

# TutorTed

## ACT Science Knowledge



### What you need to know to be ready for the ACT Science Test.

ACT Science asks a handful of questions (no more than four on any test we've seen) that require fundamental science knowledge to solve. We scoured the last 15 years of released ACTs to share with you all of the science concepts that have appeared on those exams. Here they are!

### A couple of points to make about this list:

You'll notice right away that a lot of this science content is the most fundamental, essential kind. That is not by mistake. The ACT is not going to ask you to know Planck's Constant or the atomic number of iridium. Much of this stuff you probably already know—and that's good news.

We put **in bold** the concepts that showed up over and over again. Make sure you know those ones in particular.

Once you finish watching the video and studying the list, take the quiz to assess how well you know the material. If necessary, go back and study the list again. In fact, this list is a great study tool for your review the week before your ACT!

### EXPERIMENTAL PROCEDURE

- **Independent variables** are directly controlled by the experimenter. They are usually plotted on the x-axis of a graph.
- **Dependent variables** are the measured outcomes of an experiment. They are not directly controlled by the experimenter. They are usually plotted on the y-axis of a graph.
- Control groups receive no experimental treatment.
- Experimental design: to test the effect of one variable, an experiment should vary only that one variable and leave all of the others constant.
- A hypothesis is a yet-unproven proposal based on preliminary data.
- Unsterilized equipment may have microorganisms that could contaminant experiments.

### TERMINOLOGY

- When two things are described as **directly proportional**, it means that when one of them goes up, the other one goes up. Likewise, if one goes down, the other goes down.
- When two variables are **inversely proportional**, as one goes up, the other goes down.

## PHYSICAL PROPERTIES

- Mass is the amount of matter in an object. A pool ball has more mass than a tennis ball. Mass is typically measured in grams and kilograms.
- Volume is the amount of space occupied by a substance. That pool ball and tennis ball have approximately the same volume. Volume is typically measured in liters and cubic meters.
- **Density equals mass divided by volume.** Density measures how much matter an object has per unit of space.
- The freezing point of a substance is the same as its melting point.
- The boiling point of a substance is the same as its condensation point.
- The melting/freezing point of water ( $H_2O$ ) is  $0^{\circ}C$ .
- The boiling/condensation point of water is  $100^{\circ}C$ .
- Stirring a substance helps to maintain the uniformity of its temperature.
- Evaporation is when liquid turns into a gas form due to heat.
- Insulation slows heat loss or gain.
- When water is heated it becomes less dense.
- A heterogeneous mixture contains different substances that remain physically separate. Chicken noodle soup is heterogeneous.
- A homogeneous mixture is a mixture with a uniform composition. Salt water is homogeneous.
- **Substances with lower density float above substances of higher density.**
- Objects with greater mass produce a greater gravitational force.
- The more surface area of an object is exposed to a solvent, the more quickly it will dissolve.
- Permeability describes the ability of a material to allow liquids or gases to pass through it. Something that is impermeable does not allow any other substance to pass through it.
- **Viscosity** is a measurement of the speed at which something flows. Higher viscosity is correlated with slower flow.
- The volume of a cube equals the length of a side raised to the third power.

### METHODS OF HEAT TRANSFER

- Conduction: the transfer of heat between substances that are touching. Example: if a heated block of aluminum sits next to a cool block, the heated block's temperature will fall and the cool block's temperature will rise.
- Convection: the transfer of thermal energy when a warmer area rises and circulates past a cooler area. Example: when water boils, the hotter water rises past the cooler water, pushing the cooler water to the bottom where it will be heated.
- Radiation: the transfer of heat through thermal, infrared radiation. Does not require contact. Example: warmth from the sun.

