

1. Firn is formed as a result of:
 - A. the polishing of bedrock by the scraping action of glacial ice
 - B. changes in the flow rate of glacial melt water
 - C. the partial melting and refreezing of snow crystals into small grains of ice
 - D. the deposition of unsorted glacial drift

2. Ice in a glacier moves down slope in response to:
 - A. friction
 - B. melting
 - C. gravity
 - D. freezing

3. Which of the following features is caused by erosion rather than by deposition?
 - A. drumlin
 - B. kettle
 - C. horn
 - D. esker

4. Till is best defined as:
 - A. an unsorted deposit of rock material
 - B. sediment sorted by melted ice
 - C. sorted and layered deposits of sand
 - D. unsorted deposits of drift

5. The last ice age that affected Michigan ended approximately ____ years ago.
 - A. 100,000
 - B. 50,000
 - C. 11,000
 - D. 6,000

6. Ridges of till (unsorted rock material) which form along the sides of a glacier are called:
 - A. drumlins
 - B. lateral moraines
 - C. eskers
 - D. kettle lakes

7. An oval-shaped mound of glacial till is called a (n):
 - A. drumlin
 - B. moraine
 - C. esker
 - D. cirque

8. Glacial deposits at the lower end of a glacier are called:
 - A. lateral moraines
 - B. medial moraines
 - C. terminal moraines
 - D. ground moraines

9. Where are glaciers found?
- A. Low latitude and low altitude
 - B. Low latitude and high altitude
 - C. High latitude and low altitude
 - D. High latitude and high altitude
10. The scratches left behind when a glacier has eroded a rock are called:
- A. grooves
 - B. striations
 - C. scratch marks
 - D. glacier marks
11. Glaciers and glacial processes usually cut what sort of valley?
- A. V-shaped
 - B. S-shaped
 - C. U-shaped
 - D. D-shaped
12. What are the long lakes found at the bottom of deep glacial valleys called?
- A. Great lakes
 - B. Oxbow lakes
 - C. Ribbon lakes
 - D. Tarns
13. A glacier is a large, flowing mass of ice. Glaciers form only under specific climate conditions and only over land masses. Which of the following words does NOT relate to the life cycle of a glacier?
- A. Accretion
 - B. Ablation
 - C. Accumulation
 - D. Equilibrium Line
14. An open fissure in a glacier's surface is called a (n):
- A. Firn
 - B. Tarn
 - C. Crevasse
 - D. Serac
15. Which of these is not a kind of glacier?
- A. Alpine
 - B. Ice Sheet
 - C. Barchan
 - D. Piedmont
16. What is the process called when a glacier reaches the sea and breaks up into chunks?
- A. Abrasion
 - B. Basal Slip
 - C. Calving
 - D. Plastic Flow

17. In which state is Glacier National Park?
- A. Minnesota
 - B. Wyoming
 - C. Montana
 - D. Washington
18. The source of glacial ice is _____.
- A. groundwater from springs
 - B. snow that changes into ice
 - C. mountain streams that freeze upon striking the glacier
 - D. rainwater that falls and then freezes
 - E. frozen ocean water
19. The movement of glacial ice involves _____.
- A. riding on rocks that roll underneath
 - B. basal slip
 - C. plastic flow
 - D. all of the above
 - E. both basal slip and plastic flow
20. The _____ is the area of a glacier in which new ice is forming.
- A. zone of calving
 - B. zone of accumulation
 - C. snowline
 - D. zone of wastage
 - E. zone of ablation
21. Which of the following is the most recent Ice Age glacial stage in North America?
- A. Kansan
 - B. Nebraskan
 - C. Illinoian
 - D. Wisconsinian
 - E. none of the above
22. Glacial and inter-glacial periods are likely caused by variations in the Earth's position and orientation relative to the Sun. This hypothesis is called the:
- A. Hertzprung-Russell Hypothesis
 - B. Milankovitch Theory
 - C. Nebular Theory
 - D. Interglacial Theory
 - E. Ice Age Theory
23. The orbital path of the Earth around the Sun as varying from nearly circular to highly elliptical. It takes the Earth ~100,000 year to complete this cycle. What is the term used to describe this cyclical variation in the shape of the Earth's orbit?
- A. Revolution
 - B. Precession
 - C. Obliquity
 - D. Eccentricity

24. The tilt of the Earth's axis either toward or away from the sun as varying over the range of 22.5 to 24.5 degrees. Currently, the tilt is 23.5 degrees. It takes the Earth about ~43,000 years to complete one cycle of this variation in tilt. What is the term used to describe this cyclical variation?
- A. Ablation
 - B. Precession
 - C. Obliquity
 - D. Eccentricity
25. The Earth's axis wobbles like a top slowing down as it orbits the Sun. The Earth complete one cycle of this wobble every 20,000 years. What is the term used to describe this cyclical variation?
- A. Accretion
 - B. Precession
 - C. Obliquity
 - D. Eccentricity
26. If the amount of water and ice a glacier loses is greater than the amount of snow it gains, then it will:
- A. Advance
 - B. Retreat
 - C. Remain unchanged
 - D. Retreat and then advance
 - E. None of the above
27. Which of the following glacial features does not belong in the same category as the others because it is a depositional feature?
- A. roche moutonnée
 - B. glacial striations
 - C. truncated spur
 - D. drumlin
 - E. cirque
28. What is an arête?
- A. a bowl-shaped depression on a mountain carved out by a valley glacier
 - B. a pyramidal mountain peak in a glacially eroded region
 - C. a knife-like ridge of rock between two glacially eroded valleys
 - D. a U-shaped tributary valley that sits high above a deeper valley
 - E. a small lake in a depression eroded out by a glacier long ago
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30. Which of the following depositional features is best described by the definition: "Rounded hills of till, shaped like inverted teaspoons, with the steep side facing the direction from which the glacier came?"
- A. erratic
 - B. esker
 - C. kame
 - D. varve
 - E. drumlin

31. Which of the following features is NOT a type of lake related in some way to glaciers or glaciation?
- A. kettle lake
 - B. proglacial lake
 - C. tarn
 - D. pater noster lake
 - E. fjord
32. The type of moraine that accumulates in the middle of a glacier due to two glaciers flowing together is:
- A. lateral
 - B. medial
 - C. terminal
 - D. ground
 - E. recessional
33. When glaciers spread out as they exit a mountainous area, they resemble alluvial fans but are called:
- A. continental glaciers
 - B. valley glaciers
 - C. Piedmont glaciers
 - D. ice caps
 - E. ice sheets
34. Which one of the following types of glaciers is sometimes called an ice sheet?
- A. valley glacier
 - B. continental glacier
 - C. Piedmont glacier
 - D. ice bergs
 - E. none of the above
35. Which of the following descriptions is NOT true of a continental glacier?
- A. only found in Greenland, Antarctica, and on high mountain tops
 - B. includes ice caps and ice sheets
 - C. ice flows radially outwards away from the center
 - D. can be up to 3000 meters thick
 - E. also called Piedmont glaciers
36. Where is the zone of accumulation on a glacier?
- A. at the terminus of the glacier
 - B. in the same place as the zone of wastage
 - C. where the process of ablation dominates
 - D. where the crevasses develop
 - E. at the head of the glacier
37. The process of creep in a glacier results from ice crystals sliding over each other along planes of weakness in the ice. This type of motion of the glacier is also called:
- A. internal or plastic flow
 - B. basal slip or sliding
 - C. crevassing
 - D. surging
 - E. creepification

38. Most accumulation on a glacier occurs (1) _____ whereas most ablation occurs (2) _____.
- A. (1) at night (2) during the day
 - B. (1) when the glacial budget is negative (2) when the glacier recedes
 - C. (1) in the zone of wastage (2) at the head of the glacier
 - D. (1) at the head of the glacier (2) near the front of the glacier
 - E. (1) during interglacial periods (2) during ice ages
39. Which of the following glacial features is an erosional feature that is created by the glacial process called plucking?
- A. U-shaped valley
 - B. drumlin
 - C. roche moutonnée
 - D. arête
 - E. cirque
40. **True or False**: Glaciers exist on all the Earth's continents.
41. **True or False**: Most North Atlantic icebergs have calved from glaciers in Canada and Iceland.
42. **True or False**: If all of the world's glacial ice melted, it is estimated that the seas would rise by ~ 70 m.
43. **True or False**: The Great lakes began as river valleys that were carved out by glaciations.
44. **True or False**: The position of the front of a glacier depends on the balance between accumulation and wastage.
45. **True or False**: During most of the last billion years, the Earth was largely covered with ice.
46. Which two areas are home to the only two continental ice sheets? _____ and _____.
47. Where is the Byrd Glacier found? _____
48. Where is the Malaspina Glacier found? _____
49. Where is the Fox Glacier found? _____
50. Where is the Briksdal Glacier found? _____
51. Where is the Patagonian ice cap found? _____
52. Where is the Franz Josef Glacier found? _____
53. Where is the Vatnajökull Glacier found? _____
54. Where is the Donjek Glacier found? _____
55. Where is the Perito Moreno Glacier found? _____
56. Where is the Columbia Glacier found? _____
57. Negative Mass Balance: ablation (> or = or <) accumulation...”Receding Glacier”

58. Positive Mass Balance: accumulation ($>$ or $=$ or $<$) ablation...”Advancing Glacier”

59. What part of a glacier moves fastest when the glacier moves by internal plastic flow?

- A. The center of the glacier moves fastest
- B. The bottom of the glacier moves fastest
- C. The edges of the glacier move fastest
- D. The whole ice mass moves at the same speed

60. A deposit of stratified drift is called a (n):

- A. drumlin
- B. outwash plain
- C. ground moraine
- D. roche moutonnée

61. Submerged, steep-walled troughs that formerly held glaciers are called _____.

- A. spurs
- B. cols
- C. arêtes
- D. pater nosters
- E. none of the above

62. _____ are large boulders that were deposited by glaciers.

- A. Moraines
- B. Erratics
- C. Drifts
- D. Drumlins
- E. Tills

63. The snake-like ridge composed largely of sand and gravel shown in this photograph is a (n) _____.



- A. end moraine
- B. pater noster
- C. drumlin
- D. kettle
- E. none of the above

64. The following portion of a Wisconsin topographic map illustrates a glacial landform called a(n) _____.



- A. cirque
- B. kettle
- C. drumlin
- D. esker
- E. none of the above