

SI Geology - Full Discipline Demo

Wind 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 following terms to their definition.

⚡ Ergs	Eroded stones that are polished by grains in the wind	1
⚡ Facets		
⚡ Saltation	Rock ridges eroded by the wind that are elongated parallel to the prevailing wind	2
⚡ Sand Sheets		
⚡ Surface Creep	Massive, sandy deserts	3
⚡ Suspension	Flat, tabular sand bodies	4
⚡ Ventifacts	Wind-cut faces oriented perpendicular to the prevailing wind direction	5
⚡ Yardangs	Occurs when particles are lifted up to several kilometers into the air by wind	6
	Process where particles rise a few centimeters above the ground and then fall, bouncing along the ground	7
	Occurs when particles too large to be moved by the wind are moved by rolling, sliding, or extremely small hops when impacted by bouncing grains	8

Correct answers:

- 1 Ventifacts 2 Yardangs 3 Ergs 4 Sand Sheets 5 Facets
 6 Suspension 7 Saltation 8 Surface Creep

Classify each statement as true or false.

⚡ Barchan dunes are crescent-shaped dunes with horns that point downwind.	
⚡ Star dunes are characterized by radial symmetry and slip faces on three or more arms.	
⚡ The angle of a dune's crest is usually near the angle of repose for sand.	
⚡ The horns of a parabolic dune point downwind.	
⚡ The windward surface of a dune is called the backslope.	
⚡ Transverse dunes are simple ridges that are oriented parallel to the primary wind direction.	
True	False
1	2

Correct answers:

1

Barchan dunes are crescent-shaped dunes with horns that point downwind.

Star dunes are characterized by radial symmetry and slip faces on three or more arms.

The windward surface of a dune is called the backslope.

2

The angle of a dune's crest is usually near the angle of repose for sand.

Transverse dunes are simple ridges that are oriented parallel to the primary wind direction.

The horns of a parabolic dune point downwind.

Exploration

____ occurs when particles rise a few centimeters above the ground and then fall, bouncing along the ground.

- ☐ Suspension
- ☒ Saltation ✓
- ☐ Surface creep

The most common ventifacts are ____.

- ☐ saltations
- ☐ yardangs
- ☒ facets ✓
- ☐ abrasions

The largest bedform in a sand sea is a ripple.

- ☐ True
- ☒ False ✓

The backslope of a dune represents the zone of ____.

- ☐ deposition
- ☐ transportation
- ☐ abrasion
- ☒ erosion ✓

A ____ dune is composed of narrow ridges that extend parallel to the prevailing wind direction.

- ☒ linear ✓
- ☐ barchan
- ☐ star
- ☐ transverse

Exercise 1

What is the prevailing wind direction at Location A?

How are the dunes at Location B different from Location A?

How are these types of dunes formed at Location C?

The dunes at Location C are in the same region as Location B, so why are they different here (i.e., what is the difference between the dominant processes forming these two dunes)?

How are the types of dunes at Location D formed?

Is the prevailing wind direction at Location E onshore (from the sea toward the land) or offshore (from the land toward the sea)?

Zoom in to the placemark at Location F so that the top and base of the dune are clearly visible. How high is this dune?

Hint: Hover your cursor over the top of the dune by the placemark and read the elevation, listed in meters, in the bottom right corner of the screen. Then hover your cursor over the base of the dune and find its elevation. Subtract the top elevation from the base elevation to get its total height).

What is Location G mostly composed of?

What do you think the "Race Track" at Location I is composed of? Is it the same as Location G?

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How did you determine the type of dune at Location J?

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Would you describe Location K as a dunefield or an erg, explain your reasoning?

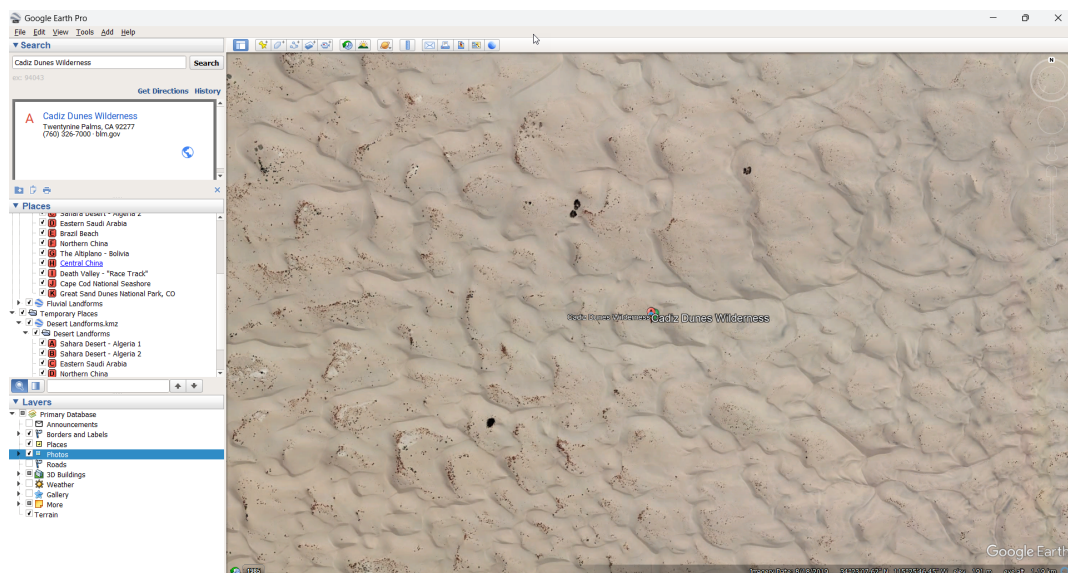
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Data Table 1: Wind Landforms
(SAMPLE ANSWER BELOW)

Location	Name of Feature
A	Longitudinal/Linear (or Seif) Dunes
B	Longitudinal/Linear Dunes
C	Star Dunes
D	Barchan Dunes
E	Barchan Dunes (or Barchanoid Ridges)
F	Star Dunes
G	Playa or Salt Flat
H	Yardangs
I	Ventifacts or Desert Varnish
J	Parabolic Dunes
K	Dunefield

Photo 1: Wind-Generated Landform
(SAMPLE ANSWER BELOW)

Example: (Student answers will vary)



Competency Review

What type of dune generally grows upward, rather than laterally?

- ☐ Linear dunes
- ☒ Star dunes ✓
- ☐ Parabolic dunes
- ☐ Transverse dunes

In Exercise 1, the rocks observed at location G had undergone abrasion.

- ☒ True ✓
 - ☐ False
-

Saltating particles can move other particles that are too large to be moved by the wind through what process?

- ☐ Suspension
- ☐ Turbulent flow
- ☒ Surface creep
- ☐ Aeolian processes

What is the largest bedform observed in a sand sea?

- ☒ Draa
- ☐ Dune
- ☐ Ripple
- ☐ Ventifact

In Exercise 1, what type of dune was observed at Location C?

- ☐ Transverse dune
- ☐ Linear dune
- ☐ Parabolic dune
- ☒ Barchan dune

The three controlling factors of wind activity are direction, velocity, and temperature gradient.

- ☐ True
- ☒ False

The angle of the slip face of a dune is typically ____ the backslope.

- ☒ steeper than
- ☐ shallower than
- ☐ the same as

_____ are rock ridges eroded by the wind that are elongated parallel to the prevailing winds.

- ☐ Abrasions
- ☐ Draas
- ☐ Facets
- ☒ Yardangs



Extension Questions

A unique phenomenon called "Singing Sands" can be observed in many dune fields. Research what causes the sands to "sing" or "boom." What conditions must be met for this phenomenon to occur? (SAMPLE ANSWER BELOW)

Singing Sands are caused by avalanches moving down the face of a dune. Audible vibrations develop when sufficient quantities of sand are picked up in the avalanche and compress the air within the moving sand. These avalanches can be caused by wind or by people. The conditions required for singing sands are: 1) the sand must contain round grains between 0.1 and 0.5 mm diameter, 2) the sand must contain silica, and 3) the sand must be at a certain humidity.