Quiz 1:

1.

IPV is inactive (killed) and administered via injection. OPV is a live-attenuated oral vaccine.

2.

From 1955 to 1961, the IPV was the only polio vaccine used in the USA. Between 1961 and 1964, the OPV gradually became predominant. By 1968, IPV was no longer administered in the USA. Beginning in 2000, children in the United States should be immunized with IPV in place of the OPV.

3.

IPV has been used exclusively in the Netherlands since 1950s. OPV was never widely available in the Netherlands.

4.

The major advantage of the OPV is that it provides longer-lasting immunity, reducing the need for booster shots. Other advantages: it is cost-effective, easy to administrate, and it offers passive vaccination by causing an infection in the bowel, leading to the excretion of live-attenuated virus that could protect unvaccinated individuals.

5.

Because widespread immunization with the IPV meant that most children in the US had high antibody levels.

6.

Van Hemert developed the Bilthoven Unit, which allowed for the growth of bacteria. Van Wezel adapted it to grow monkey kidney cells and poliovirus. The unit increased production of kidney cells and poliovirus by 1000x and greatly reduced the number of monkeys required by the institute to the extent that they no longer needed to be imported.

7.

Polio is an epidemic disease, so the change in the number of cases year over year could be due to epidemic fluctuations.

8.

The design was biased against the vaccine because wealthier families were more likely to consent to vaccination. Children from those families were more vulnerable to polio because they grew up in more hygienic environments in which the lower level exposures that would produce antibodies were less likely.

9.

A blind experiment is one in which the participants are unaware whether they have received the treatment or a placebo. A double-blind experiment is one in which both the participants and researchers do knot know who receives the treatment and who receives the placebo.

10.

The event with such low odds is that the observed difference in polio rates between treatment and control groups could be due to chance.

Quiz 2:

1.

Control is a subject who did not get the treatment.
A controlled experiment is one where the investigators decided who will be in the treatment group and who will not.
Control as a verb means to control for confounding factors in an observational study.

2.

There is a strong association between smoking and heart disease.
Gender could be a confounding factor. Smokers are male, and men are more likely to get heart disease.
Age could also be a confounding factor. Older people have different smoking habits (and are more likely to get lung cancer).

3.

Interpretations varied regarding the idea of an 'effect'.

Answer 1: adherence had no effect on the outcome of the trial because the drug was ineffective. Adherence to the protocol in the adherers group may reflect greater concern with their health.
Answer 2: adherence had a positive effect on five-year mortality rates. Adherence to the protocol in the adherers group may reflect greater concern with their health.

4.

Pellagra is caused by niacin-deficiency.

5.

Hypothesis: "The decline in suicide rates in the 1960s is better explained by a shift from coal gas to natural gas for heating and cooking."

No proof is provided.

6.

"A confounding factor is a difference between the treatment and control group that affects the response being studied." Answers can vary. Some version of: identifying all confounds may not be feasible, but it is certainly possible to attempt to generate a list of possible confounds that is as exhaustive as possible.

Quiz 3:

1.

The social and collective aspect of science makes it subjective. Scientists work together in teams, give lectures, publish in peer-reviewed journals to engage in collective scrutiny and revision.

2.

Most are owned by commercial outfits.

3.

The abstract summarizes the paper and the results. Top journals' editors might only read the abstracts to decide whether the paper should be further reviewed. To avoid â€˜desk rejectionâ€™, it is important to write a good abstract to be accepted.

4.

The methods section is important because it allows other scientists to reproduce and replicate the study.

5.

Universalism: Knowledge and claims shouldn't be evaluated based on the personal attributes (e.g. gender, race, social backgrounds) of the scientist.
Disinterestedness: Scientists do research to advance the understanding and not for any personal gain.
Communality: Knowledge has to be shared openly with other scientists so that others can build on it.
Organized skepticism: Any scientific claims can be thoroughly checked.

6.

A special element released by flammable objects when they burned.

7.

A larger sample size makes data representative and reduces the probability that the result arises from chance. The better technology, the use of infrared beams, eliminate human biases that might occur in measuring time. In the original experiment, the researchers might have timed different participants differently based on their knowledge about whether the participants were "primed".

8.

A p-value of 5% suggests that the result is likely not due to chance. An adequate p-value doesn't necessarily indicate the likelihood that the experiment cannot be replicated without more information about the experiment.