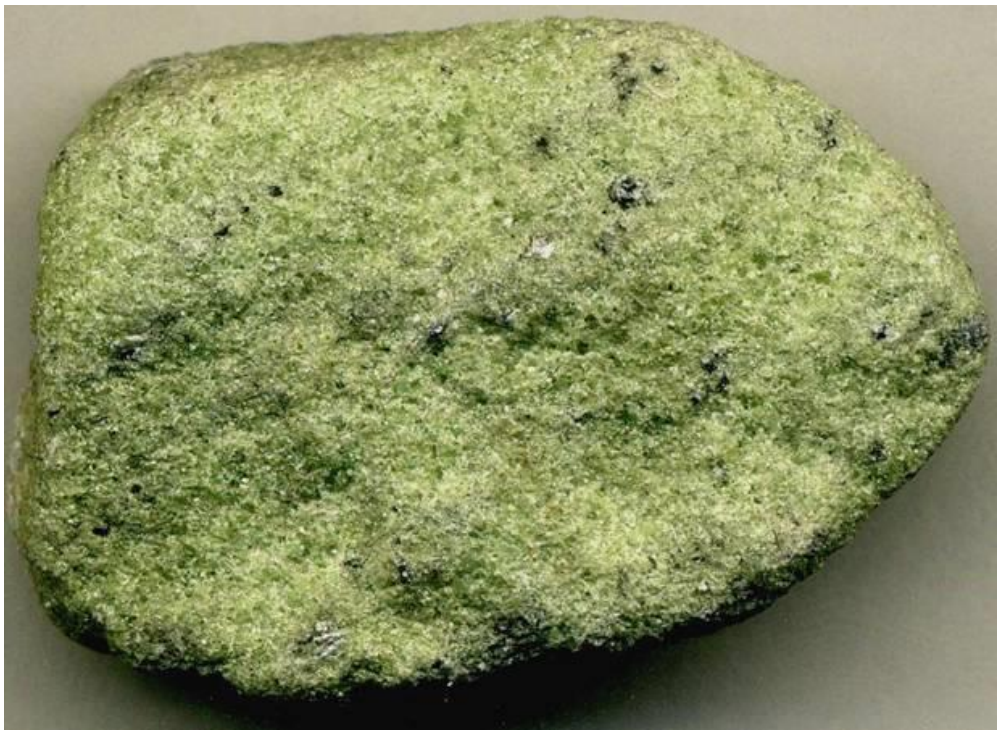

Identify: Olivine

Identify two minerals: Hematite, Magnetite (ask for a hint, if you need it)
What is the colloquial name? Where is this famously found (but still found in many other places)?
Black sand, found in hawaii (it's the famous magnetic sand)

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Identify: Silver
State mineral of what state? Nevada

Identify: Citrine