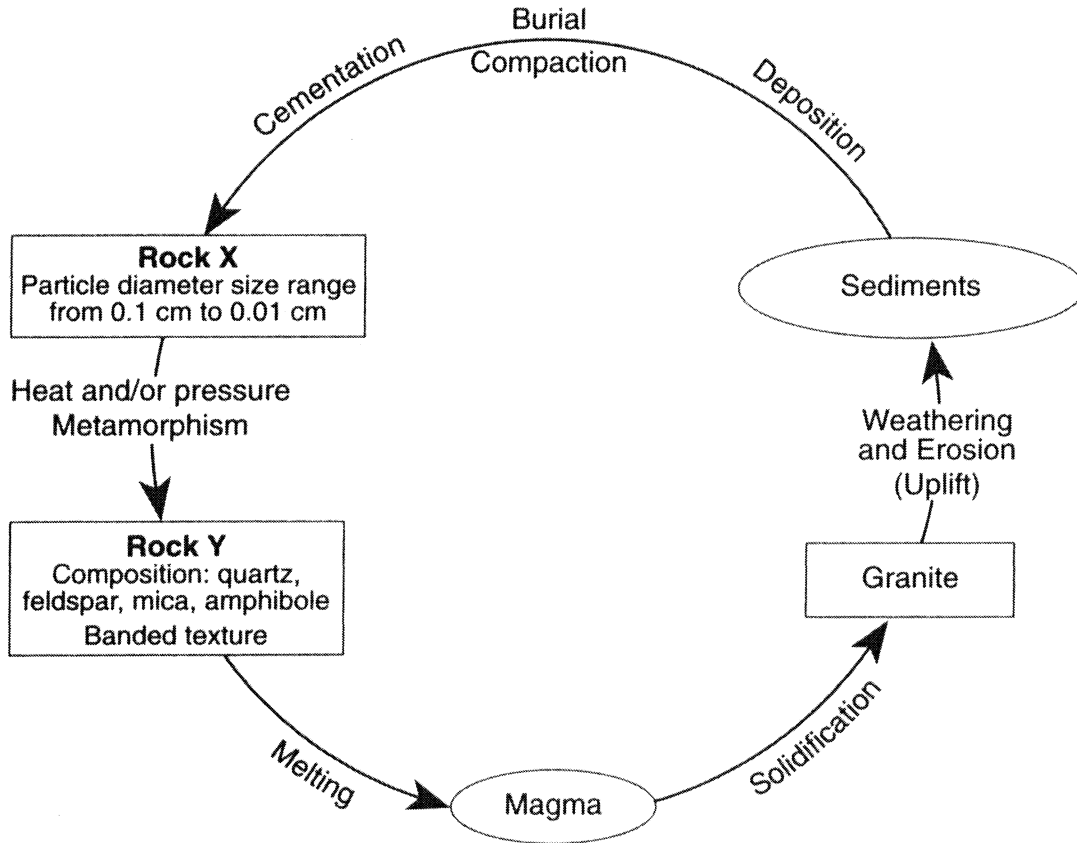


Base your answers to questions 1 through 3 on the diagram below, which represents a part of the cycle. The igneous rock, granite, and the characteristics of sedimentary rock X and metamorphic rock Y are shown.



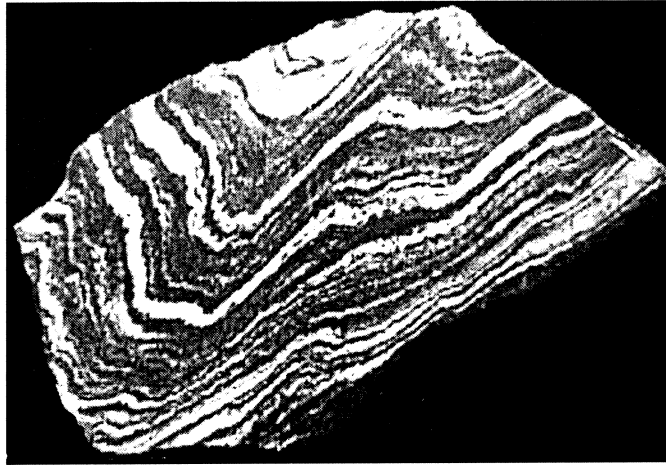
1. Identify sedimentary rock X.
2. Identify metamorphic rock Y.
3. Complete the table below, with descriptions of the observable characteristics used to identify granite.

| Characteristic of Granite | Description |
|---------------------------|-------------|
| Texture | |
| Color | |
| Density | |

over →

Short Answer

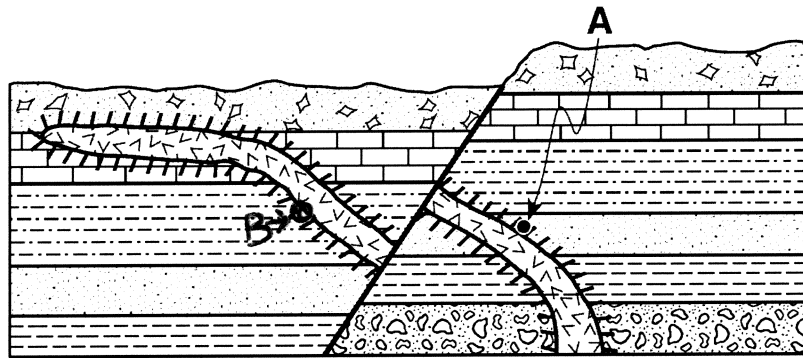
Base your answers to questions 4 through 6 on the photograph of a sample of gneiss below.



4. What observable characteristic could be used to identify this rock sample as gneiss?
 5. Identify *two* minerals found in gneiss that contain iron and magnesium.
 6. A dark-red mineral with a glassy luster was also observed in this gneiss sample. Identify the mineral and state *one* possible use for this mineral.
-

Short Answer

7. Base your answer to the following question on the geologic cross section below. The rock layers have not been overturned. Point *A* is located in the zone of contact metamorphism.



| Key | |
|--------------|----------------------|
| Siltstone | Shale |
| Limestone | Basalt intrusion |
| Sandstone | Breccia |
| Conglomerate | Contact metamorphism |

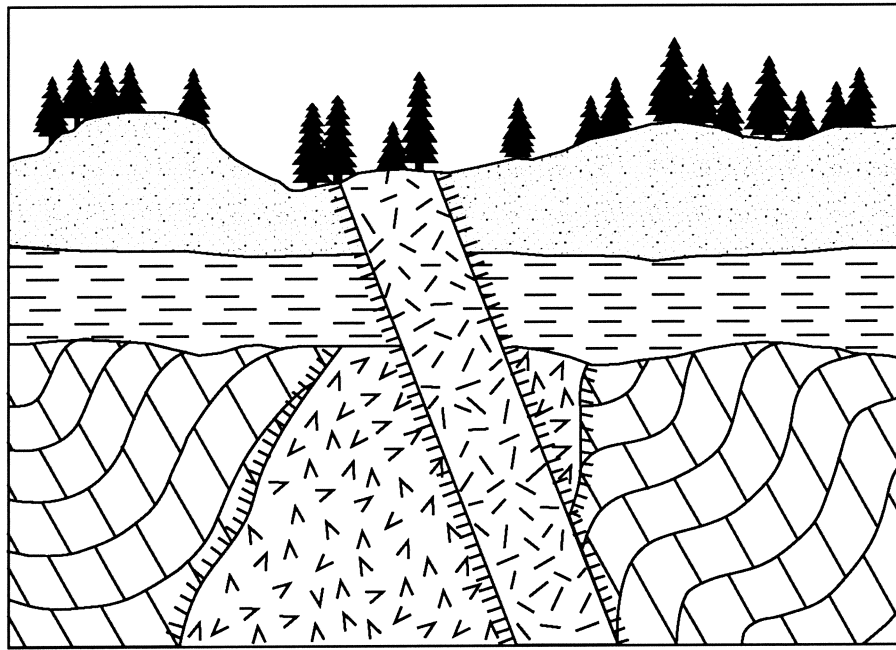
Which metamorphic rock most likely formed at point *A*?

At point B?







over →

Short Answer

Base your answers to questions 8 and 9 on the information and diagram below. The diagram represents a cliff of exposed bedrock that was investigated by an Earth science class.



Key to Rock Symbols

| | | | | | |
|--|-----------|--|------------------|---|----------------------|
|  | Sandstone |  | Folded limestone |  | Granite |
|  | Basalt |  | Shale |  | Contact metamorphism |

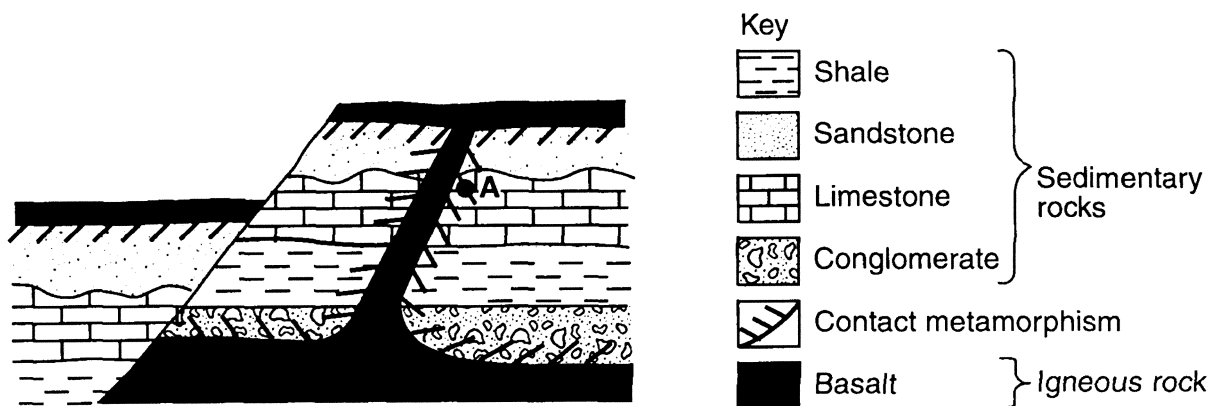
8. Students compared samples of the granite and basalt. State one observable characteristic other than crystal size that makes granite different from basalt.
9. After the students examined the cliff, they made three correct inferences about the geologic history of the bedrock.
- Inference 1: The shale layer is older than the basaltic intrusion.
- Inference 2: The shale layer is older than the sandstone layer.
- Inference 3: An unconformity exists directly under the shale layer.

Explain how *each* inference is supported by evidence shown in the diagram.

Short Answer

Base your answers to questions **10** through **12** on the diagram and information below.

The diagram shows a cross section of a portion of Earth's crust that has undergone geological processes. Overturning of rock layers has not occurred. Point *A* represents one location of metamorphic rock.



10. State the name of the rock, formed by contact metamorphism, located at *A*.
11. State the name of the inorganic sedimentary rock shown in the cross section that is composed of sediment with the greatest range in particle size.
12. As magma cools, what process changes it into basalt?