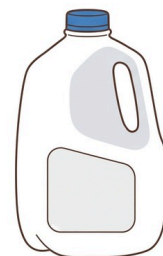
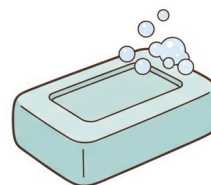
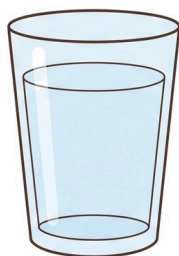


Acids, Bases and the pH Scale

How the pH scale measures acids and bases



7

printable sheets

17

pages

All

answer keys included

Acids, Bases and the pH Scale Teaching Pack

How the pH scale measures acids and bases

How to use this pack. The sheets are in a suggested teaching order: show the labeled diagram, have students label the blank one, then work through the practice sheets and finish with the quiz. Use them all over a week or pick the ones you need. The answer keys are together at the back.

What is inside

1. Teach

pH Scale Diagram 3

2. Label

Blank pH Scale 4

3. Match

Acids, Bases and pH Words 5

4. Read

Measuring Acids and Bases 6

5. Apply

Acidic, Neutral or Basic? 8

6. Review

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7. Check

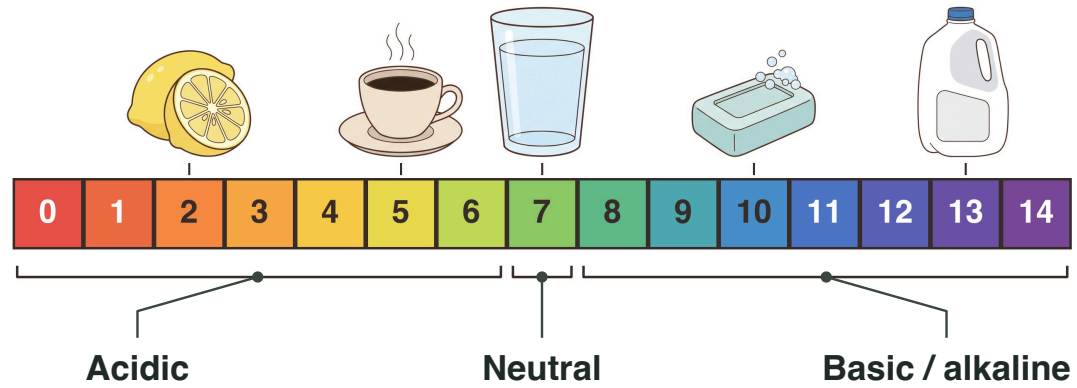
Acids, Bases and the pH Scale Quiz 10

Answer keys

Every answer key, in the same order 12

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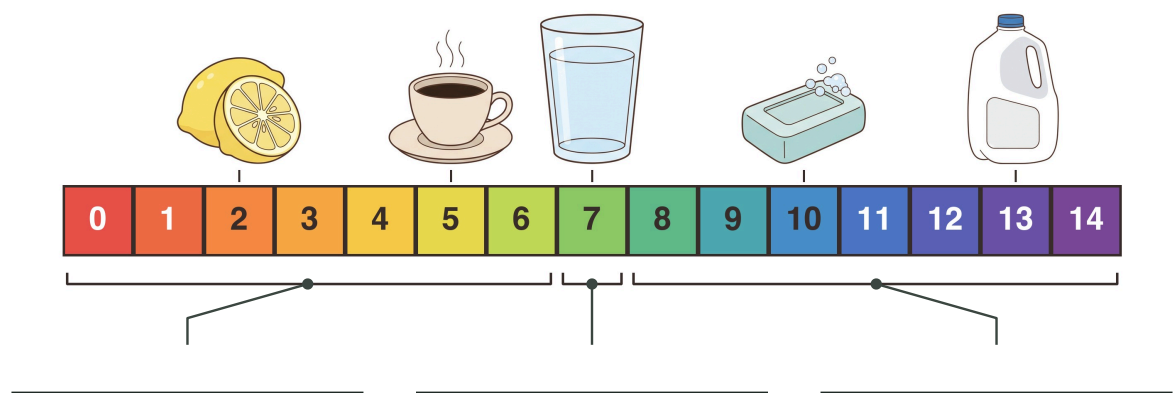
The pH Scale



The pH Scale

Name: _____

Write the name of each part on its line. Use the word bank.



Word bank Acidic Basic / alkaline Neutral

Acids, Bases and pH Words

Use the labeled pH scale diagram to help you.

Part A. Write the word that fits each description.

Word bank

Acid

Acidic

Base

Basic / alkaline

Indicator

Litmus

Neutral

Neutralize

pH scale

1. A substance that changes color to show whether a liquid is acidic or basic. _____
2. A liquid with a pH above 7 is _____. _____
3. Lemon juice and vinegar each contain one of these. Strong ones can burn skin. _____
4. The set of numbers, usually from 0 to 14, that tells how acidic or basic a liquid is. _____
5. A liquid with a pH of exactly 7 is _____. _____
6. A kind of test paper. Acids turn the blue kind red, and bases turn the red kind blue. _____
7. A liquid with a pH below 7 is _____. _____
8. To add a base to an acid, or an acid to a base, so that the pH moves toward 7. _____
9. The opposite of an acid. Baking soda is a mild one. Strong ones can burn skin. _____

Part B. Answer the questions.

1. On the diagram, lemon juice is at about pH 2 and coffee is at about pH 5. Which one is more acidic? How do you know?

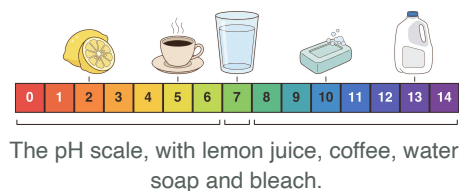
2. Soap is at about pH 10 on the diagram. Is it acidic, neutral or basic? How do you know?

3. Why should you never taste or touch an unknown liquid to find out if it is an acid or a base? What could you use instead?

Measuring Acids and Bases

Read the text. Then answer the questions on the next page.

- 1 Lemon juice and soapy water are very different liquids. Lemon juice contains an **acid**. Soapy water contains a **base**. Acids and bases are two groups of chemicals, and many are found in every home. Some are mild. Others are strong enough to burn skin, so scientists never taste or touch a chemical to find out what it is.
- 2 Instead, they measure it. The **pH scale** is a set of numbers, usually from 0 to 14, that tells how acidic or basic a liquid is. A liquid with a pH below 7 is **acidic**. A liquid with a pH above 7 is **basic**, which is also called **alkaline**. A pH of exactly 7 is **neutral**. Pure water is neutral.
- 3 The farther a number is from 7, the more acidic or the more basic the liquid is. Lemon juice has a pH of about 2, and black coffee has a pH of about 5. Both are acidic, but lemon juice is much more acidic. Each step on the scale is a change of ten times, so a liquid with a pH of 4 is ten times more acidic than one with a pH of 5. On the basic side, soap is about 10 and bleach is about 13.
- 4 To find out whether a liquid is acidic or basic, you can use an **indicator**. An indicator is a substance that changes color in acids and bases. **Litmus** paper is a simple one. An acid turns blue litmus paper red. A base turns red litmus paper blue.
- 5 When a base is added to an acid, the pH moves toward 7. This is called **neutralizing** the acid. Remember that strong acids and strong bases are both dangerous. Bleach can burn skin just as a strong acid can.



Measuring Acids and Bases: Questions

Go back to the text to find each answer. The paragraphs are numbered to help you.

1. What is this text mostly about?

- ☐ How to make lemonade
- ☐ Why bleach cleans so well
- ☐ How the pH scale measures acids and bases
- ☐ How litmus paper is made

2. Why do scientists never taste or touch a chemical to find out what it is?

3. What is the pH of a neutral liquid such as pure water?

- ☐ 0
- ☐ 7
- ☐ 10
- ☐ 14

4. Which liquid in the text is the most acidic?

- ☐ Black coffee
- ☐ Pure water
- ☐ Bleach
- ☐ Lemon juice

5. How much more acidic is a liquid with a pH of 4 than a liquid with a pH of 5?

6. Number these liquids 1, 2 and 3 from the lowest pH to the highest (paragraph 3).

- ☐ Black coffee
- ☐ Bleach
- ☐ Lemon juice

7. What does an acid do to blue litmus paper?

- ☐ It turns it red.
- ☐ It turns it green.
- ☐ It leaves it blue.
- ☐ It turns it white.

8. What happens to the pH of an acid when a base is added to it?

Acidic, Neutral or Basic?

Read the pH of each substance. Decide whether it is acidic, neutral or basic. The first five are on the pH scale diagram.

SUBSTANCE	ITS pH	ACIDIC, NEUTRAL OR BASIC?
1. Soap	About 10	_____
2. Lemon juice	About 2	_____
3. Pure water	7	_____
4. Bleach	About 13	_____
5. Black coffee	About 5	_____
6. Vinegar	About 3	_____
7. Baking soda in water	About 8	_____
8. Tomato juice	About 4	_____
9. Ammonia cleaner	About 11	_____

Word bank

Acidic

Basic

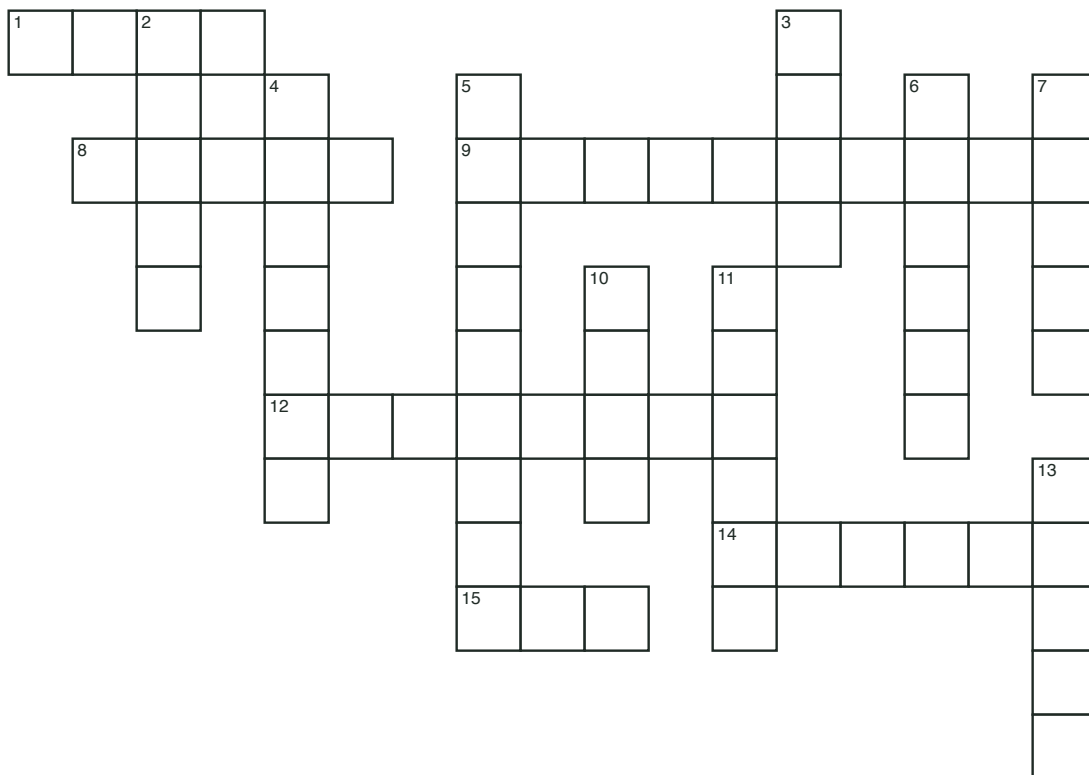
Neutral

Your turn

Which substance in the table is the most acidic? Which is the most basic? Tell how the numbers show it.

Acids and Bases Crossword

Read each clue. Write the answer in the puzzle, one letter in each box. Use the word bank if you get stuck.



ACROSS

1. Baking soda is a mild one. In water it gives a pH above 7.
8. When it is pure, this liquid has a pH of 7.
9. To add a base to an acid so that the pH moves toward 7.
12. Another word for basic.
14. A dark, hot drink with a pH of about 5.
15. The color blue litmus paper turns in an acid.

DOWN

2. The pH ____ usually runs from 0 to 14.
3. You wash your hands with it. Its pH is about 10.
4. Neither acidic nor basic.
5. A substance that changes color to show whether a liquid is acidic or basic.
6. The blue kind of this test paper turns red in an acid.
7. The pH of pure water, written as a word.
10. Vinegar contains one of these. In water it gives a pH below 7.
11. A strong cleaner with a pH of about 13. It can burn skin.
13. The juice of this yellow fruit has a pH of about 2.

Word bank

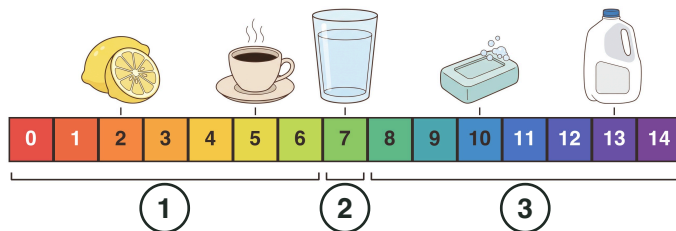
acid alkaline base bleach coffee indicator lemon litmus neutral
neutralize red scale seven soap water

Acids, Bases and the pH Scale Quiz

Score _____ / 11

Show what you know about acids, bases and the pH scale. In the picture, each bracket under the scale marks one range, and the circled number sits under its bracket.

Part A. This is the pH scale. Write the name of each range.



- 1 _____
2 _____
3 _____

Acidic · Basic / alkaline · Neutral

Part B. Choose the best answer.

1. Which pH is neutral?

- ☐ 0
☐ 7
☐ 10
☐ 14

2. Which of these is acidic?

- ☐ Soap
☐ Bleach
☐ Pure water
☐ Lemon juice

3. Which pH is the most basic?

- ☐ 1
☐ 6
☐ 8
☐ 13

4. What does an indicator do?

- ☐ It makes an acid stronger.
☐ It changes color in acids and bases.
☐ It turns any liquid into water.
☐ It measures how hot a liquid is.

5. What happens to the pH when a base is added to an acid?

- ☐ It moves toward 7.
☐ It drops to 0.
☐ It moves away from 7.
☐ It stays the same.

6. One liquid has a pH of 3. Another has a pH of 4. How do they compare?

- ☐ They are equally acidic.
☐ The second is more acidic.
☐ The first is ten times more acidic.
☐ The first is ten times more basic.

Part C. Write your answer.

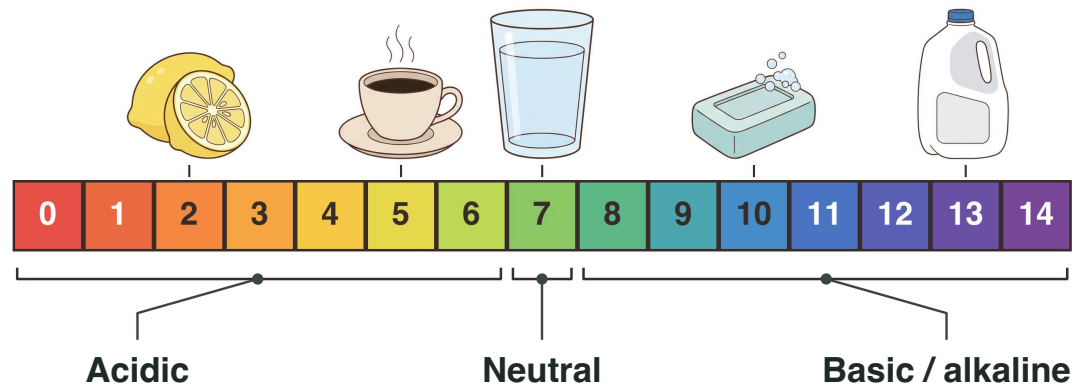
7. Black coffee has a pH of about 5. Soap has a pH of about 10. Which one is basic? How do you know?

8. Why is it unsafe to touch a strong base such as bleach?

Answer Keys

In the same order as the sheets.

The pH Scale: Answer Key



Acids, Bases and pH Words: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. Write the word that fits each description.

Word bank

Acid

Acidic

Base

Basic / alkaline

Indicator

Litmus

Neutral

Neutralize

pH scale

1.	A substance that changes color to show whether a liquid is acidic or basic.	Indicator
2.	A liquid with a pH above 7 is ____.	Basic / alkaline
3.	Lemon juice and vinegar each contain one of these. Strong ones can burn skin.	Acid
4.	The set of numbers, usually from 0 to 14, that tells how acidic or basic a liquid is.	pH scale
5.	A liquid with a pH of exactly 7 is ____.	Neutral
6.	A kind of test paper. Acids turn the blue kind red, and bases turn the red kind blue.	Litmus
7.	A liquid with a pH below 7 is ____.	Acidic
8.	To add a base to an acid, or an acid to a base, so that the pH moves toward 7.	Neutralize
9.	The opposite of an acid. Baking soda is a mild one. Strong ones can burn skin.	Base

Part B. Answer the questions.

- On the diagram, lemon juice is at about pH 2 and coffee is at about pH 5. Which one is more acidic? How do you know?
Lemon juice. It has the lower pH, and a lower pH means more acidic.
- Soap is at about pH 10 on the diagram. Is it acidic, neutral or basic? How do you know?
Basic. Its pH is above 7.
- Why should you never taste or touch an unknown liquid to find out if it is an acid or a base? What could you use instead?
Strong acids and strong bases can burn you. Use an indicator, such as litmus paper.

Measuring Acids and Bases: Answer Key

Answers are in green. Written answers will vary; these are examples.

1. What is this text mostly about?

- ☐ How to make lemonade
- ☐ Why bleach cleans so well
- ☒ How the pH scale measures acids and bases
- ☐ How litmus paper is made

2. Why do scientists never taste or touch a chemical to find out what it is?

Some acids and bases are strong enough to burn skin.

3. What is the pH of a neutral liquid such as pure water?

- ☐ 0
- ☒ 7
- ☐ 10
- ☐ 14

4. Which liquid in the text is the most acidic?

- ☐ Black coffee
- ☐ Pure water
- ☐ Bleach
- ☒ Lemon juice

5. How much more acidic is a liquid with a pH of 4 than a liquid with a pH of 5?

Ten times more acidic.

6. Number these liquids 1, 2 and 3 from the lowest pH to the highest (paragraph 3).

- Black coffee
- Bleach
- Lemon juice

7. What does an acid do to blue litmus paper?

- ☒ It turns it red.
- ☐ It turns it green.
- ☐ It leaves it blue.
- ☐ It turns it white.

8. What happens to the pH of an acid when a base is added to it?

The pH moves toward 7. The base neutralizes the acid.

Acidic, Neutral or Basic?: Answer Key

Answers are in green. The last answer may be worded differently.

SUBSTANCE	ITS pH	ACIDIC, NEUTRAL OR BASIC?
1. Soap	About 10	Basic
2. Lemon juice	About 2	Acidic
3. Pure water	7	Neutral
4. Bleach	About 13	Basic
5. Black coffee	About 5	Acidic
6. Vinegar	About 3	Acidic
7. Baking soda in water	About 8	Basic
8. Tomato juice	About 4	Acidic
9. Ammonia cleaner	About 11	Basic

Word bank

Acidic

Basic

Neutral

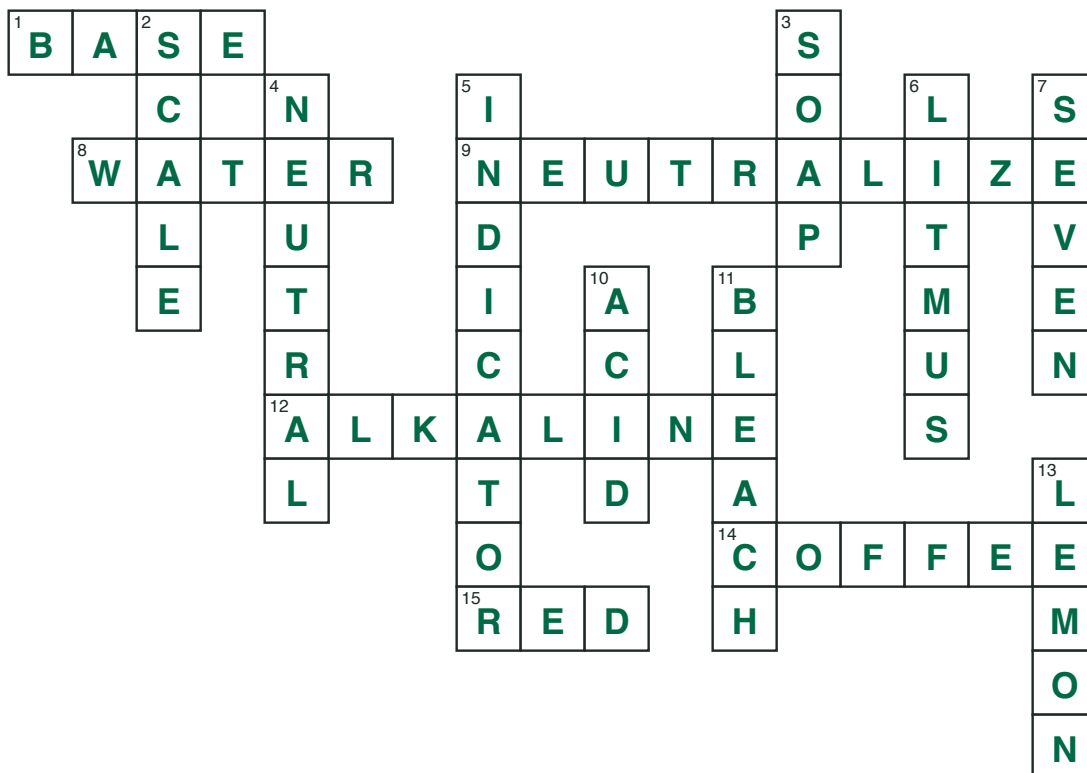
Your turn

Which substance in the table is the most acidic? Which is the most basic? Tell how the numbers show it.

Lemon juice is the most acidic. It has the lowest pH, about 2. Bleach is the most basic. It has the highest pH, about 13.

Acids and Bases Crossword: Answer Key

Answers are in green.



ACROSS

1. Baking soda is a mild one. In water it gives a pH above 7.
8. When it is pure, this liquid has a pH of 7.
9. To add a base to an acid so that the pH moves toward 7.
12. Another word for basic.
14. A dark, hot drink with a pH of about 5.
15. The color blue litmus paper turns in an acid.

DOWN

2. The pH ____ usually runs from 0 to 14.
3. You wash your hands with it. Its pH is about 10.
4. Neither acidic nor basic.
5. A substance that changes color to show whether a liquid is acidic or basic.
6. The blue kind of this test paper turns red in an acid.
7. The pH of pure water, written as a word.
10. Vinegar contains one of these. In water it gives a pH below 7.
11. A strong cleaner with a pH of about 13. It can burn skin.
13. The juice of this yellow fruit has a pH of about 2.

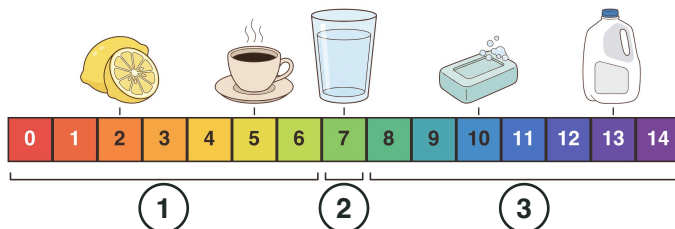
Word bank

acid alkaline base bleach coffee indicator lemon litmus neutral
neutralize red scale seven soap water

Acids, Bases and the pH Scale Quiz: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. This is the pH scale. Write the name of each range.



1 **Acidic**

2 **Neutral**

3 **Basic / alkaline**

Acidic · Basic / alkaline · Neutral

Part B. Choose the best answer.

1. Which pH is neutral?

- ☐ 0
☒ 7
☐ 10
☐ 14

2. Which of these is acidic?

- ☐ Soap
☐ Bleach
☐ Pure water
☒ Lemon juice

3. Which pH is the most basic?

- ☐ 1
☐ 6
☐ 8
☒ 13

4. What does an indicator do?

- ☐ It makes an acid stronger.
☒ It changes color in acids and bases.
☐ It turns any liquid into water.
☐ It measures how hot a liquid is.

5. What happens to the pH when a base is added to an acid?

- ☒ It moves toward 7.
☐ It drops to 0.
☐ It moves away from 7.
☐ It stays the same.

6. One liquid has a pH of 3. Another has a pH of 4. How do they compare?

- ☐ They are equally acidic.
☐ The second is more acidic.
☒ The first is ten times more acidic.
☐ The first is ten times more basic.

Part C. Write your answer.

7. Black coffee has a pH of about 5. Soap has a pH of about 10. Which one is basic? How do you know?

Soap. Its pH is above 7.

8. Why is it unsafe to touch a strong base such as bleach?

Strong bases can burn skin, just as strong acids can.