Scheme For Metamorphic Rock Identification

1 Which rock has never melted, but was produced by great heat and pressure, which distorted and rearranged its minerals?

(1) siltstone (3) pegmatite

(2) breccia (4) metaconglomerate

2 Which medium-grain-sized metamorphic rock is composed mostly of the same mineral as the sedimentary rock limestone?

(1) gneiss (3) quartzite

(2) marble (4) schist

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3 The data table below lists characteristics of rocks A, B, C, and D.

Rock Characteristics

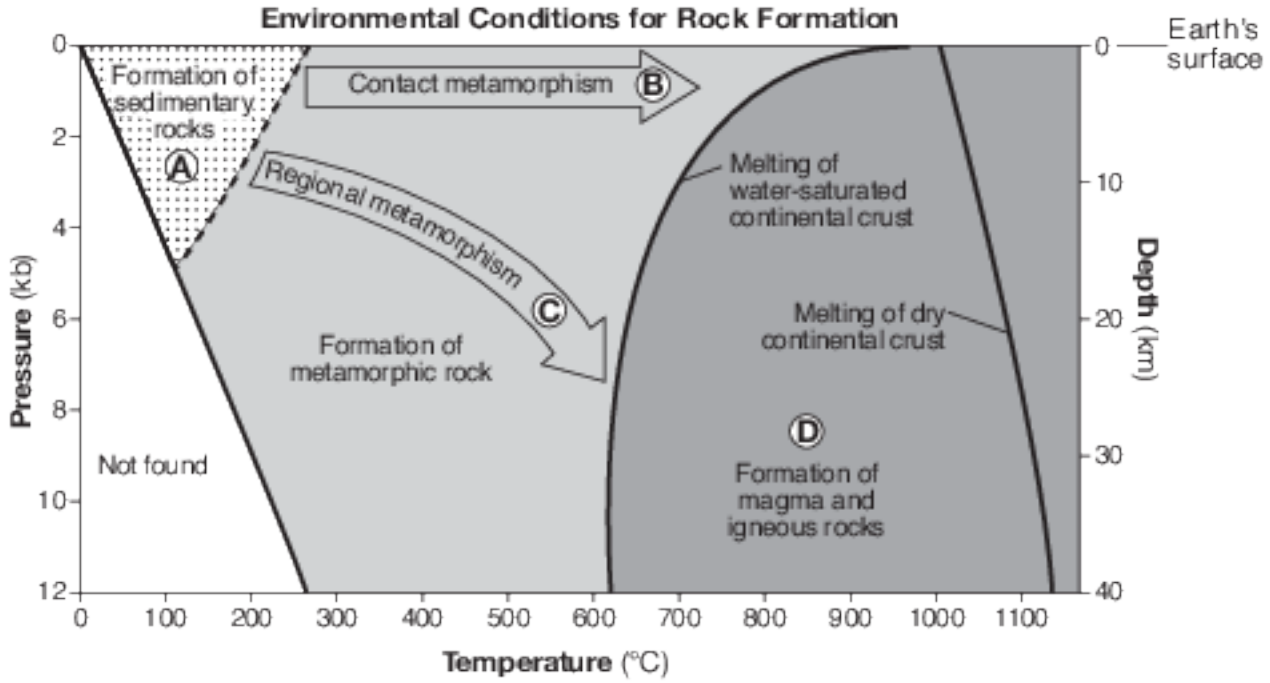
Rock	Texture	Grain Size	Mineral Composition
A	nonfoliated	fine to coarse	calcite, dolomite, carbon
B	banding	coarse	biotite, quartz, plagioclase feldspar
C	bioclastic	microscopic to coarse	carbon, pyroxene, mica
D	foliated	fine to medium	quartz, amphibole, garnet

Which rock is most likely phyllite?

(1) A (3) C

(2) B (4) D

Base your answers to questions 4 on the graph below and on your knowledge of Earth science. The graph shows the temperature, pressure, and depth environments for the formation of the three major rock types. Pressure is shown in kilobars (kb). Letters A through D identify different environmental conditions for rock formation.

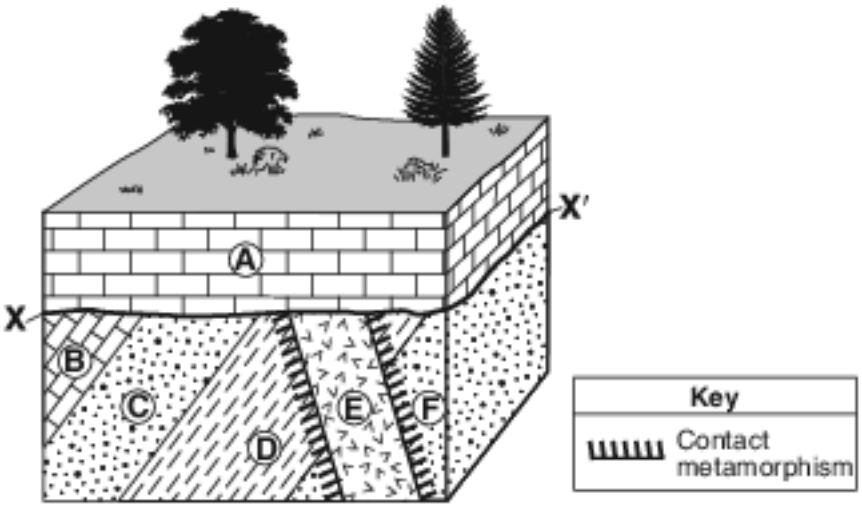


4 Which letter represents the environmental conditions necessary to form gneiss?

(1) A (3) C

(2) B (4) D

Base your answers to questions 5 on the block diagram below, which shows bedrock units A through F and boundary XX■.

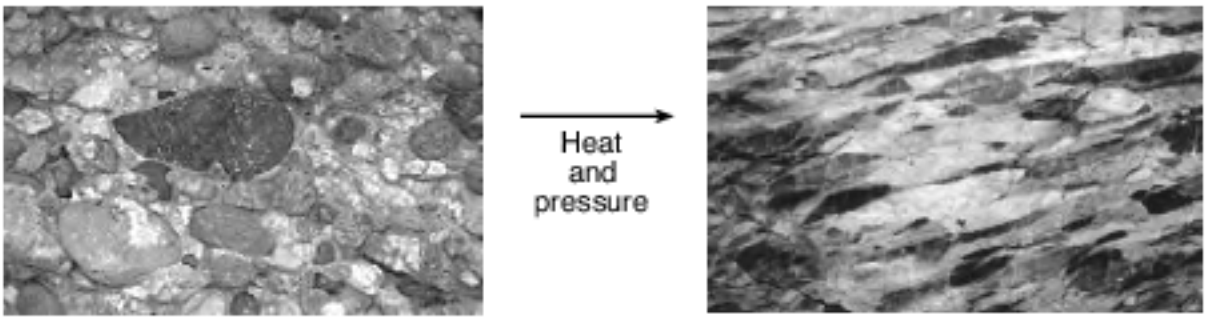


5 The rock that formed in the contact metamorphic zone between rock unit E and rock unit D is

(1) hornfels (3) schist

(2) marble (4) anthracite coal

6 The two photographs below and the arrow between them show conglomerate and the processes that changed the conglomerate to rock X.



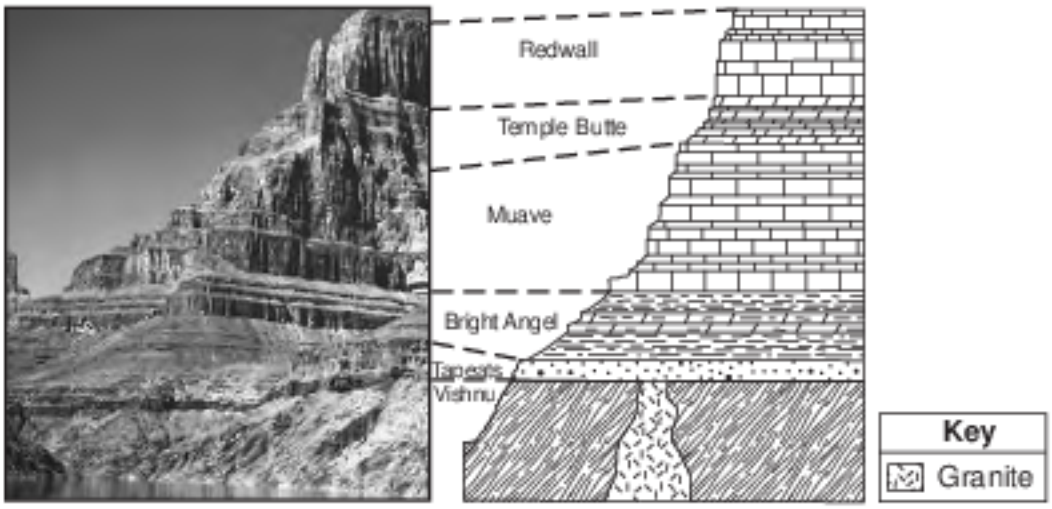
Conglomerate Rock X

Rock X is most likely

(1) breccia (3) metaconglomerate

(2) slate (4) vesicular basalt

Base your answers to questions 7 on the photograph and cross section below and on your knowledge of Earth science. The sequence of rock types found in the walls of the Grand Canyon are shown. The names of rock formations are shown and the upper and lower boundaries of each formation are indicated by dashed lines. The rock layers have not been overturned.



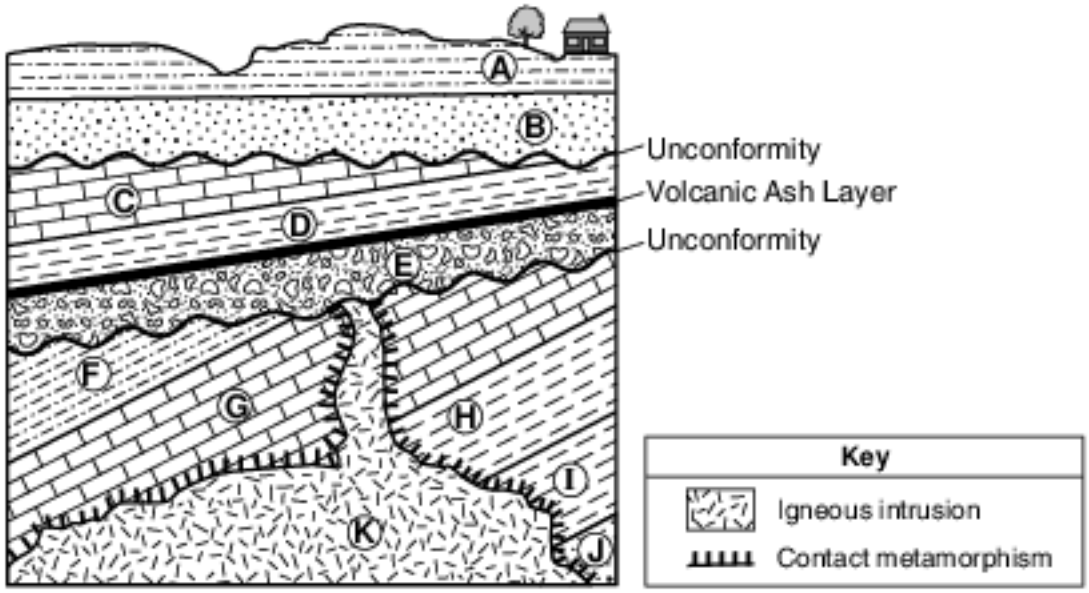
7 If the Vishnu schist had been exposed to greater heat and pressure during metamorphism, it could have formed

(1) gneiss
(2) marble
(3) quartzite
(4) phyllite

8 The surface bedrock in the Hudson Highlands consists mostly of

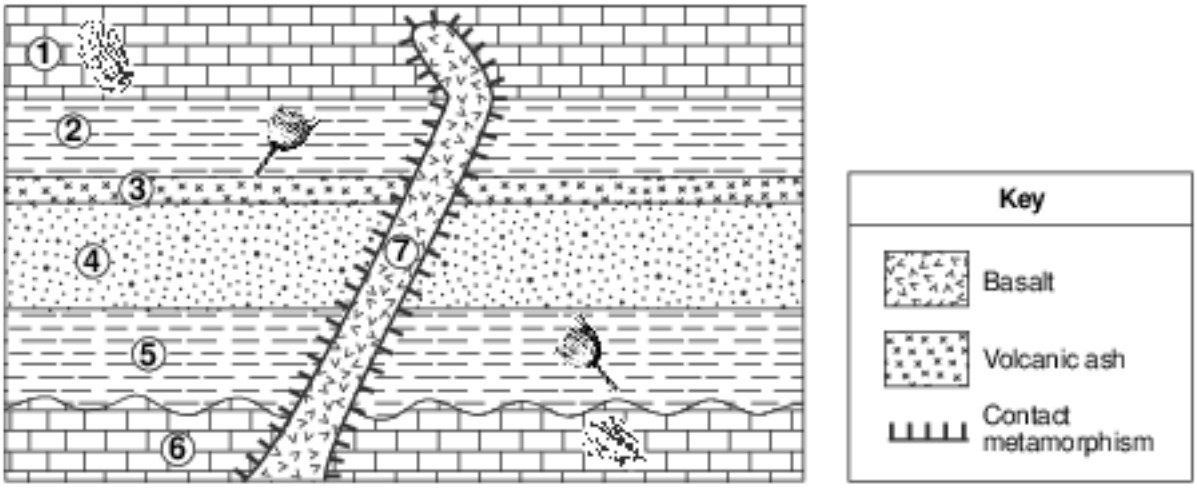
(1) diabase, dolostone, and granite
(2) slate, siltstone, and basalt
(3) gneiss, quartzite, and marble
(4) limestone, shale, sandstone, and conglomerate

Base your answers to questions 9 on the geologic cross section below and on your knowledge of Earth science. The cross section represents rock units, labeled A through K, that have not been overturned. Two unconformities and a volcanic ash layer are indicated.



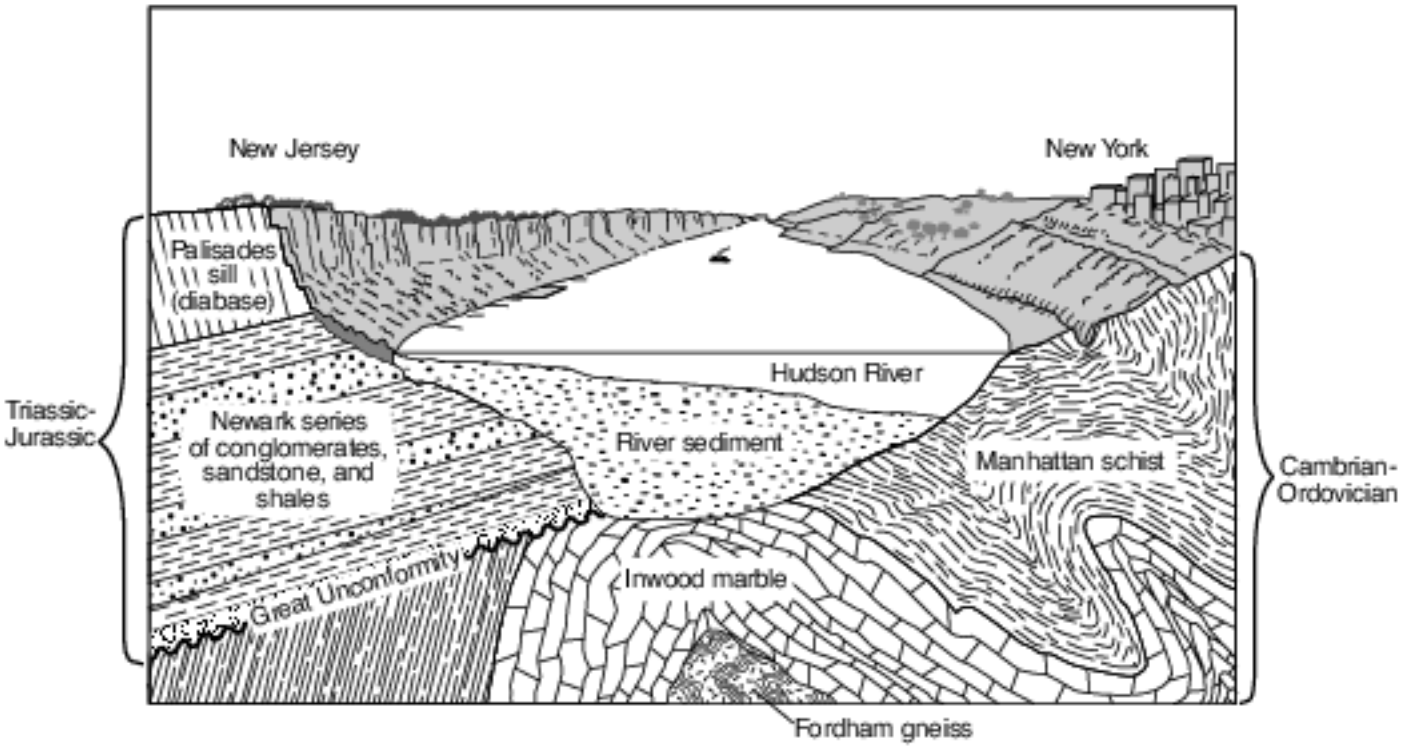
9 Identify one metamorphic rock that most likely formed within rock unit G at the boundary of rock unit K. [1]

Base your answers to questions 10 on the geologic cross section below, which shows rock units 1 through 7 that have not been overturned. Some of the rock units contain New York State index fossils. An unconformity exists between rock units 5 and 6.



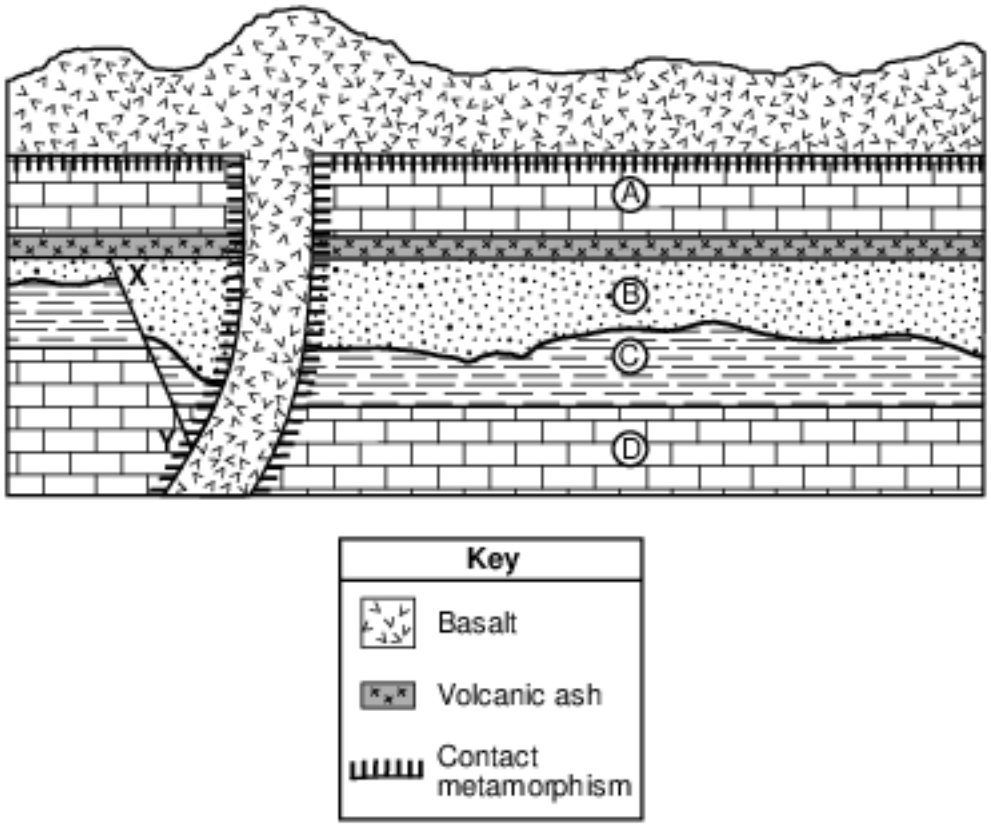
10 Identify one metamorphic rock that could have been formed by the contact metamorphism within rock unit 1. [1]

Base your answers to questions 11 on the cross section below showing the underlying bedrock of New York and New Jersey along the Hudson River.



11 Identify the oldest bedrock shown in the diagram. [1]

Base your answers to questions 12 on the geologic cross section below and on your knowledge of Earth science. The cross section represents sedimentary rock units labeled A through D, a layer of volcanic ash deposits, and a basalt extrusion. An unconformity is present between rock units B and C. Line XY represents a fault. The rock layers have not been overturned.

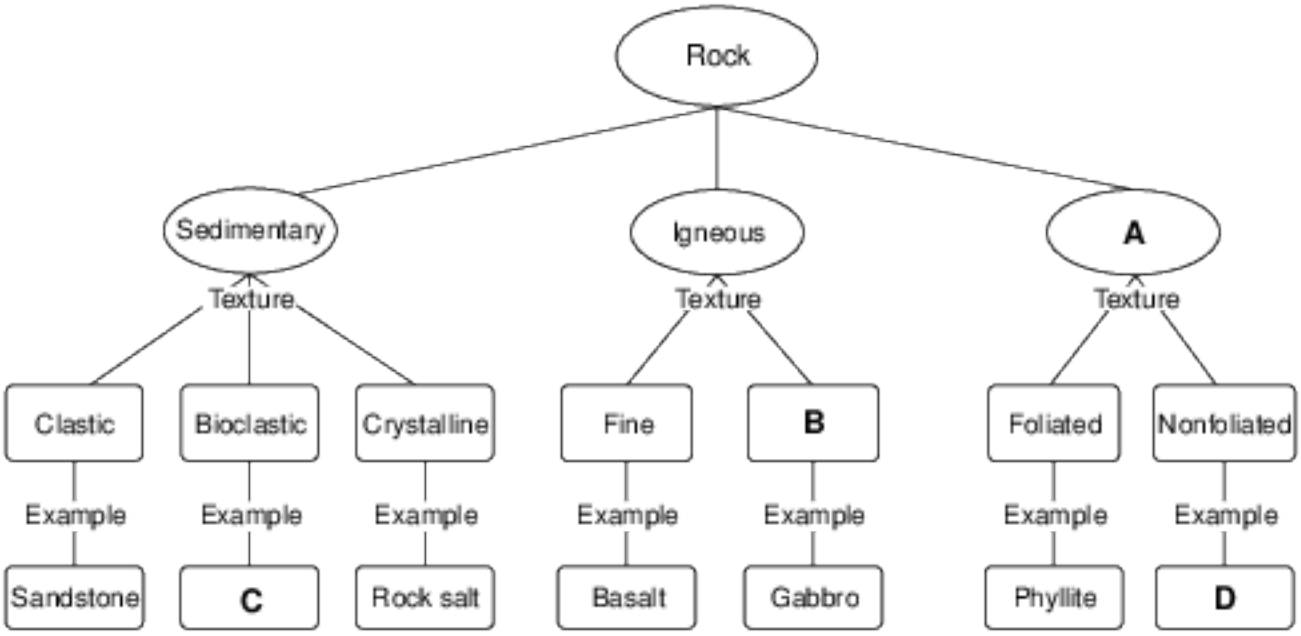


12 State the name of one metamorphic rock that most likely formed in the zone of contact metamorphism between rock unit A and the basalt. [1]

Base your answers to questions 13 on the cross section of part of Earth's crust in image provided and on your knowledge of Earth science. On the cross section, some rock units are labeled with letters A through I. The rock units have not been overturned. Line XY represents a fault. Line UV represents an unconformity.

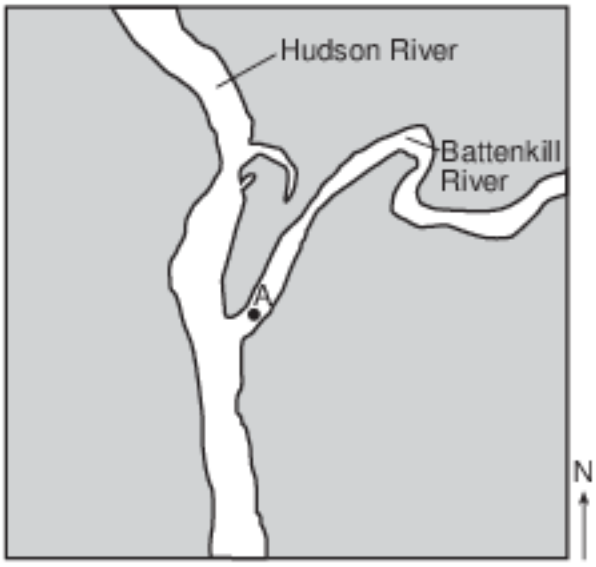
13 Identify the contact metamorphic rock that formed between rock units B and C. [1]

Base your answers to questions 14 on the flowchart below and on your knowledge of Earth science. Letters A through D represent information that is missing in the chart.



14 Identify the name of one foliated rock formed when phyllite undergoes increased heat and pressure. [1]

Base your answers to questions 15 on the map and table below and on your knowledge of Earth science. The map shows the area where the Battenkill River flows into the Hudson River north of Albany, New York. Point A indicates a location within the Battenkill River. The table shows the densities of four common minerals found in Hudson River sediments.



Mineral Density

Mineral Name	Density (g/cm^3)
amphibole	3.3
feldspar	2.6
garnet	4.2
quartz	2.7

15 Some of the sediments transported by the Hudson River came from metamorphic rock. Identify one foliated metamorphic rock that contains all four minerals listed in the mineral density table. [1]

Answer Keys

1 4

2 2

3 4

4 3

5 1

6 3

7 1

8 3

9 Allow 1 credit for marble or hornfels.

10 Allow 1 credit for marble or hornfels.

11 Allow 1 credit for Fordham gneiss or gneiss.

12 Allow 1 credit for marble or hornfels.

13 Allow 1 credit for marble or hornfels.

14 Allow 1 credit for schist or gneiss.

15 Allow 1 credit. Acceptable responses include, but are not limited to:

- — gneiss
- — schist
- — phyllite