2006 S. CO SO Regional Competition **Rocks and Minerals**

1. **Do not turn this card over until the signal has been given!** A different station activity has been printed on the back of each card.
2. Enter all requested information at the top of page 1 of the response sheet. Also enter your team number at the top of each individual page.
3. Each specimen has been identified with a letter/number combination.
4. Be certain to record your answers on the section of the response sheet corresponding to the station at which you are working.
5. Spelling does not count. However, there must be no doubt as to what word you intended to spell. "*Flourite*" would be an acceptable spelling for "*Fluorite*."
6. Identify and record the name of each specimen in Column I next to its corresponding letter-number combination. Those questions labeled with a "Q" generally require information other than specimen names and will be used as tie-breakers.
7. Determine which statement(s) listed under Column II match each specimen. Record the lower-case letter(s) preceding the statements you choose on the short line(s) following the name of the specimen.
8. One or more statements in Column II may relate to a particular specimen. The total number of correct matches is indicated by the number of short lines available. All matching statements in Column II must be identified correctly as no partial credit will be given. Example, if the correct response is "a, b" and you record "a, c," the answer will be scored as incorrect.
9. **Three minutes** are allotted at each station. **You may not proceed to the next station until the signal has been given, nor may you return to a previous station!**

Sample Station. Identify each specimen. Perform a streak test on each specimen and match to its streak color. (1 match each)

S-1	a. gray-black
S-2	b. reddish or red-brown
S-3	c. dark gray
S-4	d. gray
S-Q	Is the following question **true** or **false**? A mineral's streak may be a different color than that of the actual specimen.

	Column I	**Column II**
S-1	hematite	b
S-2	pyrite	c
S-3	galena	d
S-4	graphite	c
S-Q	true	

Station A

Identify each specimen. Match each to its type. (1 match each)

A-1	a. clastic
A-2	b. organic
A-3	c. chemical
A-4	
A-5	
A-6	
A-7	
A-Q	As seawater becomes more and more concentrated, minerals begin to "come out of solution." List the three chemically-derived minerals at this station in order of formation from first to last.

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
A – 2	**2.0 – 2.5**	**2.16**	**XXX**
A – 5	**3.0**	**2.7**	**White**
A – 6	**1.5 – 2.0**	**2.3 – 2.4**	**White**
A – 7	**2.0 – 2.5**	**XXX**	**XXX**

Station B

Identify each specimen. Match each to one or more of the descriptions given. (B-8 and B-10 have 3 matches; B-9 has 1)

B-8	a. perfect, one direction cleavage
B-9	b. contains potassium, iron, and magnesium
B-10	c. a source of lithium
	d. confined to granite pegmatite
	e. adds the glitter to schist
B-Q	This metamorphic rock contains a high percentage of one or more of the minerals at this station. What is the full (two-part) name of this rock?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
B-8	**2.5 – 3.0**	**2.8 – 2.9**	**Colorless**
B-9	**2.0 – 2.5**	**2.7 – 3.0**	**Colorless**
B-10	**2.5 – 3**	**2.8 – 3.4**	**Colorless**

Station C

Identify these specimens. Match each to three of the descriptions given.
(3 matches each)

C-11	a. used as an abrasive
C-12	b. porous
	c. volcanic in origin
	d. formed from the silica shells of single-celled organisms
C-Q	Is specimen C-12 a variety of **andesite**, **basalt**, **rhyolite**, or **gabbro**?

Station D

Identify each mineral. Match each to the list identifying several of its more common uses. (1 match each)

D-13	a. lubricant, cosmetics, electrical insulation
D-14	b. porcelain, glass, ceramics
D-15	c. electrical wring, plumbing
D-16	d. dry lubricant, pencil “lead”
D-Q	Which two specimens at this station occur in a free, uncombined state?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
D-13	**1.0 – 2.0**	**1.9 – 2.3**	**Gray-black**
D-14	**6.0 – 6.5**	**2.5 – 2.6**	**White**
D-15	**1.0**	**2.7 – 2.8**	**White**
D-16	**2.5 – 3.0**	**8.9**	**Copper-red**

Station E

Identify each mineral. Match each to its crystalline shape. (1 match each)

E-17	a. isometric
E-18	b. rhombohedra
E-19	c. octahedral
E-20	d. hexagonal
E-Q	What are the fine parallel lines running across the crystal faces of specimen E-18 called?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
E-17	**3.0**	**2.7**	**White**
E-18	**6.0 – 6.5**	**4,9 – 5.2**	**Greenish-black**
E-19	**7.0**	**2.65**	**White**
E-20	**4.0**	**3.0 – 3.2**	**White**

Station F

Identify each mineral. Match each to its cleavage type. (1 match each)

F-21	a. two directions at 90°
F-22	b. perfect, three directions at 90°
F-23	c. one direction
F-24	d. conchoidal
F-Q	Which of the specimens at this station was once commonly used as a substitute for glass?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
F-21	**2.0 – 2.5**	**2.7 – 3.0**	**Colorless**
F-22	**6.0 – 7.0**	**XXX**	**XXX**
F-23	**6.0 – 6.5**	**2.5 – 2.6**	**White**
F-24	**2.0 – 2.5**	**2.0 – 2.5**	**White**

Station G

Identify each mineral. Heft and attempt to match each to its value of specific gravity. (1 match each)

G-25	a. the most common variety if schorl
G-26	b. prized for its glass luster and rich variety
G-27	of color
	c. named for its high sodium content
G- Q	What term describes the crystalline shape visible in specimen G-27?

Rock/Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
G-25	**5.5 – 6.0**	**2.2 – 2.3**	**White**
G-26	**7.0 – 7.5**	**3.0 – 3.3**	**White**
G-27	**4**	**3.0 – 3.2**	**White**

Station H

Identify each mineral. Match each specimen to the major ore extracted from it. (1 match each)

H-28	a. silver
H-29	b. lead
H-30	c. iron
H-31	d. zinc
H-Q	When specimen H-31 contains flakes of mica it displays a glistening appearance when reflected in light. What adjective precedes the name of this specimen when it glistens as noticeably as this one?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Streak
H-28	**3.5 – 4.0**	**3.9 – 4.0**	**Light brown**
H-29	**5.5 – 6.5**	**4.9 – 5.2**	**Black**
H-30	**2.5**	**7.4 – 7.6**	**Dark lead-gray**
H-31	**5.0 – 6.0**	**4.9 – 5.3**	**Brownish- red**

Station I

Identify each specimen. Match each with two of the descriptions given. Note: the term “plutonic” refers to rocks formed extremely deep beneath Earth’s surface. (2 matches each)

I-32	a. both felsic and plutonic
I-33	b. rich in magnesium and iron
I-34	c. rich in feldspar and silica
I-35	d. both mafic and plutonic
	e. may be either intrusive or extrusive
I-Q	Which specimen at this station is the fine-grained equivalent of I-33?

Station J

In Column I, identify each parent rock by name. In Column II, identify and record the name and letter of the first-order metamorphic rock, i.e. the first metamorphic rock it becomes as it metamorphoses. (Parent rocks are identified with a "J; first-order metamorphic rocks are identified with lower-case letters … a through d.)

J-36
J-37
J-38
J-39
J-40

a. gneiss
b. slate
c. marble
d. quartzite

J-Q Two of the metamorphic specimens in Column II are foliated. Which of the following statements identifying the usual orientation of foliated metamorphic rocks as found in nature is true?

a. horizontal, the same as sedimentary rocks
b. vertical and perpendicular to stress
c. random orientation

Station K

Identify each specimen. Match each to its composition. (1 match each)

K-41	a. aphanitic
K-42	b. intermediate
K-43	c. phaneritic
K-44	
K-45	
K-46	
K-Q	Identify the <u>two specimens</u> at this station that contain the mineral quartz.

Station L

Identify each specimen. Match each to its most dominant mineral or material. (1 match each)

L-47	a. calcite
L-48	b. quartz
L-49	c. clay materials
L-50	d. dolomite
L-51	e. microcrystalline quartz
L-Q	Which specimen represents the most abundant sedimentary rock found on Earth's surface?

Station M

Identify each specimen. Match each to one of the descriptions stated. (1 match each)

M-52	a. calcium/magnesium carbonate precipitate
M-53	b. the mineral form of sodium chloride
M-54	c. made up of fossil shells having little or no matrix
M-55	d. forms by evaporation of cave, spring, or river waters
M-56	
M-57	e. a type of fossiliferous limestone made up entirely of microscopic shells
M-58	f. generally consists of a coarse mosaic of intergrown calcite crystals
	g. composed of tiny concentric spheres of calcium carbonate

M-Q Describe how ooliths become shaped into small, spherical objects. Hint: This occurs prior to the ooliths forming into a rock.

Station N

Identify each specimen. Match each to its mineral group. Hardness and specific gravity (SG) values are stated at the bottom of this activity sheet. (1 match each)

N-59	a. carbonate
N-60	b. native element
N-61	c. oxide
N-62	d. borate
N-63	e. silicate
N-64	f. sulfate
N-65	g. sulfide
N-66	
N-67	
N-68	
N-Q	Why are minerals N-67 and N-68 often associated with each other (i.e. found together)?

Mineral Data Table

Specimen Number	Hardness	Specific Gravity	Composition	Streak
N-59	**3.5 – 4.0**	**2.9 – 3.0**	**$CaCO_3$**	**White**
N-60	**1.5 – 2.5**	**2.0 – 2.1**	**S**	**White**
N-61	**3.5 – 4.0**	**4.1 – 4.3**	**$CuFeS_2$**	**Greenish-black**
N-62	**3.0**	**4.9 – 5.1**	**Cu_5FeS_4**	**Grayish-black**
N-63	**2.5**	**1.9**	**$NaCaB_5O_9 \bullet 8H_2O$**	**White**
N-64	**6.0 – 7.0**	**3.3 – 3.6**	**$Ca_2Al_2FeOSi;O_4Si_2O_7(OH)$**	**Colorless- gray**
N-65	**3.0 – 3.5**	**4.3 – 4.6**	**$BaSO_4$**	**White**
N-66	**5.0 – 6.5**	**4.9 – 5.2**	**Fe_3O_4**	**Black**
N-67	**3.5 – 4.0**	**3.9 – 4.0**	**$Cu_2(CO_3)(OH)_2$**	**Light-green**
N-68	**3.5 – 4.0**	**3.7 – 3.8**	**$Cu_3(CO_3)_2(OH)_2$**	**Blue**

Station O

Identify each specimen. Number these five specimens beginning with the parent rock, which is not a metamorphic rock, as # 1 … followed by the other specimens representing progressively increasing grades of metamorphism.

O-69	a. 1
O-70	b. 2
O-71	c. 3
O-72	d. 4
O-73	e. 5
O-Q	Identify the two conditions, one of which must be present, for metamorphism to occur.