

SI Geology - Full Discipline Demo

Fluvial Processes and Landforms

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Geology - Full Discipline Demo
Course	SI Geology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match the term to its definition.

⌘ Alluvial Fans	Area of land where all water that falls within it flows to a common outlet	1
⌘ Deltas	Describes the change in elevation between two points in a stream	2
⌘ Drainage Basin	Relatively flat surfaces that occupy most of the bottom of a river valley and are underlain by unconsolidated sediments	3
⌘ Estuaries	Abandoned floodplains created when a river flowed at a higher level than its present location	4
⌘ Floodplains	Depositional end of an erosional-depositional system that is linked by a river; occur where there is a significant change in topography between where erosion occurs and the fan is deposited	5
⌘ Fluvial Terraces	Depositional plains formed at the mouth of rivers where sediments accumulate to form a fan-like feature; limited in their vertical growth	6
⌘ Stream Gradient	Transitional zone between freshwater and saltwater	7

Correct answers:

- | | | | | | |
|---|------------------|---|-----------------|---|-------------|
| 1 | Drainage Basin | 2 | Stream Gradient | 3 | Floodplains |
| 4 | Fluvial Terraces | 5 | Alluvial Fans | 6 | Deltas |
| | | 7 | Estuaries | | |

Classify each statement as true or false.

⚡ Braided channels are uncommon in rivers and streams over large distances.	
⚡ Erosion only occurs in the Zone of Erosion; it cannot occur in the Zone of Transport or Deposition.	
⚡ Meandering channels and straight channels are differentiated by their sinuosity, the ratio of stream length to valley length.	
⚡ Sediment reaches its final resting point in the Zone of Deposition.	
⚡ The Zone of Erosion is the primary collecting system of a river.	
⚡ The Zone of Transport is characterized by rapids and waterfalls.	
True	False
1	2

Correct answers:

1

Meandering channels and straight channels are differentiated by their sinuosity, the ratio of stream length to valley length.

Sediment reaches its final resting point in the Zone of Deposition.

The Zone of Erosion is the primary collecting system of a river.

2

Braided channels are uncommon in rivers and streams over large distances.

Erosion only occurs in the Zone of Erosion; it cannot occur in the Zone of Transport or Deposition.

The Zone of Transport is characterized by rapids and waterfalls.

Exploration

_____ are topographic highs that define the boundaries of a drainage basin.

- ☐ Watersheds
- ☐ Slopes
- ☒ Divides
- ☐ Deltas

✓

The part of a river where sediment is carried along the flowing water body towards its dispersal system is called the _____.

- ☐ Zone of Erosion
- ☒ Zone of Transport
- ☐ Zone of Deposition

✓

A steep stream gradient would indicate a mature, old stream.

- ☐ True
- ☒ False

✓

Oxbow lakes and cut banks are characteristic of _____ channels.

- ☒ meandering
- ☐ braided
- ☐ straight
- ☐ fluvial

✓

Fluvial terraces are made up of two parts, _____ and _____.

- ☐ deltas; alluvial fans
- ☐ deltas; scarps
- ☐ treads; deltas
- ☒ treads; scarps

✓

Exercise 1

Based on the stream gradients you calculated in Data Table 1 and Data Table 2, which stream would you expect to have the highest flow rate (velocity)? Explain your answer.

Locate Windy Point (near the headwaters of Oasis Creek) on the topographic map. Would a precipitation falling on Windy Point eventually drain into Oasis Creek? Explain your answer.

Convert the stream gradient of Oasis Creek from meters per kilometer (m/km) to feet per mile (ft/mi). 1 mile = 1.61 kilometers.

Convert the stream gradient the Colorado River from meters per kilometer (m/km) to feet per mile (ft/mi).

Based on the stream gradient, would you describe Oasis Creek as a youthful or mature? Why?

Based on the stream gradient, would you describe the Colorado River as youthful or mature? Why?

Data Table 1: Colorado River Stream Gradient
(SAMPLE ANSWER BELOW)

	Measurement
Measured length (cm)	55
Ground distance (cm)	1,320,000
Ground distance (km)	13.2
Elevation difference (ft)	170
Elevation difference (m)	51.8
Stream gradient (m/km)	3.9

Data Table 2: Oasis Creek Stream Gradient
(SAMPLE ANSWER BELOW)

	Measurement
Measured length (cm)	30
Ground distance (cm)	720,000
Ground distance (km)	7.2
Elevation difference (ft)	4,220
Elevation difference (m)	1286.3
Stream gradient (m/km)	178.7

Photo 1: Outlined Drainage Basin
(SAMPLE ANSWER BELOW)





Exercise 2

Discuss briefly the processes of erosion and deposition that are occurring in the area around Location A.

Compare and contrast the rivers at Location A and Location B.

What is the eventual fate of the bend in the river around the town of Luuq?

Discuss briefly the processes of erosion and deposition that are occurring in the area around Location D.

Compare and contrast the rivers at Location D and Location E.

How did the features in Location F form?

Describe how the stream gradient of Locations F and G relate to the channel patterns that occur in these locations.

Is the feature at Location H high-destructive or high-constructive? How can you tell?

What is the dominant process that controls the shape of the delta at Location I?

Explain how the feature at Location I differs from the feature at Location J.

Which of the Fluvial Landform features is likely the oldest and why?

Data Table 3: Fluvial Landforms
(SAMPLE ANSWER BELOW)

Location	Name of Feature
A	Meandering Channel
B	Meandering Channel
C	Meandering Channel
D	Braided Channel
E	Braided Channel
F	Meander scars/oxbow lakes
G	Braided Channel
H	Delta
I	High-Constructive (bird-foot/elongate) Delta
J	Alluvial Fan
K	Alluvial Fan
1	Oxbow Lake
2	Fluvial Terrace
3	Point-Bar

Panel 1: Stream Gradient and Elevation
(SAMPLE ANSWER BELOW)

The gradient is steeper around Location G, but very gently sloping (almost flat) around Location F. The elevation of Location G is significantly higher than Location F.

Data Table 4: Death Valley
(SAMPLE ANSWER BELOW)

Relief	199 meters
Distance	2.56 kilometers
Gradient	77.7 meters per kilometer

Competency Review

Consider a mountain stream with a headwater at 2000 feet elevation, a mouth at 1735 feet of elevation, and a length of 4.50 miles. What is the stream gradient?

- ☒ 58.9 feet/mile ✓
 - ☐ 49.1 feet/mile
 - ☐ 61.3 feet/mile
 - ☐ 42.4 feet/mile
-

In what part of a river would a delta be located?

- ☐ Zone of Erosion
 - ☐ Zone of Transport
 - ☒ Zone of Deposition ✓
 - ☐ Zone of Drainage
-

Straight channels run roughly parallel to each other, and are relatively uncommon in rivers and streams over large distances.

- ☒ True ✓
 - ☐ False
-

What two landforms can be used to identify a drainage basin on a topographic map?

- ☐ Braided bars and deltas
 - ☒ Ridges and rivers ✓
 - ☐ Ridges and deltas
 - ☐ Watersheds and estuaries
-

What type of feature might be observed in a river like the one at Location A and B in Exercise 2?

- ☐ Braided bar
- ☒ Oxbow lake ✓
- ☐ Estuary
- ☐ Fluvial terrace

The gradient of a stream increases over time.

- ☐ True
- ☒ False ✓

A(n) ____ is the transitional zone between freshwater from the river and saltwater from the sea.

- ☐ delta
- ☐ floodplain
- ☒ estuary ✓
- ☐ alluvial fan

A mature stream would be found in a wide, flat bottomed valley with well-developed floodplains.

- ☒ True ✓
- ☐ False

Extension Questions

In addition to natural processes, humans have also altered rivers and streams for various purposes. Describe three human alterations made to rivers, and explain why these alterations may have been made. (SAMPLE ANSWER BELOW)

Student answers will vary but may include building dams to prevent flooding or support hydroelectric powerplants, landcover alteration (e.g., the addition of permeable surfaces alongside of a river), and stream diversion to support irrigation and agriculture.