LESSON MAKER PRO

Water Quality Watch

Track changes in aquatic measurements

HIGH SCHOOL · MAQ.1.4

MAQ.1.4 "Collect, analyze, and communicate quantitative data that includes dissolved oxygen, pH, temperature, salinity, mineral content, nitrogen compounds, and turbidity from an aquatic environment (i.e., hydrometer, refractometer, Secchi disk..."

NAME _____ DATE _____

FIND THE CHANGE

To find how a water measurement changed, subtract the first reading from the second reading. A positive result means the reading rose, and a negative result means it fell. Keep the measurement's unit with your answer.

WORKED EXAMPLE

A chemical test kit measures dissolved oxygen at 7.8 mg/L in the morning and 6.6 mg/L in the afternoon. Find the signed change.

1. Subtract the morning reading from the afternoon reading: 6.6 - 7.8.
2. The result is -1.2 mg/L.
3. The negative sign shows that dissolved oxygen fell.

Answer: -1.2 mg/L

PRACTICE 6 problems

1 A chemical test kit gives these pH readings. Find the signed change in pH.

POND PH

Time	pH
Morning	8.0
Evening	7.5

ANSWER _____

2 A thermometer reads 22°C before noon and 26°C after noon. Find the signed change in water temperature.

ANSWER _____

3 A refractometer gives these salinity readings. Find the signed change in salinity.

TIDE POOL SALINITY

Time	Salinity (ppt)
First reading	32
Second reading	29

ANSWER _____

4 A mineral test kit measures calcium at 80 mg/L in one sample and 95 mg/L in a later sample. Find the signed change in calcium concentration.

ANSWER _____

5 A chemical test kit gives these nitrate readings. Find the signed change in nitrate concentration.

CREEK NITRATE

Sample	Nitrate (mg/L)
First	0.6
Later	1.1

ANSWER _____

6 A Secchi disk is lowered until it can no longer be seen. Find the signed change in Secchi depth, a measure of water clarity.

LAKE SECCHI DEPTH

Day	Depth (m)
Monday	2.5
Friday	1.5

ANSWER _____

APPLY IT Show your work

1 Your class is checking a creek near a public park. A chemical test kit gives the dissolved oxygen readings below. For this survey, a reading below 5.0 mg/L flags possible stress for fish. What is the signed change, and does the afternoon reading trigger the flag?

PARK CREEK DISSOLVED OXYGEN

Time	Dissolved oxygen (mg/L)
Morning	6.5
Afternoon	4.5

ANSWER _____

2 A student checks a saltwater aquarium with a hydrometer before and after adding water. The target salinity is 33 to 36 ppt. What is the signed change in salinity, and how far below the target range is the later reading?

AQUARIUM SALINITY

Time	Salinity (ppt)
Before	34
After	30

ANSWER _____

CHALLENGE One step up

After a storm, your class tests a creek with a chemical test kit and a Secchi disk. Calculate the signed change in each measurement. A classmate says the change in Secchi depth means the water became clearer. Explain whether the data support that claim.

CREEK READINGS

Time	Nitrate (mg/L)	Secchi depth (m)
Before storm	0.2	1.8
After storm	0.8	1.0

WORK SPACE AND ANSWER

Water Quality Watch

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A chemical test kit gives these pH readings. Find the signed change in pH.	**-0.5**
2	A thermometer reads 22°C before noon and 26°C after noon. Find the signed change in water temperature.	**+4°C**
3	A refractometer gives these salinity readings. Find the signed change in salinity.	**-3 ppt**
4	A mineral test kit measures calcium at 80 mg/L in one sample and 95 mg/L in a later sample. Find the signed change in calcium concentration.	**+15 mg/L**
5	A chemical test kit gives these nitrate readings. Find the signed change in nitrate concentration.	**+0.5 mg/L**
6	A Secchi disk is lowered until it can no longer be seen. Find the signed change in Secchi depth, a measure of water clarity.	**-1 m**

PART 2 · APPLY IT

1. **-2.0 mg/L; yes, the afternoon reading triggers the flag.** Subtract 6.5 from 4.5 to get -2.0 mg/L. The afternoon reading of 4.5 mg/L is below 5.0 mg/L.
2. **-4 ppt; the later reading is 3 ppt below the target range.** Subtract 34 from 30 to get -4 ppt. The lower end of the target range is 33 ppt, which is 3 ppt above the later reading.

CHALLENGE

Nitrate changed by +0.6 mg/L, and Secchi depth changed by -0.8 m. The claim is not supported: the disk could not be seen as deep after the storm, which indicates cloudier water.

Accept a minus sign or the word “decreased” for negative changes. Secchi depth indicates water clarity, but it is not a direct measurement of turbidity in NTU.