1.	Local water-management strategy that may include surface water, groundwater, desalination, or other supplies, depending on present and future water needs:
a)	overdraft
b)	water budget
c)	influent streams
d)	variable-source approach
e)	wetlands
	Ans: d Difficulty: Medium Link to: 21.5

2.	Use of groundwater at a rate faster than it is naturally re-supplied:
a)	overdraft
b)	water budget
c)	influent streams
d)	variable-source approach
e)	wetlands
	Ans: a Difficulty: Easy Link to: 21.2

3.	Model that tracks the rates of input, rates of output, and storage of water in a region or in a water system:
a)	overdraft
b)	water budget
c)	influent streams
d)	variable-source approach
e)	wetlands
	Ans: b Difficulty: Easy Link to: 21.2

4.	The figure below shows average household water use in the United States, subdivided into the four major activities that use water. Which of the choices below is the correct sequence of activity that matches the figure:

	T	= toilet flushing

	D+C	= drinking and cooking
	L+D	= laundry and dishes
	B+P	= bathing and personal use
	SP	= swimming pools
	WB	= water beds

	I	II	III	IV
a)	D+C	T	L+D	B+P
b)	SP	B+P	D+C	T
c)	D+C	T	B+P	L+D
d)	WB	L+D	T	SP
e)	L+D	T	B+P	D+C

Ans: a
Difficulty: Medium
Link to: 21.5

5. What is an aquifer?

a) a canal or system to transport water over long distances
b) a zone of hot, pressurized groundwater
c) a rock that holds and transmits water
d) a rock in which permeability is low
e) the area of a drainage basin which recharges water into the system

Ans: c
Difficulty: Easy
Link to: 21.1

6. "Instream use" refers to:

a) water removed from a river and eventually returned to the river
b) use for agricultural purposes
c) evaporation during transport in pipes or canals
d) use by cities or agriculture in the close vicinity of the river
e) uses of the river or lake itself, without removing water

Ans: e
Difficulty: Easy
Link to: 21.3

7. In all of the following examples, assume that input = output:

	Stream A consists of 1,000 m^3 of water, and it discharges 50 m^3 p hour

		Lake B consists of 50,000 m^3 of water, and it discharges 150 m^3 p hour
		River C consists of 10,000 m^3 of water, and it discharges 100 m^3 p hour
		Aquifer D consists of 50,000 m^3 of water, and it discharges 50 m^3 hour
	If _____ became contaminated with 500 m^3 of oil, it would be the fastest of the four bodies of water to cleanse itself. In contrast, if _____ were overused as a source of water, it would be the slowest to recover.	
a)	Stream A; Aquifer D	
b)	Lake B; Stream A	
c)	River C; Aquifer D	
d)	Stream A; Lake B	
e)	Aquifer D; Stream A	
	Ans: a Difficulty: Difficult Link to: 21.2	

8.	Loss of vegetation and soil during urbanization will produce:	
a)	more overland flow	
b)	more subsurface flow	
c)	less overland flow	
d)	more groundwater flow	
e)	more throughflow	
	Ans: a Difficulty: Medium Link to: 21.4	

9.	Which of the following is or are example(s) of offstream use of water from a river?	
a)	agricultural irrigation on the banks of the river	
b)	water used to cool a nuclear power plant	
c)	water from a sewage treatment plant that is returned to the river	
d)	water used to supply a nearby city	
e)	all of these	
	Ans: e Difficulty: Medium Link to: 21.3	

10.	Channelized streams have reduced wildlife because of which of the following characteristics:
a)	excessive shading
b)	aesthetic degradation
c)	excessive daily and seasonal variation in water temperature
d)	increased leaf material input
e)	low stream velocity
	Ans: c Difficulty: Medium Link to: 21.8

11.	What is overdrafting?
a)	excessive rafting on reservoirs and streams
b)	excessive withdrawal of groundwater
c)	withdrawal of water from streams in excess of recharge
d)	excessive withdrawal of water from reservoirs
e)	discharge of nutrient-rich water, in excess of the biological oxygen demand
	Ans: b Difficulty: Easy Link to: 21.3

12.	All of the following characteristics are true about water except:
a)	universal solvent
b)	high surface tension
c)	natural waters are slightly acidic
d)	low capacity to absorb and store heat
e)	the solid form of water is less dense than the liquid form
	Ans: d Difficulty: Medium Link to: 21.1

13.	97 % of all water on Earth is in the oceans. Which of the following is the correct order of the Earth's water storage compartments from largest to smallest:
a)	ocean, atmosphere, lakes, groundwater, rivers, ice caps
b)	ocean, groundwater, rivers, ice caps, atmosphere, lakes
c)	ocean, ice caps, groundwater, lakes, atmosphere, rivers
d)	ocean, lakes, ice caps, groundwater, atmosphere, rivers
e)	ocean, atmosphere, ice caps, groundwater, rivers, lakes

	Ans: c Difficulty: Easy Link to: 21.1

14.	The vadose zone refers to:
a)	the unsaturated zone above the water table
b)	the saturated zone below the water table
c)	the discharge zone of a basin
d)	the recharge zone of a basin
e)	the water table
	Ans: a Difficulty: Medium Link to: 21.1

15.	In the figure below, which of the labeled points (a, b, c, d, or e) identifies the recharge zone?
a)	a
b)	b
c)	c
d)	d
e)	e
	Ans: a Difficulty: Easy Link to: 21.1

16.	In the figure below, which of the labeled points (a, b, c, d, or e) identifies the discharge zone?
a)	a
b)	b
c)	c
d)	d
e)	e
	Ans: b Difficulty: Easy Link to: 21.1

17.	In the figure below, which of the labeled points (a, b, c, d, or e) identifies the water table?
a)	a
b)	b
c)	c
d)	d
e)	e
	Ans: c Difficulty: Easy Link to: 21.1

18.	In the figure below, which of the labeled points (a, b, c, d, or e) identifies the aquifer?
a)	a
b)	b
c)	c
d)	d
e)	e
	Ans: d Difficulty: Easy Link to: 21.1

19.	The stream illustrated in the figure below is an example of:
a)	an influent stream
b)	an effluent stream
c)	a perennial stream
d)	instream use
e)	an ephemeral stream
	Ans: b Difficulty: Easy Link to: 21.1

20.	According to the Environmental Science textbook, the Colorado River is noteworthy because:
a)	its natural regularity and steadiness of flow make it a model for flood control projects on other rivers
b)	it is the last of the pristine and unharnessed rivers of the American West

c)	it supplies water to a large portion of the arid southwestern United States
d)	the river is the last underutilized source of water west of the Rocky Mountains
e)	it is far from video games
	Ans: c Difficulty: Medium Link to: 21.9

21.	On the global scale, the total water abundance is not the problem, the problem is:
a)	a water shortage linked to our food supply
b)	increased storage of fresh water in ice caps and glaciers
c)	reduced precipitation
d)	a global increase in surface water pollution
e)	lowering of the water table world wide
	Ans: a Difficulty: Medium Link to: 21.10

22.	Which of the following is a serious groundwater overdraft problem:
a)	loss of fish habitat
b)	land subsidence
c)	damage to river ecosystems
d)	damage to riparian vegetation
e)	all of these
	Ans: e Difficulty: Medium Link to: 21.3

23.	What is the main common feature of a wetland:
a)	it is wet all year round
b)	it has little variation in water temperature over the course of the year
c)	it is wet part or all of the year
d)	the duration of inundation depends on the precipitation
e)	the wetland soil is characterized by sufficient oxygen

	Ans: c Difficulty: Medium Link to: 21.6

24.	The principal reason to channelize natural streams and rivers is:
a)	to reduce habitat for mosquitoes and other pests
b)	for flood control
c)	to distribute water to agricultural areas
d)	to control sediment pollution
e)	to provide a benign environment for aquatic wildlife
	Ans: b Difficulty: Easy Link to: 21.8

25.	According to the Environmental Science text, which of the following is most contested when it is classified as wetlands and protected accordingly?
a)	swamps
b)	sloughs
c)	bogs
d)	coastal marshes
e)	seasonal potholes
	Ans: e Difficulty: Easy Link to: 21.6

26.	Adverse environmental effects of channelization include all of the following except:
a)	a less diverse range of habitats for aquatic species
b)	loss of wetlands
c)	increased flood hazard along channelized segments of streams
d)	aesthetic degradation
e)	loss of riparian vegetation
	Ans: c Difficulty: Medium Link to: 21.8

27.	Which of the following effects can be associated with groundwater overdraft:

a)	raising of the water table
b)	uplift of the land surface
c)	salt water intrusion
d)	global warming
e)	acid mine drainage

Ans: c
Difficulty: Easy
Link to: 21.2

28. Floodplains have all of the following advantages for urbanization and construction except:

a)	flat ground makes transportation and construction simple
b)	the floodplain surface is safe from flooding
c)	easy access to commerce and communication routes by river
d)	accessible water and hydroelectric supply
e)	scenic river views

Ans: b
Difficulty: Easy
Link to: 21.1

29. Shallow subsurface flow of water within the soil but above the water table is known as:

a)	infiltration
b)	overland flow
c)	throughflow
d)	groundwater flow
e)	capillary flow

Ans: c
Difficulty: Easy
Link to: 21.1

30. 99% of the earth's water is unavailable or unsuitable for human use because:

I.	of its salinity
II.	it is polluted
III.	it lies in inaccessible areas

a)	I only
b)	II only
c)	I and II

d)	I and III
e)	I, II, and III
	Ans: d Difficulty: Easy Link to: 21.1

31.	In the United States, the single sector which consumes the greatest portion of water supplies is:
a)	agriculture
b)	municipal water use
c)	electric power plants
d)	waste disposal
e)	industry
	Ans: a Difficulty: Easy Link to: 21.3

32.	Desalination is a promising source of water for some locations because:
a)	desalinated water can be delivered at a lower cost than many water sources
b)	desalination produces water purer than surface water and approaching the purity of groundwater
c)	desalination requires less energy than transporting water over long distances
d)	desalination is a potential water source for even the most arid coastal area
e)	all of these
	Ans: d Difficulty: Medium Link to: 21.2

33.	Hydroelectric power generation on a river is an example of:
a)	offstream use
b)	instream use
c)	consumptive use
d)	overdrafting
e)	geothermal energy

	Ans: b Difficulty: Easy Link to: 21.3

34.	All of the following are improvements or additions to agriculture that would increase the efficiency of water use and the quality of runoff except:
a)	metering (measurement) of water usage
b)	more drip irrigation and less flood irrigation
c)	restoration of stream and river ecosystems
d)	use of moisture sensors to prevent over-watering
e)	increased use of fertilizer and pesticides
	Ans: e Difficulty: Medium Link to: 21.4

35.	All of the following are valid criteria for the sustainable use of water except:
a)	develop water-efficient technology
b)	ensure minimum standards for water quality
c)	allocate sufficient water resources to maintain the health of ecosystems
d)	give volume discounts to the largest water consumers
e)	develop sufficient water supplies to guarantee human health and well-being
	Ans: d Difficulty: Medium Link to: 21.5

36.	Agriculture uses about 80% of the fresh water used in the United States. List five measures that could be taken to make agriculture more efficient in its use of water.
Ans:	line or cover canals monitor and schedule water release for maximum efficiency integrate use of surface water and groundwater night irrigation more efficient irrigation systems improve land preparation develop less water-intensive crops realistic water pricing

	Difficulty: Medium Link to: 21.4

37.	How has Palm Beach, Florida utilized wetlands to conserve water?
Ans:	They are using treated wastewater to establish hundreds of acres of wetlands that act as filters to reduce the concentration of nitrogen and phosphorus in water before it enters underground aquifers.
	Difficulty: Medium Link to: Case Study

38.	The total runoff of the world's rivers is 48,000 km^3 of fresh water each year. Human use of water is about 4,000 km^3, or about 8% of the total. How can anyone say there is a water shortage on Earth?
Ans:	Most of the Earth's water is where most of the people aren't; and where people are, they usually outstrip the local water supplies.
	Difficulty: Medium Link to: 21.2

39.	Name three urban areas in the U.S. that, according to your textbook, are experiencing the impact of a population growth on water supply.
Ans:	San Diego, CA Denver, CO Chicago, IL Tampa, FL Atlanta, GA New York, NY
	Difficulty: Easy Link to: 21.2

40.	On what factors in the hydrologic cycle does water supply depend? List them.

Ans:	rates of precipitation rates of evaporation stream flow subsurface flow
	Difficulty: Medium Link to: 21.1

41.	Discuss the advantages and disadvantages of constructing the Three Gorges Dam.
Ans:	advantages: generation of electricity equivalent to 18coal burning powerplants. disadvantages: development in flood prone areas, seismically active area
	Difficulty: Difficult Link to: A Closer Look 21.3

42.	What are the three major pathways by which water on slopes is transported?
Ans:	overland flow throughflow (a type of subsurface flow above the groundwater table) groundwater flow
	Difficulty: Medium Link to: 21.1

43.	Give two examples each of offstream and instream water use.
Ans:	offstream use: Water is taken for drinking, washing, sewage, agricultural irrigation. instream use: hydroelectric power generation, fish and wildlife habitat, recreation, navigation
	Difficulty: Easy Link to: 21.3

44.	Define the following terms: **offstream use of water** **consumptive use of water** **instream use of water**
Ans:	offstream use of water - water removed from its source for use consumptive use of water - offstream use in which the water is not returned instream use of water - use of water without removing it from the river, reservoir, etc.
	Difficulty: Easy Link to: 21.3

45.	List four examples of instream water use.
Ans:	river navigation, hydroelectric generation, recreation, wildlife, etc.
	Difficulty: Medium Link to: 21.3

46.	Many natural waters are slightly acidic. How does this condition affect human health?
Ans:	It is beneficial to the human body because slightly acidic water is able to dissolve a great variety of compounds the human body needs for its health (e.g., amino acids, sodium chloride).
	Difficulty: Medium Link to: 21.1

47.	Among common molecules and compounds, water is the only one whose solid form is **less dense than / more dense than / equal to** (circle one) its liquid form.
Ans:	less dense than
	Difficulty: Easy Link to: 21.1

48.	How can groundwater overdraft lead to increased flood hazard?

Ans:	Overdrafting can lower the water table below root level, which kills riparian plants and which, in turn, renders stream banks more vulnerable to erosion during floods.
	Difficulty: Difficult Link to: 21.2

49.	The oceans offer a virtually unlimited supply of water. Yet desalination is not a common source of freshwater, even in many arid coastal areas. What are its main drawbacks?
Ans:	Desalination is very energy-intensive, and therefore expensive.
	Difficulty: Medium Link to: 21.2

50.	Why is groundwater preferable to surface water as a domestic water source in many cases?
Ans:	Groundwater is naturally filtered by seepage through wetlands, soil and porous rock of the aquifer.
	Difficulty: Medium Link to: 21.1, Case Study

51.	Explain how groundwater withdrawal in excess of recharge may lead to subsidence.
Ans:	The withdrawal of groundwater reduces the fluid pressure in the aquifer. The material compacts and the surface subsides.
	Difficulty: Medium Link to: 21.2

52.	Name four of the improvements or additions to agriculture listed in the textbook that would increase the efficiency of water use and the quality of runoff.

Ans:	metering (measurement) of usage drip irrigation replaces flood irrigation improved sprinkler irrigation moisture sensors prevent over-watering biological pest control supplants chemical pesticides improved weather monitoring restoration of stream and river ecosystems
	Difficulty: Medium Link to: 21.4

53.	How can groundwater overdrafting affect surface vegetation?
Ans:	Overdrafting can lower the water table below root level, which kills plants.
	Difficulty: Medium Link to: 21.2

54.	Groundwater has a reputation for always being clean and pure. It is not always so. What natural conditions may render groundwater unhealthy?
Ans:	If the soil or rock where the water is passing through is already highly contaminated or contains naturally toxic elements. Also, if the rate of groundwater flow (for example, in a limestone karst aquifer) is very fast, then no filtering will occur
	Difficulty: Difficult Link to: 21.1

55.	Why does domestic use of water (only 6% of total national consumption) pose a major local problem in many areas?
Ans:	Domestic use is concentrated in small areas, whereas the water supply is distributed over large areas and not concentrated where it is most needed.
	Difficulty: Medium Link to: 21.4

56.	List three major service functions of wetlands:

Ans:	provide food, water, and habitat for many species cleanse water of pollutants recharge groundwater control flooding control erosion
	Difficulty: Medium Link to: 21.6

57.	Name three general criteria for water-use sustainability.
Ans:	Develop water resources in sufficient volume to maintain health and well-being Provide sufficient water resources to guarantee the health and maintenance of ecosystems Ensure minimum standards of water quality for the various users of water resources Ensure that actions of humans do not damage or reduce long-term renewability of water resources Promote the use of water efficient technology and practice Eliminate water pricing policies that subsidize inefficient use of water
	Difficulty: Difficult Link to: 21.5