Geologic Processes Activity Answers

Questions

5. Principal Types of Volcanoes, http://pubs.usgs.gov/gip/volc/types.html

Volcano Types, Descriptions, and Locations

Volcano type	Description	Location
Cinder cone	built from particles and blobs of congealed lava ejected from a single vent	western North America as well as throughout other volcanic terrains of the world.
Composite volcano	typically steep-sided, symmetrical cones of large dimension built of alternating layers of lava flows, volcanic ash, cinders, blocks, and bombs	Mount Fuji in Japan, Mount Cotopaxi in Ecuador, Mount Shasta in California, Mount Hood in Oregon, and Mount St. Helens and Mount Rainier in Washington.
Shield volcano	built almost entirely of fluid lava flows, flow after flow pours out in all directions from a central summit vent, or group of vents, building a broad, gently sloping cone of flat, domical shape, with a profile much like that of a warrior's shield	northern California and Oregon, the Hawaiian Islands are composed of linear chains of these volcanoes including Kilauea and Mauna Loa on the island of Hawaii
Lava dome	formed by relatively small, bulbous masses of lava too viscous to flow any great distance, as it grows its outer surface cools and hardens, then shatters, spilling loose fragments down its sides	Novarupta Dome that formed during the 1912 eruption of Katmai Volcano, Alaska, Mont Pelée in Martinique, Lesser Antilles, and Lassen Peak and Mono domes in California

7. Soil Erosion Types, http://www.dpiw.tas.gov.au/inter.nsf/ThemeNodes/TPRY-5Z64YM?open

Erosion

Erosion type	Description
Mass movement	involves the downward movement of soil and rock under the assistance of gravity.
Water erosion	is a two-part process involving the detachment and transport of soil particles. The water erosion process consists of discrete stages from rain drop impact to the formation of gully erosion. Each stage has its own processes and characteristics. Controlling or preventing water erosion requires an understanding of each step in the erosion process.
Wind erosion	involves the detachment, transportation and re-deposition of soil particles by wind. Wind erosion is common on flat, bare areas with dry, sandy soils, or anywhere the soil is loose, dry, and finely granulated. Sandy soils are very susceptible to erosion, however clay soils which have been pulverised by powered tillage implements or worked when they are too dry are also susceptible to wind erosion.

8.

Geologic Processes

Image	Terrestrial Object	Processes
A	Mars	There is very clear evidence of erosion in many places on Mars including large floods and small river systems. At some time in the past there was clearly water on the surface There may have been large lakes or even oceans. But it seems that this occurred only briefly and very long ago; the age of the erosion channels is estimated at about nearly 4 billion years. (Valles Marineris was NOT created by running water. It was formed by the stretching and cracking of the crust associated with the creation of the Tharsis bulge.) http://seds.lpl.arizona.edu/nineplanets/nineplanets/mars.html
B	Mercury	Hills of Mercury "Weird terrain" best describes this hilly, lineated region of Mercury. This area is at the antipodal point from the large Caloris basin. The shock wave produced by the Caloris impact was reflected and focused to this antipodal point, thus jumbling the crust and breaking it into a series of complex blocks. The area covered is about 100 kilometers (62 miles) on a side. (Copyright Calvin J. Hamilton; FDS 27370) http://www.solarviews.com/eng/mercury.htm
C	Venus	Eistla Regio - Rift Valley A portion of Western Eistla Regio is displayed in this three dimensional perspective view of the surface of Venus. The viewpoint is located 725 kilometers (450 miles) southeast of Gula Mons. A rift valley, shown in the foreground, extends to the base of Gula Mons, a 3 kilometer (1.86 miles) high volcano. This view is facing the northwest with Gula Mons appearing at the right on the horizon. Sif Mons, a volcano with a diameter of 300 kilometers (180 miles) and a height of 2 kilometers (1.2 miles), appears to the left of Gula Mons in the background. (Courtesy NASA/JPL) http://www.solarviews.com/eng/venus.htm
D	Mars	South Polar Cap This image shows the south polar cap of Mars as it appears near its minimum size of about 400 kilometers (249 miles). It consists mainly of frozen carbon dioxide. This carbon dioxide cap never melts completely. The ice appears reddish due to dust that has been incorporated into the cap. (Courtesy NASA) http://www.solarviews.com/eng/mars.htm

E	Earth	Africa The crew of Apollo 17 took this photograph of Earth in December 1972 while the spacecraft was traveling between the Earth and the Moon. The orange-red deserts of Africa and Saudi Arabia stand in stark contrast to the deep blue of the oceans and the white of both clouds and snow-covered Antarctica. (Courtesy NASA) http://www.solarviews.com/eng/earth.htm
F	Venus	Mariner 10 Image of Venus This beautiful image of Venus is a mosaic of three images acquired by the Mariner 10 spacecraft on February 5, 1974. It shows the thick cloud coverage that prevents optical observation of the surface of Venus. Only through radar mapping is the surface revealed. (Copyright Calvin J. Hamilton) http://www.solarviews.com/eng/venus.htm
G	Moon	Sea of Tranquility on the Moon before Apollo 11 touchdown This picture was taken from the Apollo 11 LM window during the descent to the lunar surface shortly before landing. It shows the area of the Moon near the touchdown point in the Sea of Tranquility. Landing occurred on July 20 at 20:18 UT (4:18 p.m. EDT) at 00.57 S, 23.49 E. The view is to the north. (Apollo 11, AS11-37-5458) http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/a11_h_37_5458.html
H	Mars	Martian Atmosphere This oblique image taken by the Viking orbiter spacecraft shows a thin band of the Martian atmosphere. This image looks northeast across the Argyre basin. The Argyre basin is about 600 kilometers across with a rugged rim of about 500 kilometers in width. (Copyright 1997 by Calvin J. Hamilton) http://www.solarviews.com/eng/mars.htm
I	Earth	Clementine Mission This false-colored image was acquired during the Clementine mission. It shows airglow of the upper atmosphere as a thin blue line. The bright spot toward the bottom is an urban area. (Courtesy Naval Research Laboratory) http://www.solarviews.com/eng/earth.htm

J	Moon	Copernicus Crater and the Carpathian Mountains on the Moon This oblique view of the Moon taken from the Lunar Module shows the 107 km diameter Copernicus crater near the horizon at the center of the frame. Reinhold crater, 42 km across, is in the foreground. The Carpathian mountain range is visible on the horizon at lower left. This area is just to the north of the Apollo 12 landing site. The view is looking northeast. (Apollo 12, AS12-H-47-6875) http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/a12_h_47_6875.html
K	Mars	Landslide in Valles Marineris Although Valles Marineris originated as a tectonic structure, it has been modified by other processes. This image shows a close-up view of a landslide on the south wall of Valles Marineris. This landslide partially removed the rim of the crater that is on the plateau adjacent to Valles Marineris. Note the texture of the landslide deposit where it flowed across the floor of Valles Marineris. Several distinct layers can be seen in the walls of the trough. These layers may be regions of distinct chemical composition or mechanical properties in the Martian crust. (Copyright Calvin J. Hamilton; Caption: LPI)
L	Mercury	Large Faults on Mercury This Mariner 10 image shows Santa Maria Rupes, the sinuous dark feature running through the crater at the center of this image. Many such features were discovered in the Mariner images of Mercury and are interpreted to be enormous thrust faults where part of the mercurian crust was pushed slightly over an adjacent part by compressional forces. The abundance and length of the thrust faults indicate that the radius of Mercury decreased by 1-2 kilometers (.6 - 1.2 miles) after the solidification and impact cratering of the surface. This volume change probably was due to the cooling of the planet, following the formation of a metallic core three-fourths the size of the planet. North is towards the top and is 200 kilometers (120 miles) across. (c Copyright 1998 by Calvin J. Hamilton; FDS 27448) http://www.solarviews.com/eng/mercury.htm

M	Venus	Arachnoids Arachnoids are one of the more remarkable features found on Venus. They are seen on radar-dark plains in this Magellan image mosaic of the Fortuna region. As the name suggests, arachnoids are circular to ovoid features with concentric rings and a complex network of fractures extending outward. The arachnoids range in size from approximately 50 kilometers (29.9 miles) to 230 kilometers (137.7 miles) in diameter. Arachnoids are similar in form but generally smaller than coronae (circular volcanic structures surrounded by a set of ridges and grooves as well as radial lines). One theory concerning their origin is that they are a precursor to coronae formation. The radar-bright lines extending for many kilometers might have resulted from an upwelling of magma from the interior of the planet which pushed up the surface to form "cracks." Radar-bright lava flows are present in the 1st and 3rd image, also indicative of volcanic activity in this area. Some of the fractures cut across these flows, indicating that the flows occurred before the fractures appeared. Such relations between different structures provide good evidence for relative age dating of events. (Courtesy NASA/JPL) http://www.solarviews.com/eng/venus.htm
N	Moon	Close-up color image of the orange soil at Shorty Crater on the Moon Apollo 17 surface photo showing orange soil discovered during the 2nd EVA near Shorty Crater at the Taurus-Littrow landing site on the Moon. Upon close examination on Earth, the soil was seen to contain many orange volcanic glass particles, giving it its distinctive color. The tripod at left center is a gnomon and photographic reference chart. This picture was taken on 12 December 1972. (Apollo 17, AS17-137-20990) http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/a17_h_137_2099.html
O	Earth	America This map of North and South America uses radar altimetry to reflect the underlying topography of the oceans and continents. (Courtesy NGDC) http://www.solarviews.com/eng/earth.htm
P	Mercury	Bright Rayed Craters This image shows two prominent craters (upper right) with bright halos on Mercury. The craters are about 40 kilometers (25 miles) in diameter. The halos and rays cover other features on the surface indicating that they are some of the youngest on Mercury. (Copyright Calvin J. Hamilton; FDS 275) http://www.solarviews.com/eng/mercury.htm

Q	Moon	Mosiac of the Schrodinger impact basin on the Moon Clementine mosaic of the Schrodinger impact basin near the south pole of the Moon. The basin is 312 km in diameter and centered at 67 S, 132 E. Note the smooth floor and the large inner ring. The dark area around the small crater just left of the center of the basin was probably caused by relatively recent volcanic ejecta. The south pole is just off the upper left corner of the image. (Clementine, USGS slide 18) http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/clm_usgs_18.html
R	Venus	Data from Magellan's imaging radar shows that much of the surface of Venus is covered by lava flows. There are several large shield volcanoes (similar to Hawaii or Olympus Mons) such as Sif Mons (right). Recently announced findings indicate that Venus is still volcanically active, but only in a few hot spots; for the most part it has been geologically rather quiet for the past few hundred million years. http://seds.lpl.arizona.edu/nineplanets/nineplanets/venus.html
S	Mercury	Incoming View of Mercury This photomosaic of Mercury was constructed from photos taken by Mariner 10 six hours before the spacecraft flew past the planet on March 29, 1974. These images were taken from a distance of 5,380,000 kilometers (3,340,000 miles). (Courtesy USGS, and NASA) http://www.solarviews.com/eng/mercury.htm
T	Earth	Barringer Meteor Crater, Arizona 35°02'N, 111°01'W; diameter: 1.186 kilometers (.737 miles); age: 49,000 years. The origin of this classic simple meteorite impact crater was long the subject of controversy. The discovery of fragments of the Canyon Diablo meteorite, including fragments within the breccia deposits that partially fill the structure, and a range of shock metamorphic features in the target sandstone proved its impact origin. Target rocks include Paleozoic carbonates and sandstones; these rocks have been overturned just outside the rim during ejection. The hummocky deposits just beyond the rim are remnants of the ejecta blanket. This aerial view shows the dramatic expression of the crater in the arid landscape. (Courtesy of D. Roddy and LPI) http://www.solarviews.com/eng/tercrate.htm