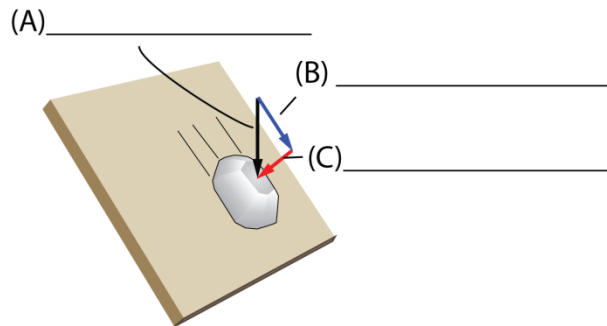


Chapter 8 – Landslides

Practice Exam and Study Guide

1. Mass wasting is the _____ movement of Earth material such as regolith or solid rock under the influence of gravity.
2. What is regolith?
3. Gravity, a force, can be represented by a vector. A vector has both _____ and _____.
4. Gravity acting across a sloped or inclined surface can be broken into a _____ and a _____ component.
5. Gravity acting on a boulder resting on an inclined or slanted surface can be broken into the following three components: F_{total} , $F_{\text{tangential}}$, and F_{normal} . In the following illustration please fill in the missing labels.



6. A landslide is defined as the downward and outward movement of slope-forming materials. True or False

7. Landslides are classified on the basis of the type of material that existed prior to the landslide and the type of movement that dominates during the landslide. Select from the following list the types of material that might exist prior to a landslide.
 - a. Rock
 - b. Soil
 - c. Earth
 - d. Mud
 - e. Debris

8. Select from the following list the type of movement that might occur during a landslide.
 - a. Falling
 - b. Sliding
 - c. Spreading
 - d. Flowing
 - e. Running

9. Rock is defined as any _____, _____, and firm mass that existed in its natural place prior to a landslide.

10. Soil is an aggregate of _____ and _____
_____ ± organic material that formed from the in situ weathering of rock or sediments.

11. What might fill the voids and spaces between mineral or rock fragments in a soil?

12. Material defined as earth is composed of
 - a. 80% or more particles smaller than 0.06 mm
 - b. 20% to 80% particles larger than 2 mm
 - c. 80% or more particles smaller than 2 mm

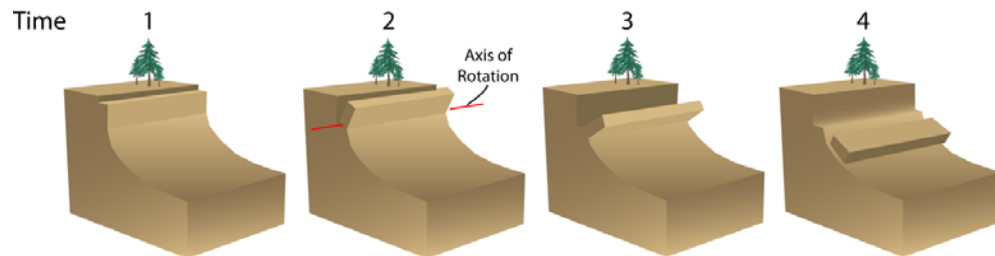
13. Material defined as mud is composed of
 - a. 80% or more particles smaller than 0.06 mm
 - b. 20% to 80% particles larger than 2 mm
 - c. 80% or more particles smaller than 2 mm

14. Material defined as debris is composed of
- a. 80% or more particles smaller than 0.06 mm
 - b. 20% to 80% particles larger than 2 mm
 - c. 80% or more particles smaller than 2 mm
15. A complex landslide commonly involves two or more of the classes _____, _____, _____, or _____.

16. What are rock falls?

17. What are topples?

18. What type of landslide is shown in the following illustration?



19. What produced all of the gravelly debris along the road in the following photograph?



20. What type of landslide is shown in the following photograph?



21. What is a common term that is synonymous with slide?

22. A slide forms when a coherent mass of regolith or bedrock breaks free and then slides down slope along either a _____ or _____ surface.

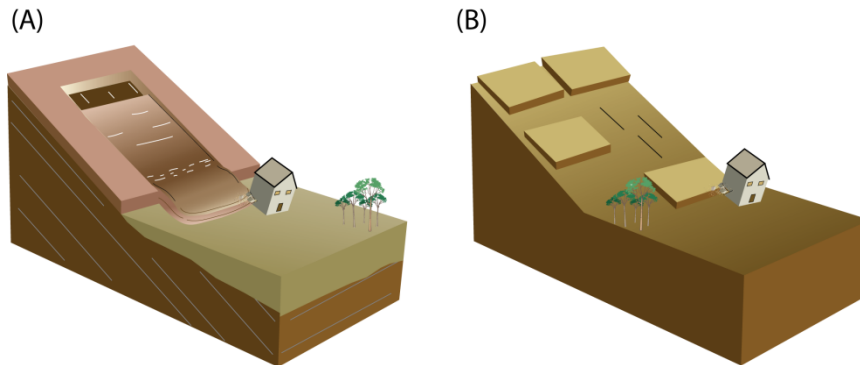
23. What are the two major types of landslides that fall under the heading of slide?

24. Is the surface of failure for a translational slide planar or curved?

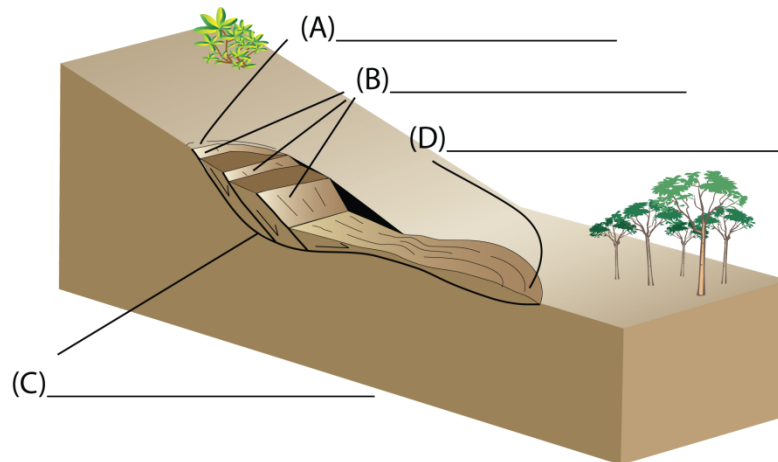
25. Is the surface of failure for a rotational slide planar or curved?

26. How does a translational slide differ from a block slide?

27. Which of the following two illustrations is a translational and which is a block slide?



28. For the following illustration please fill in the missing labels.

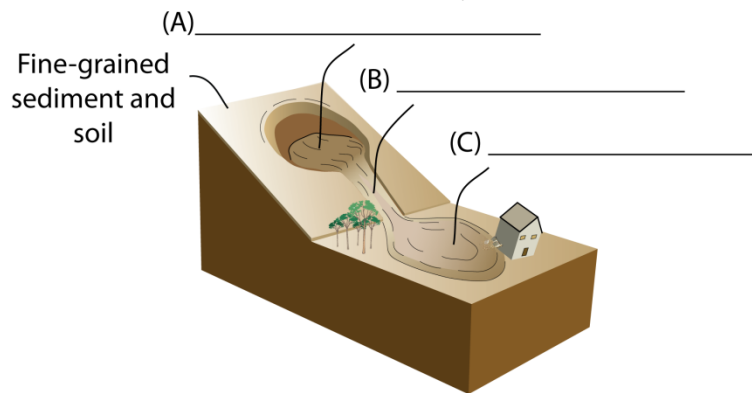


29. How would you classify the landslide depicted in question #28?

30. Liquefaction is the process by which water saturated, loose, cohesionless sediments are transformed from a _____ into a _____ state.

31. On what type of a slope would a lateral spread likely occur on: gentle or steep?

32. Failure during a lateral spread is caused by what?
33. Water-saturated fine-grained slope material that liquefies and then runs out, leaving a bowl-shaped depression on the sloping land surface are called _____.
34. Please fill in the missing labels in the following illustration.

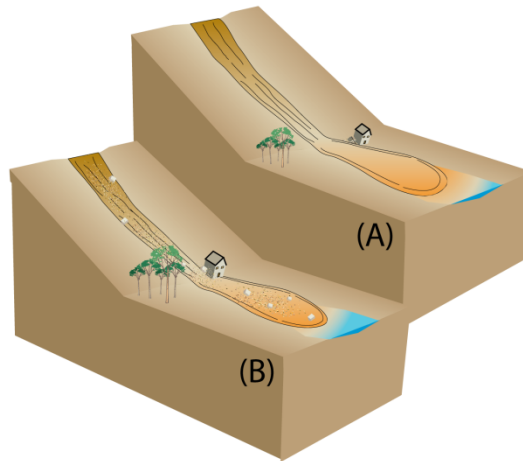


35. Are earthflows generally faster or slower than mudflows?
36. Material in an earthflow is composed of
- 80% or more particles smaller than 0.06 mm
 - 20% to 80% particles larger than 2 mm
 - 80% or more particles smaller than 2 mm
37. How would you describe the outline of the source area, main track, and site of deposition of an earthflow if you could view it in an airplane?
38. Given a steep sloped terrain with a mantle of loose coarse debris, what might happen following an intense torrential rainfall or the melting of large amounts of snow and ice during a spring thaw?
39. A debris flow is commonly described as having the consistency of what common mixture?

40. Material in a debris flow is composed of
- 80% or more particles smaller than 0.06 mm
 - 20% to 80% particles larger than 2 mm
 - 80% or more particles smaller than 2 mm
41. Debris flows can reach speeds of
- 26 km/hour
 - 36 km/hour
 - 50 km/hour
 - 56 km/hour
 - 66 km/hour
42. Can debris flows carry particles as large as a house?
43. A mudflow differs from a debris flow in what way?

44. In the following illustration, which block diagram (A) or (B) characterizes the essential elements of a debris flow and which characterizes the essential elements of a mudflow?

(A) Flow is composed of ~ 80% particles less than 0.06 mm in size



(B) Flow is composed of ~20% - 80% particles greater than 2.0 mm in size

45. The imperceptible slow and steady down slope movement of the regolith is called _____.

46. List below at least 4 lines of evidence for creep.
47. Permafrost is soil that must remain frozen for at least _____ consecutive years.
48. What happens to the topmost or surface portion of permafrost during the summer?
49. The slow imperceptible down slope motion of the topmost or surface portion of permafrost is called _____.
50. What common rock type underlies Mount Soledad in La Jolla, California?
- Gneiss
 - Granite
 - Shale
 - Conglomerate
 - Rhyolite
51. Have geologists mapped ancient landslides in the Mount Soledad region?
52. A major right-lateral strike-slip fault system transects the Mount Soledad region and is called the
- San Andreas fault system
 - San Jacinto fault system
 - Rose Canyon – Country Club fault system
 - Elsinore fault system
 - Garlock fault system
53. Is there recent historical evidence of landslide activity in the Mount Soledad area?

54. On October 3rd, 2007, a large mass of the slope lying between Soledad Mountain Road and Desert View Drive, La Jolla, California detached and began sliding down slope. Given your answers to questions 50 through 53, should the residents of this area have been surprised? If not, then why not?
55. Between March 4, 1995 and January 10, 2005 two landslides occurred at La Conchita, California. How is the 1995 landslide classified?
56. Was anyone killed during the March 4, 1995 landslide?
57. During the January 10, 2005 landslide was new material involved or did the January 10 landslide simply reactive portions of the older slide?
58. How was the January 10, 2005 landslide at La Conchita classified?
59. How many people were killed by the January 10 landslide?
60. How would you describe the weather conditions that preceded the January 10, 2005 and March 4, 1995 landslides at La Conchita?
61. As it turns out, the January 10, 2005 and March 4, 1995 landslides at La Conchita are only small parts of a much larger ancient landslide. What is the name of this larger and more ancient feature?
62. Do you consider La Conchita a safe place to live? If not, then why not?

Answers

1. Down slope
2. Regolith is all of the materials lying between unweathered bedrock below and the Earth's surface above.
3. Magnitude, direction
4. Normal, tangential
5. (A) total gravitational force, (B) tangential component, (C) normal component
6. True
7. a. through e. all represent material that might exist prior to a landslide
8. a. through d. are common types of movement associated with landslides
9. intact, hard
10. minerals, rock fragments
11. gas and water
12. c. 80% or more particles smaller than 2 mm
13. a. 80% or more particles smaller than 0.06 mm
14. b. 20% to 80% particles larger than 2 mm
15. fall, slide, spread, flow
16. The term rock fall represents both a process and the resulting deposit. The process involves the falling for some distance through the air, or the bouncing and rolling down slope of solid material or soil on a steep slope. The typically broken and shattered material resulting from this process is also called a rock fall.
17. A topple is a rock fall that involved the forward rotation of a detached block above a pivotal point located in the lower part of the detached material. When the block detaches from the substrate it appears to pitch and rotate forward.
18. A topple
19. A rock fall
20. A rock fall
21. Slump
22. Planar, curved
23. Translational and rotational
24. Planar
25. Curved
26. A block slide is a special type of translational slide. It involves material that is hard and intact enough to slide down slope as a relatively coherent mass.
27. (A) translational slide with an earthflow in the toe region. (B) block slide
28. (A) crown, (B) scarps, (C) slip or detachment surface, (D) toe
29. A complex rotational slide-earthflow or a complex rotational slump-earthflow
30. Solid, liquid-like
31. Gentle
32. Liquefaction which typically occurs as a result of ground shaking during an earthquake

33. Earthflow
34. (A) bowl-shaped depression where earthflow originated, (B) main track, (C) depositional site, i.e., the final resting place of the earthflow
35. Slower
36. c. 80% or more particles smaller than 2 mm
37. As an hour-glass
38. A debris flow may form
39. Wet cement
40. b. 20% to 80% particles larger than 2 mm
41. d. 56 km/hour
42. yes
43. It is composed of finer grained material. For example, a mudflow is composed of 80% or more particles less than 0.06 mm in size, while a debris flow is composed of 20% to 80% particles larger than 2 mm in size.
44. (A) mudflow, (B) debris flow
45. Creep
46. Bent trees, roads, railroad tracks, retaining walls, and the down slope tilting of layered rocks
47. 2
48. It melts
49. Solifluction
50. c. shale
51. yes, many
52. c. Rose Canyon – Country Club fault system
53. yes, several have occurred since 1961
54. No, the Mount Soledad area is well known for its susceptibility to landslides
55. A complex slump-earthflow
56. No
57. The SE portion of the old landslide material was reactivated
58. Debris flow
59. 10
60. Intense long periods of rainfall preceded both landslides
61. The Rincon Mountain landslide
62. La Conchita, though beautiful is clearly not a safe place to live. As noted by Larry Gurrola, other landslides are highly likely especially following intense long **periods of rainfall.**