Name: ____ Class: _____________

SECOND TERM E-LEARNING NOTE

SUBJECT: BASIC SCIENCE **CLASS: JSS2**

SCHEME OF WORK

WEEK	TOPIC
1.	WORK, ENERGY AND POWEER
2.	POTENTIAL AND KINETIC ENERGY
3.	CALCULATING KINETIC AND POTENTIAL ENERGY
4.	ENERGY TRANFER WHEN WORK IS DONE
5.	FAMILY LIFE EDUCATION II
6.	KINETIC THEORY
7.	EXPLANATION OF SOME PHENOMENA USING KINETIC THEORY
8.	BOILING AND EVAPORATION
9.	THERMAL ENERGY I
10.	THERMAL ENERGY II

REFRENCE

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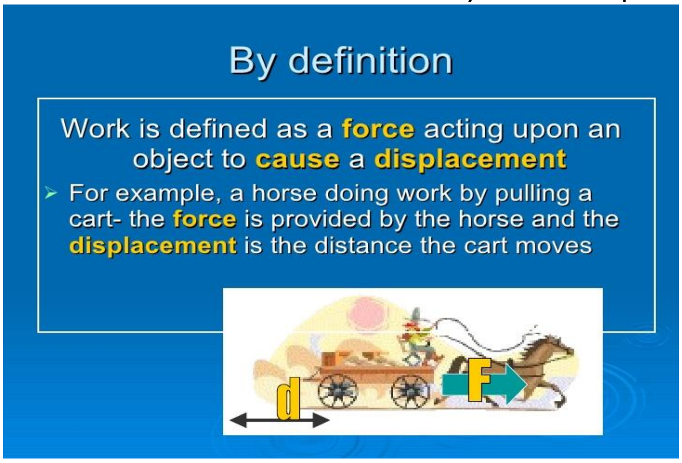
WEEK ONE **DATE:……………….**

TOPIC: WORK, ENERGY AND POWER

Work

Work results when a force acts upon an object to cause a displacement (or a motion) or, in some instances, to hinder a motion. Three variables are of importance in this definition - force, displacement, and the extent to which the force causes or hinders the displacement. Each of these three variables find their way into the equation for work.



That equation is:

Work = Force × Displacement

W = F × d

Since the standard metric unit of force is the Newton and the standard metric unit of displacement is

the meter, then the standard metric unit of work is a Newton•meter, defined as a Joule and abbreviated with a J.

Name: ____ Class: ___________

Evaluation

1. What is work?
2. What is the standard unit of work?

Energy

Energy is defined as the amount of work a physical system is capable of performing. Energy, can neither be created nor consumed or destroyed.

Energy, however may be converted or transferred to different forms: The kinetic energy of moving air molecules may be converted to rotational energy by the rotor of a wind turbine, which in turn may be converted to electrical energy by the wind turbine generator. With each conversion of energy, part of the energy from the source is converted into heat energy. We mean that part of the energy from the source cannot be used directly in the next link of the energy conversion system, because it is converted into heat. E.g. rotors, gearboxes or generators are never 100 per cent efficient, because of heat losses due to friction in the bearings, or friction between air molecules.

Note: Energy is measured in Joules (J)

EVALUATION

1. What do you understand by the word energy?
2. What is the unit of energy?

Power

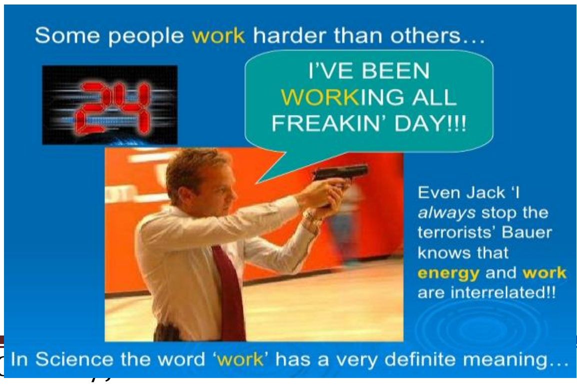
Electrical power is usually measured in watt (W), kilowatt (kW), megawatt (MW), etc. **Power is energy transfer per unit of time.**

Power may be measured at any point in time, whereas energy has to be measured during a certain period, e.g. a second, an hour, or a year. If a wind turbine has a rated power or nameplate power of 1000 kW, that tells you that the wind turbine will produce 1000 kilowatt hours (kWh) of energy per hour of operation, when running at its maximum performance (i.e. at high winds above, say, 15 metres per second (m/s)).

The power of automobile engines are often rated in horsepower (HP) rather than kilowatt (kW). The word "horsepower" may give you an intuitive idea that **power** defines how much "muscle" a generator or motor has, whereas **energy** tells you how much "work" a generator or motor performs during a certain period of time.

Concepts of work, energy and power

Virtually every day we see people carry out various task such as pulling or pushing objects towards a distance. It is observed that force is applied when carrying out the aforementioned activities .It is also pertinent to note that many activities which involve



human fatigue do not necessarily, imply that mechanical work is done. For instance, if a man carries a heavy load on his head or his hands , no work is being done if the load is kept stationary.

Evaluation:

1. Define the following terms: A.Work B. EnergyC. power
2. What is the unit of energy?

FORMS OF ENERGY

Gravitational energy - Stored energy in raised objects e.g. Sky divers
Chemical energy - Stored energy in fuel, foods and batteries e.g. Organic food
Sound energy - Energy released by vibrating objects e.g. Guitar
Electrical energy - Energy in moving or static electric charges e.g. Lightning
Elastic potential –Stored energy in stretched or squashed objects. E.g. Catapult
Nuclear energy - Stored in the nuclei of atoms. e.g. Nuclear fuel assembly
Light energy - Also called radiant energy. i.e energy from the sun. e.g. Sunlight
Kinetic energy - that energy exhibited by a moving body or object. e.g. A bullet cutting a playing card. The energy in moving objects. Also called **movement energy**.
Potential energy - is the energy exhibited by a body or object due to its position..
Mechanical energy - The sum of (usually macroscopic) kinetic and potential energies
Mechanical wave energy - a form of mechanical energy propagated by a material's oscillations
Chemical energy - that contained in molecules.
Electric energy - that from electric fields
Magnetic energy - that from magnetic fields. E.g. Energy in magnets and electromagnets
Nuclear energy - is the energy released by that of binding nucleons to form the atomic nucleus
Ionization energy - energy involved in binding an electron to its atom or molecule
Elastic energy - that of deformation of a material (or its container) exhibiting a restorative force
Gravitational energy - that from gravitational fields
Heat energy - an amount of thermal energy being transferred (in a given process) in the direction of decreasing temperature. E.g. burning match. Also called **thermal energy**
Mechanical work energy - an amount of energy being transferred in a given process due to displacement in the direction of an applied force.

READING ASSIGNMENT

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EVALUATION

1. State the law of conservation of energy.
2. List five forms of energy

GENERAL EVALUATION

1. Define the following terms : A. Work B. Energy C. power
2. State the law of conservation of energy.
3. List five forms of energy.
4. What do you understand by the word energy?
5. What is the unit of energy?

Name: ____ Class: ___________

WEEKEND ASSIGNMENT

1. The mainspring to all life activities is the A. energy B. power C. work D. force
2. ---------- is the amount of work a physical system is capable of performing. A. Energy B. Work C. Power D. Force
3. --------- is the sum of (usually macroscopic) kinetic and potential energies A. Mechanical B. Mechanical Wave C. Mechanical Advantage d. Potential
4. --------- results when a force acts upon an object to cause a displacement (or a motion) or, in some instances, to hinder a motion. A. Work B. Power C. Energy D. Potential
5. The law of conservation of energy is also known as ---- A. First law of thermodynamic B. Law of mass action C. Pythagoras theorem D. None

THEORY

1. Define the following terms: A. work B. energy C. power
2. List five forms of energy and explain.

WEEK TWO **DATE: …………….**

TOPIC: POTENTIAL AND KINETIC ENERGY

Kinetic energy is energy possessed by a body by virtue of its movement. Potential energy is **the energy possessed by a body by virtue of its position or state**. While kinetic energy of an object is relative to the state of other objects in its environment, potential energy is completely independent of its environment. Hence the acceleration of an object is not evident in the movement of one object, where other objects in the same environment are also in motion. For example, a bullet whizzing past a person who is standing possesses kinetic energy, but the bullet has no kinetic energy with respect to a train moving alongside.

Definition

The energy of a body or a system with respect to the motion of the body or of the particles in the system. Potential Energy is the stored energy in an object or system because of its position or configuration.

Relation to environment

Kinetic energy of an object is relative to other moving and stationary objects in its immediate environment. Potential energy is not relative to the environment of an object.
Transferability
Kinetic energy can be transferred from one moving object to another, say, in collisions. Potential energy cannot be transferred.
Examples, Flowing water, such as when falling from a waterfall. Water at the top of a waterfall, before the precipice. SI Unit is Joule (J)

INTERCONVERSION OF KINETIC AND POTENTIAL ENERGY

The law of conservation of energy states that energy cannot be destroyed but can only be transformed from one form into another. Take a classic example of a simple pendulum. As the pendulum swings the suspended body moves higher and due to its position potential energy increases and reaches a maximum at the top. As the pendulum begins its downward swing, the stored potential energy is converted into kinetic energy.

When a spring is stretched to one side, it exerts a force to the other side so it can come back to its original state. This force is called restoring force and acts to bring objects and systems to their low energy level position. The force required to stretch the spring is stored in the metal as potential energy. When the spring is released, the stored potential energy is converted into kinetic energy by the restoring force.

When any mass is lifted, the gravitational force of the earth (and the restoring force in this case) acts to bring it back down. The energy needed to lift up the mass is stored as potential energy due to its position. As the mass is dropped, stored potential energy is converted to kinetic energy.

Types of Kinetic Energy and Potential Energy

Kinetic energy can be classified into two types, depending on the type of objects:
Translational kinetic energy
Rotational kinetic energy

Rigid non rotating bodies have rectilinear motion. Thus translational kinetic energy is kinetic energy possessed by an object moving in a straight line. Kinetic energy of an object is related to its momentum (product of mass and velocity, p= mv where m is mass and v is velocity). Kinetic energy is related to momentum through the relation $E = p^2 / 2m$ and hence translational kinetic energy is calculated as $E = ½ mv^2$. Rigid bodies which rotate along their center of mass possess rotational kinetic energy. Rotational kinetic energy of a rotating body is calculated as the total kinetic energy of its different moving parts. Bodies at rest also have kinetic energy. The atoms and molecules in it are in constant motion. The kinetic energy of such a body is the measure of its temperature.

Potential energy is classified depending on the applicable restoring force.

Gravitational potential energy – potential energy of an object which is associated with gravitational force. For example, when a book is placed on top of a table, energy required to raise the book from the floor and energy possessed by the book due to its elevated position on the table is gravitational potential energy. Here gravity is the restoring force.

Elastic potential energy – energy possessed by an elastic body like the bow and catapult when it is stretched and deformed in one direction is elastic potential energy. The restoring force is elasticity which acts in the opposite direction.

Chemical potential energy – energy related to arrangement of atoms and molecules in a structure is chemical potential energy. Chemical energy possessed by a substance due to the potential it has to undergo a chemical change by taking part in a chemical reaction is chemical potential energy of the substance. When fuel is used, for example, chemical energy stored in fuel is converted to produce heat.

Electrical potential energy – energy possessed by an object by virtue of its electric charge is electrical potential energy. There are two types – electrostatic potential energy and electrodynamic potential energy or magnetic potential energy.

Nuclear potential energy – potential energy possessed by particles (neutrons, protons) inside an atomic nucleus is nuclear potential energy. For example, hydrogen fusion in the sun converts potential energy stored in solar matter into light energy.

Applications

- The roller coaster in an amusement park begins with the conversion of kinetic energy into gravitational potential energy.
- The gravitational potential energy keeps planets in orbit around the sun.
- Projectiles are thrown by a trebuchet making use of gravitational potential energy.
- In spacecrafts, chemical energy is used for takeoff after which the kinetic energy is increased to reach orbital velocity. Kinetic energy gained remains constant while in orbit.
- Kinetic energy given to cue a ball in a game of billiards is transferred to other balls through collisions.

EVALUATION

1. Explain kinetic and potential energy
2. State two application of kinetic and potential energy
3. State the classes of potential energy.

CALCULATING KINETIC AND POTENTIAL ENERGY

For moving objects, we can easily calculate kinetic energy using the formula:
KE = (mass x velocity2)/2 or $1/2\ mv^2$

Although mass and velocity both have great effects on kinetic energy, it is velocity more significantly determines kinetic energy.

Sample Problem

1. What is the kinetic energy of a 45 kg object moving at 13 m/sec?
   First we identify the information we are given in the problem:
   mass = 45 kg
   velocity = 13 m/sec

Next, we place this information into the kinetic energy formula:

KE = 1/2 mv2
KE = 1/2 (45 kg)(13 m/sec)2

Solving the equation gives a kinetic energy value of 3802.5 J
Note: the unit for energy is the same as for work: the Joule (J)

2. Sample Problem

The kinetic energy of a boat is calculated at 52,000 J. If the boat has a mass of 39,000 kg, with what velocity is it moving?
We identify the information given in the problem:

KE = 52,000 J
mass = 39,000 kg

We now place the information into the kinetic energy formula:

$KE = 1/2\ mv^2$
$52{,}000\ J = 1/2\ (39{,}000\ kg)(v)^2$
$52{,}000\ J/(1/2 \times 39{,}000\ kg) = v^2$

Solving the equation gives a velocity value of 1.63 m/sec
Potential energy is the energy possessed by a body or an object due to its position. Potential energy, on the other hand, is energy of position, not of motion. The amount of potential energy possessed by an object is proportional to how far it was displaced from its original position. If the displacement occurs vertically, raising an object off of the ground let's say,

we term this Gravitational Potential Energy. We can calculate the gravitational potential energy of an object with this formula:

GPE = weight x height

An increase in the weight of an object or the height to which it is raised will result in an increase in the potential energy the object possesses. Once the object is dropped, the potential energy begins to decrease due to reduced height, but we also now see an increase in kinetic energy because the velocity is also increasing.

1. Sample Problem

A 37 N object is lifted to a height of 3 meters. What is the potential energy of this object?
Identify the information given to you in the problem:

weight = 37 N
height = 3 meters
Insert the information into the gravitational potential energy formula:
GPE = weight x height
GPE = 37 N x 3 meters
Solving the problem gives a potential energy value of 111 J.

Evaluation

1. The kinetic energy of a boat is calculated at 50,000 J. If the boat has a mass of 37,000 kg, with what velocity is it moving?
2. A 38 N object is lifted to a height of 5 meters. What is the potential energy of this object?

GENERAL EVALUATION

1. Explain kinetic and potential energy
2. State two application of kinetic and potential energy
3. State the classes of potential energy.
4. The kinetic energy of a boat is calculated at 50,000 J. If the boat has a mass of 37,000 kg, with what velocity is it moving?
5. A 38 N object is lifted to a height of 5 meters. What is the potential energy of this object?

WEEKEND ASSIGNMENT

1. What is the kinetic energy of a 45 kg object moving at 13 m/sec? A. 3802.5 J B. 380 J C. 38J D. 382.5 J.
2. The energy related to arrangement of atoms and molecules in a structure is -------- A. chemical potential energy B. potential energy C. chemical energy D. work potential energy.
3. Potential energy possessed by particles (neutrons, protons) inside an atomic nucleus is A. nuclear potential energy B. nuclear kinetic energy C. potential energy D. nuclear energy.
4. The energy of a body or a system with respect to the motion of the body or of the particles in the system is-------A. Potential Energy B. Kinetic Energy C. Potential system D. Kinematic Energy.
5. The translational kinetic energy is kinetic energy possessed by an object moving on a A. straight line B. crooked line C. systemic line D. steam line

THEORY

Name: ____ Class: ____________

1. State two application of kinetic and potential energy
2. State the classes of potential energy.

READING ASSIGNMENT

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WEEK THREE **DATE:……………….**

TOPIC: CALCULATION INVOLVING WORK DONE

Worked Example 1

How much work is done when a force of 5 kN moves its point of application 600mm in the direction of the force.

Solution

W.D = $(5\times10^{3})\times(600\times10^{-3})$

= 3000J

= 3KJ

Worked Example 2

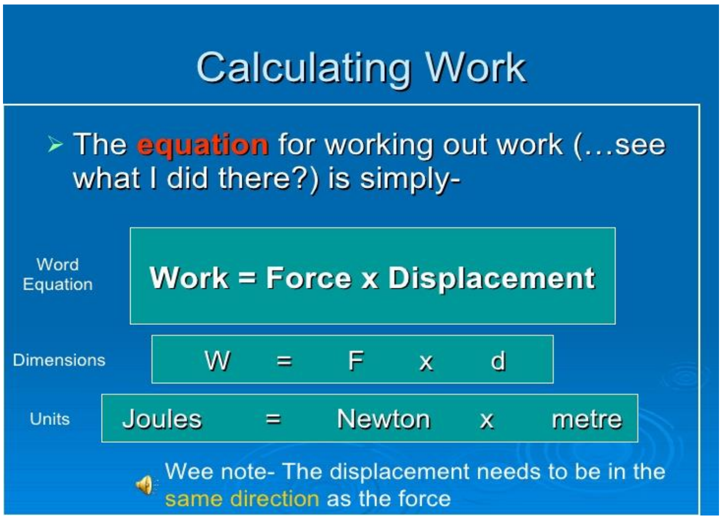
Find the work done in raising 100 kg of water through a vertical distance of 3m.

Solution

The force is the weight of the water, so

W.D = $(100 \times 9.81) \times 3$

=294J



Work done by a variable force

Worked example 3

What is the potential energy of a 10kg mass: 100m above the surface of the earth at the bottom of a vertical mine shaft 1000m deep.

Solution

a) P.E = mgh

= $10 \times 9.81 \times 100$

=9810J

= 981KJ

b) P.E = mgh

= $10 \times 9.81 \times (-100)$

= -98100J

=-98.1KJ

Worked example 4

A car of mass 1000 kg travelling at 30m/s has its speed reduced to 10m/s by a constant breaking force over a distance of 75m.

Find:

a. The cars initial kinetic energy

b. The final kinetic energy

c. The breaking force

Solution

a. Initial K.E =1/2MV^2

= 500 ×30^2

= 450000J

= 450KJ

b. Final K.E = 1/2MV^2

= 500 × 10^2

= 50000J

= 50KJ

c. Change in kinetic energy = 400 kJ

Equation 4

The SI unit for power is the watt W.

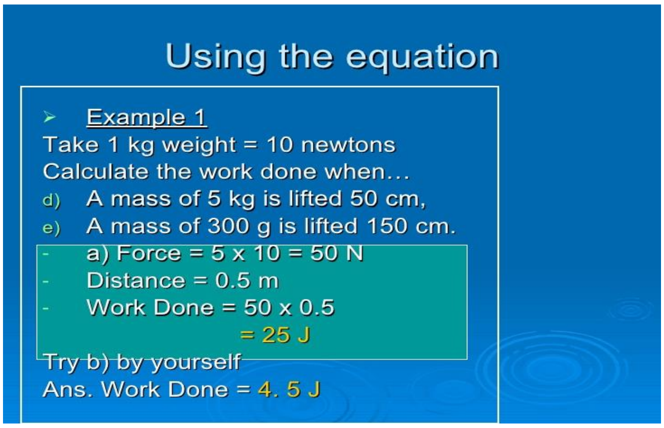
A power of 1W means that work is being done at the rate of 1J/s.

Larger units for power are the kilowatt kW (1kW = 1000 W = 103 W) and the megawatt MW (1 MW = 1000000 W = 106 W).

If work is being done by a machine moving at speed v against a constant force, or resistance, F, then since work doe is force times distance, work done per second is Fv, which is the same as power.

Name: ____ Class: ___________

Work done



Ques I; If a force of one Newton is applied by a car over a distance of 5metres , what is the work done?

Work done =Force x distance, therefore

W= f x d

200 x 6= 1200joules

Ques 2: Calculate the power of a pump which can lift 500kg of water through a vertical height of 12m in 0.3 minutes ,assuming g =9.8m/s

Solution

Force =500kg x 9.8N

Distance =12m

Work done =500 x 9,8 x 12j

Time taken = 0.3 x 60 = 18 sec

Power = $\frac{\text{Work done}}{\text{Time taken}} = \frac{500 \times 9.8 \times 12}{18}$ j

=3266.67watts

=3.27Kilowatts

Ques 3: A student whose mass is 60kg runs up a height of 7.2 m in 10.4 second . Find the power used by the student (given that g = 9.8m/s) .

Solution

Force = 60kg x 9.8N

Distance =7.2m

Work done = F x D

= 60 x 9.8 x 7.2 j

Power == $\frac{\text{Work done}}{\text{Time taken}} = \frac{60 \times 9.8 \times 7.2}{10.4\text{sec}}$

=407.076j/sec

=0.40Kilowatts(KW)

EVALUATION

1. A constant force of 2kN pulls a crate along a level floor a distance of 10 m in 50s. What is the power used?
2. What is the work done by a force of 20N pushing an object 5m in the direction of force?

Name: ________________________________ Class: __________

GENERAL EVALUATION

1. What is the potential energy of a 10kg mass: 100m above the surface of the earth at the bottom of a vertical mine shaft 1000m deep
2. A constant force of 2kN pulls a crate along a level floor a distance of 10 m in 50s. What is the power used?
3. What is the work done by a force of 20N pushing an object 5m in the direction of force?
4. Calculate the power of a pump which can lift 500kg of water through a vertical height of 10m in 0.5 minutes ,assuming g =9.8m/s

READING ASSIGNMENT

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WEEKEND ASSIGNMENT

1. How much work is done when a force of 5 kN moves its point of application 600mm in the direction of the force. A. 3KJ B. 4KJ C. 3.8KJ D. 2.67KJ
2. Calculate the power of a pump which can lift 500kg of water through a vertical height of 12m in 0.3 minutes ,assuming g =9.8m/s A. 3.27Kilowatts B. 3.7Kilowatts C. 3.2Kilowatts D. 3Kilowatts.
3. A student whose mass is 60kg runs up a height of 7.2 m in 10.4 second . Find the power used by the student (given that g = 9.8m/s) A. 0.40KW B. 0.04KW C. 0.42KW D. 0.004KW
4. If a force of 200 Newton is applied by a car over a distance of 6 metres ,the workdone is A. 1200joules B. 120joules C. 12joules D. 1.20joules
5. Find the work done in raising 100 kg of water through a vertical distance of 3m. A. 294J B. 24J C. 94J D. 29J

THEORY

1. Define the term energy.
2. The distance from boys classroom to the edge of a football field is 120 metres .He runs with a force of 100 Newtons across the field. calculate the work done.

WEEK FOUR **DATE:……………….**

TOPIC: ENERGY TRANSFER WHEN WORK IS DONE

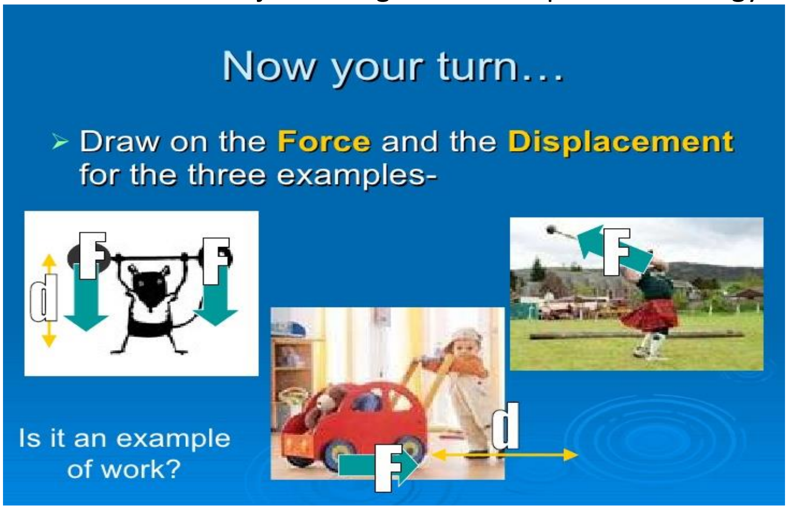
If you put energy into an object, then you do work on that object (mass).

If a first object is the agent that gives energy to a second object, then the first object does work on the second object. The energy goes from the first object into the second object.

At first we will say that if an object is standing still, and you get it moving, then you have put energy into that object. The object has kinetic energy as a result of your work. You pushed it through a displacement, you did work on the object.

- A golfer uses a club and gets a stationary golf ball moving when he or she hits the ball. The club does work on the golf ball as it strikes the ball. Energy leaves the club and enters the ball. This is a transfer of energy. Thus, we say that the club did work on the ball
- The work done by the weight lifter in lifting the weights, in order to do this work energy had to be transferred. Chemical energy from food eaten by the weight lifter

was transferred to joules of gravitational potential energy to the barbell.



- Thus the amount of work done is equal to the energy transferred from one form to another. In order to lift the barbell above his head the weight lifter need to apply a force which opposes the downward acting force of gravity on the mass of the barbell.
- No mechanical work occurs in the man's body while he holds himself motionless. There is a transformation of chemical energy into heat, but this happens at the microscopic level inside the tensed muscles. Right: When the woman lifts herself, her arms do positive work on her body, transforming chemical energy into gravitational potential energy and heat

ENERGY CONVERSION	**with examples**
Chemical energy to Heat energy	Match, Rockets
Electrical energy to Sound energy	Electric Bell, Loud speaker
Electrical energy to Mechanical	Electrical fan
Chemical energy to Electrical	Dry Cells (Batteries)
Light energy to Chemical energy	Green plant leaves
Mechanical energy to Heat energy	Brakes of a car/bikes
Chemical energy to mechanical energy	Human body/car
Mechanical energy to sound energy	Drum /hand bell
Sound energy to electrical energy	Microphone
Light energy to electrical energy	Solar cell

EVALUATION

1. List five examples of energy conversions and their converters in each case.
2. Explain the term exercise physiology.

GENERAL EVALUATION

1. What is the energy transfer when a golfer uses a club and gets a stationary golf ball moving when he or she hits the ball? The club does work on the golf ball as it strikes the ball. Energy leaves the club and enters the ball?
2. List five examples of energy conversions and their converters in each case.
3. Explain exercise physiology.

WEEKEND ASSIGNMENT

1. The mainspring to all life activities is the A. energy B. power C. work D. force
2. The device which can convert solar energy to electricity is the A. electro magne

B. photo voltaic solar panel C. turbine D. dynamic

3. The chlorophyll in plants uses ---- to produce energy. A. light B. plant C. sun D. atmosphere.
4. If you put energy into an object, then you do ---on that object. A. work B. power C. energy D. force
5. The law of conservation of energy is also known as ---- A. First law of thermodynamic B. law of mass action C. Pythagoras theorem D. Quate law

THEORY

1. List five examples of energy conversions and their converters in each case.
2. Explain the term exercise physiology.

READING ASSIGNMENT

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WEEK FIVE **DATE: ……………….**

FAMILY LIFE EDUCATION II

Life Continuum—the mechanism by which an individual is compelled to carry on the life of another deceased or departed individual, generating in his own body the infirmities and mannerisms of the departed.

The human continuum can also be defined as the sequence of experience which corresponds to the expectations and tendencies of the human species in an environment consistent with that in which those expectations and tendencies were formed. It includes appropriate behavior in, and treatment by other people as part of that environment.
The continuum of an individual is whole, yet forms part of the continuum of his family, which in turn is part of his clan's, community's, and species, just as the continuum of the human species forms part of that of all life.

Continuum concept

This is the idea that in order to achieve optimal physical, mental and emotional development, human beings, especially babies , require the kind of experience to which our species adapted during the long process of our evolution. For an infant, these include such experiences as...

- constant physical contact with his mother (or another familiar caregiver as needed) from birth;
- sleeping in his parents' bed, in constant physical contact, until he leaves of his own volition;
- breastfeeding "on cue" — nursing in response to his own body's signals;
- being constantly carried in arms or otherwise in contact with someone, usually his mother, and allowed to observe (or nurse, or sleep) while the person carrying him goes about his or her business — until the infant begins creeping, then crawling on his own impulse, usually at six to eight months;
- having caregivers immediately respond to his signals (squirming, crying, etc.), without judgment, displeasure, or invalidation of his needs, yet showing no undue concern nor making him the constant center of attention;
- sensing (and fulfilling) his elders' expectations that he is innately social and cooperative and has strong self-preservation instincts, and that he is welcome and worthy.

In contrast, a baby subjected to modern Western childbirth and child-care practices often experiences...

- traumatic separation from his mother at birth due to medical intervention and placement in maternity wards, in physical isolation except for the sound of other crying newborns, with the majority of male babies further traumatized by medically unnecessary circumcision surgery;
- at home, sleeping alone and isolated, often after "crying himself to sleep";
- scheduled feeding, with his natural nursing impulses often ignored or "pacified";
- being excluded and separated from normal adult activities, relegated for hours on end to a nursery, crib or playpen where he is inadequately stimulated by toys and other inanimate objects;
- caregivers often ignoring, discouraging, belittling or even punishing him when he cries or otherwise signals his needs; or else responding with excessive concern and anxiety, making him the center of attention;

If, however, his continuum expectations are fulfilled — precisely at first, with more variation possible as he matures — he will exhibit a natural state of self-assuredness, well-being and joy. Infants whose continuum needs are fulfilled during the early, in-arms phase grow up to have greater self-esteem and become more independent than those whose cries go unanswered for fear of "spoiling" them or making them too dependent.

Factors influencing individual sense of self worth (Body image)

Biological- the impact of overall health, of current illness or injury, and the scope of the individual's anatomy and physiology all are considered under this aspect. An example is how having diabetes mellitus causes the person's nutritional activities to differ from those of a person without diabetes.

Psychological- the impact of not only emotion, but cognition, spiritual beliefs and the ability to understand. this is about "knowing, thinking, hoping, feeling and believing". One example of the application of this factor would be how having paranoid thoughts might influence independence in communication; another example would be how lack of literacy could impact independence in health promotion.

Sociocultural- the impact of society and culture experienced by the individual. Expectations and values based on (perceived or actual) social class or status, or related to the individual's perceived or actual health or ability to carry our activities of daily living. Culture within this factor relates to the beliefs, expectations and values held by the individual both for themselves and by others pertaining to their independence and ability to carry out activities of daily living. One example is when caring for an individual of advanced age and how societies expectations and assumptions about infirmity and cognitive decline, even if not present in the individual, could influence the delivery of care and level of independence permitted by those with sufficient authority to curtail it.

Environmental- it recommends consideration of not only the impact of the environment on the activities of daily living, but also the impact of the individual's (ALs) on the environment. One example of the environment impacting ALs is to consider, if damp is present in one's home, how that might impact independence in breathing (as damp can be related to breathing impairments)

Politicoeconomic – this is the impact of government, politics and the economy on ALs. Issues such as funding, government policies and programmes, state of war or violent conflict, availability and access to benefits, political reforms and government targets, interest rates and availability of fundings (both public and private).

Evaluation

1. Mention five Factors influencing individual sense of self worth.
2. Explain psychological factor.

GENERAL EVALUATION

1. Define Life Continuum
2. Define Human continuum
3. Mention five Factors influencing individual sense of self worth.
4. Explain psychological factor.
5. What do you understand by The Continuum Concept?

WEEKEND ASSIGNMENT

1. -------- is the impact of government, politics and the economy on ALs. Issues such as funding, government policies and programmes, state of war or violent conflict, availability and access to benefits, political reforms and government targets, interest rates and availability of fundings. A. Politicoeconomic B. Politicoeconomi
   C. Politicoecono D. Politicoecon
2. --------- is the impact of overall health, of current illness or injury, and the scope of the individual's anatomy and physiology a. A. Biological B. Chemistry C. Geographical D. Hormonical.
3. --------- is the impact of society and culture experienced by the individual.
   A. Sociocultural B. Politicoeconomic C. Biological D. Hormonical
4. -----------is the mechanism by which an individual is compelled to carry on the life of another deceased or departed individual, generating in his own body the infirmities and mannerisms of the departed. A. Life Continuum B. Living Continuum C. Human Continuum D. Total Continuum
5. -------- can also be defined as the sequence of experience which corresponds to the expectations and tendencies of the human species in an environment consistent with that in which those expectations and tendencies were formed. A. The human continuum B. The Life continuum C. The Animal continuum D. Total continuum

THEORY

1. Mention five Factors influencing individual sense of self worth.
2. Explain the term psychological factor.

READING ASSIGNMENT

NIGERIA BASIC SCIENCE PROJECT PAGE 77-83, Precious seed BASIC SCIENCE FOR JUNIOR SECONDARY SCHOOLS BOOK 2 PAGE 25

WEEK SIX **DATE: ………………..**

TOPIC: KINETIC THEORY

Kinetic theory of gases - states that gases consist of small particles in random motion. The kinetic particle THEORY explains the properties of the different states of matter. The particles in solids, liquids and gases have different amounts of energy. They are arranged differently and move in different ways.

Solids

Property of solids

- They have a fixed shape and cannot flow
- The particles cannot move from place to place
- They cannot be compressed or squashed
- The particles are close together and have no space to move into

Liquids

Property of liquids

- They flow and take the shape of their container
- The particles can move around each other
- They cannot be compressed or squashed
- The particles are close together and have no space to move into

Gases

Gases are made up of molecules. What are molecules? Molecules are the smallest unit which behaves same as the sample, i.e. they have the same chemical properties as of the sample.

Property of gases

- They flow and completely fill their container
- The particles can move quickly in all directions
- They can be compressed or squashed
- The particles are far apart and have space to move into

Changes of state

Melting and freezing

If energy is supplied by heating a solid, the heat energy causes stronger vibrations until the particles eventually have enough energy to break away from the solid arrangement to form a liquid.

When a liquid freezes, the reverse happens. At some temperature, the motion of the particles is slow enough for the forces of attraction to be able to hold the particles as a solid. As the new bonds are formed, heat energy is evolved.

Boiling and condensing

If more heat energy is supplied, the particles eventually move fast enough to break all the attractions between them, and the liquid boils. The heat energy required to convert one mole of liquid into a gas at its boiling point is called the enthalpy of vaporisation.
If the gas is cooled, at some temperature the gas particles will slow down enough for the attractions to become effective enough to condense it back into a liquid. Again, as those forces are re-established, heat energy is released.

The evaporation of a liquid

The average energy of the particles in a liquid is governed by the temperature. The higher the temperature, the higher the average energy. But within that average, some particles have energies higher than the average, and others have energies lower than the average. Some of the more energetic particles on the surface of the liquid can be moving fast enough to escape from the attractive forces holding the liquid together. They evaporate.

Sublimation

Solids can also lose particles from their surface to form a vapour. Sublimation is the direct change from solid to vapour (or vice versa) without going through the liquid stage. For example, naphthalene, dry ice of carbon(iv)oxide, Iodine crystals e.t.c

Evaluation

1. State three each of the properties of solid, liquid and gas.
2. What do you understand by **enthalpy of vaporization**?

Assumptions of kinetic THEORY of gases:

1. All gases are made up of molecules which are constantly and persistently moving in random directions.
2. The separation between the molecules is much greater than the size of molecules.
3. When a gas sample is kept in a container, the molecules of the sample do not exert any force on the walls of the container during collision.
4. The time interval of collision between two molecules, and between a molecule and the wall is considered to be very small.
5. All the collisions between molecules and even between molecules and wall are considered to be elastic.
6. All the molecules in a certain gas sample obey the Newton's laws of motion.
7. If a gas sample is left for a sufficient time, it eventually comes to a steady state. The density of molecules and the distribution of molecules are independent of position, distance and time.

EVALUATION

1. State four properties of solid, liquid and gas
2. What are the particles of matter?
3. State three assumption of kinetic THEORY of gases.

GENERAL EVALUATION

1. State three each of the properties of solid, liquid and gas.
2. What do you understand by **enthalpy of vaporization**?
3. State four properties of solid, liquid and gas
4. What are the particles of matter?
5. State three assumption of kinetic THEORY of gases.

WEEKEND ASSIGNMENT

1. All of the following can be compressed except----------- A. oxygen B. hydrogen C. carbon dioxide D. water
2. In which of the following is the kinetic energy of particles of matter is greatest A. gas B. liquid C. solid D. stone
3. The process whereby a substance in solid state changes directly to gaseous state is known as------------ A. freezing B. sublimation C. melting D. cooling
4. Which of these is not a state of matter? A. solid B. water C. liquid D. gas
5. When a liquid is frozen, it turns to a substance in the------------ form A. gaseous B. solid C. liquid D. water

THEORY

READING ASSIGNMENT

Precious seed BASIC SCIENCE FOR JUNIOR SECONDARY SCHOOLS BOOK 2 PAGE 134-135.

Name: ____ Class: ___________

WEEK SEVEN **DATE:………………..**

TOPIC: Explanation of some phenomena using Kinetic THEORY

How does a gas exerts pressure on the walls of its container?

The gas particles are in constant and continual collisions with the walls. The collisions give rise to the force. The force per unit area exerted on the walls is the pressure of the gas.

Why is energy required to evaporate a liquid?

There are intermolecular forces between liquid molecules.
Only the fastest-moving molecules will have large enough energy to overcome the intermolecular forces. Hence energy is required to break the attractive forces.

Why does evaporation occur?

In liquids, there are intermolecular forces holding the liquid molecules together. Due to the constant collisions between molecules, some molecules at the surface may attain greater velocities.

Such molecules, if moving in the upward direction, may have large enough kinetic energy to overcome the downward attractive forces exerted by the molecules in the liquid and break away from the liquid surface and exist independently as vapour molecules. Hence evaporation occurs, and can occur at any temperature.

Why does cooling occur when a liquid evaporate?

Since only the fastest-moving molecules leave the liquid, it follows that the average kinetic energy of the molecules remaining in the liquid is decreased.
Since temperature is directly proportional to the average kinetic energy of the liquid molecules, therefore temperature falls, and cooling occurs.

Why does a liquid evaporate more quickly in a draught?

In a draught, the liquid molecules that leave the surface of the liquid will be blown away. More liquid molecules are able to take up the space left empty by the previous molecules. At the same time, fewer molecules are able to return to the liquid. Hence liquid evaporate more quickly in a draught.

How does the surface area of a liquid affect evaporation?

Evaporation only takes place at the surface of a liquid.
The larger the surface area, there are more number of liquid molecules that can escape from the surface. Hence evaporation will be rapid. This in turns lead to rapid cooling of the liquid.

How does temperature affect evaporation?

The rate of evaporation is greater at higher temperature.
This is because of the greater average kinetic energy of the molecules, leading to greater velocities. Hence the molecules readily overcome the attractive forces and contribute to the process of evaporation.

EVALUATION

1. Why does evaporation occur?
2. How does the kinetic THEORY explain diffusion?

What happens when a fixed mass of gas is heated in a container of fixed volume?
When the container is heated, the moving molecules gain internal energy. Since temperature is directly proportional to the average kinetic energy of the molecules, their average speed and hence their kinetic energy are increased.

As the molecules are moving faster than before, they will make more collisions per second with the walls. At the same time, each collision now results in a greater force imparted. Hence pressure is increased.
(i.e. Pressure increases as Temperature increases) (and vice versa)

What happens when a fixed mass of gas is heated in a container of fixed pressure?
For pressure to remain constant, the number of collisions per unit time with the container can be reduced. This can be done by increasing the volume of the container.
(i.e. Volume increases as Temperature increases) (and vice versa)

What happens when a gas is heated in a container of fixed temperature? (a.k.a. Boyle's Law)
At constant temperature, the average speed of the molecules remains constant.
When the volume of the container is halved, the number of molecules per unit volume in the container will be doubled. The number of molecules hitting the wall per second will also be doubled. Hence pressure will be doubled.
(i.e. Pressure increases as Volume decreases) (and vice versa)

How does the kinetic THEORY explain diffusion?
All molecules are in constant motion. Because of the rapid, constant and chaotic motion of molecules, especially in a gas, molecules spread out from a region of higher concentration to a region of lower concentration.
In a gas, the spreading out is faster because of the larger intermolecular distance and negligible force among molecules.

Evaluation

1. Why is energy required to evaporate a liquid?
2. How does the surface area of a liquid affect evaporation?

GENERAL EVALUATION

1. How does temperature affect evaporation?
2. How does the kinetic THEORY explain diffusion?
3. How does the kinetic THEORY explain diffusion?
4. Why is energy required to evaporate a liquid?
5. How does the surface area of liquid affect evaporation?

WEEKEND ASSIGNMENT

1. The gas particles are in constant and continual collisions with the walls. The collisions give rise to the--------A. force B. energy C. work D. power
2. Only the fastest-moving molecules will have large enough --------to overcome the intermolecular forces. A. energy B. power C. work D. sufficiency
3. ---------occurs, and can occur at any temperature. A. Evaporation B. Pressure C. Boiling D. Melting
4. At the same time, each collision now results in a greater force imparted. Hence pressure is---------A. increased B. decreased C. suspended D. affected

5. When the volume of the container is halved, the number of molecules per unit volume in the container will be doubled. The number of molecules hitting the wall per second will also be doubled. Hence pressure will be--------- A. doubled. B. reduced C. suppressed D. affect

THEORY

1. How does the kinetic THEORY explain diffusion?
2. Why is energy required to evaporate a liquid?

READING ASSIGNMENT

NIGERIA BASIC SCIENCE PROJECT PAGE 77-83, Precious seed BASIC SCIENCE FOR JUNIOR SECONDARY SCHOOLS BOOK 2 PAGE 23

WEEK EIGHT **DATE: ………………..**

TOPIC: EVAPORATION AND BOILING

Evaporation vs. Boiling

Evaporation occurs on the surface of liquid and it is a vaporization of liquid. It is a state of transition from liquid to gaseous state. The process occurs slowly and cannot be seen as well. It occurs when there is exposure of water to air and water molecules change into vapor and these vapors rise up and form clouds.

Boiling occurs on the entire mass of liquid and it is the vaporization of liquid. It occurs rapidly. It happens when the vapor pressure of the liquid is equal to the pressure exerted by the environmental pressure on liquid. It is a state of phase transition. The boiling occurs in three different stages: nucleate boiling, transition boiling and film boiling. There are no such stages for evaporation.

Boiling occurs when the temperature of the liquid is greater than the boiling point of the substance. Evaporation can occur at any temperature. It occurs as long as the substance Â remains Â liquid at a particular temperature. Evaporation occurs when there is an increased energy present and occurs rapidly. It occurs from the bottom of the container when allowed to boil. The bubbles form at the bottom of the container and then rise on top of the container. In boiling, bubbles do not form at the bottom and rise to the surface. Evaporation occurs at room temperature and therefore, occurs at a slower rate when compared to boiling. In boiling, there is formation of bubbles as it is a complex physical process and these bubbles are formed on a heated liquid. There is cavitation and acoustic effects seen in boiling. There is no such bubbles formed in evaporation and there is no cavitation and acoustic effect present in evaporation.

The microscopic difference between evaporation and boiling is as follows:

1. Evaporation occurs on the surface of the liquid whereas boiling occurs at the entire length of liquid.
2. Boiling occurs rapidly whereas evaporation occurs slowly.
3. Evaporation occurs at any temperature whereas boiling occurs at a specific temperature.
4. The motion of particles is fast in boiling whereas in evaporation few particles move slowly and few at a faster rate.
5. There is formation of bubbles in boiling, but bubbles are not seen in evaporation.

Evaluation

1. Explain evaporation and boiling
2. State three differences between evaporation and boiling.

Factors influencing the rate of evaporation

Note: Air used here is a common example; however, the vapor phase can be other gases.

- Concentration of the substance evaporating in the air.

If the air already has a high concentration of the substance evaporating, then the given substance will evaporate more slowly.

- Concentration of other substances in the air.

If the air is already saturated with other substances, it can have a lower capacity for the substance evaporating.[citation needed]

- Flow rate of air.

This is in part related to the concentration points above. If "fresh" air (i.e., air which is neither already saturated with the substance nor with other substances) is moving over the substance all the time, then the concentration of the substance in the air is less likely to go up with time, thus encouraging faster evaporation. This is the result of the boundary layer at the evaporation surface decreasing with flow velocity, decreasing the diffusion distance in the stagnant layer.

- Inter-molecular forces.

The stronger the forces keeping the molecules together in the liquid state, the more energy one must get to escape. This is characterized by the enthalpy of vaporization.

- Pressure

Evaporation happens faster if there is less exertion on the surface keeping the molecules from launching themselves.

- Surface area

A substance that has a larger surface area will evaporate faster, as there are more surface molecules per unit of volume that are potentially able to escape.

- Temperature of the substance

the higher the temperature of the substance the greater the kinetic energy of the molecules at its surface and therefore the faster the rate of their evaporation.

In the US, the National Weather Service measures the actual rate of evaporation from a standardized "pan" open water surface outdoors, at various locations nationwide. Others do likewise around the world. The US data is collected and compiled into an annual evaporation map. The measurements range from under 30 to over 120 inches (3,000 mm) per year.

Evaluation

1. Mention five factors that influencing the rate of evaporation.
2. Explain the effect of surface area on the rate of evaporation.

GENERAL EVALUATION

1. Explain evaporation and boiling
2. State three differences between evaporation and boiling.
3. Mention five factors that influencing the rate of evaporation.
4. Explain the effect of surface area on the rate of evaporation.
5. Explain Concentration of other substances in the air.

WEEKEND ASSIGNMENT

1. The stronger the forces keeping the molecules together in the liquid state, the more energy one must get to escape. This is characterized by the---------. A. enthalpy of vaporization B. enthalpy of change C. enthalpy of condensation D. all of the above.
2. ---------occurs on the surface of the liquid whereas boiling occurs at the entire length of liquid. A. Evaporation B. Melting C. Condensation D. Boiling
3. There is formation of bubbles in---------, but bubbles are not seen in evaporation. A. boiling B. melting C. evaporation D. mixing.
4. Evaporation occurs when there is an ---------energy present and occurs rapidly. A. increased B. decreased C. normal D. perfect
5. Evaporation happens faster if there is less exertion on the surface keeping the molecules from launching themselves. This explains--------- A. pressure B. surface area C. temperature D. flow rate

THEORY

1. State three differences between evaporation and boiling.
2. Mention five factors that influencing the rate of evaporation.

WEEK NINE **DATE: ………………..**

TOPIC: THERMAL ENERGY I

Heat flow is the movement of heat (energy) from the interior of Earth to the surface. The source of most heat comes from the cooling of the Earth's core and the radioactive heat generation in the upper 20 to 40 km of the Earth's crust.

Energy flows into your body from the surrounding air, from surrounding objects, and from the sun when you're outside, or even light bulbs when you're inside. Energy also flows out of your body into the surrounding air, into the surrounding objects, and even into outer space, most notably if you are outside on a clear night. Heat flow moves energy from a higher temperature to a lower temperature. The bigger the difference in temperature between two objects, the faster heat flows between them. When temperatures are the same, there is no change in energy due to heat flow. Heat has the units of energy; heat flow has the units of power.

This type of energy transfer from one place to another place is driven by differences in temperature and is called heat flow

Way Heat Flows

1) There has to be a temperature difference. Energy only flows as heat if there is a temperature difference.
2) Energy as heat flows from a higher temperature to a lower temperature.
3) The greater or larger the difference in temperature, the faster the energy flows.

EVALUATION

1. What do you understand by heat flow?
2. Mention the three things to know about heat flow

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HEAT FLOWS

- Heat flow from the sun to the plants and algae and some types of bacteria is the energizer of photosynthesis

- A **steam boiler converting** the chemical energy stored in coal (in the old days) or fuel oil or natural gas (more common nowadays), into "heat" which was used to convert liquid water into gas phase water (steam to you laymen). The steam flowed up into the radiators where its heat was transferred by conduction to the air and by radiation to the objects in the room.
- Because of heat flow, cold-blooded reptiles and insects that live in cold climates only come out in the summer. Heat flow is why there are a lot more reptiles and insects in equatorial climates than arctic climates.
- **Warm-blooded** mammals and birds with their high metabolisms and hotter bodies can live and move in some pretty cold places. But, because of heat flow, they have to have good dry fur or feathers, or a good layer of blubber, and plenty of high energy food to keep that body heat coming.
- When you put on a jacket in the winter, or wear shorts on a hot day, you are adjusting your heat flow, trying to help your body keep its temperature very close to 38 degrees C (98.6 deg. F). It's a never ending struggle. Energy as heat is always flowing out of, and into, your body.
- Car radiators are used to transfer heat out of the car engine.
- Elephant ears act like giant radiators to transfer heat out of their bodies.

READING ASSIGNMENT

Precious seed BASIC SCIENCE FOR JUNIOR SECONDARY SCHOOLS BOOK 2 pages 139

EVALUATION

1. What do you understand by heat flow?
2. Mention the three things to know about heat flow
3. What are the Three Things To Know about the way heat flows?
4. Define heat flow.

WEEKEND ASSIGNMENT

1. ----------is the movement of heat (energy) from the interior of Earth to the surface. A. Heat flow B. Energy flow C. Power flow D. Temperature fling
2. Heat flow moves ----------from a higher temperature to a lower temperature. A. energy B. power C. work D. gravity
3. Heat has the units of energy; heat flow has the units of-------- A. power B. energy C. force D. work
4. Heat flow from the sun to the plants and algae and some types of bacteria is the ---------of photosynthesis. A. energizer B. gravitational C. appetizer D. none
5. ----------- mammals and birds with their high metabolisms and hotter bodies can live and move in some pretty cold places. A. Warm-blooded B. Cold-blooded C. Chilled-blooded D. All of the above

THEORY

1. Define heat flow.
2. What are the three things to know about the way heat flows?

WEEK TEN **DATE: ……………….**

TOPIC: THERMAL ENERGY II

Temperature is a measure of the average amount of kinetic energy possessed by the particles in a sample of matter. The more the particles vibrate, translate and rotate, the greater the temperature of the object. You have hopefully adopted an understanding of heat as a flow of energy from a higher temperature object to a lower temperature object. It is the temperature difference between the two neighboring objects that causes this heat transfer. Heat is transferred from the hot water to the cold water until both samples have the same temperature.

Conductive heat flow involves the transfer of heat from one location to another in the absence of any material flow. The mechanism in which heat is transferred from one object to another object through particle collisions is known as conduction.

Applications

- cooling a glass in an ice bucket
- burning your hand on a hot tripod
- holding the handle of a pan

EVALUATION

1. Define temperature
2. What do you understand by conductive heat flow

Convection is the process of heat transfer from one location to the next by the movement of fluids. The moving fluid carries energy with it. The fluid flows from a high temperature location to a low temperature location. The two examples are heating water in a pot and heating air in a room.

Application

- boiling water
- hot air balloon rising
- warm water on the surface of a lake and cold water at the bottom of the lake
- air condition cooling a room
- cooking rice in water

Radiation is the transfer of heat by means of electromagnetic waves. The transfer of heat by radiation involves the carrying of energy from an origin to the space surrounding it. The energy is carried by electromagnetic waves and does not involve the movement or the interaction of matter.

Application

- Sun's light warming the Earth
- feeling warm when you sit in sunlight
- a pan above the stove burner
- barbeque meat with charcoal

Radiation for heat to reach the meat, conduction to cook it inside

READING ASSIGNMENT

Precious seed BASIC SCIENCE FOR JUNIOR SECONDARY SCHOOLS BOOK 2 pages 139-140

EVALUATION

1. Define the following; conduction, convection and radiation
2. State two application each of conduction, radiation and convection

Name: ____ Class: _____________

GENERAL EVALUATION

1. Define temperature
2. What do you understand by conductive heat flow
3. Define the following; conduction, convection and radiation
4. State two application each of conduction, radiation and convection
5. Define conductive heat flow

WEEKEND ASSIGNMENT

1. The mechanism in which heat is transferred from one object to another object through particle collisions is known as---------- A. conduction B. convection C. radiation D. none
2. ----------is the process of heat transfer from one location to the next by the movement of fluids. A. Convection B. conduction C. radiation D. none
3. ----------is the transfer of heat by means of electromagnetic waves. A. Convection B. conduction C. radiation D. none
4. Heat is transferred from the hot water to the cold water until both samples have the same A. temperature B. heat C. heat flow D. hotness
5. The more the particles vibrate, translate and rotate, the greater the ----------of the object. A. temperature B. heat C. heat flow D. hotness

THEORY

1. Define conductive heat flow
2. State two applications each of conduction, radiation and convection.