



SECTION
31.1

PATHOGENS AND HUMAN ILLNESS
Reinforcement

KEY CONCEPT Germs cause many diseases in humans.

Before the 1800s, people thought that illnesses were caused by spirits. Around 1850, however, that all changed with the developments that were made by three scientists. Their work provided evidence that disease is caused by germs.

- In 1857, Louis Pasteur came up with **germ theory**, which states that diseases are caused by small, physical particles and not spirits. These disease-causing particles are called **pathogens**.
- Around 1865, Joseph Lister found that cleaning his surgical tools with acid before a surgery greatly reduced the patient's chance for getting an infection and dying.
- Until 1883, there was no way to test germ theory. Robert Koch changed that by developing four conditions: (1) the pathogen thought to cause a disease was present in every case; (2) the pathogen can be isolated from the body; (3) healthy animals will catch the disease when given the pathogen; and (4) the pathogen can be isolated from the newly infected animal. If a scientist studying a disease found all of these things to be true, one could conclude that the pathogen that was isolated did in fact cause the disease.

There are five types of pathogens that cause a variety of diseases: bacteria, viruses, fungi, protozoa, and parasites. Each of these pathogens harm the body by destroying cells, taking cells' nutrients, or poisoning cells. In order for a pathogen to cause an infection, it must somehow get inside the body. Generally, a pathogen can enter the body in one of two ways

- In direct contact, a pathogen spreads when an infected individual touches an healthy individual.
- Diseases that spread by indirect contact can infect a healthy person who encounters the pathogen that is waiting on a surface, such as a doorknob. Indirect contact also includes diseases that are spread by vectors. A **vector** is a living agent, such as a mosquito, that transfers a pathogen from one person to another.

1. How is germ theory different from previous theories of disease? _____

2. What is a pathogen, and what are the five general types? _____

3. How are pathogens that spread by direct contact different from those that spread by indirect contact? _____

4. What is a vector? _____
