

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

## 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

## 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

## 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

## 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

Punnett Square

## 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