1: Why are the answers that flow from the scientific approach more reliable than those based on intuition and common sense?

Although common sense often serves us well, we are prone to hindsight bias (also called the “I-knew-it-all-along phenomenon”), the tendency to believe, after learning an outcome, that we would have foreseen it. We also are routinely overconfident of our judgments, thanks partly to our bias to seek information that confirms them. Although limited by the testable questions it can address, scientific inquiry can help us sift reality from illusion and restrain the biases of our unaided intuition.

2: What are three main components of the scientific attitude?

The three components of the scientific attitude are (1) a curious eagerness to (2) skeptically scrutinize competing ideas and (3) an open-minded humility before nature. This attitude carries into everyday life as critical thinking, which examines assumptions, discerns hidden values, evaluates evidence, and assesses outcomes. Putting ideas, even crazy-sounding ideas, to the test helps us winnow sense from nonsense.

3: How do theories advance psychological science?

Psychological theories organize observations and imply predictive hypotheses. After constructing precise operational definitions of their procedures, researchers test their hypotheses, validate and refine the theory, and, sometimes, suggest practical applications. If other researchers can replicate the study with similar results, we can then place greater confidence in the conclusion.

4: How do psychologists observe and describe behavior?

Psychologists observe and describe behavior using individual case studies, surveys among random samples of a population, and naturalistic observations. In generalizing from observations, remember: Representative samples are a better guide than vivid anecdotes.

5: What are positive and negative correlations, and why do they enable prediction but not cause-effect explanation?

Scatterplots help us to see correlations. A positive correlation (ranging from 0 to +1.00) indicates the extent to which two factors rise together. In a negative correlation (ranging from 0 to −1.00), one item rises as the other falls. An
association (sometimes stated as a *correlation coefficient*) indicates the possibility of a cause-effect relationship, but it does not prove the direction of the influence, or whether an underlying third factor may explain the correlation.

6: **What are illusory correlations?**

*Illusory correlations* are random events that we notice and falsely assume are related. Patterns or sequences occur naturally in sets of random data, but we tend to interpret these patterns as meaningful connections, perhaps in an attempt to make sense of the world around us.

7: **How do experiments, powered by random assignment, clarify cause and effect?**

To discover cause-effect relationships, psychologists conduct *experiments*, manipulating one or more factors of interest and controlling other *confounding variables*. *Random assignment* minimizes preexisting differences between the *experimental group* (exposed to the treatment) and the *control group* (given a placebo or different version of the treatment). The *independent variable* is the factor you manipulate to study its effect. The *dependent variable* is the factor you measure to discover any changes that occur in response to these manipulations. Studies may use a *double-blind procedure* to avoid the *placebo effect* and researcher’s bias.

8: **How can we describe data with measures of central tendency and variation?**

Three measures of central tendency are the *median* (the middle score in a group of data), the *mode* (the most frequently occurring score), and the *mean* (the arithmetic average). Measures of variation tell us how similar or diverse data are. A *range* describes the gap between the highest and lowest scores. The more useful measure, the *standard deviation*, states how much scores vary around the mean, or average, score. The *normal curve* is a bell-shaped curve that describes the distribution of many types of data.

9: **What principles can guide our making generalizations from samples and deciding whether differences are significant?**

Three principles are worth remembering: (1) Representative samples are better than biased samples. (2) Less-variable observations are more reliable than those that are more variable. (3) More cases are better than fewer.

When averages from two samples are each reliable measures of their own populations, and the difference between them is relatively large, we can assume that the result is *statistically significant*—that it did not occur by chance alone.

10: **Can laboratory experiments illuminate everyday life?**

By intentionally creating a controlled, artificial environment in the lab, researchers aim to test theoretical principles. These general principles help explain everyday behaviors.

11: **Does behavior depend on one’s culture and gender?**

Attitudes and behaviors vary across *cultures*, but the underlying principles vary much less because of our human kinship. Although gender differences tend to capture attention, it is important to remember our greater gender similarities.

12: **Why do psychologists study animals, and is it ethical to experiment on animals?**

Some psychologists are primarily interested in animal behavior. Others study animals to better understand the physiological and psychological processes shared by humans. Under ethical and legal guidelines, animals used in experiments rarely experience pain. Nevertheless, animal rights groups raise an important issue: Even if it leads to the relief of human suffering, is an animal’s temporary suffering justified?

13: **Is it ethical to experiment on people?**

Researchers may temporarily stress or deceive people in order to learn something important. However, animal protection legislation, laboratory regulation and inspection, and local ethics committees serve to protect human and animal welfare. At universities, Institutional Review Boards screen research proposals. Ethical principles developed by international psychological organizations urge researchers using human participants to obtain *informed consent*, to protect them from harm and discomfort, to treat their personal information confidentially, and to fully *debrief* all participants.

14: **Is psychology free of value judgments?**

Psychologists’ values influence their choice of research topics, their theories and observations, their labels for behavior, and their professional advice. Applications of psychology’s principles have been used mainly in the service of humanity.