

ACT Science Terms and Concepts

Every ACT Science section has 2 or 3 questions that require some outside scientific knowledge. Though you can never be certain what will be tested, several terms and concepts have appeared many times on past ACTs, so it is a good bet you might see them tested again. Here is a selection of some of the most often tested terms and concepts.

General Science

Lab Equipment

Balance a device for measuring mass

Beaker short, wide glassware used to hold or measure liquid

Graduated cylinder tall, narrow glassware with markings, used to measure the volume of a liquid

Calorimeter a device in which a chemical reaction is performed so that the temperature change can accurately be measured

Litmus paper strips that turn color based on the pH of a solution (red = acid; blue = base)

Water bath, sand bath, or ice bath used to evenly heat or cool a solution by putting a container into the bath to spread the temperature change more evenly

Math Calculations and Terms

Percent error method used to calculate how close experimental results are to the expected results

$$\text{percent error} = \frac{|\text{expected value} - \text{measured value}|}{\text{expected value}} \times 100\%$$

Direct and inverse relationships directly related, or proportional, measurements will increase together (as x increases, y increases), where inversely related measurements will have opposite outcomes (as x increases, y decreases)

Metric measurements different units of measurement vary by a factor of 10

kilo	one thousand	1 kilogram = 1000 grams	1 kilometer = 1000 meters
centi	one one-hundredth	100 centiliters = 1 liter	100 centimeters = 1 meters
milli	one one-thousandth	1000 milligrams = 1 gram	1000 milliliters = 1 liter

Experimental Terms

Control group the group that receives no treatment or “normal” treatment; the basis for comparison

Experimental group the group that is given the variable (drug, treatment...) that is being tested

Independent vs. dependent variable the dependent variable should be evident by the fact that it is affected, either positively or negatively, by changes in the independent variable, which may be itself changing at a constant rate

Biology

Genetics

Genes individual units of hereditary information, encoded in a specific sequence of DNA

Genotype the genetic makeup of an organism

Phenotype the actual physical traits of an organism, which are determined by its genotype

Alleles the different traits that one can have from alternate genetic combinations
For example, brown eyes (*B* allele) are dominant over blue eyes (*b* allele), which are recessive

Homozygous having a pair of matching alleles

Heterozygous having a pair of unmatched alleles

DNA the primary genetic material, found in the nucleus in the form of a double helix

RNA intermediate genetic material, created from DNA by the process of transcription and found in and outside the nucleus in the form of a single helix

Mitosis the process of cell division, wherein a cell replicates its genetic material and splits into two genetically identical daughter cells

Punnett square a method for determining percent probabilities of different alleles for genetic crosses (mating). Usually it is a two by two square, with the traits of each parent on two of the sides. The inside squares represent the possible combinations that can be passed along to children. The example to the right is a cross between two parents who both carry the *dominant* (*A*) and *recessive* (*a*) gene for a trait. If blonde hair is dominant and red hair is recessive, then in this case there is a 75% chance that the child will have blonde hair.

Cross $Aa \times Aa$

	<i>A</i>	<i>a</i>
<i>A</i>	<i>AA</i>	<i>Aa</i>
<i>a</i>	<i>Aa</i>	<i>aa</i>

Energetics

Glucose the basic source of energy for all animals; structures composed of chains of glucose make up structural parts of plant cells. Glucose is a sugar, or saccharide, and has the chemical formula $C_6H_{12}O_6$.

ATP a high-energy molecule providing cellular energy for many processes

Cellular respiration the process by which cells break down glucose to obtain chemical energy in the form of ATP

Aerobic in the presence of oxygen

Anaerobic in the presence of no oxygen

Photosynthesis the process by which green plants utilize chemical energy from the sun to create carbohydrates and oxygen from carbon dioxide and water

Classification

Genus and species the two most specific categories of classification, the name by which most animals and plants are known

Endothermic warm-blooded organisms that can regulate their body temperature

Ectothermic cold-blooded organisms that are dependent on external sources to heat their bodies

Chemistry

Phase Changes

Freezing changing from liquid to solid (the freezing point of water is 0°C)

Melting changing from solid to liquid

Condensation changing from gas to liquid

Vaporization changing from liquid to gas (the boiling point of water is 100°C)

Sublimation changing from solid to gas

Deposition changing from gas to solid

Miscellaneous Chemistry

Reactants and products reactants are the starting materials, which are written on the left of a chemical equation, while products are what is created, and they are written on the right.

In the example $A + B \rightarrow C + D$, reactants A and B combine to form products C and D .

pH scale measures the acidity of a solution from 0–14

7 is neutral (pure water)

any solution with a pH below 7 is acidic

any solution with a pH above 7 is basic

Solvent a liquid that a solute can be dissolved into

Solute the component that dissolves into a solvent in a solution

Density mass divided by volume, commonly in **g/mL** (the density of water is 1 g/mL)

Viscosity a measure of a liquid's resistance to flow (syrup is more viscous than water)

Porous or permeable having small spaces or holes through which liquid or gas can pass

Physics

Subatomic Particles

Proton a particle in the nucleus of an atom having a positive charge of +1 and a mass of 1 atomic mass unit (amu)

Neutron a particle in the nucleus of an atom having no charge and a mass of 1 atomic mass unit (amu)

Electron a particle outside of the nucleus of an atom, in the electron cloud, having a negative charge of -1 and negligible mass

Charged particles opposite charges will attract each other, while like charges will repel each other

Energy

Potential energy stored energy, due, for example, to an object's height or the tightness of a wound spring, that could result in motion

Kinetic energy the energy of an object in motion

Heat a form of energy associated with the movement of atoms and molecules in a material

Miscellaneous Physics

Mass the quantity of matter in a body, usually measured in **kilograms (kg)**

Velocity the magnitude (speed) and direction of motion, usually measured in **meters per second** or **m/s**

Acceleration the rate of change of velocity over time, usually measured in **meters per second per second** or **m/s²**

Force the mass multiplied by the acceleration of an object, commonly measured in **newtons (N)**

Drag force a type of resistance, which is always in the opposite direction of the relative motion of an object

Work a force multiplied by the distance over which that force is exerted

Momentum the mass times the velocity of an object