1.	Mineral deposit that forms as rough spheres on the ocean floor are called:
a)	secondary enrichment
b)	sulfide deposit
c)	biohydrometallurgy
d)	mineral reserve
e)	manganese oxide nodules
	Ans: e Difficulty: Easy Link to: 26.2

2.	The class of mineral that can be formed by circulation of hot, metal-rich water at divergent plate boundaries:
a)	secondary enrichment
b)	sulfide deposit
c)	biohydrometallurgy
d)	mineral reserve
e)	manganese oxide nodules
	Ans: b Difficulty: Easy Link to: 26.2

3.	Artificial enrichment of mineral ores by injection of microscopic organisms into the rock is called:
a)	secondary enrichment
b)	sulfide deposit
c)	biohydrometallurgy
d)	mineral reserve
e)	manganese oxide nodules
	Ans: c Difficulty: Medium Link to: Critical Thinking Issue

4.	The top 1 km of the Earth's crust contains an estimated 2×10^{12} metric tons of silver, equal to hundreds of millions times the average consumption of the metal. The main reason that silver remains a valuable and relatively scarce material is its low:
a)	concentration
b)	market price

c)	abundance
d)	depth
e)	density

Ans: a
Difficulty: Medium
Link to: 26.2

5.	All of the following are geologic processes that form mineral deposits listed in the Environmental Science textbook except:
a)	biological processes
b)	igneous processes
c)	sedimentary processes
d)	radiational processes
e)	weathering processes

Ans: d
Difficulty: Medium
Link to: 26.2

6.	An ore deposit formed by weathering processes:
a)	bauxite
b)	an evaporite
c)	a placer deposit
d)	phosphate
e)	none of these

Ans: a
Difficulty: Easy
Link to: 26.2

7.	Minerals may be concentrated by crystallization within a magma chamber. What force concentrates the crystallized minerals?
a)	heat
b)	pressure
c)	gravity
d)	fission
e)	temperature

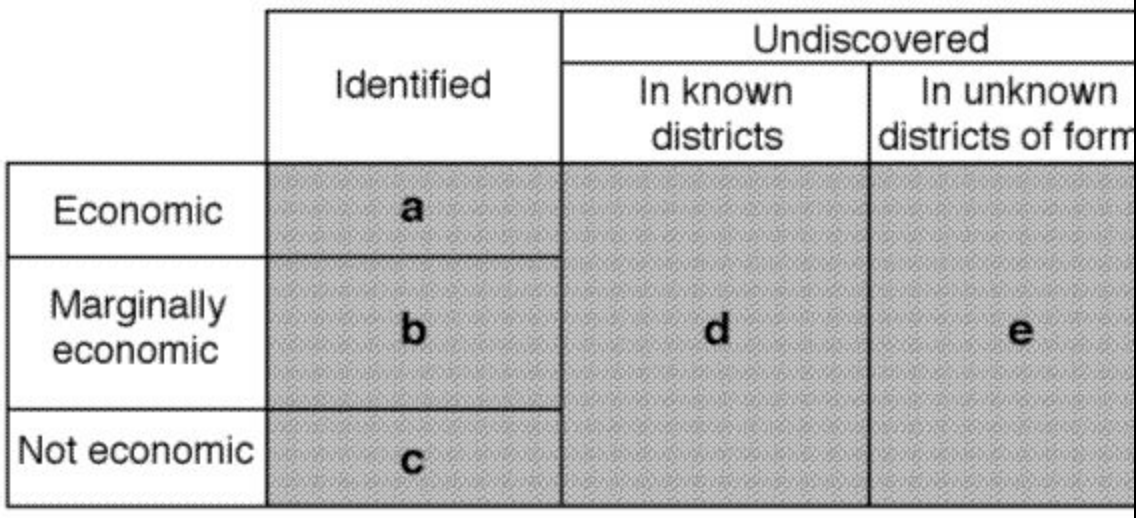
Ans: c
Difficulty: Medium
Link to: 26.2

8.	The example of Butchart Gardens, on Victoria Island in Canada (Case Study in Chap. 27 of the Environmental Science textbook), illustrates the principle of:
a)	efficient recycling
b)	resource depletion
c)	drip irrigation
d)	carrying capacity
e)	mine reclamation
	Ans: e Difficulty: Easy Link to: Case Study

9.	Mineral resources are:
a)	infinite
b)	nonrenewable
c)	chemical byproducts
d)	alternative energy sources
e)	rare and high-cost materials
	Ans: b Difficulty: Easy Link to: 26.3

10.	Which of the following effects does recycling have on the environmental impacts of mineral development?
a)	forces more landfills to open
b)	drives the prices of raw materials up
c)	increases the quantities of raw materials mined from the Earth
d)	forces producers to explore for new mineral reserves
e)	decreases the quantity of waste
	Ans: e Difficulty: Medium Link to: 26.6

11.

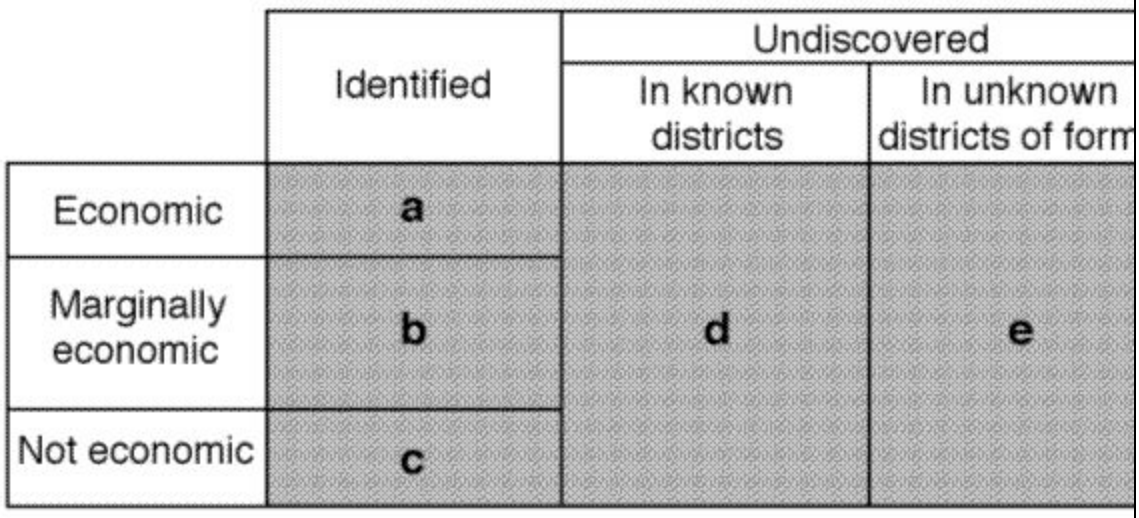


Which of the blocks in the figure above (a, b, c, d, or e) refers to mineral reserves which are being profitably mined or utilized right now?

a)	a
b)	b
c)	c
d)	d
e)	e

Ans: a
Difficulty: Medium
Link to: 26.3

12.

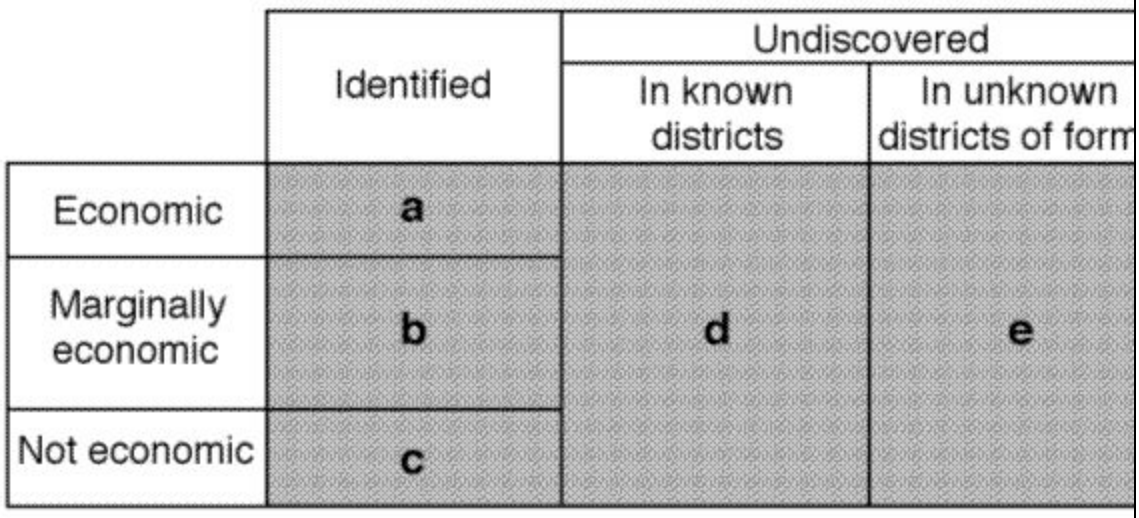


A low-grade copper deposit has been located but, at the present market price of copper, it would cost much more to mine it than the mineral is worth. Into which of the blocks in the figure above (a, b, c, d, or e) would you place that copper deposit?

a)	a
b)	b
c)	c
d)	d
e)	e

Ans: c
Difficulty: Medium
Link to: 26.3

13.

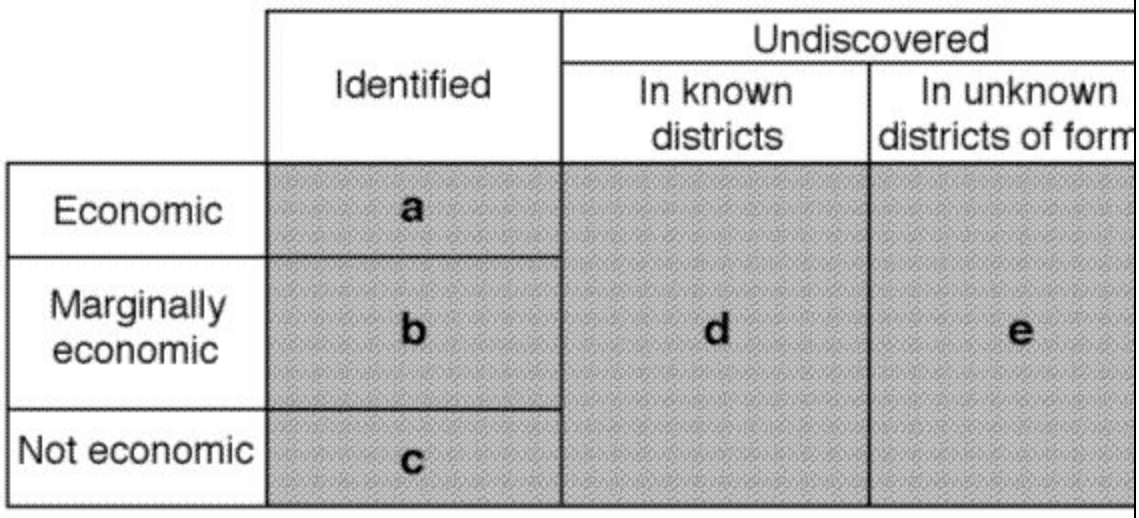


It is highly likely that large petroleum deposits are located beneath the ice sheets of the Antarctic. However, for technical, political, and environmental reasons, those oil resources are being neither exploited nor explored. Into which of the blocks in the figure above (a, b, c, d, or e) would that oil fit?

a)	a
b)	b
c)	c
d)	d
e)	e

Ans: e
Difficulty: Medium
Link to: 26.3

14.



Into which of the blocks in the figure above (a, b, c, d, or e) would oil shale and tar sand deposits currently be placed?

a)	a
b)	b
c)	c
d)	d
e)	e

Ans: c
Difficulty: Medium
Link to: 26.3

15. On average, each person in the United States uses _____ of new mineral materials each year (excluding energy resources).

a)	20 lbs (0.01 tons)
b)	200 lbs (0.1 tons)
c)	2000 lbs (1.0 tons)
d)	20,000 lbs (10 tons)
e)	200,000 lbs (100 tons)

Ans: d
Difficulty: Medium
Link to: 26.4

16. Which of the following are examples of common evaporite minerals?

a)	copper, lead and zinc
b)	gas and oil
c)	calcium, sodium, potassium
d)	uranium and lead

e)	magnesium and sulfides
	Ans: c Difficulty: Medium Link to: 26.2

17.	Biohydrometallurgy refers to techniques for extracting minerals from rock by:
a)	using a forceful jet of water
b)	filtering ocean water
c)	reprocessing animal waste
d)	injecting chemical wastes into deep, fractured rock formations
e)	using microscopic organisms
	Ans: e Difficulty: Medium Link to: Critical Thinking Issue

18.	Placer deposits are:
a)	economic concentrations of sand and gravel
b)	gold-rich veins
c)	ore-grade metal deposits
d)	metals concentrated by flow and turbulence in a stream or river
e)	deposits of gold or silver in ocean sediments
	Ans: d Difficulty: Easy Link to: 26.2

19.	Which of the following is not a major way in which ore deposits typically form:
a)	secondary enrichment associated with weathering processes
b)	chemical precipitation from seawater
c)	enrichment by selective chelation
d)	sorting of sediments during transport by streams
e)	by the movement of magma and high-temperature fluids
	Ans: c Difficulty: Medium Link to: 26.2

20.	All of the following are generally considered to be renewable resources except:
a)	surface water
b)	fisheries
c)	groundwater
d)	coal
e)	forests
	Ans: d Difficulty: Easy Link to: 26.3

21.	Which of the following trends over time have made (and will continue to make) minerals more difficult and expensive to supply?
a)	depletion of high-grade ores
b)	increasing energy costs
c)	less tolerance for environmental damage associated with mining
d)	increasing energy costs and less tolerance for environmental damage associated with mining
e)	all of these
	Ans: e Difficulty: Medium Link to: 26.5

22.	Which of the following are mineral resources used as building materials? I. sand II. steel III. halite
a)	I only
b)	II only
c)	III only
d)	I and II
e)	I, II, and III
	Ans: d Difficulty: Easy Link to: Table 26.1

23.	The largest non-energy-related mineral industry in the United States is:
a)	gold, silver, and platinum mining
b)	iron mining
c)	sand and gravel
d)	limestone quarrying
e)	salt recovery
	Ans: c Difficulty: Easy Link to: 26.2

24.	When costs of locating, extracting, processing, and distributing mineral resources exceed the price the market is willing to pay, which of the following results?
a)	exploration for new reserves
b)	development of alternatives to that mineral resource
c)	development of recycling techniques for that mineral
d)	consumers do without that mineral resource
e)	all of these
	Ans: e Difficulty: Medium Link to: 26.4

25.	With regards to minerals, a _____ is material which can be legally, economically, and technically extracted at the present time; and a _____ is material than potentially can be extracted in the long-run.
a)	supply; reserve
b)	resource; reserve
c)	reserve; resource
d)	renewable resource; economic resource
e)	economic resource; renewable resource
	Ans: c Difficulty: Medium Link to: 26.4

26.	Evaporites form:
a)	in nutrient-rich open ocean water
b)	in enclosed or semi-enclosed saline waters by evaporation
c)	under high pressure

d)	within buried saline rocks
e)	in coral reefs

Ans: b
Difficulty: Easy
Link to: 26.2

27.	Which of the following minerals can be precipitated by processes involving living organisms:
a)	sodium and gypsum
b)	magnesium and gypsum
c)	calcium and iron
d)	iron and magnesium
e)	calcium and magnesium

Ans: e
Difficulty: Medium
Link to: Critical Thinking Issue

28.	Placer deposits are mineral deposits concentrated _____.
a)	along a stream channel
b)	on the ocean floor
c)	in hydrothermal deposits
d)	in seafloor sediments
e)	in evaporites

Ans: a
Difficulty: Easy
Link to: 26.2

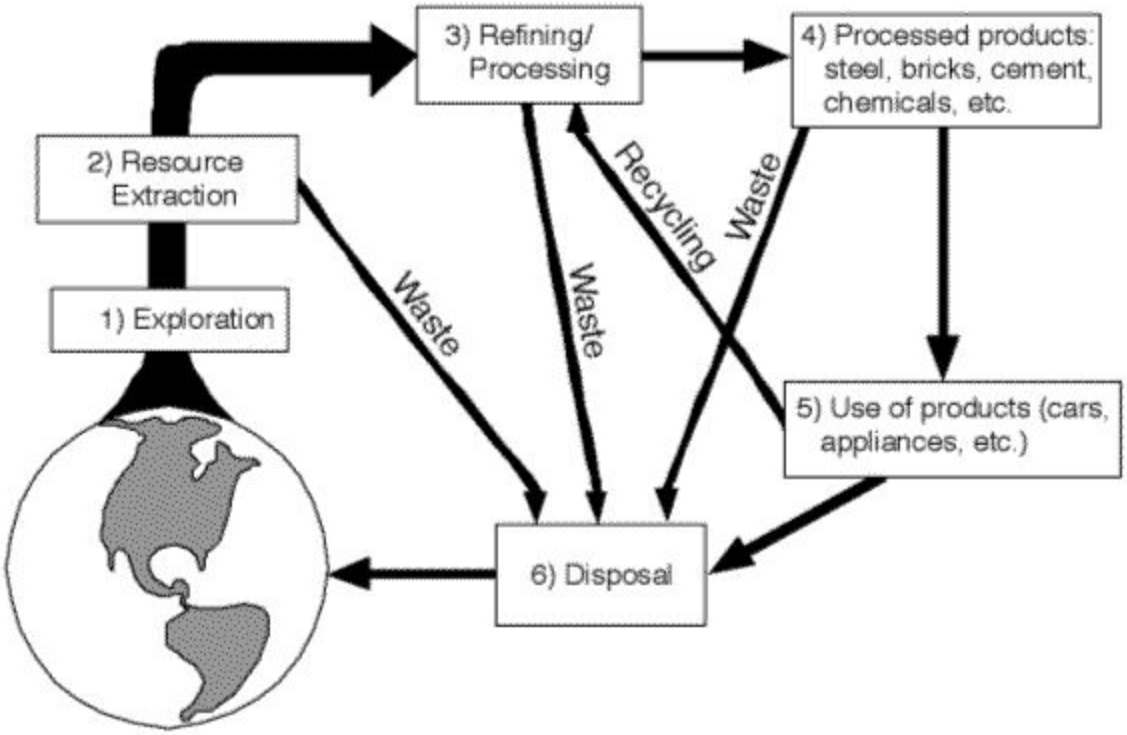
29.	Which of the following statements about resources is false?
a)	resources are classified as renewable or non-renewable
b)	they are the portion of a reserve that is presently extracted economically
c)	it is impossible to support exponential growth on finite resources
d)	though resources are ultimately finite, exploration annually increases known reserves
e)	all technology used in resource extraction, either primitive or advanced, causes some environmental change

Ans: b
Difficulty: Difficult
Link to: 26.3

30.	The combination of _____ mobilizes metals in magmas.
a)	heat, crystallization and partial melting
b)	crystallization, cooling and temperature decline
c)	heat, pressure and partial melting
d)	seismicity, temperature and pressure
e)	convection, seismicity and partial mixing
	Ans: c Difficulty: Medium Link to: 26.2

31.	Which of the following factors would not be a characteristic of an ore body that is desirable and profitable to mine:
a)	ore is located in a sensitive wetlands ecosystem
b)	ore body is large
c)	ore is not deeply buried
d)	ore is concentrated
e)	deposit is accessible using existing rail and/or road networks
	Ans: a Difficulty: Medium Link to: 26.6

32. Pick one mineral resource (for example, iron ore, oil, uranium ore, etc.). For each of the six stages illustrated below, name one type of environmental impact that occurs.



Ans:

	e.g., Coal:	
	1) Damage of pristine wildermess	4) production of byproducts
	2) acid mine drainage	5) greenhouse gases
	3) spoil heaps	6) leachate

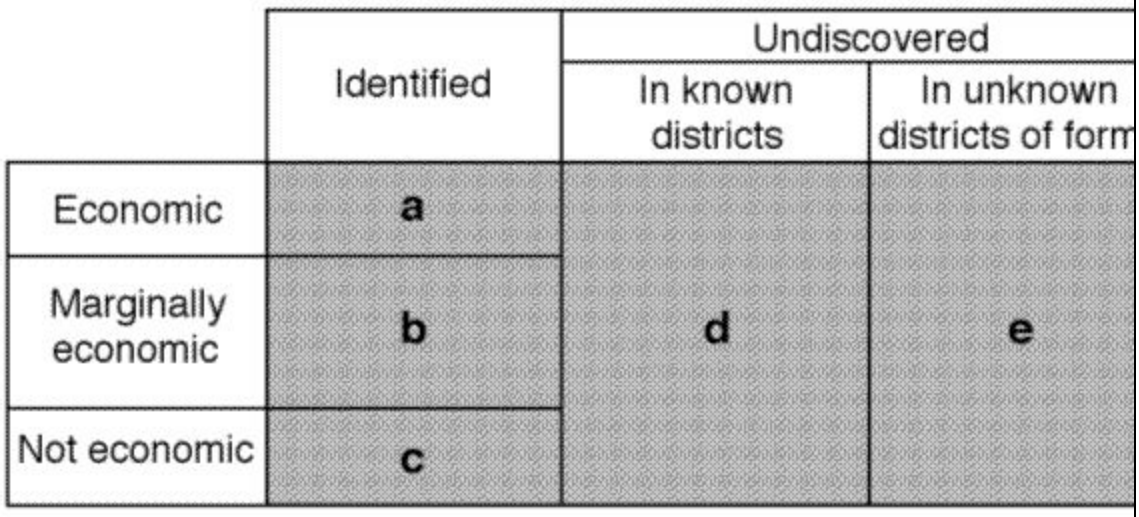
Difficulty: Difficult
Link to: 26.6

33. The top 1 km of the Earth's crust contains an estimated 2×10^{12} metric tons of silver, equal to hundreds of millions times the average consumption of the metal. Explain why silver remains a valuable and relatively scarce material.

Ans: Although its total abundance is high, its average concentration is very low

Difficulty: Medium
Link to: 26.3

34.



In the figure, which blocks (a, b, c, d, or e) refer to resources and which blocks (a, b, c, d, or e) refer to reserves?

Ans: Resources - a, b
Reserves - c, d, e

Difficulty: Medium
Link to: 26.3

35. Name the four possible solutions when the availability of a particular mineral becomes a limitation.

Ans:
1. find more sources
2. recycle what has already be obtained
3. find a substitute
4. do without

Difficulty: Medium
Link to: 26.7

36. Name two environmental problems that are caused by open-pit copper mines.

Ans: contamination of surface- and groundwater by acids and heavy metals.
Smelting produces sulfur dioxide that contributes to air pollution

	Difficulty: Medium Link to: 26.5

37.	What are the principal advantages and disadvantages of biohydrometallurgy over conventional methods?
Ans:	advantages: may produce minerals without large-scale excavations - techniques may be used to decontaminate wastes disadvantages: slow process - technology is not yet available for all mining situations - genetically-engineered organisms may pose a threat if released
	Difficulty: Medium Link to: Critical Thinking Method

38.	What are the four main mineral resources that humans utilize?
Ans:	1) ores 2) building materials 3) chemical minerals 4) agricultural fertilizers
	Difficulty: Easy Link to: 26.3

39.	What are the five processes which result in rich mineral resources?
Ans:	1) igneous processes 2) sedimentary processes 3) biological processes 4) chemical processes 5) weathering processes
	Difficulty: Easy Link to: 26.2

40.	The modern trend is away from subsurface mining and toward more surface mining. Explain this fact.
Ans:	It is cheaper for the mining company and safer for the workers.

	Difficulty: Medium Link to: 26.5

41.	The Environmental Science text lists three conditions that favored widespread and profitable mining in the past that are no longer favorable. List these three conditions.
Ans:	1) widespread high-grade ores 2) cheap sources of energy 3) tolerance for the environmental damage caused by mining
	Difficulty: Medium Link to: 26.5

42.	Why doesn't the Earth's crust have a uniform distribution of elements?
Ans:	Because geological and biological processes selectively dissolve, transport and deposit elements and minerals.
	Difficulty: Medium Link to: 26.2, 26.3

43.	Where on the deep ocean floor are massive sulfide deposits produced?
Ans:	Massive sulfide deposits are produced at mid-ocean ridges.
	Difficulty: Easy Link to: 26.2

44.	Why are secondary minerals and ore enrichments sometimes more valuable than primary minerals and ore enrichments?
Ans:	Secondary enrichment concentrates dispersed minerals or metals from primary deposits.
	Difficulty: Medium Link to: 26.3

45.	Cite three ways that resource depletion can be slowed. List them in the order you think most feasible today.

Ans:	conservation, recycling, exploration, find alternatives
	Difficulty: Medium Link to: 26.7

46.	Under what conditions are diamonds formed?
Ans:	They are formed under extremely high pressure, such as in the upper mantle. Then they are brought up into the crust very quickly before they can break down to graphite.
	Difficulty: Medium Link to: 26.2

47.	The environmental impact of mineral exploitation depends of a number of factors related to the nature of the mineral deposit and the location of the mining site. List at least three such factors.
Ans:	ore quality mining procedures local hydrologic factors climate rock types size of the mining operation topography
	Difficulty: Easy Link to: 26.6

48.	A typical home contains numerous products manufactured from mineral resources. For example, a stone house is built of stone. List at least five other mineral products found in a typical home.
Ans:	plumbing and wiring material: iron, steel, copper, brass, lead paint and wallpaper: mineral pigments (iron, zinc, titanium), fillers (talc, asbestos) building materials: steel, aluminum, brick (clay), cement clothing: synthetic fibers made from minerals (coal and petroleum products drugs and cosmetics: mineral chemicals appliances: iron, copper, rare minerals
	Difficulty: Easy Link to: 26.1

49.	What is "secondary enrichment," and under what circumstances does it form mineral deposits?
Ans:	It is the process by which mineral ore deposits are chemically weathered and enriched in its content as a result.
	Difficulty: Medium Link to: 26.2

50.	Name four mineral resources.
Ans:	gravel, sand, iron ore, potash fertilizer, etc.
	Difficulty: Easy Link to: 26.3