Water Pollution and Quality

Use this key to check answers and read the explanations.

1. On a diagram of a wastewater system, the label outfall points to the end of a pipe at a river. What does that label identify?
   A. The place where water is discharged to the river
   B. The high ground dividing two watersheds
   C. The upper surface of the groundwater
   D. A place where rain first falls on land
   Correct answer: A. The place where water is discharged to the river
   An outfall is a discharge location. On this diagram, it identifies where water leaves the pipe.

2. Rain carries lawn fertilizer from many properties toward a lake. What kind of source does that example illustrate?
   A. A single spring
   B. One isolated pipe discharge
   C. Nonpoint source
   D. A groundwater recharge well
   Correct answer: C. Nonpoint source
   The runoff collects material from numerous places. It is a diffuse, or nonpoint, source.

3. A classroom container of muddy water sits undisturbed. Larger soil particles collect at the bottom. What process has taken place?
   A. Evaporation of every dissolved substance
   B. Sedimentation
   C. Dilution by adding water
   D. Dissolving all the soil
   Correct answer: B. Sedimentation
   Some suspended particles settle under gravity and form a layer at the bottom.

4. Which reading measures the oxygen present in the water that fish take up through their gills?
   A. Nitrate concentration
   B. Sediment depth
   C. Total stream discharge
   D. Dissolved oxygen
   Correct answer: D. Dissolved oxygen
   Dissolved oxygen measures molecular oxygen in the water that aquatic organisms can use.

5. Which pair names nutrients that can promote excessive algal growth if too much enters a lake?

A. Sand and gravel
B. Nitrogen and phosphorus
C. Helium and neon
D. Sodium and chloride

Correct answer: B. Nitrogen and phosphorus
Nitrogen and phosphorus support growth. An excess can increase algae and aquatic plant production.

6. On a sunny day in a pond with abundant algae, which process can add dissolved oxygen in daylight?

A. Photosynthesis by algae
B. Respiration by fish
C. Breakdown of dead leaves
D. Settling of sand

Correct answer: A. Photosynthesis by algae
Photosynthesis can add oxygen during daylight. Organisms also use oxygen when they respire.

7. Two samples come from the same stream. One is visibly muddier after rain. Which change best accounts for that observation?

A. The local altitude increased during the storm.
B. The rain removed all particles from the water.
C. The stream changed back into groundwater.
D. Runoff carried more suspended sediment into the stream.

Correct answer: D. Runoff carried more suspended sediment into the stream.
Runoff can carry loosened soil. Fine particles stay suspended and help make the stream cloudy.

8. A fictional stream reads 8 turbidity units before rain, 33 during high flow, and 15 the next day. How much higher is the peak than the reading before rain?

A. 7 units
B. 18 units
C. 25 units
D. 41 units

Correct answer: C. 25 units
Subtract the starting reading of 8 from the peak of 33. The difference is 25.

9. A class wants to see whether nitrate changes across a stream reach near an inflow. Which design gives the strongest starting comparison?

A. Repeat paired upstream and downstream measurements at comparable times.
B. Measure only the deepest spot once.
C. Measure upstream in winter and downstream in summer exactly once.
D. Ask which site looks clearer and skip nitrate measurements.

Correct answer: A. Repeat paired upstream and downstream measurements at comparable times.
Paired sampling helps distinguish a change across the reach from background variation over time.

10. Two freshwater samples are fully saturated with air at the same atmospheric pressure, but one is warmer. Which generally holds more dissolved oxygen?

A. Neither contains any oxygen
B. The warmer sample
C. Both always hold the same amount
D. The cooler sample

Correct answer: D. The cooler sample
At the same pressure, oxygen is generally more soluble in cooler water.

11. A filter removes suspended soil from a classroom water sample. The measured nitrate concentration stays the same. Which explanation best fits?

A. Nitrate cannot be present in clear water.
B. The filter changed all nitrate into suspended soil.
C. The nitrate is dissolved and passes through that particle filter.
D. Any nitrate reading must be a measurement of water color.

Correct answer: C. The nitrate is dissolved and passes through that particle filter.
A particle filter removes solids it can retain. Dissolved substances can remain in clear water.

12. A fictional drain carries 20 liters of water per second with 3 milligrams of a dissolved substance per liter. What mass of that substance passes per second?

A. 23 milligrams
B. 60 milligrams
C. 17 milligrams
D. About 6.7 milligrams

Correct answer: B. 60 milligrams
Multiply the volume rate by the concentration. The liters cancel and give 20 × 3 = 60 milligrams per second.

13. A model combines 10 liters of water containing 4 milligrams of nitrate per liter with 30 liters containing no nitrate. If the mixture is uniform and none is removed, what is its nitrate concentration?

A. 4 milligrams per liter
B. 2 milligrams per liter
C. 3 milligrams per liter
D. 1 milligram per liter

Correct answer: D. 1 milligram per liter
There are 40 milligrams of nitrate in 40 liters after mixing. Dividing gives 1 milligram per liter.

14. A lake shows higher nutrient levels after rain on eight sampling days. Several streams enter the lake. Which finding does that evidence support by itself?

A. Higher nutrients were associated with the sampled rain events.
B. One particular stream caused every increase.
C. Every dry day of the year had the same nutrient reading.
D. All nearby land uses made identical contributions.

Correct answer: A. Higher nutrients were associated with the sampled rain events.
The pattern documents a relationship across the sampling days. Sampling individual inflows would help distinguish their contributions.

15. A stream gets warmer and receives more decomposing organic material at the same time. Dissolved oxygen falls. Which interpretation fits both changes?

A. The changes prove suspended sediment is the sole cause.
B. Warming adds more oxygen, and decomposition never affects it.
C. Warmer water can hold less oxygen, and decomposition can use more of it.
D. A decline in oxygen by itself proves which input changed first.

Correct answer: C. Warmer water can hold less oxygen, and decomposition can use more of it.
Temperature affects the oxygen that can dissolve. Decomposition affects how quickly oxygen is consumed, so both changes could contribute.