1. Base your answer to the following question on the photographs and news article below.

**Old Man’s Loss Felt in New Hampshire**

FRANCONIA, N.H. — Crowds of visitors were drawn to Franconia Notch on Sunday to mourn the loss of New Hampshire’s well-known symbol — the Old Man of the Mountain granite profile. The 700-ton natural formation was just a pile of rocks after breaking loose from its 1,200-foot-high mountainside perch. It was unclear when the outcropping fell because clouds had obscured the area Thursday and Friday; a state park trail crew discovered the collapse Saturday morning. The famous mountain’s history dates millions of years. Over time, nature carved out a 40-foot-tall profile resembling an old man’s face, and it eventually became New Hampshire’s most recognizable symbol.

The Buffalo News, May 5, 2003

The rock of the Old Man of the Mountain most likely includes a mineral with a composition of

A) NaCl    B) SiO₂    C) FeS₂    D) PbS

2. Which mineral is the major component of drywall?

A) talc    B) calcite
C) muscovite mica
D) selenite gypsum

3. Base your answer to the following question on The three statements below are observations of the same rock sample:

- The rock has intergrown crystals from 2 to 3 millimeters in diameter.
- The minerals in the rock are gray feldspar, green olivine, green pyroxene, and black amphibole.
- There are no visible gas pockets in the rock.

This rock sample is most likely

A) sandstone    B) gabbro    C) granite    D) phyllite

4. Igneous, sedimentary, and metamorphic rocks are usually composed of

A) intergrown crystals    B) fossils
C) minerals    D) sediments
5. Which mineral has a metallic luster, a black streak, and is an ore of iron?

A) galena      B) **magnetite**      C) pyroxene      D) graphite

6. The internal atomic structure of a mineral most likely determines the mineral's

A) color, streak, and age  
B) origin, exposure, and fracture
C) size, location, and luster  
**D) hardness, cleavage, and crystal shape**

7. In which set are the rock drawings labeled with their correct rock types?

A) ![Igneous, Sedimentary, Metamorphic](image1)  
B) ![Igneous, Sedimentary, Metamorphic](image2)
C) ![Igneous, Sedimentary, Metamorphic](image3)  
D) ![Igneous, Sedimentary, Metamorphic](image4)

8. Which type of rock most likely contains fossils?

A) scoria  
B) gabbro  
C) schist  
**D) shale**

Base your answers to questions 9 and 10 on the drawings of six sedimentary rocks labeled **A** through **F**.

9. Which table shows the rocks correctly classified by texture?

A) | Texture | clastic | bioclastic | crystalline |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Rock</td>
<td>A, B, C, D</td>
<td>E</td>
<td>F</td>
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B) | Texture | clastic | bioclastic | crystalline |
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C) | Texture | clastic | bioclastic | crystalline |
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<td>Rock</td>
<td>A, C</td>
<td>B, E</td>
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</table>

D) | Texture | clastic | bioclastic | crystalline |
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<tbody>
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<td>Rock</td>
<td>A, B, F</td>
<td>E</td>
<td>C, D</td>
</tr>
</tbody>
</table>
10. Which two rocks are composed primarily of quartz, feldspar, and clay minerals?

A) rock salt and conglomerate  
B) rock salt and breccia  
**C) sandstone and shale**  
D) sandstone and limestone

11. Base your answer to the following question on the map and cross section below. The shaded areas on the map represent regions of the United States that have evaporite rock layers (layers of rock formed from the evaporation of seawater) under the surface bedrock. The cross section shows the generalized structure of the area in which the evaporite layers are found in New York State.

These evaporite deposits could be composed of which minerals?

A) garnet and pyroxene  
B) mica and feldspar  
C) hornblende and olivine  
D) **halite and gypsum**

12. Which two rocks are primarily composed of a mineral that bubbles with acid?

A) limestone and marble  
B) granite and dolostone  
C) sandstone and quartzite  
D) slate and conglomerate

13. Which mineral is white or colorless, has a hardness of 2.5, and splits with cubic cleavage?

A) calcite  
B) **halite**  
C) pyrite  
D) mica

14. Which property is most useful in mineral identification?

A) hardness  
B) color  
C) size  
D) texture
15. Base your answer to the following question on the diagram below, which shows the results of three different physical tests, A, B, and C, that were performed on a mineral.

![Test A Diagram](image1)

Test A
Struck with a hammer

![Test B Diagram](image2)

Test B
Rubbed on an unglazed porcelain plate

![Test C Diagram](image3)

Test C
Rubbed on a glass square

The luster of this mineral could be determined by

A) using an electronic balance

B) using a graduated cylinder

C) observing how light reflects from the surface of the mineral

D) observing what happens when acid is placed on the mineral

16. Base your answer to the following question on A student created the table below by classify six minerals into two groups, A and B, based on a single property.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>olivine</td>
<td>pyrite</td>
</tr>
<tr>
<td>garnet</td>
<td>galena</td>
</tr>
<tr>
<td>calcite</td>
<td>graphite</td>
</tr>
</tbody>
</table>

Which property was used to classify these minerals?

A) color

B) luster

C) chemical composition

D) hardness

17. Which rock type is most likely to be monomineralic?

A) rock salt

B) rhyolite

C) basalt

D) conglomerate
18. A mineral’s crystal shape and cleavage are a direct result of the mineral’s

A) hardness
B) abundance in nature
C) **arrangement of atoms**
D) exposure to the hydrosphere and atmosphere

19. The diagram below shows the results of one test for mineral identification.

![Diagrams of mineral identification](image)

Which mineral property is being tested?

A) density  B) fracture  C) **streak**  D) luster

20. Base your answer to the following question on The diagram below shows a broken crystal of the mineral halite

![Diagram of halite crystal](image)

The shape of the halite crystal is a direct result of the

A) **internal arrangement of the atoms in the crystal**
B) temperature at which the crystal formed
C) type of surface on which the crystal formed
D) stream erosion that changed the crystal

21. Which object is the best model of the shape of a silicon-oxygen structural unit?

A) ![Image A]  B) ![Image B]  C) ![Image C]  D) ![Image D]
22. Which process led to the formation of thick salt deposits found in the bedrock at some locations in New York State?

A) melting  B) runoff  C) condensation  D) evaporation

23. Which type of rock is most likely to contain fossils?

A) granite  B) gneiss  
C) shale  D) metaconglomerate

24. Which process is necessary for the formation of igneous rocks?

A) erosion  B) deposition  
C) solidification  D) metamorphism

25. The profile below shows the average diameter of sediment that was sorted and deposited in specific areas A, B, C, and D by a stream entering an ocean.

As compaction and cementation of these sediments eventually occur, which area will become siltstone?

A) A  B) B  C) C  D) D
26. Base your answer to the following question on the diagram below, which represents a cross section of rock layers that have not been overturned.

Within which rock type would a fossil most likely be found?

A) andesite  B) pegmatite  C) pumice  D) scoria

27. Which igneous rock has a vesicular texture and contains the minerals potassium feldspar and quartz?

A) andesite  B) pegmatite  C) pumice  D) scoria

28. Which property best describes a rock which has formed from sediments?

A) crystalline structure  B) distorted structure
C) banding or zoning of minerals  D) fragmental particles arranged in layers

29. The diagram below shows actual sizes and shapes of particles removed from a clastic sedimentary rock.

The sediments are from

A) chemical limestone  B) conglomerate
C) granite  D) sandstone
30. Base your answer to the following question on the diagram below.

Which two processes formed this rock?

A) folding and faulting  B) melting and solidification
C) compaction and cementation  D) heating and application of pressure

31. Which process most likely formed a layer of the sedimentary rock, gypsum?

A) precipitation from seawater  B) solidification of magma
C) folding of clay-sized particles  D) melting of sand-sized particles

32. Large rock salt deposits in the Syracuse area indicate that the area once had

A) large forests  B) a range of volcanic mountains
C) many terrestrial animals  D) a warm, shallow sea

33. Which intrusive igneous rock could be composed of approximately 60% pyroxene, 25% plagioclase feldspar, 10% olivine, and 5% amphibole?

A) granite  B) rhyolite  C) gabbro  D) basalt

34. Compared to felsic igneous rocks, mafic igneous rocks contain greater amounts of

A) white quartz  B) aluminum  C) pink feldspar  D) iron

35. Which is the best description of the properties of basalt?

A) fine-grained and mafic  B) fine-grained and felsic
C) coarse-grained and mafic  D) coarse-grained and felsic

36. Which property is common to most dark-colored igneous rocks?

A) high density  B) intrusive formation
C) abundant felsic minerals  D) coarse-grained texture
37. Which sedimentary rock is most likely to be changed to slate during regional metamorphism?

A) breccia  B) conglomerate  C) dolostone  D) shale

38. The diagrams below represent four rock samples. Which rock was formed by rapid cooling in a volcanic lava flow? [The diagrams are not to scale.]

A)  
B)  
C)  
D)  

39. Base your answer to the following question on the diagrams below of five rock samples.

A) sandstone  B) conglomerate  C) basalt  D) granite

40. Base your answer to the following question on The rock shown below has a foliated texture and contains the minerals amphibole, quartz, and feldspar arranged in coarse-grained bands.

Which rock is shown?

A) slate  B) dunite  C) gneiss  D) quartzite

41. The recrystallization of unmelted material under high temperature and pressure results in

A) metamorphic rock  B) sedimentary rock
C) igneous rock  D) volcanic rock
42. The diagram below shows some features in a cave.

Which type of rock was chemically weathered by acidic groundwater to produce the cave and its features?

A) siltstone  
B) basalt  
C) quartzite  
D) limestone

43. Base your answer to the following question on The sequence of diagrams below represents the gradual geologic changes in layer $X$, located just below Earth’s surface.

Which type of sedimentary rock was formed at layer $X$?

A) conglomerate  
B) shale  
C) rock salt  
D) coal
44. Which rock forms by the recrystallization of unmelted rock material under conditions of high temperature and pressure?

A) granite  B) gneiss  C) rock gypsum  D) bituminous coal

45. Which characteristic of rocks tends to increase as the rocks are metamorphosed?

A) density  B) porosity

C) permeability  D) number of fossils present

46. Base your answer to the following question on The graph below shows the relationship between the cooling time of magma and the size of the crystals produced.

Which graph correctly shows the relative positions of the igneous rocks granite, rhyolite, and pumice?

A)  B)  C)  D)
At which location is metamorphic rock most likely to be found?

A) A  B) B  C) C  D) D
48. Base your answer to the following question on the diagrams below which represents the same rock material at five stages of development. The graph below shows the temperature and depth of burial at which stages A through D develop Stage E has intentionally been omitted from the graph.

In the simple rock-cycle diagram, which processes along path $X$ would change the schist (stage $C$) directly into a pile of sediments (stage $A$)?

A) uplift, weathering, and erosion of the schist

B) cementing of sediment grains followed by compaction

C) melting of the schist followed by cooling

D) heat and/or pressure applied to the schist
49. Base your answer to the following question on the block diagram below, which shows rock units that have not been overturned. Point \( A \) is located in the zone of contact metamorphism. A New York State index fossil is shown in one of the rock units.

Identify the crystal size of the minerals in rhyolite and explain what this size indicates about the rate of cooling of the magma from which it formed.

Crystal size: ________________________________

Explanation: ________________________________
50. Base your answer to the following question on the graph below, which shows a generalized sequence of rock types that form from original clay deposits at certain depths and temperature conditions within Earth’s interior.

Explain why gneiss would *not* form at a depth of 27 kilometers and at a temperature of 800°C.
1. B
2. D
3. B
4. C
5. B
6. D
7. D
8. D
9. A
10. C
11. D
12. A
13. B
14. A
15. C
16. B
17. A
18. C
19. C
20. A
21. B
22. D
23. C
24. C
25. C
26. D
27. C
28. D
29. B
30. C
31. A
32. D
33. C
34. D
35. A
36. A
37. D
38. C
39. D
40. C
41. A
42. D
43. D
44. B
45. A
46. A
47. B
48. A
49. Crystal size: — fine grained — less than 1-mm crystal size
Explanation: — The magma cooled rapidly. — It cooled over a short period of time.
50. – Rocks at a depth of 27 km and at a temperature of 800°C will be melted. – The temperature should be approximately 600°C in order for gneiss to form. – Melted rocks will form igneous rocks.