

Bellringer REVIEW:

- What is the angle of repose?
- What can we do to improve building sites on hillsides?

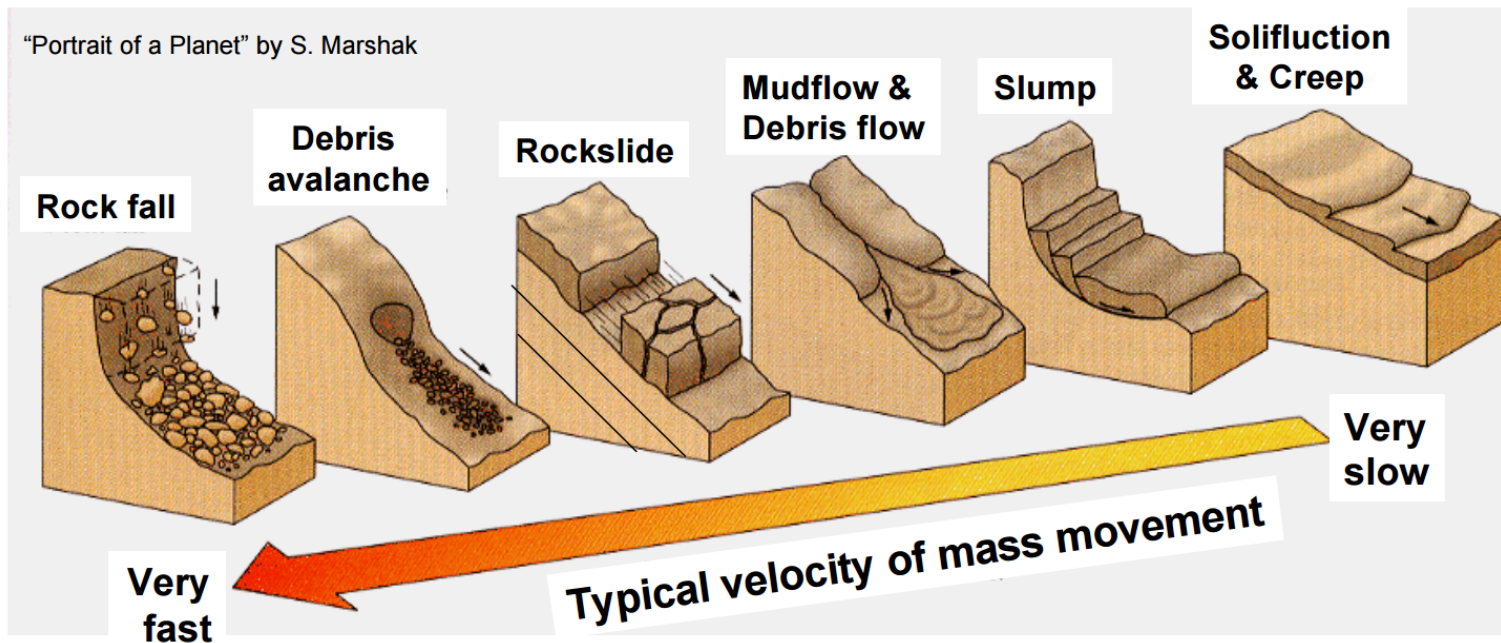
Learning Objectives:

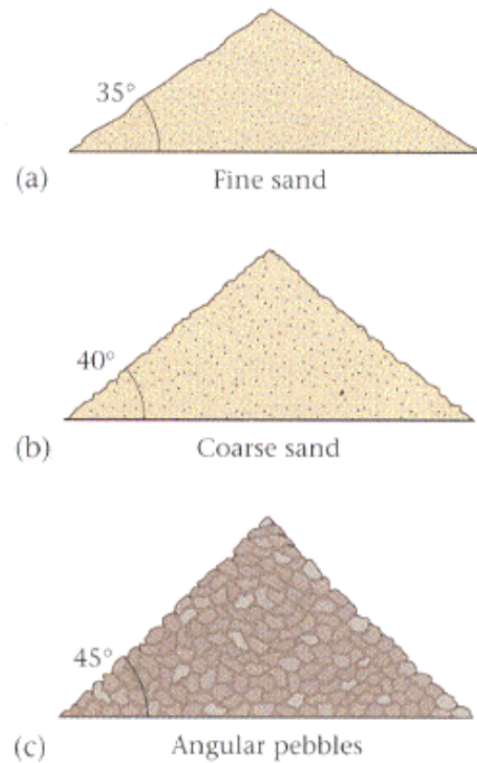
- I can identify dangerous environments prone to potential mass movement.

Check for Understanding Questions:

- What causes Landslides?
- What are some of the signs of potential landslides?
- What are some things we can do to avoid landslides or prevent them?

Types of Mass Movement





Angle of repose: The angle of the steepest slope that a pile of uncemented material can attain without collapsing from the pull of gravity. As this angle is exceeded, the slope will fail, causing mass wasting.

FIGURE 16.16 The angle of repose is the steepest slope that a pile of unconsolidated sediment can have and remain stable. Angles of repose depend on the size and shape of grains. (a) Fine, well-rounded sand has a small angle of repose. (b) Coarse, angular sand has a larger angle. (c) Large, irregularly shaped pebbles have a large angle of repose.

Prediction

Some warning signs can be recognized individual by observations of things around you:

- > Springs, seeps, or saturated ground in areas that have not typically been wet before.
- > New cracks or unusual bulges in the ground, street pavements or sidewalks.
- > Soil moving away from foundations.
- > Ancillary structures such as decks and patios tilting and/or moving relative to the main house.
- > Tilting or cracking of concrete floors and foundations.
- > Broken water lines and other underground utilities.
- > Leaning telephone poles, trees, retaining walls or fences
- > Offset fence lines.
- > Sunken or down-dropped road beds.
- > Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content).
- > Sudden decrease in creek water levels though rain is still falling or just recently stopped.
- > Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb.
- > A faint rumbling sound that increases in volume is noticeable as the landslide nears.
- > Unusual sounds, such as trees cracking or boulders knocking together, might indicate moving debris.

Prevention and Mitigation

All slopes are susceptible to mass movement hazards if a triggering event occurs. Thus, all slopes should be assessed for potential mass movement hazards. Mass movement events can sometimes be avoided by employing engineering techniques to make the slope more stable. Among them are:

- > Steep slopes can be covered or sprayed with concrete covered with a wire mesh to prevent rock falls.
- > Retaining walls could be built to stabilize a slope.
- > If the slope is made of highly fractured rock, rock bolts may be emplaced to hold the slope together and prevent failure.
- > Drainage pipes could be inserted into the slope to more easily allow water to get out and avoid increases in fluid pressure, the possibility of liquefaction, or increased weight due to the addition of water.
- > Oversteepened slopes could be graded or terraced to reduce the slope to the natural angle of repose.
- > In mountain valleys subject to mudflows, plans could be made to rapidly lower levels of water in human-made reservoirs to catch and trap the mudflows.

Some slopes, however, cannot be stabilized. In these cases, humans should avoid these areas or use them for purposes that will not increase susceptibility of lives or property to mass movement hazards.

Check for Understanding Questions:

- What causes Landslides?
- What are some of the signs of potential landslides?
- What are some things we can do to avoid landslides or prevent them?

Learning Objectives: Did you accomplish them?

- I can determine the best environments for building a home.

Self-Evaluation

- How well did you understand the material today?
(1-Lost, 2- understand, 3-can teach it)
- How well did you and your team members participate in class?
(1-didn't do anything, 2-Bare minimum, 3-fully participated)