I. ICE AGE THEORY NOTES

NAME _____HR__

217 PTS TOTAL

A. 5 _____ _____ IN EARTH'S HISTORY
   a. _____ (2.4-2.1 billion years ago),
   b. _____ (850-635 million years ago),
   c. _____ -_____ (460-430 mya),
   d. _____ (360-260 mya) and
   e. _____ (2.6 mya-present) ← WE WILL BE TALKING ABOUT THIS ONE

B. WHAT CAUSES THEM?

_____ degree C drop in _____ world _____ [this does not mean that EVERYWHERE is that much _____ . Equator area is still quite _____ and tropical]

   a. Change in _____ energy output [thermostat turned down in sun]
   b. Change in _____ of earth's _____ (maybe not 23.5, maybe only 21 degrees?]
   c. Continental _____ _____
   d. _____ _____ blocking out sunlight
   e. Nearby _____ explodes disrupting _____ of energy from _____

C. WHERE DOES THE WATER COME FROM TO MAKE A GLACIER?

   a. Water to form glaciers comes from _____
   b. This drops their _____ several _____ feet [evaporated water hits land, _____ , then oceans _____]
   c. Humans then could _____ across a _____ _____ between Siberia and Alaska

D. WHERE ARE GLACIERS FOUND AND HOW BIG ARE THEY?

   a. Glaciers move from _____ towards the _____ and
   b. may be _____ miles thick

E. WHAT PLANTS GREW NEAR THE GLACIERS?

   a. _____ ,
   b. _____ ,
   c. fast _____ plants

F. WHAT ANIMALS LIVED NEAR GLACIERS?
   a. Primary consumers
      i. _____ ,
      ii. _____ ox,
      iii. _____
      iv. _____
   b. Secondary consumers
      i. _____ tiger [hunted to _____ probably because they were brave and invaded _____ _____],
      ii. _____ , [were domesticated- _____ .. for protection?]
      iii. _____ [called cave bears and were _____ feet tall!]

G. HOW DID HUMANS LIVE?:
   a. Humans likely used _____ housing that could _____ and _____ , since they were following the _____ for food
   b. If _____ were available, they may have lived there, but evidence suggests that they actually used caves for temporary _____ , for _____ , and for _____ .

NOTES- GLACIER MOVEMENT, TYPES + GLACIATIONS

_____- large mass of recrystallized _____that is on _____and is moving

a. Snow compacts into _____(granular ice) then firn compacts into glacial _____
b. _____--the amount of snow added annually
c. _____– the amount of ice lost annually

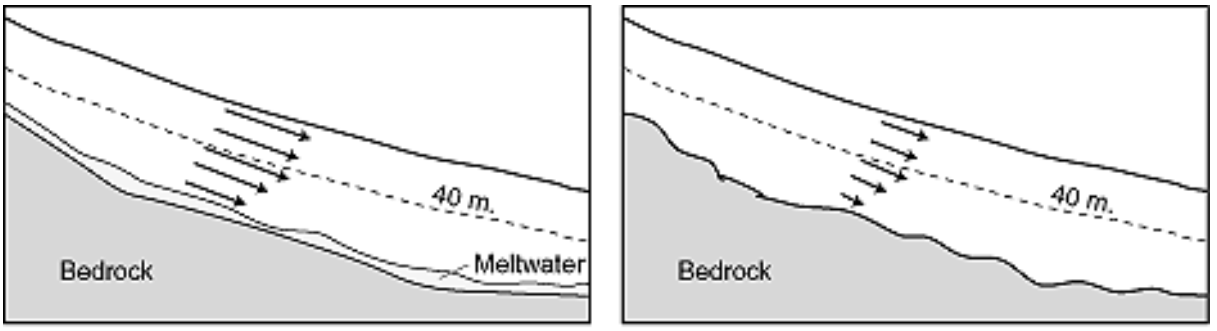
4 mechanisms responsible for ablation

a. _____
b. _____ **calving**- pieces of ice break off and form icebergs when a glacier reaches a shoreline
c. _____- ice turns directly into _____
d. _____ **erosion**- strong winds can cause melting and sublimation

II. GLACIER MOVEMENT—ultimately, movement occurs due to _____

1. **internal** _____**deformation**, (or **internal flow** or **ductile flow**)
   a. the glacier's _____becomes too much to support itself
   b. ice layers _____within the glacier
   c. glacier moves _____like a deck of cards being _____
   d. top layers move more _____than the bottom layers due to _____at base

2. _____ _____
   a. _____at the base of the glacier causes a thin layer of ice to _____.
   b. This reduces _____,
   c. the entire glacier moves as a _____ _____like it's on a water slide



Wet glacier Dry glacier

- _____**glaciers**: In _____climates, basal melting is minimal or absent, and flow is entirely through internal plastic _____.
- _____**glaciers**: In _____climates, _____slip can predominate.

3. Glaciers always move _____, never backward
   a. _____--If it moves forward at the _____rate as the front of the glacier melts
   b. _____– when a glacier moves forward _____than it melts
   c. _____—when a glacier _____faster than it moves forward

4. Move 300ft (100 m) per _____, and mostly in _____

III. TYPES OF GLACIERS

1. _____glaciers / **Ice Sheets** -large mass of ice that covers almost _____surface features (must cover at least 30,600 square miles (50,000 km)
   a. Examples: _____, _____
   b. _____miles thick!

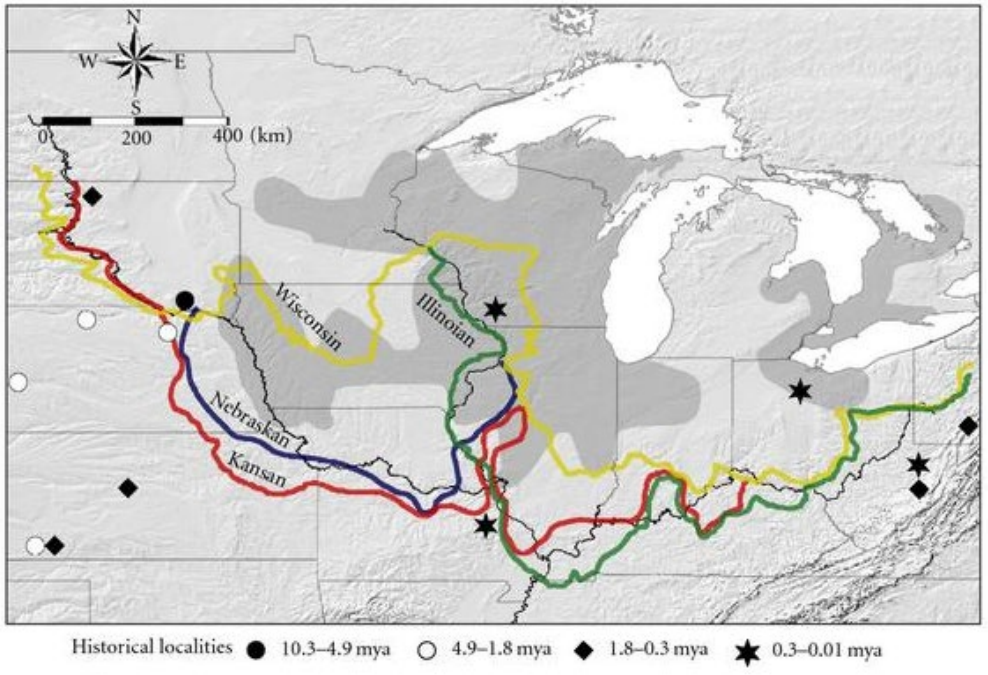
2. _____/ _____/ _____glacier - between 2 mountains
   a. Examples: Andes, _____, Himalayas, Alps, Mt Kilamenjaro, Mt Kenya

3. _____glacier - a valley glacier that enters a lowland plain and _____out like a _____
   a. Example: Malaspina glacier in Alaska

4. _____glacier- glacier fills “bowl” on _____ then eventually feeds _____ glaciers
   a. Example: Swiss Alps

IV. 4 glaciations of the last ice age (2,000,000 ya to 10,000 ya)

1. _____- the temporary enlargement of a glacier during an _____age
2. Named by the _____that the ice reached
   a. _____= 2,000,000 ya
   b. _____= 1,250,000 ya
   c. _____= 500,000 ya
   d. _____= 40,000 ya



V. GLACIAL DEPOSITION- (WHAT GLACIERS LEAVE BEHIND)

1. LANDFORMS and DEBRIS MADE BY CONTINENTAL GLACIERS

a. _____ _____ - sliding rocks and ice grinding up _____ rock into powder

b. _____ - unsorted (large and small) _____ and sediments that are placed by a glacier

c. _____ - forms when sand is blown by wind when lake water level is _____ . Example: (sleeping bear dunes)

d. _____ _____ - large _____ that were moved long distances by glaciers and are dropped off in a new location. They are completely different from the surrounding rock.

e. _____ (**End**) _____ - an accumulation of _____ at the _____ (tip) of a glacier

f. _____ _____ - gently rolling _____ that form when till is dropped in place as a glacier melts. Ithaca is on the Owosso moraine

g. _____ _____ - ridges of till along sides of a glacier [bulldozer with dirt _____ left to the sides]

h. _____ - snakelike _____ that form when meltwater carries small sediments and deposits them in a narrow path _____ the glacier- Example: mason esker [most has been used up for road construction]

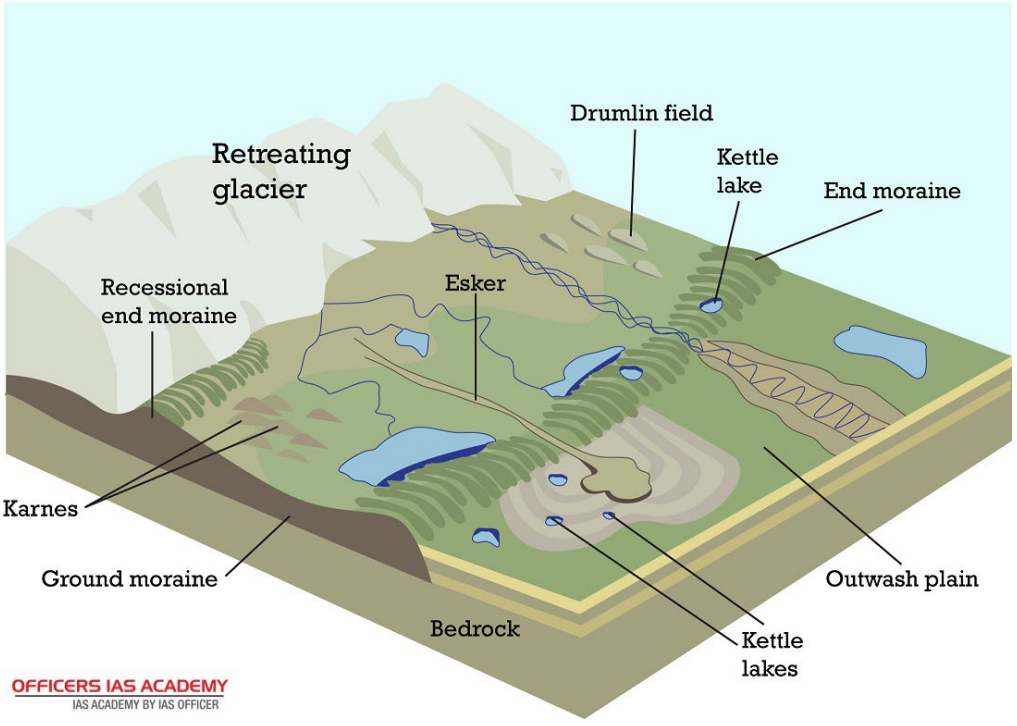
i. _____ – egg shaped small _____ . The tapered end of each hill points in the direction of glacier _____ .

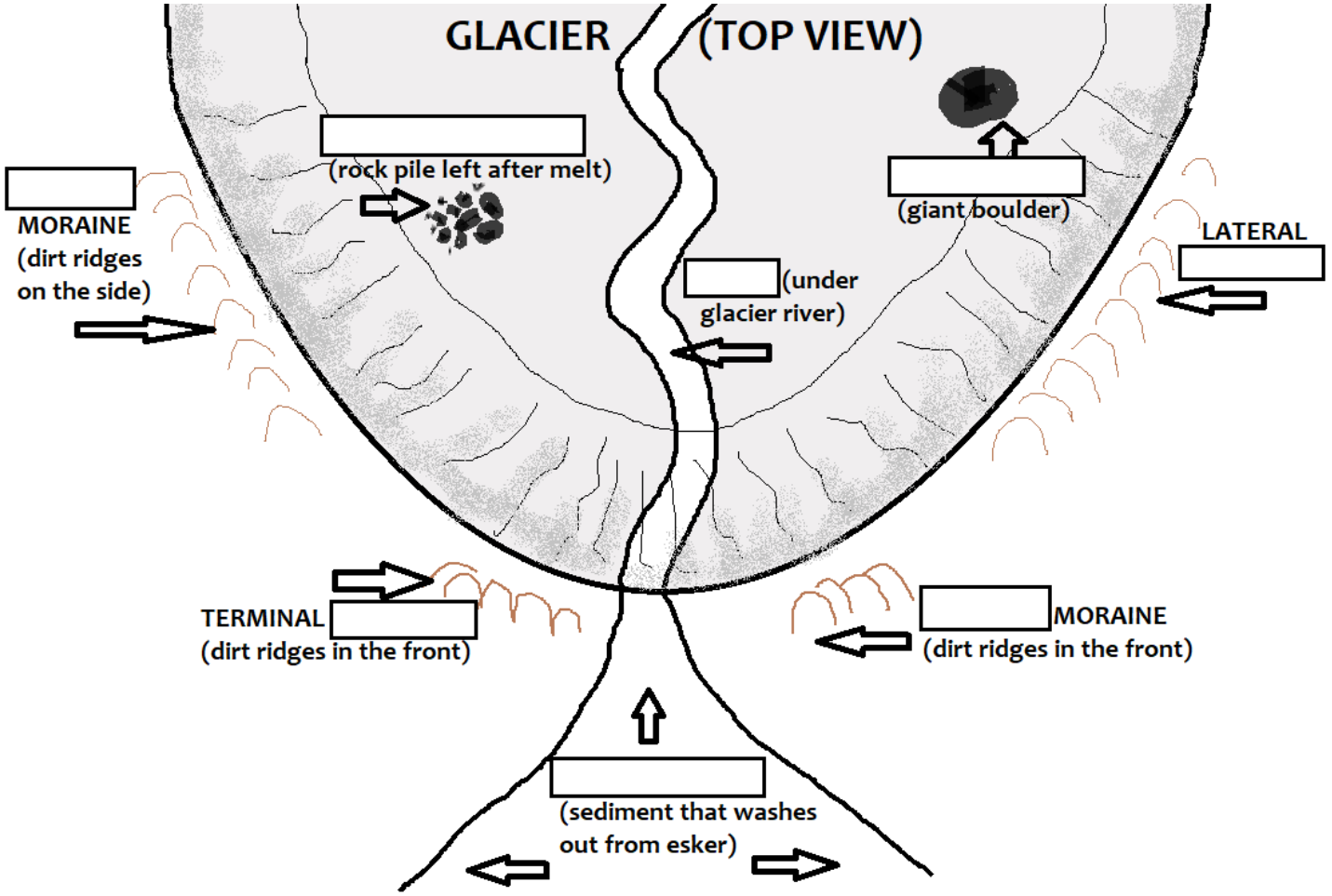
j. _____ _____ --meltwater carries small sediments (clay, sand, small gravel) and deposits it in a _____ - like pattern [bad agricultural land--too sandy]

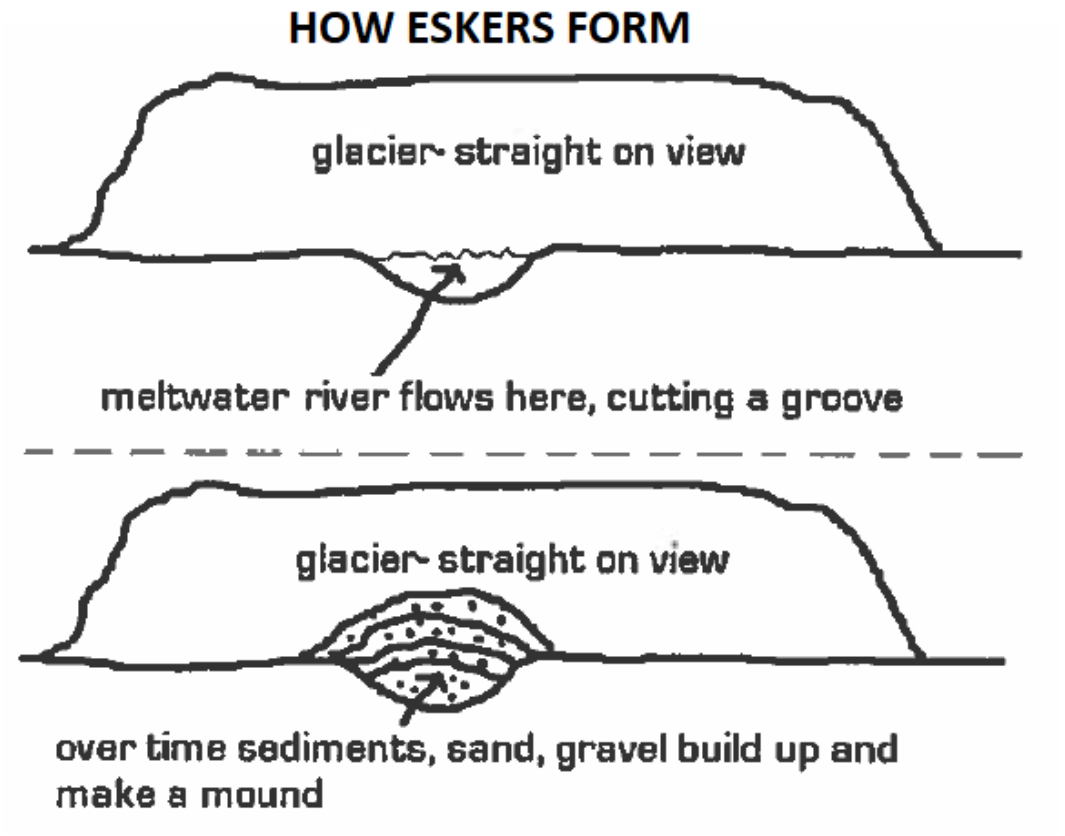
k. _____ _____ - flat, fertile land caused by sediments being layed down by _____ action Example: Saginaw river valley

l. _____ - formed when large blocks of ice break off, create a _____ due to their weight, then _____ and fill in the dent. Many of Michigan's lakes were formed this way.

m. _____ _____ - a section of rock that stands out _____ than the surrounding land. Form due to _____ by the flow of _____ past soft, sedimentary rock. examples: Mackinac island, Drummond Island, Castle Rock, Wisconsin Dells

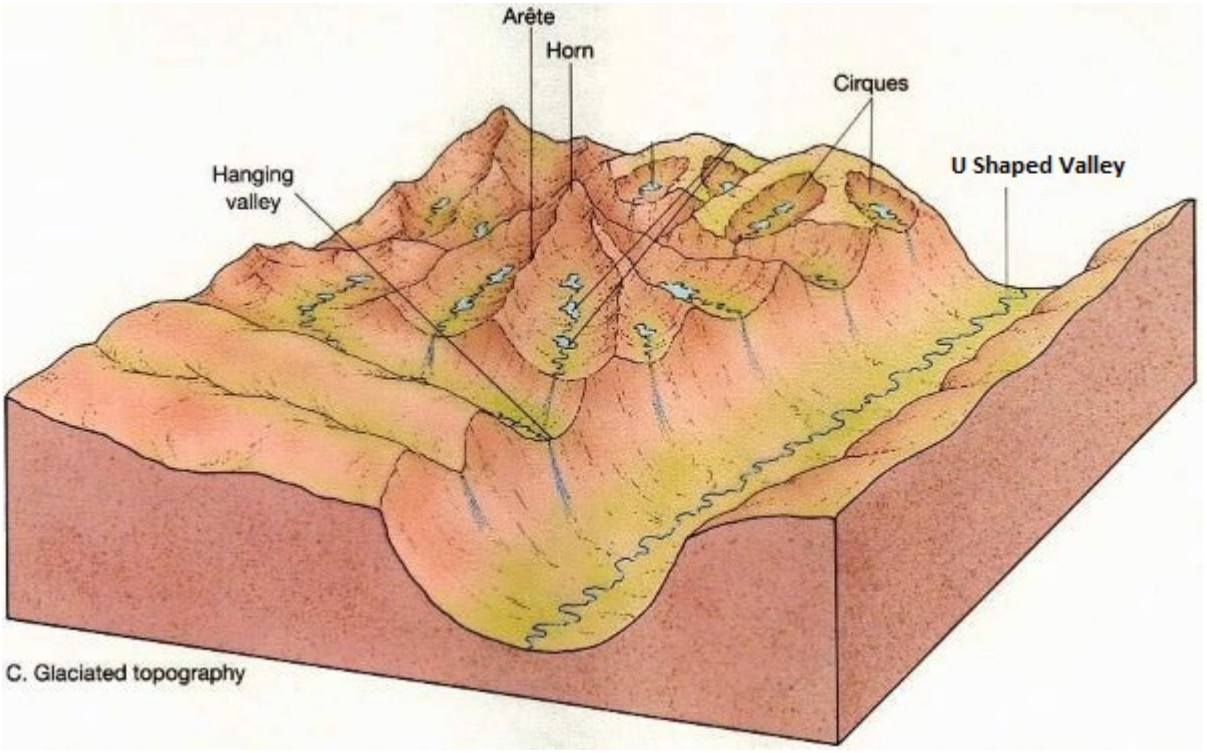



GLACIER (TOP VIEW)
(rock pile left after melt)
(giant boulder)
MORAINE
(dirt ridges
on the side)
LATERAL
(under
glacier river)
TERMINAL
(dirt ridges in the front)
MORAINE
(dirt ridges in the front)
(sediment that washes
out from esker)


HOW ESKERS FORM
glacier- straight on view
meltwater river flows here, cutting a groove
glacier- straight on view
over time sediments, sand, gravel build up and
make a mound

2. LANDFORMS MADE BY MOUNTAIN GLACIERS

a. _____ - carved out _____ shapes on _____
b. _____ - sharp _____ formed by back to back _____ glaciers
c. _____ _____ - u shaped valley carved by cirque glaciers that often have a steep _____ off, thus making great waterfalls
d. _____ - sharp mountain _____ formed by cirque glaciers on the sides of mountains
e. _____ _____ - shape created by valley glacier _____ and eroding the _____ between mountains
f. _____ _____ - long ridges that form along the _____ of a glacier (like the dirt on the sides of a bulldozer)



3. GLACIAL EROSION

a. _____ - water melts into cracks of rocks then _____ . It grips the rock, then the Ice moves forward breaking the rock up. The attached rock can now be used as a _____ tool.
b. _____ - _____ of rocks in the glacier on the rock of the Earth.
    i. Creates _____ _____ if rock is soft or
    ii. _____ (scratches) if rock is _____ . Striations show the direction the glacier moved.
c. _____ _____ is the opening of _____ (a crack) in rock due to _____ and thawing water. It is another method glaciers use to pulverize rock.

4. **VI. _____ _____ FORMATION**
    a. We were under _____ for 300 million years laying down _____ sedimentary rock
    b. After oceans left, water _____ (due to rainfall) and wind erosion carved ancient _____ _____ for 280 my (these became the "_____ the glaciers would follow as they grew into Michigan)
    c. 2 million years ago an ice age began and 1 million years ago _____ fell off the Canadian Shield and into the soft sedimentary rock, _____ the land 300 - _____ feet and following the ancient river basins. This carved the deep _____ of the great lakes.
    d. Glaciers began to _____ /recede 15,000 years ago leaving meltwater behind which _____ the basins.
    e. Many times lake levels rose and fell _____ and _____ material on shores and allowing wind to blow sand, forming _____ .