

# O.G.T. SCIENCE TEST: *QUICK STUDY GUIDE*

version 2

## PLATE TECTONICS

The Earth's outer layer is broken up into 7 **plates**. This is sometimes referred to as the CRUST.

The **plates move due to convection currents** inside the MANTLE.

When the plates move, many things can happen including **volcano eruptions, earthquakes, mountain building, seafloor spreading**, etc.

## ATOMS

**protons** = positive charge, found inside the nucleus

**electrons** = negative charge, found in the "electron cloud" (outside of the nucleus)

**neutrons** = neutral charge, found inside the nucleus

## THE PERIODIC TABLE

The **atomic number** is equal to the **number of protons**. The *number of protons is equal to the number of electrons* in a neutral atom.

The **atomic mass** is equal to the **number of protons plus the number of neutrons**.

The **group number** (found at the top of each column) is equal to the **number of valence electrons**. *This is used when drawing electron dot structures.*



## POTENTIAL ENERGY VS. KINETIC ENERGY

potential energy – an object's stored energy (*Objects that are higher up or have more mass have a higher potential energy because they have further to drop*)

kinetic energy – an object's energy while in motion (*the faster it moves, the more kinetic energy it has*)

## DENSITY

density = mass/volume

Substances that are MORE dense SINK.

Substances that are LESS dense RISE.

## NEWTON'S LAWS OF MOTION & GRAVITY

**Newton's 1<sup>st</sup> Law:** an object in motion stays in motion and an object at rest stays at rest

**Newton's 2<sup>nd</sup> Law:**  $F = ma$

**Newton's 3<sup>rd</sup> Law:** for every action there is an equal and opposite reaction

**Friction:** will slow down an object

**Gravity:** Under ideal conditions, objects fall to the ground at the same rate; it does not matter if one is heavier than the other

## SCIENTIFIC INQUIRY

**Observations are made by gathering information using your senses** about events or processes. An **inference is a guess** based on prior knowledge or experience.

A **hypothesis is a proposed scientific explanation** for a set of observations.

The variable that is **deliberately changed is called the manipulated variable**.

The variable that is observed and **changes in response to the manipulated variable is called the responding variable**.

A **control group is not exposed to the independent variable** so that it can be used as comparison to the experimental data.

There should only be one manipulated variable in a scientific experiment.

## FOOD WEBS & ENERGY PYRAMIDS

FOOD WEBS show the **feeding relationships between plants and animals in an ecosystem**. *Arrows* show the relationships. They show the direction of energy transfer. (the organism that the arrow is pointing to eats the organism the arrow is coming from)

ENERGY PYRAMIDS show the **relative amounts of energy at each trophic level**. The amount of energy is greatest at the bottom of the pyramid and lowest at the top of the pyramid.

*trophic level – each step in a food web or pyramid*

## Prefixes/Suffixes to know

**bio** – life (*biology is the study of life*)

**geo** – earth (*geology is the study of the earth*)

**hetero** – different (*heterozygous means different genes*)

**homo** – same (*homozygous means same/like genes*)

**a** – not (*abiotic means not living*)

**thermo** – heat/temperature (*thermometer*)

**eco** – environment/outdoors (*ecology is study of outdoors*)

**chemo** – chemical (*chemosynthesis is creating chemicals*)

**photo** – light (*photography uses light to take pictures*)

**synthesis** – creates (*photosynthesis uses light to create food*)

## ENERGY TRANSFER

Energy cannot be created or destroyed. It can only be transferred from one form to another (i.e. electrical to mechanical).

Types of energy:

thermal – heat

mechanical – movement

(eg. pedaling a bicycle)

chemical – chemical reactions

(eg. chemicals in a battery, food in your body)

electrical – electricity

radiant – like light waves traveling through the air

(eg. from the Sun to your eyes)

Heat energy ALWAYS travels from **hot to cold**.

## CELLULAR ORGANELLES

**Nucleus** – contains genetic material (DNA) and chromosomes

**Mitochondria** – respiration occurs here; makes energy

**Cell membrane** – the “skin” of the cell; it encloses the entire cell and food/wastes pass through it

**Flagella** – is like a long tail used for movement (cilia are little hairs that could also be used for movement)

**Plant cells contain a cell wall and chloroplasts.** Animal cells do not.

**Chloroplasts** – where plant cells use chlorophyll to do photosynthesis

## CELLS

**prokaryotes** = simple cells that do not have a nucleus;  
example: bacteria

**eukaryotes** = complex cells that have a nucleus; includes plants, animals, humans, protists and fungi

## CELLULAR PROCESSES

**photosynthesis** – process in which a plant (or other organism) uses light to convert carbon dioxide and water into food/energy

**cellular respiration** – process that releases energy by using oxygen to break down sugar (glucose) and other food molecules into food/energy

## GENETICS

**Genes come in pairs of CHROMOSOMES** (half come from your mom and half come from your dad).

The different varieties of genes are called alleles. **Alleles can be dominant or recessive.** If the dominant allele (represented by a CAPITAL letter) is present, it will always have “control.” A recessive allele (represented by a lowercase letter) will only be recognized if it is paired with another recessive allele.

**HOMOZYGOUS PAIRS** can be 2 dominant alleles (EE) paired together or 2 recessive alleles (ee) paired together. A

**HETEROZYGOUS PAIR** is one dominant allele and one recessive allele (Ee).

**GENOTYPE** is the genetic make-up of an individual (eg. EE or Ee). **PHENOTYPE** is an individual’s physical appearance.

**PUNNETT SQUARES** are useful for finding the probabilities of traits being expressed in potential offspring.

A **PEDIGREE** goes further by tracking the transmission of traits among various generations.

	E	e
E	EE	Ee
e	Ee	ee

## COMMUNITY INTERACTIONS

**Competition** – occurs when organisms compete for the same resource at the same place at the same time

**Predation** – an interaction in which one organism captures and feeds on another organism

**Symbiosis** – any relationship in which two species live closely together

**Mutualism** – a type of symbiosis in which both species mutually benefit from the relationship

**Commensalism** – a type of symbiosis in which one organism benefits and other is neither helped nor harmed

**Parasitism** – a type of symbiosis in which one organism lives on or inside the other organism and harms it

## SCIENCE BUZZWORDS

**BIAS**...unfair prejudice towards a particular opinion; favoring one side of an argument

**ETHICS**...a set of principles that guide decision-making; whether something is morally right or wrong (*it is ethical to warn people of the side-effects of a drug...it is unethical to secretly test new drugs on someone*)

**QUALITATIVE**...data that does not use numbers

**QUANTITATIVE**...data that uses numbers

## ABIOTIC & BIOTIC FACTORS

**abiotic factor** – something that is **not and has never been alive**, examples: a rock in the forest, the water in a stream

**biotic factor** – things that are or used to be **alive**, examples: a redwood tree, a rotting tree stump