Facies Elements

Fall, 20xx
Geology 364:
Test # 1

Name:_____

Date:_____

Time Begun:_____ Time Ended:_____

Rules for All Lecture Tests

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(You have a several day period in which to take this test. You may take it any time during that several day period. The days available will be announced in lecture.

; You may <u>not</u> peek at these questions in any way until just at the moment you are ready to take the test.

(The test will probably take more than 50 minutes, but you <u>must</u> take the whole test <u>in one sitting</u>. Pit stops are allowed. There are no time limits.

(You <u>must</u> sit and work alone while taking the test.

(When you sit down to take the test you may have <u>only</u> the following items:
- (The test paper and scantron card.
- (Any writing instruments [rulers, colored pencils, etc.] you need to write your answers.
- (Any refreshments you require for the duration.

; Once you have taken the test you are expressly forbidden talk about it in any way, shape, or form with anyone else, except me, until <u>everyone</u> has finished taking the test.

HONOR: Scientific and Personal

Science and honesty must go hand in hand. Science is the search for a true understanding of the universe, not what we wish it to be, or need it to be. But the universe is complex and for all our success science has had to struggle mightily to learn what it has. Dishonesty thus is very detrimental. Not only does it deliberately lead us down the wrong path, actions taken on the basis of that false knowledge can be deadly. Besides good ideas are hard enough to discover even when struggling honestly.

Personal dishonesty is also detrimental. Dishonesty in science, when discovered, destroys a career, and ruins a reputation. And dishonesty is always discovered because science's goal is to uncover false ideas.

Because each of you take this test individually, and without supervision, whether you cheat or are honest is <u>your</u> very personal and private responsibility. Not cheating means no notes, and not talking with anyone until everyone has finished the test - following the spirit of the law rather than just the letter. Putting your name at the top of the test page is equivalent to signing the James Madison University Honor Pledge.

Geology 364
Stratigraphy and Basin Analysis
Test Number One
Philosophical Foundations and Facies Elements

The test is a mixture of scantron, computer graded questions, and short answer questions (structure identification at the back). Answer True/False and Multiple Choice question on the scantron card. Answer short answer questions on the page at the back.

PHILOSOPHICAL FOUNDATIONS:

SELECT FROM THESE

1A Aquinas, St. Thomas	2A Descartes, Rene	3A Kuhn, Thomas
1B Aristotle	2B Dialectic	3B Newton, Isaac
1C Augustine, St.	2C Empirical	3C Plato
1D Bacon, Francis	2D Hume, David	3D Popper, Karl
1E Deduction	2E Induction	3E Syllogism

RIGHTS MINUS WRONGS MULTIPLE CHOICE QUESTIONS: 3 points each, 24 points total. In the box to the right are 15 choices you can use for the questions below. Of the ***15 choices*** in each box, ***choose only the one*** which answers the question. Leave all others blank.

Identify the ***individual*** who developed the ***syllogistic deductive argument.*** Leave other spaces blank.

1. **1A** **1B** **1C** **1D** **1E**
2. **2A** **2B** **2C** **2D** **2E**
3. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who argued we are born with knowledge of the truth. Leave other spaces blank.

4. **1A** **1B** **1C** **1D** **1E**
5. **2A** **2B** **2C** **2D** **2E**
6. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who argued that there are two truths, one because we know it to be true in our soul, and one derived logically. Leave the other 14 spaces blank.

7. **1A** **1B** **1C** **1D** **1E**
8. **2A** **2B** **2C** **2D** **2E**
9. **3A** **3B** **3C** **3D** **3E**

Identify the ***specific method*** used by Plato to discover true knowledge. Leave the other 14 spaces blank.

10. **1A** **1B** **1C** **1D** **1E**
11. **2A** **2B** **2C** **2D** **2E**
12. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who brought together induction and mathematical deduction to discover Truth (so he thought) in the natural world. Leave the other 14 spaces blank.

13. **1A** **1B** **1C** **1D** **1E**
14. **2A** **2B** **2C** **2D** **2E**
15. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who first argued that just because we experience with our senses that "B follows A" does not mean necessarily that "B must follow A." Leave the other 14 spaces blank.

16. **1A** **1B** **1C** **1D** **1E**
17. **2A** **2B** **2C** **2D** **2E**
18. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who first argued that induction is flawed because it is invalid to argue from "some to all." Leave the other 14 spaces blank.

19. **1A** **1B** **1C** **1D** **1E**
20. **2A** **2B** **2C** **2D** **2E**
21. **3A** **3B** **3C** **3D** **3E**

Identify the ***individual*** who argued that since science is incapable of finding **T**ruth the goal of science should be to disprove its theories as fast as possible so that by finding out what is not true we may approach what is true. Leave the other 14 spaces blank.

22. **1A** **1B** **1C** **1D** **1E**
23. **2A** **2B** **2C** **2D** **2E**
24. **3A** **3B** **3C** **3D** **3E**

TRUE/FALSE QUESTIONS; 2 points each, 130 points total:

25. T/F. Science as a method of investigating the natural world has moved beyond myths.
26. T/F. The argument below is neither true nor valid.

    Pigs are animals with wings
    No animals with wings can fly
    Therefore pigs can't fly

27. T/F. This syllogism could be true, but is definitely not valid.

    Gnawbone is east of Needmore
    Needmore is east of Stony Lonesome
    Thus, Gnawbone is east of Stony Lonesome

28. T/F. The psychological defect in deduction is that we can never make an observation without it biasing the way in which we make the next observation.
29. T/F. In the "To and Fro" model of science by Jacob Bronowski, induction ***must*** come before deduction.
30. T/F. Karl Popper argued that what makes a scientific theory powerful were the number of confirming observations we have that it in fact accurately explains.
31. T/F. Scientific models can only be constructed for real world conditions.

Scientific Revolutions

32. T/F. Scientific revolutions usually begin by the accumulation of anomalies.
33. T/F. Extraordinary science occurs when a new paradigm is expanding and being exploited for all the new things it tells us.
34. T/F. Paradigms are a great advantage to science because they make fact gathering focused rather than random.
35. T/F. The Pre-Paradigm stage is defined by the existence of mythical rather than scientific beliefs.
36. T/F. Normal science exists only when all practitioners accept and believe the same ideas.
37. T/F. Revolutions are initiated only through someone who understands the existing paradigm very well.
38. T/F. One advantage of a paradigm is that it allows science to explore new, unknown ideas.
39. T/F. The really hard part about a scientific revolution is choosing between two equally compelling theories of the world.

Information Theory and the Quality of Geologic Observation

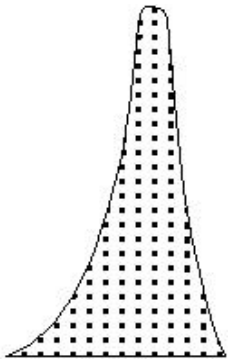
40. T/F. Noise in a geological system includes anything you are not interested in studying.
41. T/F. In geology the message is the rocks in the earth.
42. T/F. In studying the stratigraphic record, the most difficult noise in making interpretations is metamorphism and weathering.
43. T/F. Encoding noise occurs when the record is the result of ambiguous recording.
44. T/F. Rapid environmental fluctuations is an example of environmental noise.
45. T/F. Poor observation and/or poor recording of information is an example of a Type I error.
46. T/F. Type II errors stem most significantly from ignorance.
47. T/F. A top-down study is one based primarily on models.

FACIES ELEMENTS:

Pressure Solution

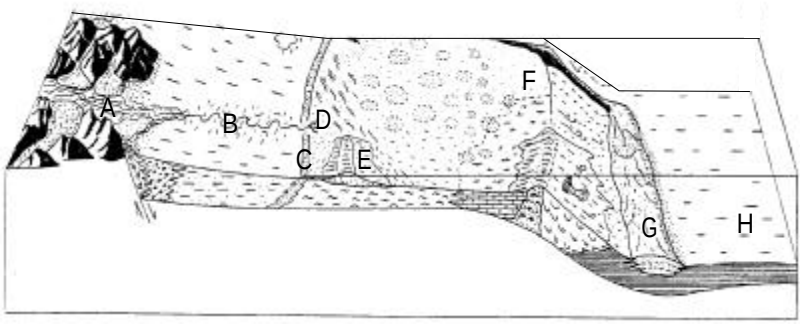
48. T/F. A suture seam pressure solution is typical of stylolites.
49. T/F. Pressure solution is capable of producing primary sedimentary structures.
50. T/F. Magnesium and mica are both considered impurities when it comes to pressure solution.
51. T/F. A resistant unit is typically a grain or a shell in the limestone.
52. T/F. Pervasive solution typically occurs in limestones with uniform distribution of minor amounts of clay, and an absence of resistant units.

Texture



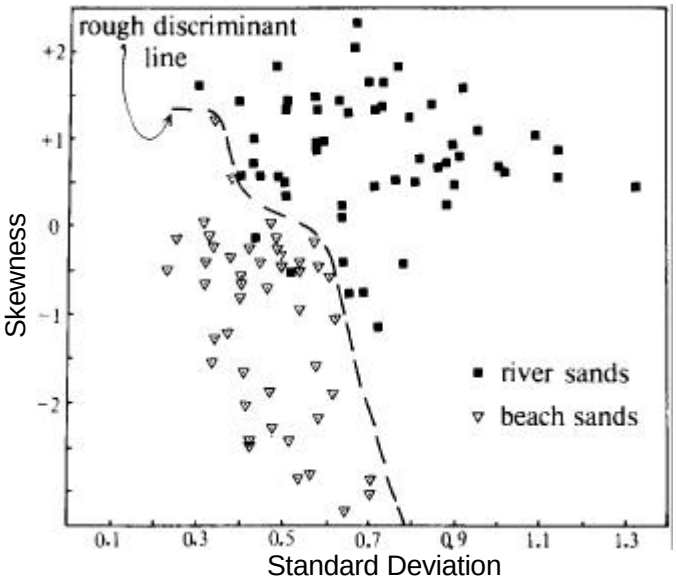
53. T/F. Sediments typically are normally distributed in the natural world.
54. T/F. The higher the phi value the coarser the sediment is.
55. T/F. The curve to the right would be platykurtic and positively skewed.
56. T/F. We use a logarithmic texture scale because it makes the data easier to plot.
57. T/F. A filter process leads to a rapid truncation of grain sizes.
58. T/F. A leptokurtic distribution means sediment is deposited in a narrow turbulence range.
59. T/F. A playtkurtic distribution would expectedly show up in a braided river system.
60. T/F. Negatively skewed distributions are more likely to be proximal than distal.
61. T/F. A tail of fines is positive skewing.

Questions apply to environmental drawing



62. T/F. Sediment at location A is most likely to have a Poisson distribution.
63. T/F. Sediment at location B is most likely to be positively skewed.
64. T/F. Sediment at location D is most likely to be normally distributed.
65. T/F. Sediment at location F is most likely to be positively skewed.

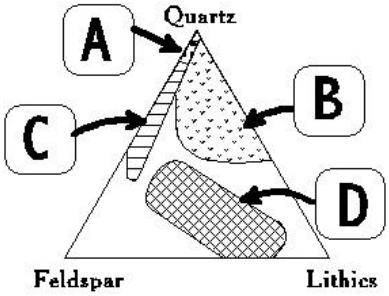
Questions for CM diagram



66. T/F. Beach sediments are positively skewed because beach sorting is more efficient than in a river.
67. T/F. The wacke nature of a river sediment shows up as a larger standard deviation.
68. T/F. Small standard deviations and high skewness are most typical of the beach.

Composition

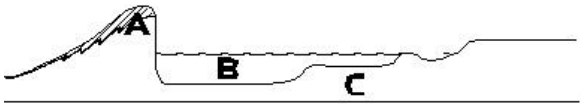
69. T/F. A rock of composition B would most likely show up in a short system.
70. T/F. A rock of composition C requires a rift system to form.
71. T/F. A rock of composition D would reasonably show up in the tectonic situation shown in the cross section below.



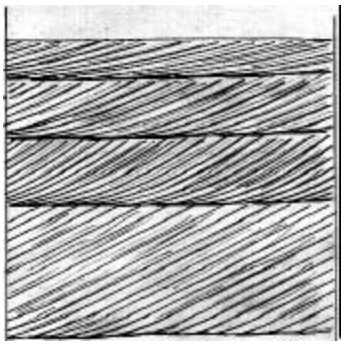
Color

72. T/F. Iron is so important as a rock coloring agent because it exists in two valence states.
73. T/F. All iron colors in sedimentary rocks are the result of the Fe^{+3} oxidation state.
74. T/F. Based on the geochemistry of iron it is probably true that primary red beds are never deposited.

75. T/F. The paleomagnetic signature of a sedimentary rock influences the way we interpret the color of that sediment.
76. T/F. The older a sedimentary rock is the less likely it is to be red in color due to the diagenetic alteration of the iron compounds.
77. T/F. In a sequence of alternating fluvial sandstone and shales, where the sandstones are paler red than the shales, the difference is due to the greater porosity of the sandstones.
78. T/F. Green colors observed in sandstone are the result of the sandstone having been originally deposited below sea level.
79. T/F. It would be reasonable to say that all the sediments entering the Catskill clastic wedge began in a state that would become red, and that all non-red beds are the result of secondary alteration.
80. T/F. The drawing is a cross section through a point bar sequence. We would expect locations A and C to go red but not the sediments at B.



Flow Regime Theory



81. T/F. The sequence of cross beds to the right could be explained this way: Up section velocity increases and flow separation decreases.
82. T/F. Or alternatively, they could be explained this way: Up section water shallows and flow separation increases.
83. T/F. Encroachment is most likely to take place on the stoss side of a ripple.
84. T/F. In the upper flow regime both the bed form and the water form are in phase, except when we start to get chute and pool conditions.
85. T/F. Finer grained sediment, less than fine sand, will be more easily eroded than coarser sand because the smaller grains are easier for turbulence to lift.
86. T/F. Flow regime transitions are always accompanied by a phase of turbulence.
87. T/F. In drift climbing ripples are favored by lower suspension load and higher velocities than in phase climbing ripples.
88. T/F. Oscillation ripples have no upper flow regime components.

RIGHTS MINUS WRONGS: MULTIPLE CHOICE QUESTIONS: 3 points each, 54 points total.

Flow Regime Structures

On the next page is a flow regime diagram with the various flow regime fields identified by letter. Surrounding the diagram are drawings or pictures of sedimentary structures. For each "Specimen Number" listed below identify the letter on flow regime diagram that corresponds. If more than one applied, that is the structure can form in more than one flow regime, identify all that apply.

Specimen 1. Identify all locations on the flow regime diagram that correspond to the structure.

89.	**A**	**B**	**C**	**D**	**E**
90.	**F**	**G**	**H**	**I**	**J**
91.	**K**	**L**	**M**	**N**	**O** = none of the above.

Specimen 3. Identify all locations on the flow regime diagram that correspond to the structure.

92. **A** **B** **C** **D** **E**
93. **F** **G** **H** **I** **J**
94. **K** **L** **M** **N** **O** = none of the above.

Specimen 6. Identify all locations on the flow regime diagram that correspond to the structure.

95. **A** **B** **C** **D** **E**
96. **F** **G** **H** **I** **J**
97. **K** **L** **M** **N** **O** = none of the above.

Specimen 8. Identify all locations on the flow regime diagram that correspond to the structure.

98. **A** **B** **C** **D** **E**
99. **F** **G** **H** **I** **J**
100. **K** **L** **M** **N** **O** = none of the above.

Specimen 10. Identify all locations on the flow regime diagram that correspond to the structure.

101. **A** **B** **C** **D** **E**
102. **F** **G** **H** **I** **J**
103. **K** **L** **M** **N** **O** = none of the above.

Specimen 11. Identify all locations on the flow regime diagram that correspond to the structure.

104. **A** **B** **C** **D** **E**
105. **F** **G** **H** **I** **J**
106. **K** **L** **M** **N** **O** = none of the above.

Specimen 13. Identify all locations on the flow regime diagram that correspond to the structure.

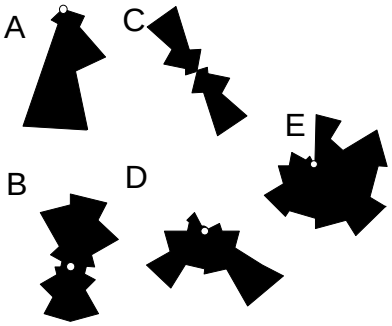
107. **A** **B** **C** **D** **E**
108. **F** **G** **H** **I** **J**
109. **K** **L** **M** **N** **O** = none of the above.

Specimen 16. Identify all locations on the flow regime diagram that correspond to the structure.

110. **A** **B** **C** **D** **E**
111. **F** **G** **H** **I** **J**
112. **K** **L** **M** **N** **O** = none of the above.

Paleocurrents

113. T/F. Rose B would best explain the direction of ripple crests.
114. T/F. Rose E would best explain a complex system like a beach nearshore set of environments.
115. T/F. It is probably acceptable to mix together current direction data for structures that formed in the same flow regime.



SEDIMENTARY STRUCTURE/BEDFORM IDENTIFICATION:

SHORT ANSWER; 5 points each, 130 points total:

On the next three pages are pictures of sedimentary structures. You are to write on the line below the ***name or identification*** of each structure. ***Interpretations*** will be docked points.

- Be as accurate, precise, and complete in your names as you can be. It may be as simple as a single word answer, but if discrimination is required then do so.
- If nothing is marked with a box or circle then identify the main structure in the picture.
- In some pictures I have circled or boxed the specific structure(s) I want you to identify.
- Repeats of structures are possible
- I know some of the pictures are lousy, but everyone is in the same boat so just do the best you can with what is available. Nature is sometimes no better at giving us evidence to work with.

1A _____

1B _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

11 _____

12A _____

12B _____

13 _____

14 _____

15 _____

17 _____

18A (Bedform) _____

18B (Internal structure) _____

19 _____

20 _____

21 _____

22 _____

23 _____