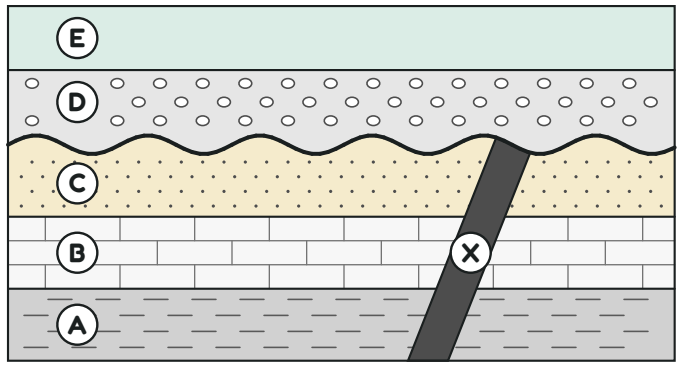
Geologic Time: Read the Rock Column

Grades 6-8

Name _____ Date _____

Directions: The drawing shows a model cliff. Layers A to E are sedimentary rock that settled as flat sheets and have not been turned over. Use the drawing for items 1 to 6 and the Ages box for items 7 and 8. Rule names you may need: superposition, cross-cutting relationships, original horizontality.



top of the cliff

X is a dike: magma that filled a crack, then hardened

wavy surface

Ages for items 7 and 8

Jurassic Period began: 201.4 Ma
Paleogene Period began: 66.00 Ma
Paleogene Period ended: 23.04 Ma
Ma = million years ago

Invented model cliff. Ages: International Commission on Stratigraphy, International Chronostratigraphic Chart v2024/12.

1. Which lettered layer settled first? _____ Name the rule that tells you. _____

2. The dike slices through layers A, B and C. Is the dike older or younger than layer C? _____ Name the rule. _____

3. Find the top of the dike. Did layer D settle before or after the dike hardened? Explain how the drawing shows it.

4. Six events built the lower part of this cliff. Number all six, from 1 (earliest) to 6 (latest).
____ magma squeezes in and hardens as X ____ layer D settles ____ layer A settles
____ erosion carves the wavy surface ____ layer C settles ____ layer B settles

5. Three kinds of fossil shell occur in this cliff. Kind P is in every layer from A to E. Kind Q is in layer B only, and has also been collected on four continents. Kind R is in layer D only and in no other place on Earth. Which kind best helps match a layer here with a layer in a distant cliff? _____ Why?

6. A drill is set up on the cliff top, well to the left of the dike, and bores straight down. List the layers in the order the drill bit reaches them. Is the bit moving into older or younger rock as it goes?

7. On a paper-strip timeline, one end is labeled "today" and every 10 million years takes up 1 centimeter of strip. Measured from the "today" end, where does the start of the Jurassic Period belong? Round to the nearest tenth. _____ cm

8. On the same strip, how long is the piece for the whole Paleogene Period? Find how many million years it lasted, then change that to centimeters (nearest tenth). _____ million years _____ cm

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Answer key

Items 1 and 2: two points each (answer and rule). Item 3: two points. Item 4: two points for all six in order, one point if a single pair is swapped. Items 5 and 6: two points each. Items 7 and 8: one point for each blank.

1. **A. Superposition.**
   In a stack that has not been overturned, each layer is younger than the one under it, so layer A at the bottom came first. Accept "law of superposition" or "principle of superposition".

2. **Younger. Cross-cutting relationships.**
   A rock has to exist before something can cut through it. Accept "cross-cutting" or "law of cross-cutting relationships".

3. **After. Magma would have cut into layer D too if D had been there. Instead the top of the dike was worn off along with the top of layer C, and layer D was laid down later on that worn surface.**
   Accept "after" with what the student sees: the dike stops at the wavy surface and does not cut D, or the wavy surface cuts off the top of the dike.

4. **Blanks in reading order: 4, 6, 1, 5, 3, 2.**
   In time order: 1 layer A settles; 2 layer B settles; 3 layer C settles; 4 magma squeezes in and hardens as X; 5 erosion carves the wavy surface; 6 layer D settles. Superposition orders the layers, the dike cuts A, B and C, and the erosion surface cuts the dike.

5. **Q. It lived for a short time (one layer) and it is widespread, so any rock holding it, here or far away, dates from that same short stretch of time.**
   P lasted too long to mark one time. R is short-lived but local, so a distant cliff will not contain it.

6. **E, D, C, B, A. Older rock: going down the stack is going back in time.**
   The reverse of the order in which the layers settled.

7. **20.1 cm**
   201.4 ÷ 10 = 20.14 cm, which rounds to 20.1 cm.

8. **42.96 million years; 4.3 cm**
   66.00 − 23.04 = 42.96 million years. 42.96 ÷ 10 = 4.296 cm, which rounds to 4.3 cm. Accept 43 or 43.0 million years with 4.3 cm.