# Evidence Changes Medicine

Trace how experiments shaped germ theory and hospital care.

**FSL.1** "Students will relate the importance of significant historical experiments and their impact on research and development. Trace and model the historical development of scientific ideas and theories (e.g., atomic theory, plate tectonics…"

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline the result of each dated investigation, circle tools used to gather evidence, and number the dated events in order. Use your marks to trace how one scientific idea developed.

### From Hospital Wards to Germ Theory

1. In 1847, physician Ignaz Semmelweis noticed that more women died after childbirth in a hospital ward staffed by doctors than in a ward staffed by midwives. Doctors often came straight from examining bodies in the morgue. Semmelweis required the doctors to wash their hands with a chlorine solution before treating patients. Deaths in their ward dropped sharply. He did not know exactly what caused the illness, and many colleagues rejected his explanation. Still, comparing the wards before and after the change gave strong evidence that a simple practice could prevent deaths.

2. In 1861, Louis Pasteur tested whether tiny living things could appear in broth without coming from other living things. He boiled broth in glass flasks with long, curved necks. Air could enter, but dust carrying microbes became trapped in the bends. The broth stayed clear until Pasteur tipped a flask so its broth touched the trapped dust; then microbes grew. His experiment challenged the idea that life arose spontaneously from nonliving material. In 1867, surgeon Joseph Lister published results from using antiseptics during operations. Inspired by Pasteur's work, Lister tried to keep microbes away from wounds and reported fewer infections.

3. In 1876, Robert Koch used a microscope to study anthrax bacteria. He found the bacteria in sick animals, grew them outside an animal, and showed that the grown bacteria could cause disease in healthy animals. Koch's evidence linked a particular microbe to a particular disease, strengthening germ theory. Across these investigations, careful comparisons, glassware, and microscopes helped turn observations into explanations. Hospitals gradually adopted cleaner practices, though changing routines took time and money. The history shows that evidence alone does not instantly change society: people must decide whether to trust a claim and pay for its use.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. How did Semmelweis's comparison support a change in hospital care, even though he did not know the exact cause of the illness?

2. How did the curved neck of Pasteur's flask help him test his idea, and what result challenged spontaneous generation?

3. How did Pasteur's work influence Lister's approach to surgery?

4. How did Koch's use of a microscope strengthen germ theory, and what social barrier slowed changes in hospital care?

## 3 YOUR TURN

Your own words

A coastal town is considering a new sensor that warns fishers about harmful algae. In four sentences, propose a way to test the sensor, explain how math would help judge its results, connect the findings to a decision fishers could make, and name one concern that might affect whether people use it.

ANSWER KEY

# Evidence Changes Medicine

HIGH SCHOOL · FSL.1

## PART 1 · READ AND MARK

Underline the result of each dated investigation, circle tools used to gather evidence, and number the dated events in order. Use your marks to trace how one scientific idea developed. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | How did Semmelweis's comparison support a change in hospital care, even though he did not know the exact cause of the illness? | **Deaths in the doctors' ward dropped sharply after doctors began washing their hands with a chlorine solution, supporting handwashing as a way to prevent deaths.** |
| 2 | How did the curved neck of Pasteur's flask help him test his idea, and what result challenged spontaneous generation? | **The neck let air enter but trapped dust carrying microbes. The broth stayed clear until it touched the trapped dust, after which microbes grew.** |
| 3 | How did Pasteur's work influence Lister's approach to surgery? | **Pasteur's work helped lead Lister to try keeping microbes away from wounds with antiseptics. Lister reported fewer infections.** |
| 4 | How did Koch's use of a microscope strengthen germ theory, and what social barrier slowed changes in hospital care? | **The microscope helped Koch study the bacteria he linked to anthrax. Cleaner practices also required hospitals to change routines and spend money.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

Researchers could test water samples with both the new sensor and a trusted laboratory method. They could calculate the percentage of samples for which the results agree. If the sensor proves reliable, fishers could use its warnings to decide when to keep their boats in port. Fishers might worry that false alarms would cost them income.

Accept other accurate explanations of how each investigation contributed to germ theory or medical practice. For the open task, look for a fair comparison, a relevant mathematical measure, a decision based on evidence, and a plausible concern.