Test Code: _____

Department of Geoscience

Assessment Exam – Part I

Rocks & Minerals

Feb 13, 2007

One of the basic skills of anyone trained in a geology-related discipline is a thorough understanding of the rocks and minerals that are found throughout the Earth. We hope that students who complete a Geoscience degree with us will leave WSU well-equipped with the ability to identify rocks and minerals in the field or laboratory. This ability is two-fold. Certainly our students will be able to efficiently identify many familiar rocks and minerals, but they will also be able to go through the process of recognizing the important characteristics of a rock and mineral that will help them identify samples that they have not seen before.

There are six rock samples for you to identify. You will complete two pages of this book per sample. You do not need to work on the samples in numerical order.

Please spend no more than 5 minutes on each rock sample.
Please write the sample number for each rock you are working on at the top of each page.

Sample # __ Test Code: _____

Circle <u>all</u> that apply, incorrect answers will be subtracted from correct answers

<u>Answer these questions for all samples:</u>

To which general rock type does this sample belong?

igneous	sedimentary	metamorphic

Which rock name best fits this sample?

granite	granodiorite	sandstone	quartz arenite	schist	gneiss
basalt	rhyolite	limestone	siltstone	slate	phyllite
peridotite	andesite	mudstone	feldspathic sandstone	hornfels	granofels
anorthosite	gabbro	pebble conglomerate	lithic sandstone	mylonite	marble
diorite	monzonite	quartz sandstone	dolostone	pelite	quartzite
quartz syenite	granitoid	skeletal grainstone	skeletal wackestone	breccia	shale

Which minerals are present in this rock?
<u>Circle</u> all that you are sure are present, <u>underline</u> those you expect might be there.

olivine	albite	K-spar	sillimanite	tourmaline	garnet	pyrite
amphibole	plagioclase	quartz	glauconite	staurolite	chloritoid	magnetite
pyroxene	anorthite	feldspar(s)	glaucophane	andalusite	kyanite	Fe-Ti oxides
hornblende	oligioclase	clay minerals	gabbro	chlorite	zircon	ilmenite
dolomite	tremolite	calcite	forsterite	biotite	lepidolite	muscovite

Please justify any minerals you "underlined" above in the space provided below

Which of the below best describe the texture or fabric for this sample? (Circle <u>all</u> that apply)

no fabric	foliated	intersection lineation	equigranular	poikiloblastic	grain supported
non-foliated	lineated	crenulation cleavage	porphyroblastic	well sorted	matrix supported
mylonitic	aphanitic	elongation lineation	porphyritic	poorly sorted	clastic
pyroclastic	phaneritic	pegmatitic	idioblastic	massive	crystalline

Sample # __ Test Code: _____

Circle <u>all</u> that apply, incorrect answers will be subtracted from correct answers

brecciated	**conglomeratic**	**cross stratified**	**amygdaloidal**	**laminated**	**fissile**

Sample # __ Test Code: _____

Circle all that apply, incorrect answers will be subtracted from correct answers

If this rock is igneous:

Which best describes the composition of the melt from which it formed? (Circle all that apply)

felsic	intermediate	mafic	ultramafic
Si-saturated	Si-oversaturated	Si-under saturated	
peraluminous	metaluminous	Subaluminous	Peralkaline

Which of the below best describes where the rock crystallized?

plutonic	volcanic	sub-volcanic

Which of the below best describes the source of the melt?

Al-rich metagraywacke	lower crustal Al-poor gneiss		upper mantle peridotite
feldspathic arenite	shale or mud	basalt	Al-rich granitic gneiss

If this rock is metamorphic:

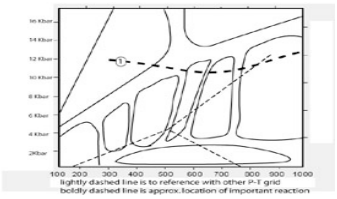
Which rock type from the list below is the most likely protolith?

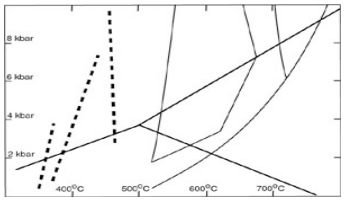
sandstone	mud stone	dolostone	basalt	siliceous limestone
granite	limestone	quartz arenite	feldspathic wacke	granodiorite

Which of the below best describes the metamorphism preserved? (Circle all that apply)

greenschist facies	blueschist facies	zeolite facies	garnet grade	chlorite grade
granulite facies	amphibolite facies	biotite grade	staurolite grade	sillimanite grade

Shade the P-T "field" appropriate for this sample on the appropriate P-T plot to the right.





If this rock is sedimentary:

From where was the sediment derived? (Circle all that apply)

From within the basin	From a previous sedimentary rock (recycled)
From a great distance away from the site of deposition	From outside the basin
From an igneous or metamorphic rock	From relatively near to the site of deposition

The nature of transport and environment of deposition was most likely (circle all that apply)

Low energy	Slow even deposition	more viscous
Relatively deep water	Marine	more fluid
High energy	Rapid deposition	debris flow
Relatively shallow water	Fluvial (river)	rapid burial
Can't tell from hand specimen	aeolian	

The fossils in this rock are: (circle all that apply)

None present	Bivalves	trilobites
Crinoids	Gastropods	Brachiopods

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Circle <u>all</u> that apply, incorrect answers will be subtracted from correct answers

stromatolites	trace fossils

<u>Answer these questions for all samples:</u>

To which general rock type does this sample belong?

igneous	sedimentary	metamorphic

Which rock name best fits this sample?

granite	granodiorite	sandstone	quartz arenite	schist	gneiss
basalt	rhyolite	limestone	siltstone	slate	phyllite
peridotite	andesite	mudstone	feldspathic sandstone	hornfels	granofels
anorthosite	gabbro	pebble conglomerate	lithic sandstone	mylonite	marble
diorite	monzonite	quartz sandstone	dolostone	pelite	quartzite
quartz syenite	granitoid	skeletal grainstone	skeletal wackestone	breccia	shale

Which minerals are present in this rock?
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olivine	albite	K-spar	sillimanite	tourmaline	garnet	pyrite
amphibole	plagioclase	quartz	glauconite	staurolite	chloritoid	magnetite
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Please justify any minerals you "underlined" above in the space provided below

Which of the below best describe the texture or fabric for this sample? (Circle <u>all</u> that apply)

no fabric	foliated	intersection lineation	equigranular	poikiloblastic	grain supported
non-foliated	lineated	crenulation cleavage	porphyroblastic	well sorted	matrix supported

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mylonitic	**aphanitic**	**elongation lineation**	**porphyritic**	**poorly sorted**	**clastic**
pyroclastic	**phaneritic**	**pegmatitic**	**idioblastic**	**massive**	**crystalline**
brecciated	**conglomeratic**	**cross stratified**	**amygdaloidal**	**laminated**	**fissile**

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If this rock is igneous:

Which best describes the composition of the melt from which it formed? (Circle all that apply)

felsic	intermediate	mafic	ultramafic
Si-saturated	Si-oversaturated	Si-under saturated	
peraluminous	metaluminous	Subaluminous	Peralkaline

Which of the below best describes where the rock crystallized?

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Which of the below best describes the source of the melt?

Al-rich metagraywacke	lower crustal Al-poor gneiss		upper mantle peridotite
feldspathic arenite	shale or mud	basalt	Al-rich granitic gneiss

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granite	limestone	quartz arenite	feldspathic wacke	granodiorite

Which of the below best describes the metamorphism preserved? (Circle all that apply)

greenschist facies	blueschist facies	zeolite facies	garnet grade	chlorite grade
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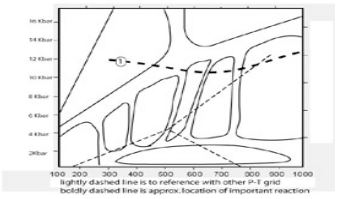

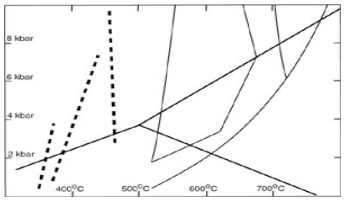

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Low energy	Slow even deposition	more viscous
Relatively deep water	Marine	more fluid
High energy	Rapid deposition	debris flow
Relatively shallow water	Fluvial (river)	rapid burial
Can't tell from hand specimen	aeolian	

The fossils in this rock are: (circle all that apply)

None present	Bivalves	trilobites
Crinoids	Gastropods	Brachiopods

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stromatolites	trace fossils

<u>Answer these questions for all samples:</u>

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Which rock name best fits this sample?

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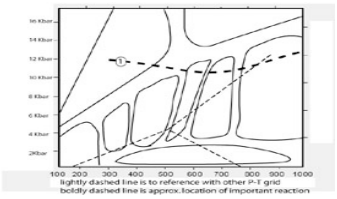

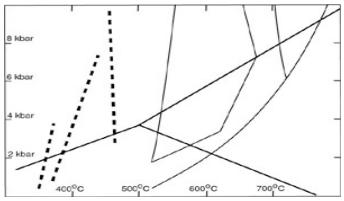

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Relatively shallow water	Fluvial (river)	rapid burial
Can't tell from hand specimen	aeolian	

The fossils in this rock are: (circle all that apply)

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stromatolites	trace fossils

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quartz syenite	granitoid	skeletal grainstone	skeletal wackestone	breccia	shale

Which minerals are present in this rock?
<u>Circle</u> all that you are sure are present, <u>underline</u> those you expect might be there.

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pyroclastic	**phaneritic**	**pegmatitic**	**idioblastic**	**massive**	**crystalline**
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If this rock is igneous:

Which best describes the composition of the melt from which it formed? (Circle all that apply)

felsic	intermediate	mafic	ultramafic
Si-saturated	Si-oversaturated	Si-under saturated	
peraluminous	metaluminous	Subaluminous	Peralkaline

Which of the below best describes where the rock crystallized?

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Which of the below best describes the source of the melt?

Al-rich metagraywacke	lower crustal Al-poor gneiss		upper mantle peridotite
feldspathic arenite	shale or mud	basalt	Al-rich granitic gneiss

If this rock is metamorphic:

Which rock type from the list below is the most likely protolith?

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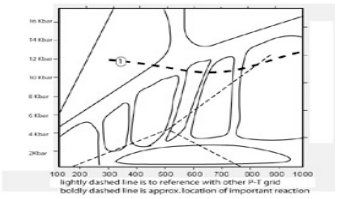

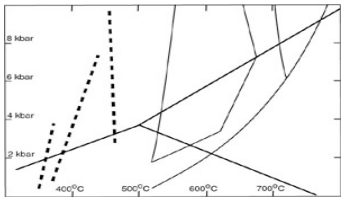

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From where was the sediment derived? (Circle all that apply)

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Relatively shallow water	Fluvial (river)	rapid burial
Can't tell from hand specimen	aeolian	

The fossils in this rock are: (circle all that apply)

None present	Bivalves	trilobites
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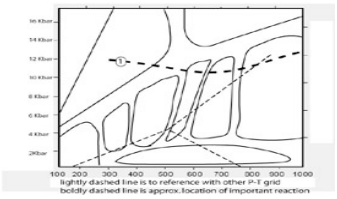

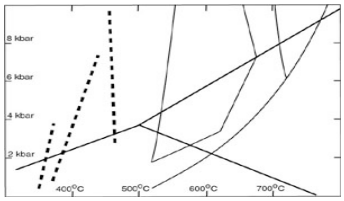

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pyroxene	anorthite	feldspar(s)	glaucophane	andalusite	kyanite	Fe-Ti oxides
hornblende	oligioclase	clay minerals	gabbro	chlorite	zircon	ilmenite
dolomite	tremolite	calcite	forsterite	biotite	lepidolite	muscovite

Please justify any minerals you "underlined" above in the space provided below

Which of the below best describe the texture or fabric for this sample? (Circle <u>all</u> that apply)

no fabric	foliated	intersection lineation	equigranular	poikiloblastic	grain supported
non-foliated	lineated	crenulation cleavage	porphyroblastic	well sorted	matrix supported

Sample # __ Test Code: _____

Circle <u>all</u> that apply, incorrect answers will be subtracted from correct answers

mylonitic	**aphanitic**	**elongation lineation**	**porphyritic**	**poorly sorted**	**clastic**
pyroclastic	**phaneritic**	**pegmatitic**	**idioblastic**	**massive**	**crystalline**
brecciated	**conglomeratic**	**cross stratified**	**amygdaloidal**	**laminated**	**fissile**

Sample # __ Test Code: _____

Circle all that apply, incorrect answers will be subtracted from correct answers

If this rock is igneous:

Which best describes the composition of the melt from which it formed? (Circle all that apply)

felsic	intermediate	mafic	ultramafic
Si-saturated	Si-oversaturated	Si-under saturated	
peraluminous	metaluminous	Subaluminous	Peralkaline

Which of the below best describes where the rock crystallized?

plutonic	volcanic	sub-volcanic

Which of the below best describes the source of the melt?

Al-rich metagraywacke	lower crustal Al-poor gneiss		upper mantle peridotite
feldspathic arenite	shale or mud	basalt	Al-rich granitic gneiss

If this rock is metamorphic:

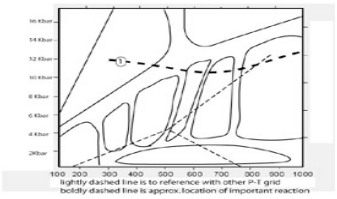
Which rock type from the list below is the most likely protolith?

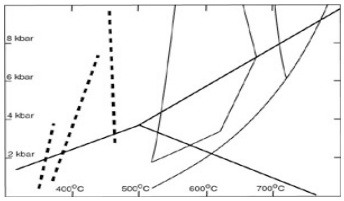
sandstone	mud stone	dolostone	basalt	siliceous limestone
granite	limestone	quartz arenite	feldspathic wacke	granodiorite

Which of the below best describes the metamorphism preserved? (Circle all that apply)

greenschist facies	blueschist facies	zeolite facies	garnet grade	chlorite grade
granulite facies	amphibolite facies	biotite grade	staurolite grade	sillimanite grade

Shade the P-T "field" appropriate for this sample on the appropriate P-T plot to the right.





If this rock is sedimentary:

From where was the sediment derived? (Circle all that apply)

From within the basin	From a previous sedimentary rock (recycled)
From a great distance away from the site of deposition	From outside the basin
From an igneous or metamorphic rock	From relatively near to the site of deposition

The nature of transport and environment of deposition was most likely (circle all that apply)

Low energy	Slow even deposition	more viscous
Relatively deep water	Marine	more fluid
High energy	Rapid deposition	debris flow
Relatively shallow water	Fluvial (river)	rapid burial
Can't tell from hand specimen	aeolian	

The fossils in this rock are: (circle all that apply)

None present	Bivalves	trilobites
Crinoids	Gastropods	Brachiopods

Sample # __ Test Code: _____

Circle <u>all</u> that apply, incorrect answers will be subtracted from correct answers

stromatolites	trace fossils