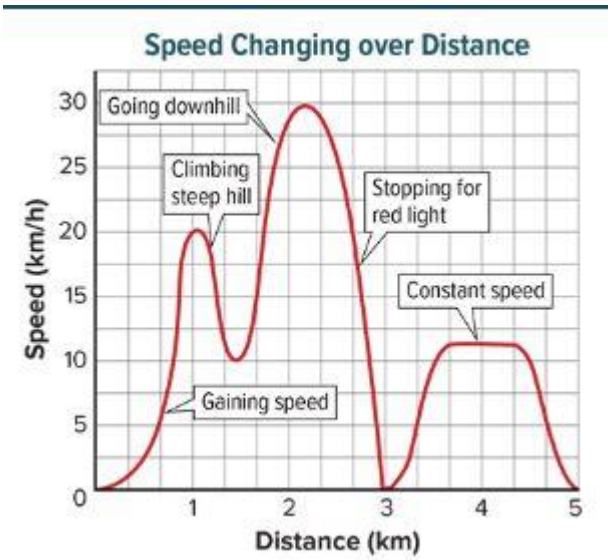
Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

1 Analyze and interpret speed-time graphs (calculate acceleration) or distance-time graphs (calculate speed) textbook, figures 5, 7, 8, 16, Example problem 3 page 42, 43, 44, 51, 52



Q1: describe the change speed ?

Incrase speed from 0 km to 20 km/h then down to 10km /h then speed up to 30 km /h then stop

Then speed up again then stop then constant and come to stop.

Q2: use figure up to calculate average speed if the triptook 15 min ?

Speed = distance ÷time

$$s = \frac{d}{t} = \frac{5\text{ km}}{0.25\text{ h}} = 20\text{ km/h}$$

time = 0.25 h
distance = 5 KM
speed = distance / time
speed = 5 / 0.25 = 20Km/h

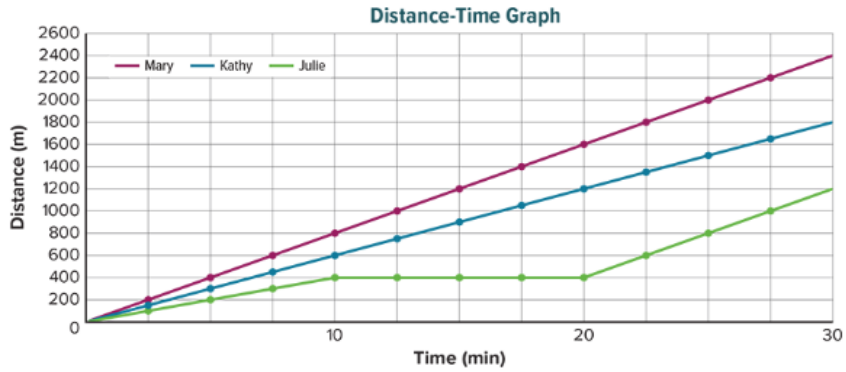
Q3: Passenger elevator travels a distance 210 m , in 35 s . what the elevators speed?

Speed = distance ÷time

Speeed = 210÷35 = 6 m/s

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

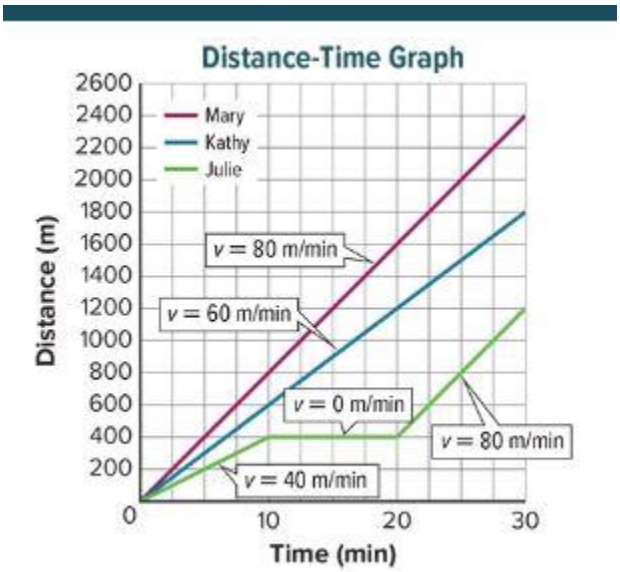
Q4: use figure to answer question



Which girl swam the farthest during the workout ?

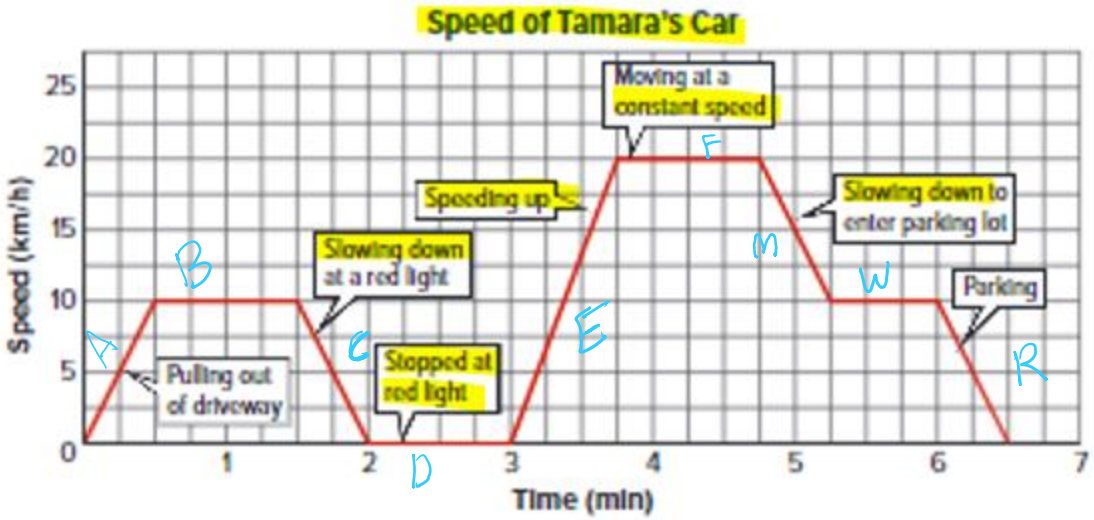
Mary

Q5: use the figure to answer question



1- Which is fsster or has a greater speed ? Mary
2- Identify the part of graph that show one of swimming resting for 10m ? juli
3- The slope of line on distance -time graph equals the object is .... .? speed

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024



Use the figure up to answer questions

1- Which tamara car is not accelerated ? B , D , F, W
2- Which tamara car is increase speed ? A , E
3- The slope of line on speed-time graph is the object represent ? Acceleration

Acceleration Equation

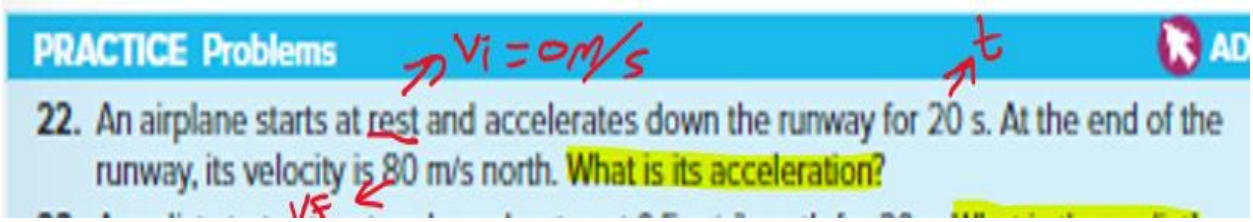
$$\text{acceleration (in meters/second}^2) = \frac{\text{change in velocity (in meters/second)}}{\text{time (in seconds)}}$$

$$a = \frac{v_f - v_i}{t}$$

EXAMPLE Problem 3

CALCULATE ACCELERATION A skateboarder has an initial velocity of 3 m/s west and comes to a stop in 2 s. What is the skateboarder's acceleration?

Identify the Unknown:	acceleration: a
List the Knowns:	initial velocity: $v_i = 3$ m/s west
	final velocity: $v_f = 0$ m/s west
	time: $t = 2$ s
Set Up the Problem:	$a = \frac{(v_f - v_i)}{t} = \frac{(0 \text{ m/s} - 3 \text{ m/s})}{2 \text{ s}}$ west
Solve the Problem:	$a = \frac{(0 \text{ m/s} - 3 \text{ m/s})}{2 \text{ s}} = -1.5 \text{ m/s}^2$ west



22 $a = \frac{v_f - v_i}{t} = \frac{80 - 0}{20} =$

$= 4\ m/s^2$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

2 1. Calculate work with a force parallel to motion and a force perpendicular to the motion, 2. Calculate the percentage efficiency of a machine 3. Calculate the mechanical advantage of a simple machine Textbook, figure 5, Example problem 1, 2, 3.
page 89, 92, 94

Work Equation

work (in joules) = applied force (in newtons) × distance (in meters)

$W = Fd$

EXAMPLE Problem 1

SOLVE FOR WORK You push a refrigerator with a horizontal force of 100 N. If you move the refrigerator a distance of 5 m while you are pushing, how much work do you do?

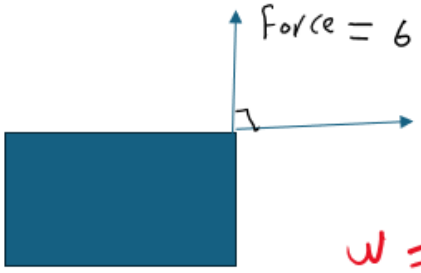
Identify the Unknown:	work: W
List the Knowns:	applied force: $F = 100$ N distance: $d = 5$ m
Set Up the Problem:	$W = Fd$
Solve the Problem:	$W = (100\ \text{N})(5\ \text{m}) = 500\ \text{J}$
Check the Answer:	Check to see whether the units match on both sides of the equation. units of W = (units of F) × (units of d) = N × m = J

Q: calculate the work for each the following

force = 50 N

distance = 3 m

W = force × distance = 50 × 3 = 150 J



force = 6 N

distance = 2m

W = 0 J because perpendicular between force and distance

Efficiency is the ratio of output work to input work. Efficiency is often measured in percent.

Efficiency Equation

$$\text{efficiency}\,(\%) = \frac{\text{output work (in joules)}}{\text{input work (in joules)}} \times 100$$

$$e = \frac{W_{out}}{W_{in}} \times 100$$

EXAMPLE Problem 2

SOLVE FOR EFFICIENCY You do 20 J of work in pushing a crate up a ramp. If the output work from the inclined plane is 11 J, then what is the efficiency of the inclined plane?

Identify the Unknown:	efficiency: e
List the Knowns:	work in: $W_{in} = 20\ \text{J}$ work out: $W_{out} = 11\ \text{J}$
Set Up the Problem:	$e = \frac{W_{out}}{W_{in}} \times 100$
Solve the Problem:	$e = \frac{11\ \text{J}}{20\ \text{J}} \times 100$ $e = 55\ \text{percent}$

W out ↑ W in ↑

5. Find the efficiency of a machine that does 800 J of work if the input work is 2000 J.

$e = \frac{W_{out}}{W_{in}} \times 100$ $e = \frac{800}{2000} \times 100 = 40\ \%$

We can describe the effectiveness of a machine at increasing force by its mechanical advantage. **Mechanical advantage** is the ratio of output force to input force.

Mechanical Advantage Equation

$$\text{mechanical advantage} = \frac{\text{output force (in newtons)}}{\text{input force (in newtons)}}$$

$$MA = \frac{F_{out}}{F_{in}}$$

EXAMPLE Problem 3

SOLVE FOR MECHANICAL ADVANTAGE A crate weighs 950 N. If you can use a pulley system to lift that crate with a force of only 250 N, then what is the mechanical advantage of the pulley system?

Identify the Unknown:	mechanical advantage: MA
List the Knowns:	output force: $F_{out} = 950\ \text{N}$ input force: $F_{in} = 250\ \text{N}$
Set Up the Problem:	$MA = \frac{F_{out}}{F_{in}}$
Solve the Problem:	$MA = \frac{950\ \text{N}}{250\ \text{N}}$ $MA = 3.8$

PRACTICE Problems

ADDITIONAL PRACTICE

8. Calculate the mechanical advantage of a hammer if the input force is 125 N and the output force is 2,000 N.

F_{in} F_{out}

$$MA = \frac{F_{out}}{F_{in}} = \frac{2000}{125} = 16$$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q; How are machines useful for each figure.

Increase speed.

change direction of force

Increase force.

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q3: 1. List the factors that kinetic energy depends on 2. Calculate gravitational potential energy 3. predict the mechanical energy transformations between kinetic energy for projectile motion or for swing motion Textbook, figures 9, 12, 13 problems 17, 18 page 97, 99, 100, 103, 104.

Kinetic Energy Equation

kinetic energy (in joules) $= \frac{1}{2}$ mass (in kg) x [speed (in m/s)]^2

$$KE = \frac{1}{2}mv^2$$

Q: what happens to kinetic energy if mass doubles? KE will be double.

Q: what happens to kinetic energy if speed doubles? KE will increase 4 times.

EXAMPLE Problem 4

SOLVE FOR KINETIC ENERGY A jogger with a mass of 60.0 kg is moving forward at a speed of 3.0 m/s. What is the jogger's kinetic energy from this forward motion?

Identify the Unknown: kinetic energy: KE

List the Knowns: mass: $m = 60.0$ kg speed: $v = 3.0$ m/s

Set Up the Problem: $KE = \frac{1}{2}mv^2$

Solve the Problem:

$KE = \frac{1}{2}(60.0\text{ kg})(3.0\text{ m/s})^2$

$KE = \frac{1}{2}(60.0\text{ kg})(9.0\text{ m}^2/\text{s}^2)$

$KE = 270\text{ J}$

m mass v speed v speed

17. CHALLENGE A 1500-kg car doubles its speed from 50 km/h to 100 km/h. By how many times does the kinetic energy from the car's forward motion increase?

$KE = \frac{1}{2} \times m \times v^2 = \frac{1}{2} \times 1500 \times (50)^2 = 1875000$ J

$KE = \frac{1}{2} \times m \times v^2 = \frac{1}{2} \times 1500 \times (100)^2 = 7500000$ J

$\frac{7500000}{1875000} =$

$= 4$

Gravitational Potential Energy Equation

gravitational potential energy (J)

= mass (kg) × gravity (N/kg) × height (m)

$GPE = mgh$

EXAMPLE Problem 5

SOLVE FOR GRAVITATIONAL POTENTIAL ENERGY A 4.0-kg ceiling fan is placed 2.5 m above the floor. What is the gravitational potential energy of the Earth-ceiling fan system relative to the floor?

$g = 9.8$

Identify the Unknown:	gravitational potential energy: GPE
List the Knowns:	mass: $m = 4.0\ kg$
	gravity: $g = 9.8\ N/kg$
	height: $h = 2.5\ m$
Set Up the Problem:	$GPE = mgh$
Solve the Problem:	$GPE = (4.0\ kg)(9.8\ N/kg)(2.5\ m) = 98\ N \cdot m = 98\ J$

PRACTICE Problems

18. An 8.0-kg history textbook is placed on a 1.25-m high desk. What is the gravitational potential energy of the textbook-Earth system relative to the floor?

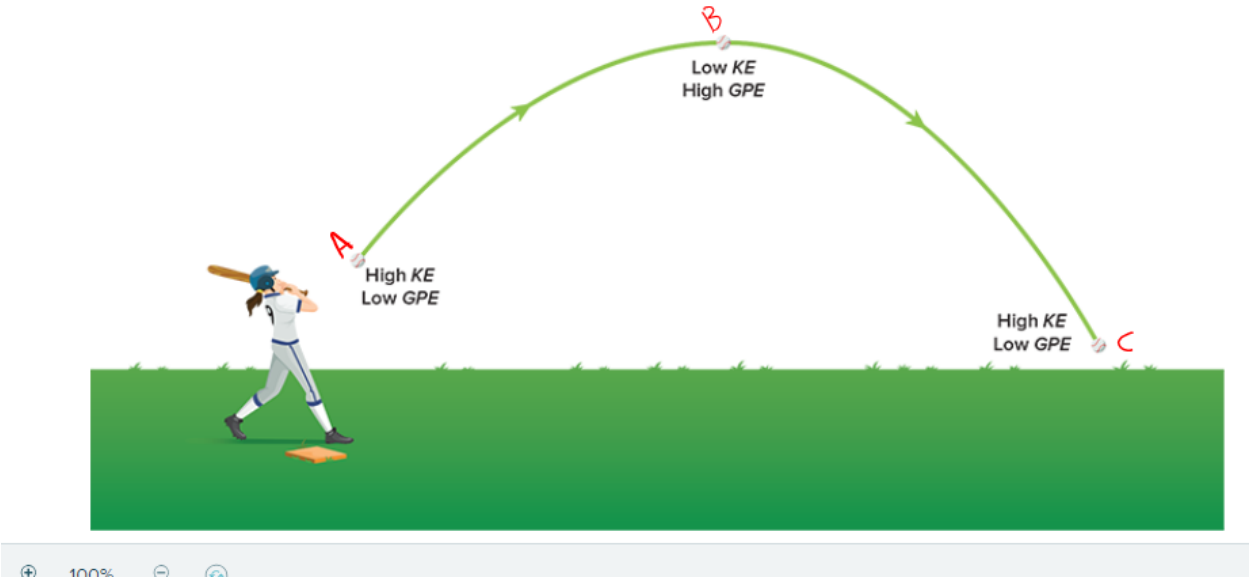
$GPE = m \times g \times h$

$GPE = 8.0 \times 9.8 \times 1.25 = 98\ J$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: use the figure to answer the following questions.

1- Which type of energy does the blue and green vase have it? GPE
2- Which vase has more GPE and why? Blue



1. Which types energy on A, B ,C ?
   A: KE B: GPE C: KE
2.which energy transformed? KE to GPE

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: use figure to answer questions

1. Which position has the greater gravitational energy GPE? A
2. Which types of energy is in position c? KE
3. Which energy transformed? KE to GPE

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

4 1. Calculate specific heat for unknown material 2. Compare the methods of how energy transfer 3. List the energy transformations that occur in an internal combustion engine and explain why the process is not 100% efficient textbook, problem 1, fig.6, 7, 8, 10, 19 page 118, 120, 122, 123, 132.

Thermal Energy Equation

change in thermal energy (J) = mass (kg) · temperature change (°C) · specific heat $\left(\frac{\text{J}}{\text{kg}\cdot^\circ\text{C}}\right)$

$$Q = m\,(T_\text{f} - T_\text{i})C$$

SOLVE FOR THERMAL ENERGY A wooden block has a mass of 20.0 kg and a specific heat of 1700 J/(kg · °C). Find the change in thermal energy of the block as it warms from 15.0°C to 25.0°C.

Identify the Unknown: change in thermal energy: Q

List the Knowns:
mass: $m = 20.0\ \text{kg}$
final temperature: $T_\text{f} = 25.0^\circ\text{C}$
initial temperature: $T_\text{i} = 15.0^\circ\text{C}$
specific heat: $C = 1700\ \text{J/(kg}\cdot^\circ\text{C)}$

Set Up the Problem: $Q = m\,(T_\text{f} - T_\text{i})C$

Solve the Problem:
$Q = (20.0\ \text{kg})\,(25.0^\circ\text{C} - 15.0^\circ\text{C})\,(1700\ \text{J/(kg} \cdot ^\circ\text{C)})$
$= (20.0\ \text{kg})\,(10.0^\circ\text{C})\,(1700\ \text{J/(kg} \cdot ^\circ\text{C)})$
$= 340{,}000\ \text{J}$

PRACTICE Problem

ADDITIONAL PRACTICE

m C Q

1. The air in a room has a mass of 50 kg and a specific heat of 1000 J/(kg · °C). What is the change in thermal energy of the air when it warms from 20°C to 30°C?

Ti TF

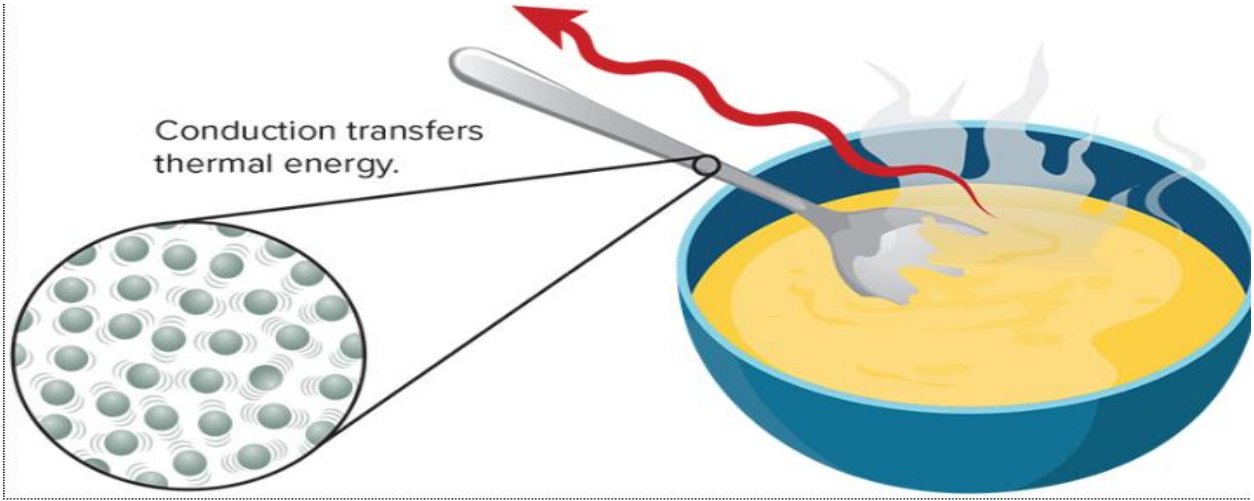
$Q = m \times (T_F - T_i) \times C = 50 \times (30-20) \times 1000 = 500000\ \text{J}$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Complete the table below , compare between methods transfer energy

Types or method transfer energy	Conduction	Radiation	Convection
Transfer energy	By collision	By electromagnetic wave	By movement
Type of matter transfer	Solid	Space	Liquid an gas (fluid)

Q: which types or mothed transfer energy?

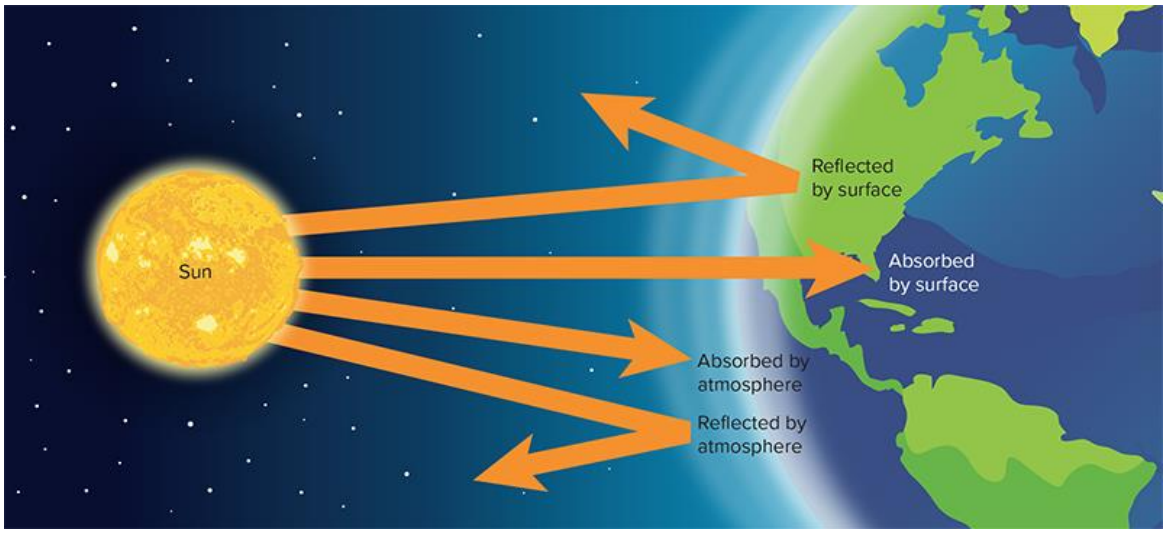


conduction

.....

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Convection



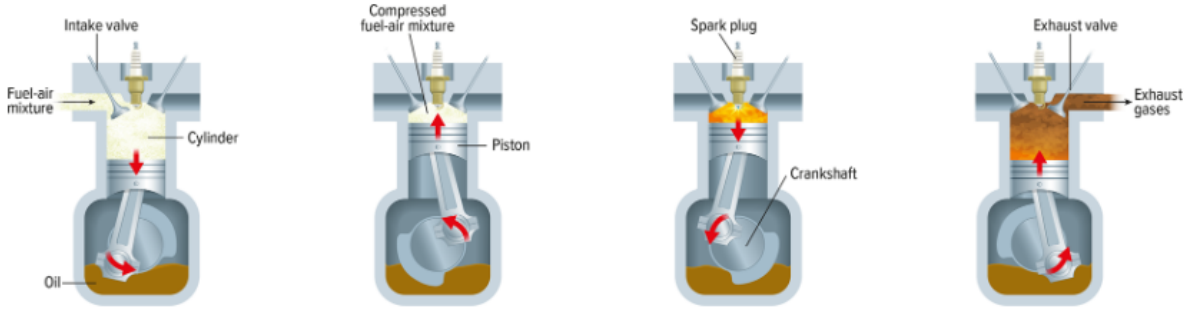
Radiation

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Why do chefs often prefer pots that are good conductors of thermal energy?

The thermal energy transfer quickly, heat evenly

Internal combustion engines Almost all cars are powered by internal combustion engines. An **internal combustion engine** is a heat engine that burns fuel inside a set of cylinders. Each cylinder contains a piston that moves up and down. Each up or down movement of the piston is called a stroke. Automobile and diesel engines have four strokes per cycle. **Figure 19** shows the four-stroke cycle in an automobile engine.



Intake The intake valve opens as the piston moves downward, drawing a mixture

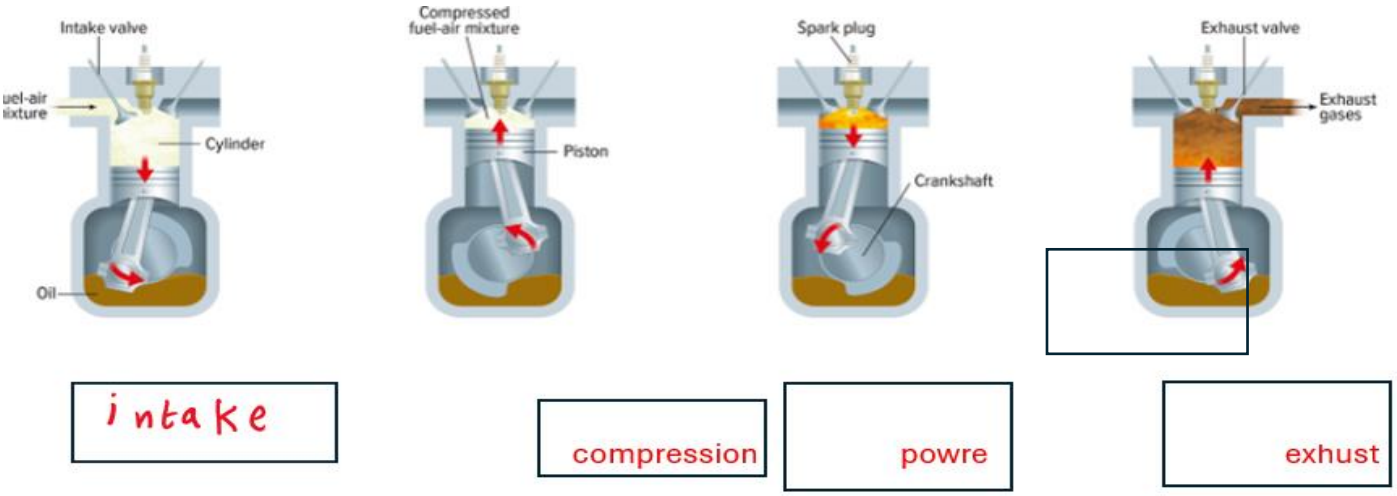
Compression The intake valve closes as the piston moves upward, compressing the fuel-

Power A spark plug ignites the fuelair mixture. As the mixture burns, hot gases

Exhaust As the piston moves up, the exhaust valve opens, and the hot gases are pushed

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: the figure show four-stroke cycle write the name each cycle?



Convert energy internal combustion engine.

Chemical energy → Thermal energy → Mechanical energy

Q: why the efficiency of heat engine not be 100 percent?

Friction convert energy to thermal and different temperature in the cylinder and out side.

5 1. Compare nonrenewable energy resources (fossil fuels) with renewable energy resources and give evidence on how they might affect the environment 2. differentiate between they type of nuclear reactions 3. List the advantages and disadvantages of using nuclear power and nuclear power plants textbook, check your progress Q1, fig. 10, 14 page 198, 199, 202, 203

Q: compare between fossil fuel and with renewable energy

Compare	Non-renewable as Fossil fuel	Renewable as sun
pollution	Pollution release carbon dioxide	No Pollution not release carbon dioxide
Example	Petroleum – natural gas-coal	Wind -sun -water energy
Replaced	Cannot be replaced quickly	Replaced quickly

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: compare between nuclear fission and nuclear fusion

Type of nuclear energy	fission	Fusion
Location occurs	Nuclear power plant	Stars
Define	Nucleus splits to small nucleus	Nuclei combine to form large nuclei
Amount of energy release	Lees than	Grater than

Q: write advantage and disadvantage nuclear power plant?

Advantage nuclear power plant	Disadvantage nuclear power plant
No release carbon dioxide	expensive
Generate electricity	Take long time to building power plant
	Release radioactive waste

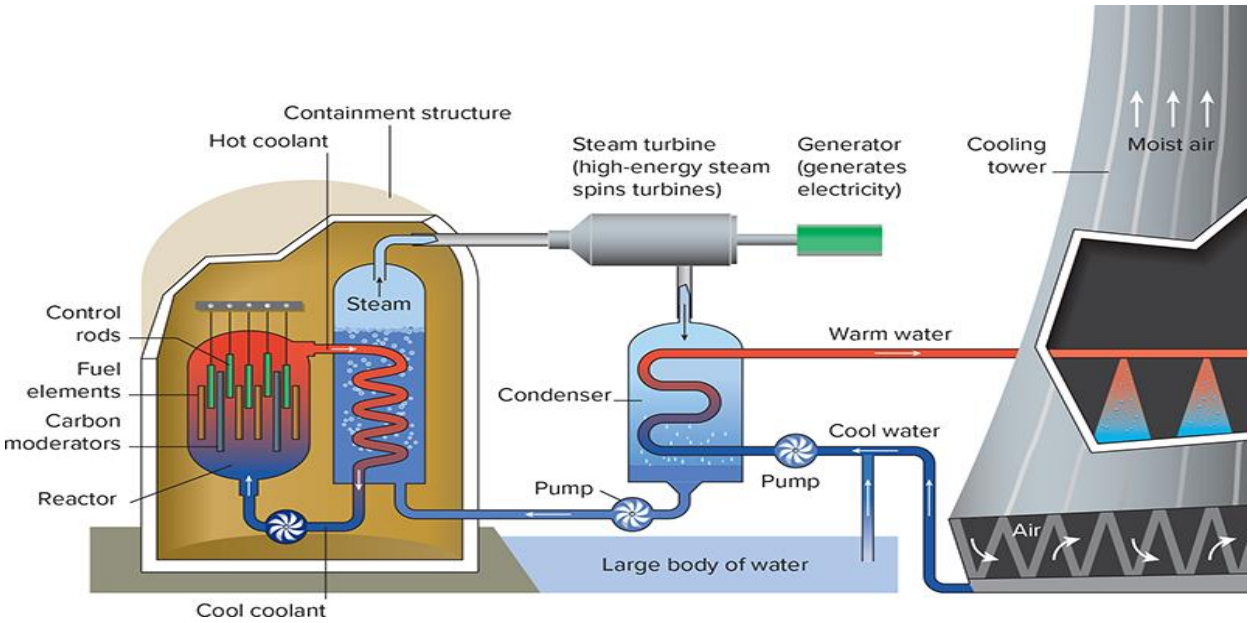
Q: use the figure to answer Question

1.what is the name of this figure? nuclear power plant

2. what is used it ? generate electric energy

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: use the figure to answer questions.



1.explain how nuclear power plants generate electricity?

Convert water to steam that spins turbine then the generator converts mechanical energy to electricity.

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Multiple choice

6 . Describe how reference points affect a point of view and observing moving objects to describe its motion textbook, figures 1, 2, 12, 13 page 38, 46, 47.

Figure 1 As the mail truck follows its route, it stops at each mailbox along the street.

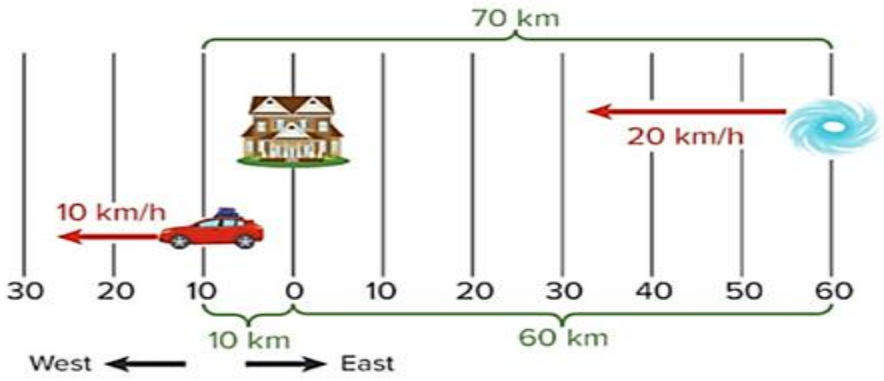
Explain *How would you know the mail truck has moved?*

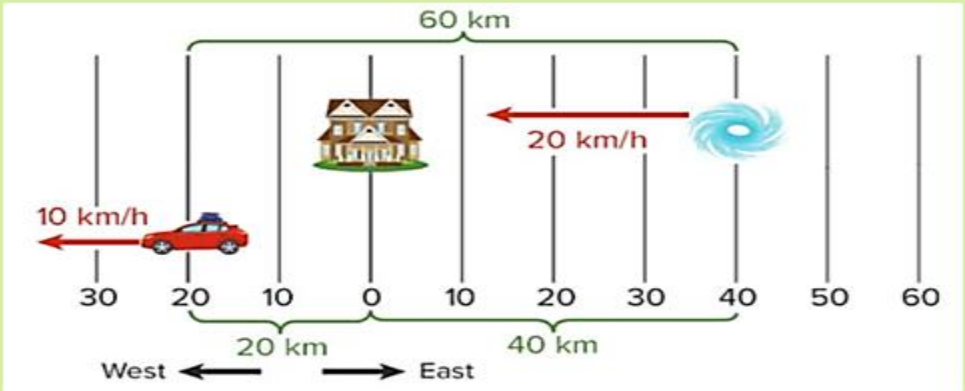
Q2: The reference point for describing the movement of the truck is

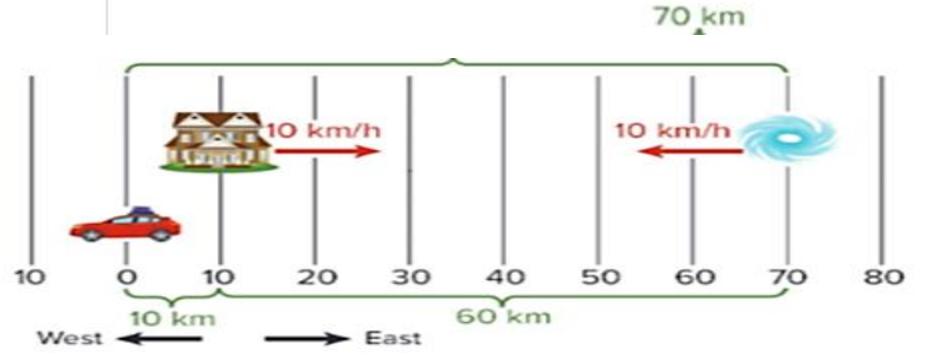
A. tree
B. mailbox
C. River
D.

وصف السؤال:

Study the figures below, the house is the reference point, which of the following figures represent the car movement at velocity = 10 km/h west, ?and 20 km away from its reference point







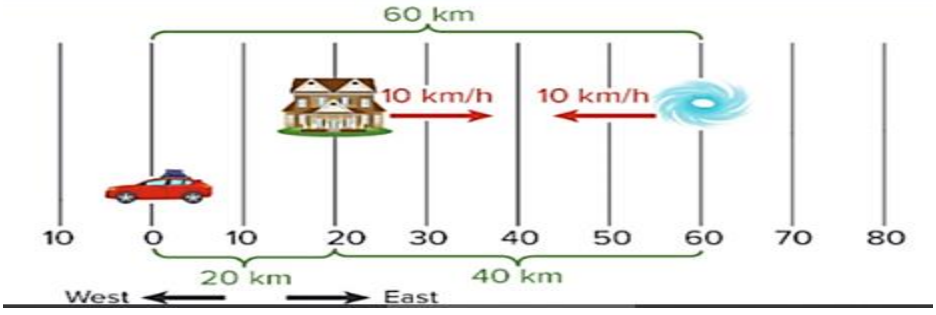
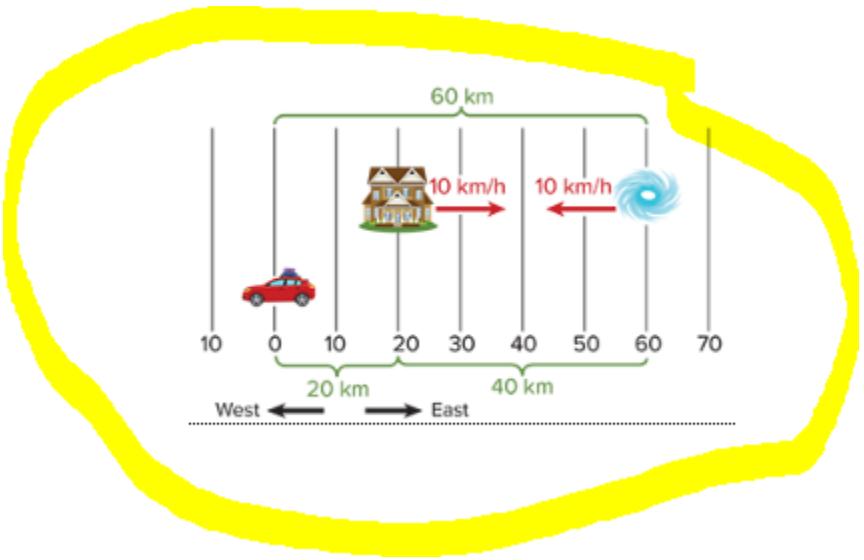
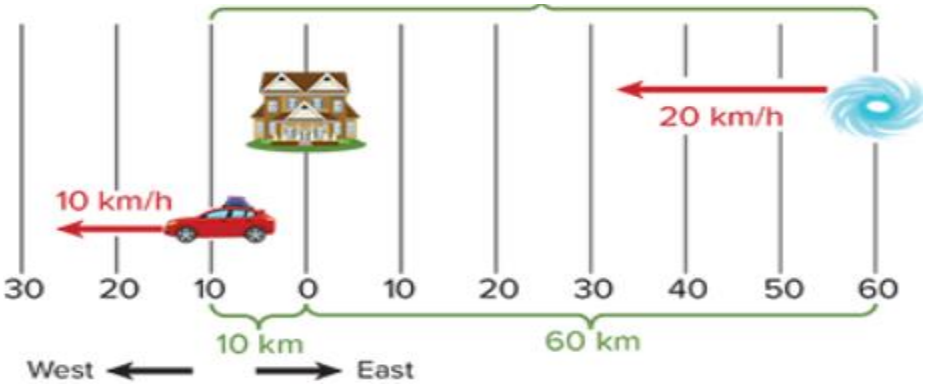


Figure 13 If the car is chosen as the reference point, the hurricane appears to be moving toward the car at 10 km/h, and the house is moving away from the car at 10 km/h.

Which is true?





Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q3: acoordinate system like map the reference point at origen ,identfy the position of orange car

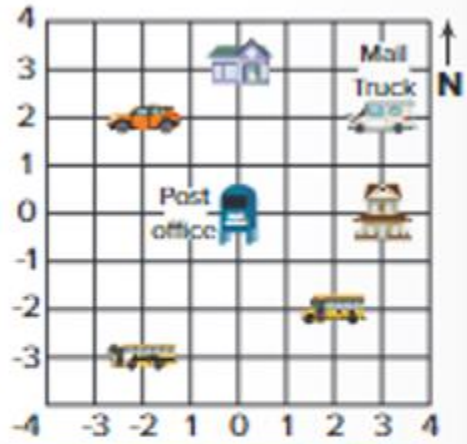


Figure 2 A coordinate system is like a map. The reference point is at the origin, and each object's position can be described with its coordinates.

Identify *the position of the orange car.*

A. X=2 y= 2

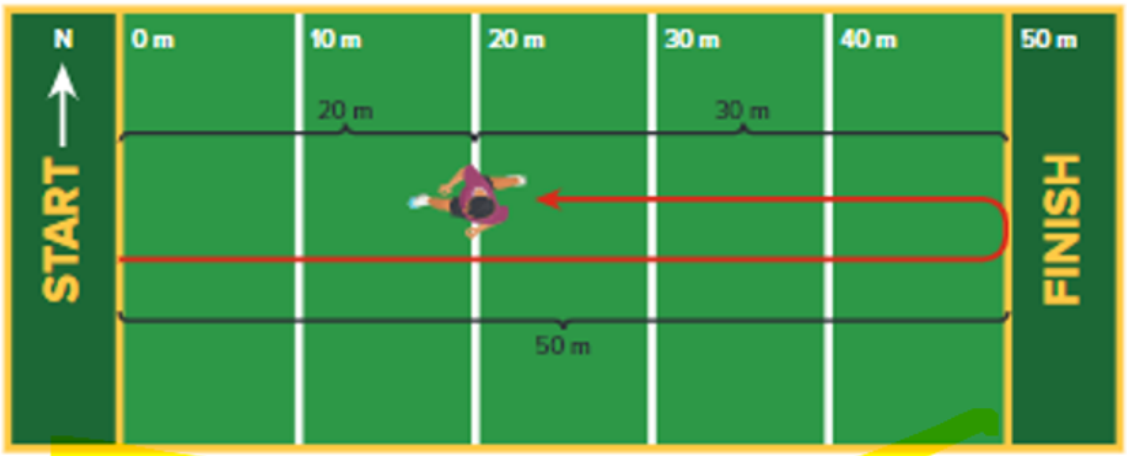
B. X=-2 y=2

C. X= 3 y= 3

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

7. Compare distance and displacement and assign them to a movement graph textbook, figures 3, 4 page 39, 40

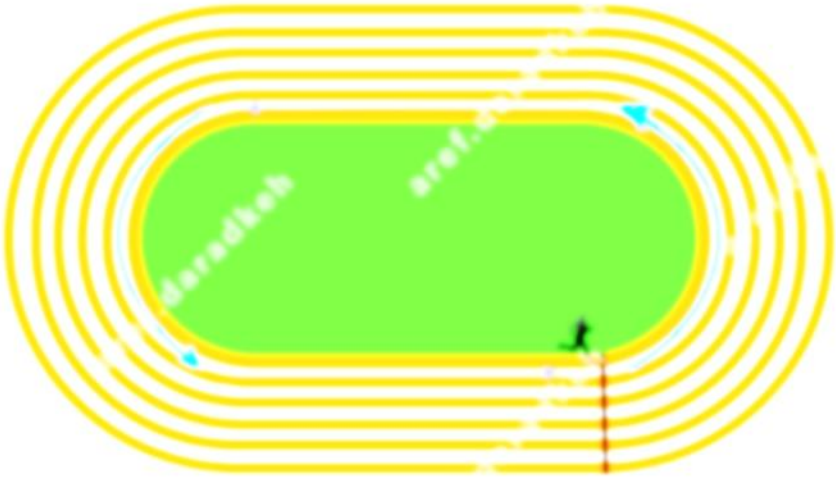
Q5: figure 3 an object displacement is not the same as total distance what is true



A. Displacement 20 m east and distance 80m
B. Displacement 20 m west and distance 80m
C. Displacement 80 m east and distance 80m
D. Displacement 80 m east and distance 20m

A runner at a track meet completes exactly one lap around a 400 m track.

What is the runner's distance and displacement traveled in a complete one lap?



The runner's traveled distance is 400 m, and his displacement is 0 m

The runner's traveled distance is 300 m, and his displacement is 100 m

The runner's traveled distance is 0 m, and his displacement is 400 m

The runner's traveled distance is 200 m, and his displacement is 200 m

A. Distance 10 m and displacement 10 m west
B. Distance 10 m and displacement 10 m north
C. Distance 10 m and displacement 10 m east
D. Distance 10 m and displacement 0 m west

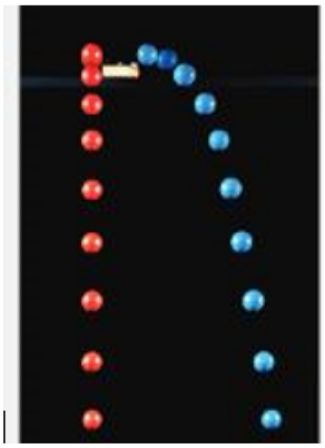
Q6: which the following true about figure

A. Distance 5 m and displacement 5m west
B. Distance 10 m and displacement 15m east
C. Distance 15 m and displacement 5m west
D. Distance 15 m and displacement 5m east

8. Define projectile objects & motion and describe the horizontal and vertical components of the displacement of a projectile and the throwing and dropping of objects textbook, figures 18, 19,
Page 53, 54

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: if you are throwing and dropping the balls from the same height which true



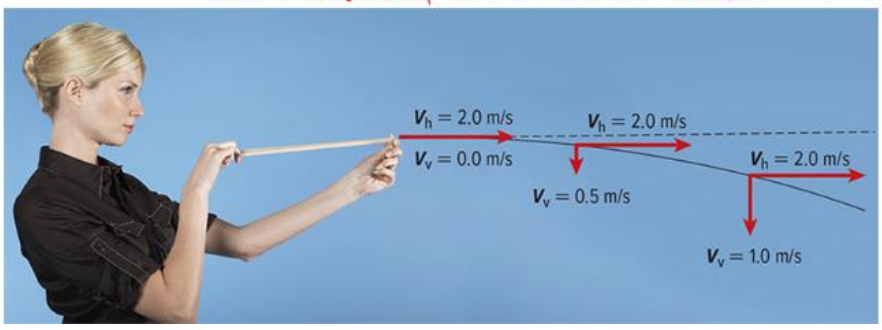
A. The ball dropping reach the ground the first.
B. The ball throwing reaches the ground the first.
C. Both arrive the same time.

Projectile motion

If you have tossed a ball to someone, you have probably noticed that thrown objects do not travel in straight lines. They curve downward. That is why quarterbacks, dart players, and archers aim above their targets. Anything that is thrown or shot through the air is called a projectile. Earth's gravity causes projectiles to follow a curved path.

Horizontal and vertical motion When you throw or shoot an object, such as the rubber band in **Figure 18,** the force exerted by your hand gives the object a horizontal velocity. For example, after the rubber band is released, its horizontal velocity is constant. The rubber band does not accelerate horizontally. If there were no gravity, the rubber band would move along the straight dotted line in **Figure 18.**

but vertical have accelerate = 9.8



Q: which true about horizontal and vertical motion

horizontal	vertical motion
Change velocity	Change velocity
Velocity constant	Change velocity
No accelerate	No accelerate

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

8. List the 6 types of simple machines with examples and describe how simple machines are important in easing work textbook, figure 4, 5 page 91, 93

Types of machines

When you cut your food with a knife, use a screwdriver, or chew your food, you are using a simple machine. A **simple machine** is a machine that does work with only one movement of the machine. There are six types of simple machines: lever, pulley, wheel and axle, inclined plane, screw, and wedge. The pulley and the wheel and axle are modified levers, and the screw and the wedge are modified inclined planes. A common example of each type of simple machine is shown in **Figure 4**.

Lever

Wheel and axle

Pulley

Inclined plane

Wedge

Screw

A **compound machine** is a combination of two or more simple machines. For example, a pair of scissors is a compound machine. It combines two wedges and two levers. A bicycle is also a compound machine.

Q: which is the following not simple machine?

A. Wedge B. Screw c. inclined plane D. scissors

Which cannot be done by a machine?

A) increase force

B) increase work

C) change direction of a force

D) increase velocity

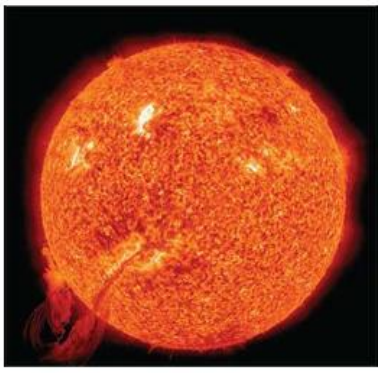
10.
Differentiate forms of energy and compare different examples to assign them to their energy form textbook, figures 7, 8 page 96, 98.

Different Forms of Energy

Turn on an electric light, and a dark room becomes bright. Turn on a portable music player, and sound comes through your headphones. In both situations, a change occurs. These changes differ from each other and from the tennis racket hitting the tennis ball in **Figure 6**. This is because energy has many different forms. These forms include mechanical energy, electrical energy, chemical energy, and radiant energy.

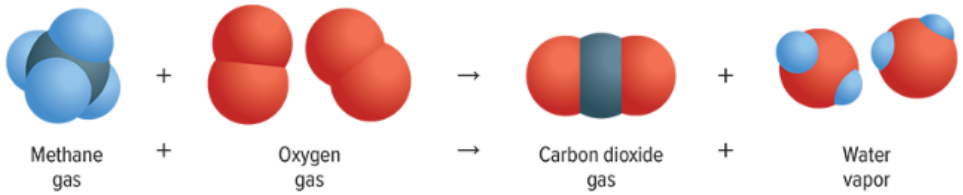
Chemical potential energy

Electrical energy

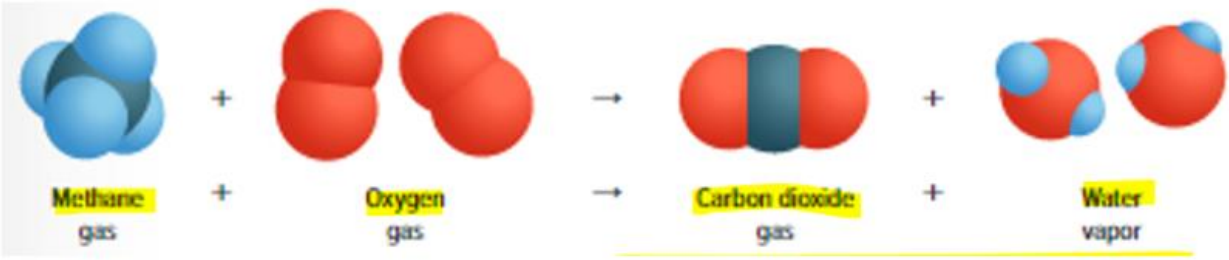


Radiant energy

Chemical potential energy The food that you eat and the gasoline in cars also have stored energy. This stored energy is due to the chemical bonds between atoms. **Chemical potential energy** is energy that is due to chemical bonds. You might notice chemical potential energy when you burn a substance. When an object is burned, chemical potential energy becomes thermal energy and radiant energy. **Figure 8** shows the process for burning methane.



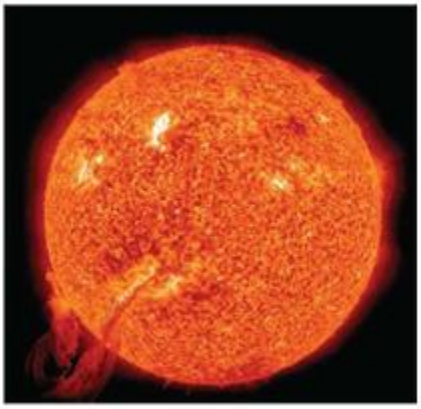
Q26: when methane gas burns it combines with oxygen which the energy convert.



A. Thermal to chemical
B. Chemical to thermal energy and radiant energy
C. Kinetic energy to chemical energy

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: which energy is in the figure below ?



A. radiant energy

B. electrical energy

C. chemical energy

D. Elastic energy

Define power and calculate work using power equation textbook, example problem 6, practice 26 page 107.

Power Equation

$$\text{Power (in watts)} = \frac{\text{Energy (in joules)}}{\text{time (in seconds)}}$$

$$P = \frac{E}{t} \qquad E = P \times t$$

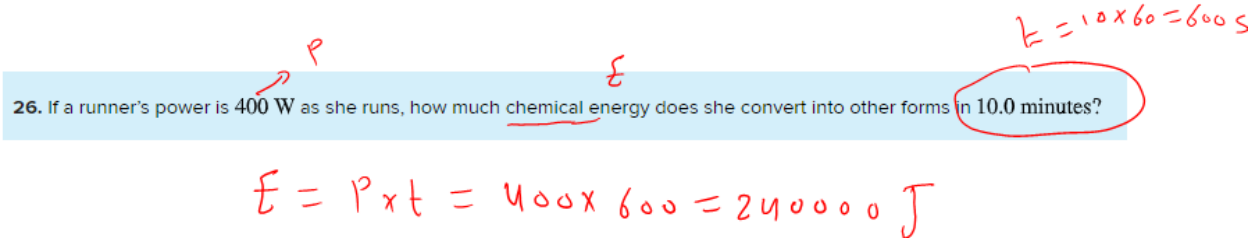
$$P = \frac{w}{t} \qquad w = P \times t$$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

EXAMPLE Problem 6

SOLVE FOR POWER You transform $950\ \text{J}$ of chemical energy into mechanical energy to push a sofa. If it took you $5.0\ \text{s}$ to move the sofa, what was your power?

Identify the Unknown:	power: P
List the Knowns:	Energy transformed: $E = 950\ \text{J}$ time: $t = 5.0\ \text{s}$
Set Up the Problem:	$P = \frac{E}{t}$
Solve the Problem:	$P = \frac{950\ \text{J}}{5.0\ \text{s}} = 190\ \text{W}$



A.40 J

B.4000J

C.240000J

D.410 J

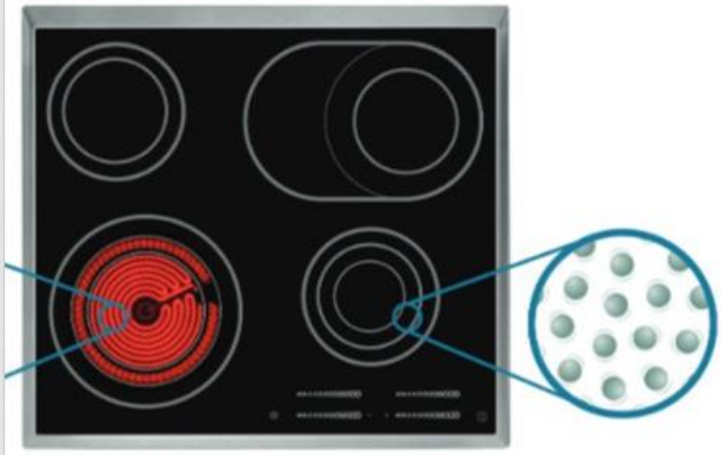
Q: equation work and power is

$P = \frac{W}{t}$ which is true?

A. W= p ÷ t
B. W = p t
C. W = t + p

12. Compare thermal energy, heat, and temperature and relate thermal energy to mass, motion, number of particles, kinetic energy and temperature textbook, figures, 1, 2, 3 114, 115, 116

particles that make up the burner, which of the following energy
on of the burner particles?



Thermal

Nuclear

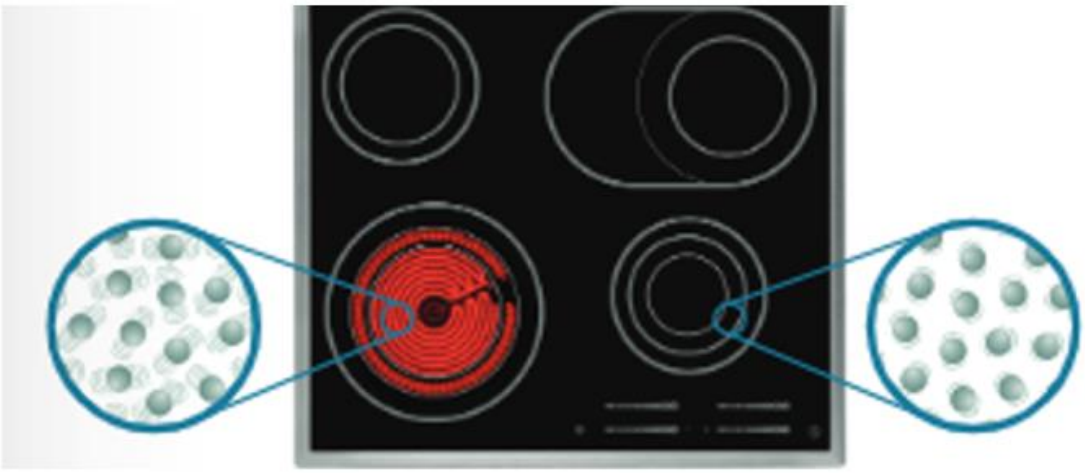
Kinetic

Potential

Q: the average kinetic energy of particles of matter is called.

A. Heat
B. Thermal energy
C. Temperature
D. Potential energy

Q :which true about the figure



A. The particles that make up the left burner are moving faster than the particle right burner.
B. The particles that make up the right burner are moving faster than the particle left burner.
C. The same temperature the particles in left and right.
D. The same kinetic energy the particles in left and right.

Q: Which is true about thermal energy?

A. increase kinetic energy decrease thermal energy.
B. increase mass increase thermal energy.
C. Increasing temperature decreases thermal energy.

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: which is <u>not</u> true about the figure

A. Kinetic energy increases the particles moving faster.

B. potential energy increases the particles spread farther apart.

C. Kinetic energy increases the particles moving slower.

‘

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: which is <u>not</u> true about the figure

A. The warmer stove heat cooler water
B. Warmer objects always heat cooler objects.
C. A cold pot heats a hot stove.

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

13. recognize and relate the basis of the gas laws and how to use those laws to calculate pressure, volume, or temperature textbook, figures 19, 20, 21, Example problem3, 4
page 369, 370, 371, 372

A weather balloon has a volume of 2.50 L at 101 kPa. As the balloon rises the pressure drops to 95.0 kPa. What is the new volume of the balloon?

V_i P_i P_F

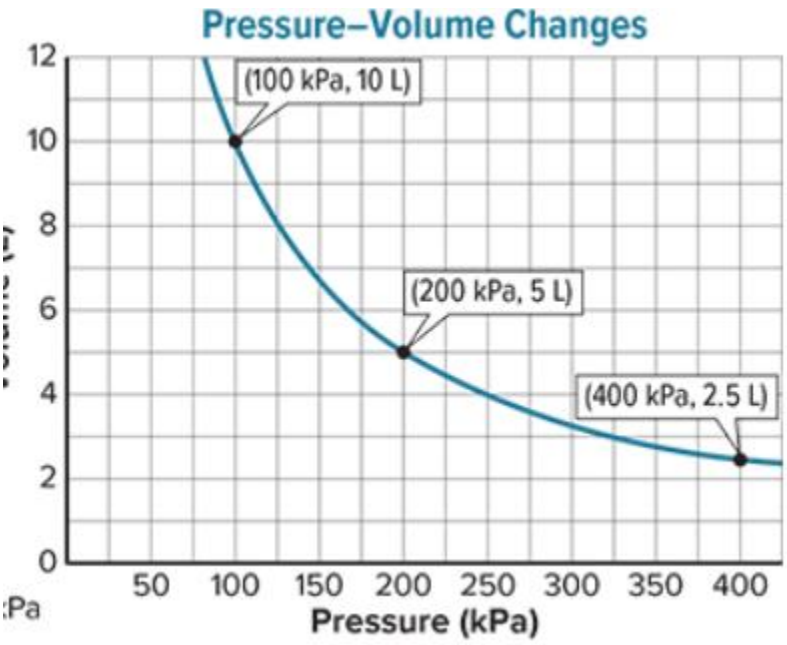
V_F

$V_F = \frac{V_i \times P_i}{P_F}$

$V_F = \frac{2.50 \times 101}{95.0} = 2.6$

- 4.11 L
- 2.35 L
- ✓ 2.66 L
- 3.83 L

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024



Which scientific concept does this graph best represent?

A. Boyle's law
B. Charles's law
C. Pascal's principle
D. Bernoulli's principle

An equation for Boyle's law

Boyle's law can be expressed with a mathematical equation. When the temperature of a gas is constant, then the product of the pressure and volume of that gas does not change.

Boyle's Law Equation

$$\text{initial pressure} \times \text{initial volume} = \text{final pressure} \times \text{final volume}$$

$$P_i V_i = P_f V_f$$

BOYLE'S LAW A weather balloon has a volume of 100.0 L when it is released from sea level, where the pressure is 101 kPa. What will be the balloon's volume when it reaches an altitude where the pressure is 43.0 kPa?

Identify the Unknown: final volume: V_f

List the Knowns:
initial pressure: $P_i = 101\ \text{kPa}$
initial volume: $V_i = 100.0\ \text{L}$
final pressure: $P_f = 43.0\ \text{kPa}$

Set Up the Problem:

$$P_i V_i = P_f V_f$$

$$V_f = V_i \left(\frac{P_i}{P_f} \right)$$

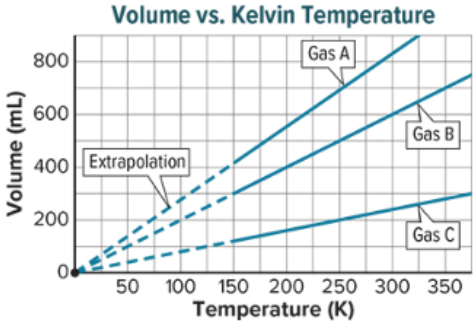
Solve the Problem:

$$V_f = 100.0\ \text{L} \left(\frac{101\ \cancel{\text{kPa}}}{43.0\ \cancel{\text{kPa}}} \right)$$

$$= 235\ \text{L}$$

Charles's Law—Temperature and Volume

If you've watched a hot-air balloon being inflated, you know that gases expand when they are heated. Jacques Charles (1746–1823), a French scientist, also noticed this. According to **Charles's law**, the volume of a gas increases with increasing temperature as long as the pressure on the gas does not change. As with Boyle's law, the reverse is also true. The volume of a gas shrinks with decreasing temperature, as shown in **Figure 21.**



Charles's Law Equation

$$\frac{\text{initial volume}}{\text{initial temperature (K)}} = \frac{\text{final volume}}{\text{final temperature (K)}}$$

$$\frac{V_i}{T_i} = \frac{V_f}{T_f}$$

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

EXAMPLE Problem 4

USE CHARLES'S LAW A 2.0-L balloon at room temperature (20.0°C) is placed in a refrigerator at 3.0°C. What is the volume of the balloon after it cools in the refrigerator?

Identify the Unknown: final volume: V_f

List the Knowns: initial volume: $V_i = 2.0\ \text{L}$

initial temperature: $T_i = 20°\text{C} = 20.0°\text{C} + 273 = 293\ \text{K}$

final temperature: $T_f = 3.0°\text{C} = 3.0°\text{C} + 273 = 276\ \text{K}$

Set Up the Problem:

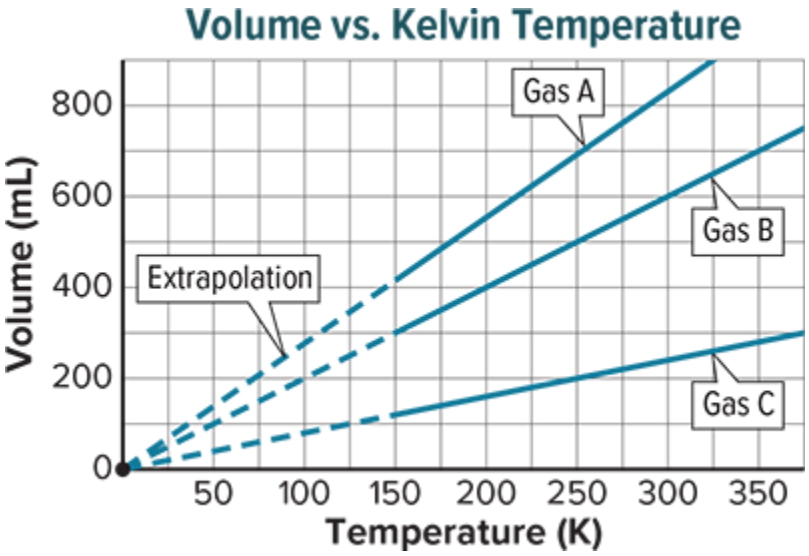
$$\frac{V_i}{T_i} = \frac{V_f}{T_f}$$

$$V_f = V_i\left(\frac{T_f}{T_i}\right)$$

Solve the Problem:

$$V_f = 2.0\ \text{L}\left(\frac{276\ \cancel{\text{K}}}{293\ \cancel{\text{K}}}\right)$$

$$= 1.9\ \text{L}$$



Use the figure which the volume for gas A if temperature 250 K

A. 700 ml
B. 400 ml
C. 200ml

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

14. Explain with giving examples how humans and animals control heat (animal adaptations, thermal insulators, insulated buildings, and thermoses) textbook, figures 11, 12, 13 page 124, 125, 126

Antarctic fur seal

Emperor penguins

Spiny lizard

Figure 11 Animals have different adaptations that help them control heat. Both the Antarctic fur seal and the emperor penguin have a thick layer of fat that reduces transfers of thermal energy to those animals' surroundings. The scaly skin of the desert spiny lizard reflects radiation from the Sun to prevent overheating.

Q: which the following used scaly skin for control heat

A. Antarctic seal
B. Emperor penguins
C. Spiny lizard

Q: which the following have thick layer of fat

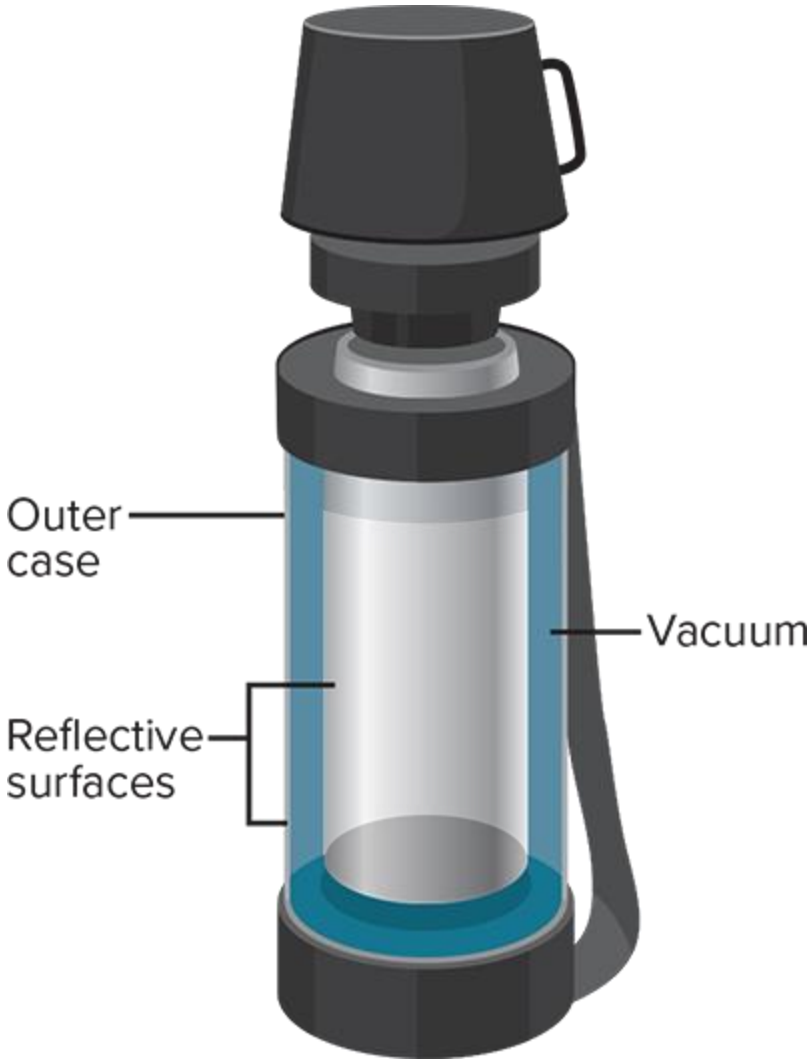
A. Antarctic seal
B. Emperor penguins
C. Both Antarctic seal and Emperor penguins
D. Spiny lizard

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q:Which the following Not thermal insulator ?

A. Air
B. Wood
C. Fiberglass
D. Metals

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024



Q: what the primary purpose of thermos ?

A. A cooking
B. Heating
C. Keeping liquids hot or cold
D. Water filtration

Q: which material is commonly used as insulation in thermos ?

A. Aluminum
B. Plastic
C. Glass
D. Vacuum

E.	
F.	15
G.	Explain the heating systems that are usually used (forced-air system, Radiator systems, Electric heating systems and solar heating (passive and active) and compare between them)
H.	Textbook, figures 14,15 page 127, 128

Q: which is the following Not heating system?
A. forced air system.
B. Radiator system
D. Refrigerators

Q: which heating system does not use central furnace electrical energy?

A. forced air system.

B. Radiator system

C. Electric heating system

D. Solar heating

Q: use the figure to identify passive solar?

Passive solar heating system

Active solar heating system

A. window, wood
B. water, air

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

16
Describe what fossil fuels are and how they are formed, link between fossil fuels and air pollutants (environment), Identify and explain the different uses of fossil fuels and how they are separated from their ores to be efficiently used.
Textbook, figures 6,7 page 194, 195, 196, 197

Q: Which of the following formed swamp plant?

A. Coal
B. Petroleum
C. Natural gas

Q: which of the following flammable liquids?

A. petroleum

B. Coal

C. natural gas

Q: How do chemical compounds in petroleum separated?

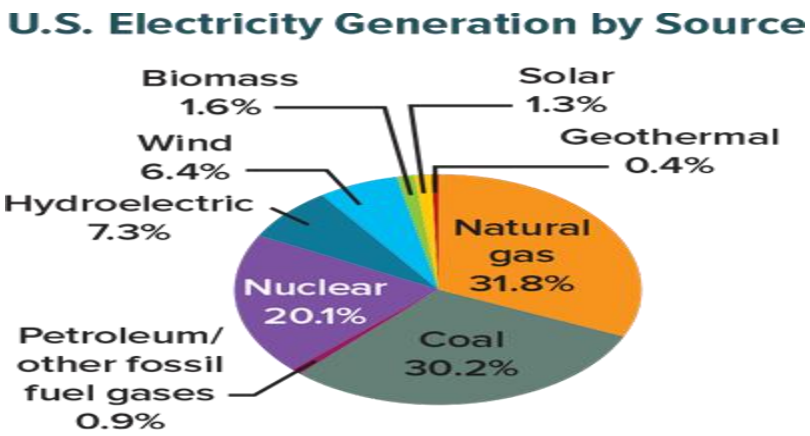
A. Evaporation
B. Combustion in air
C. Fractional distillation
D. Filtration

Q: which the following cleaner than fossil fuel

A. Coal
B. Natural gas
C. Petroleum

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

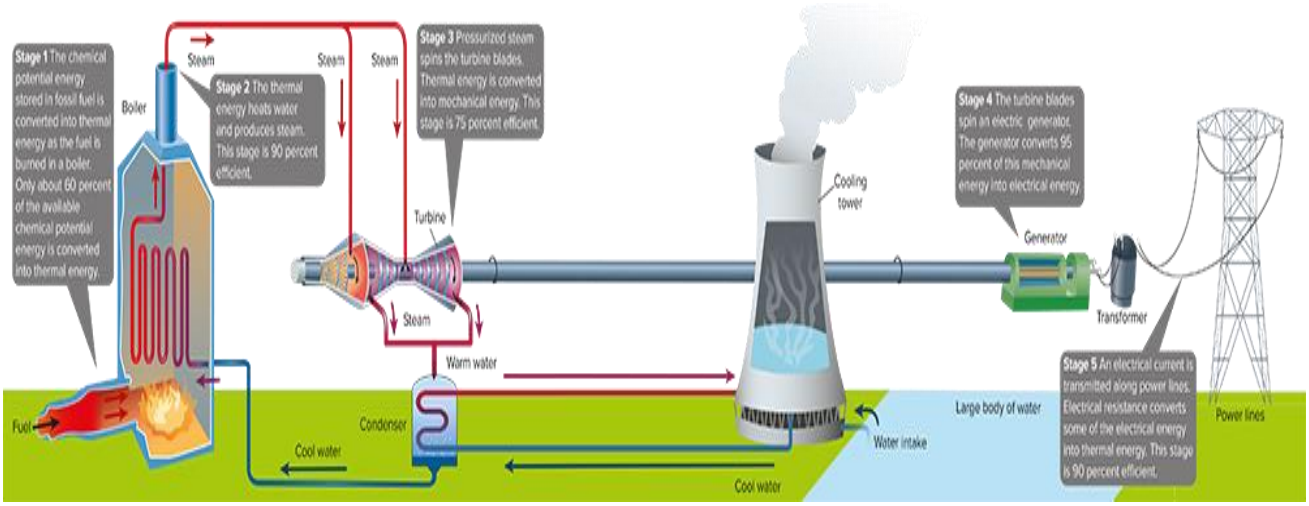
Q: use the figure to calculate percentage fossil fuel



A. 31.8 %
B. 62 %
C. 20.1 %
D. 82.1 %

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: use the the figure below to answer questions



Q1; which stage in this process is the most inefficient?

A. stage 1

B. stage 2

C. stage 3

D. stage 4

Q2: which transfer true

A. Chemical → thermal energy → mechanical energy → electrical

B. Chemical → mechanical energy → thermal → electrical

C. mechanical → thermal energy → electrical energy → chemical

17.
Explain how nuclear wastes are disposed (Low-level waste & High-level waste) Textbook, figure 16 page 204, 205.

The Disposal of Nuclear Waste

After about three years of use, there is too little U-235 in the fuel pellets that remain for the chain reaction to continue. The fuel pellets left are now referred to as spent fuel. The spent fuel includes radioactive fission products in addition to some leftover U-235. Spent fuel is a form of nuclear waste. **Nuclear waste** is any radioactive material that results when radioactive materials are used.

Low-level waste

Low-level nuclear waste usually contains a small amount of radioactive material. Additionally, low-level waste usually contains radioactive materials with short half-lives. Low-level waste is a by-product of electricity generation, medical research and treatments, the pharmaceutical industry, and food preparation. Low-level wastes also include used water and air filters from nucle power plants and discarded smoke detectors. Low-level waste is kept isolated from people and the environment. It is treated as hazardous material and is stored in spill-safe containers underground.

High-level waste

High-level nuclear waste is generated in nuclear power plants and by nuclear weapons programs. After spent fuel is removed from a reactor, it is stored in steel-lined concrete pools filled with water, as shown in **Figure 16,** or in airtight steel or concrete and steel canisters.

Many of the radioactive materials in high-level nuclear waste become nonradioactive after a relatively short amount of time. However, the spent fuel also contains materials that will remain radioactive for tens of thousands of years. For this reason, high-level waste must be disposed of in extremely durable, safe, and stable containers.

Q: the disposal of nuclear waste

A. combustion
B. thrown into water.
C. Stored in spill -safe containers and buried hundreds of meters belowground.

18. Explain the principles that underlie the ability of photovoltaic cells to convert solar (radiant) energy into electrical energy textbook, figure 17, 18 page 206 ,207

Figure 17 Photovoltaic cells convert radiant energy into electrical energy. Some vehicles have optional photovoltaic panels made of solar cells that are used to cool the car without the use of the engine.

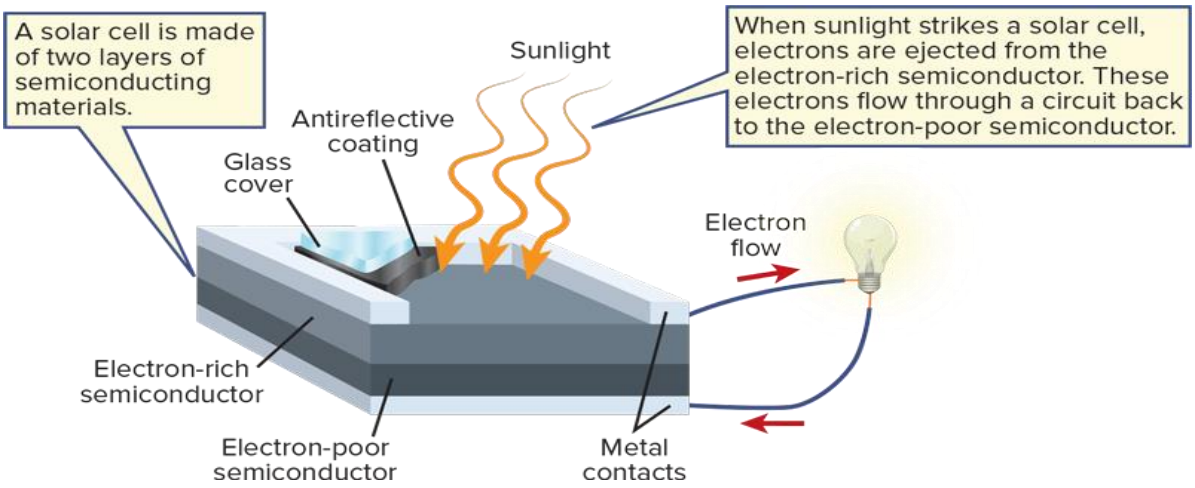


Figure 18 Radiant energy from sunlight strikes the surface of a solar cell, exciting electrons and causing them to flow through an electric circuit.

Q: how do solar cell convert energy?
A. chemical to electrical
B. electrical to radiant energy
C. radiant energy to thermal energy
D. radiant energy to electrical energy

Q; which primary function of solar cell
A. Generating energy from wind
B. Convert sunlight to electrical.
C. Producing geothermal power

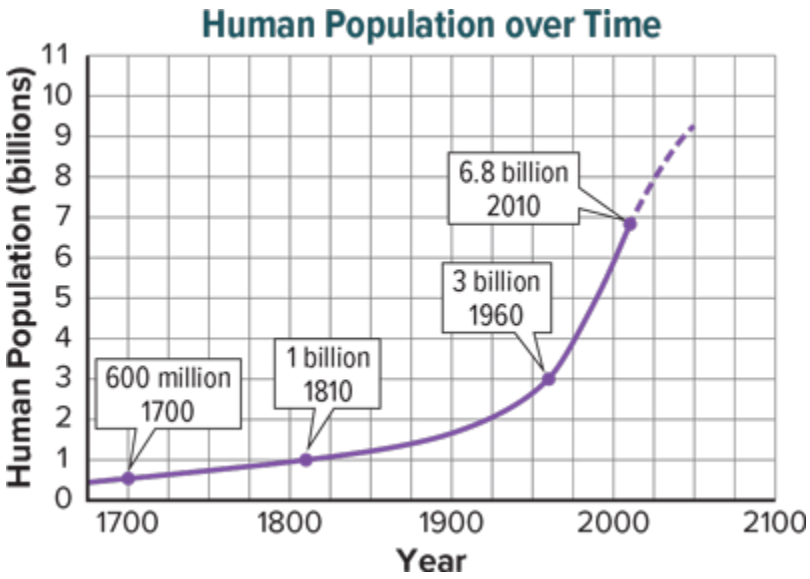
Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

19. elate Carrying capacity to the human population and predict that effect on resources and the impact on land, water and air Textbook, figure 25 page 212, 213, 214, 215

Q: the greatest number of individuals of a particular species that the environment can support is

A. Pollution
B. Carrying capacity
C. Population
D. Pollutants

Q: use the figure to answer questions



Q1: what is human population (billions) in 1810?

A. 600 million

B. 1 billion

C. 3 billion

D. 6.8 billon

Q: which different number human population between 1810 and 2010?

A. 3 billion
B. 1 billion
C. 5.8 billion
D. 600 million

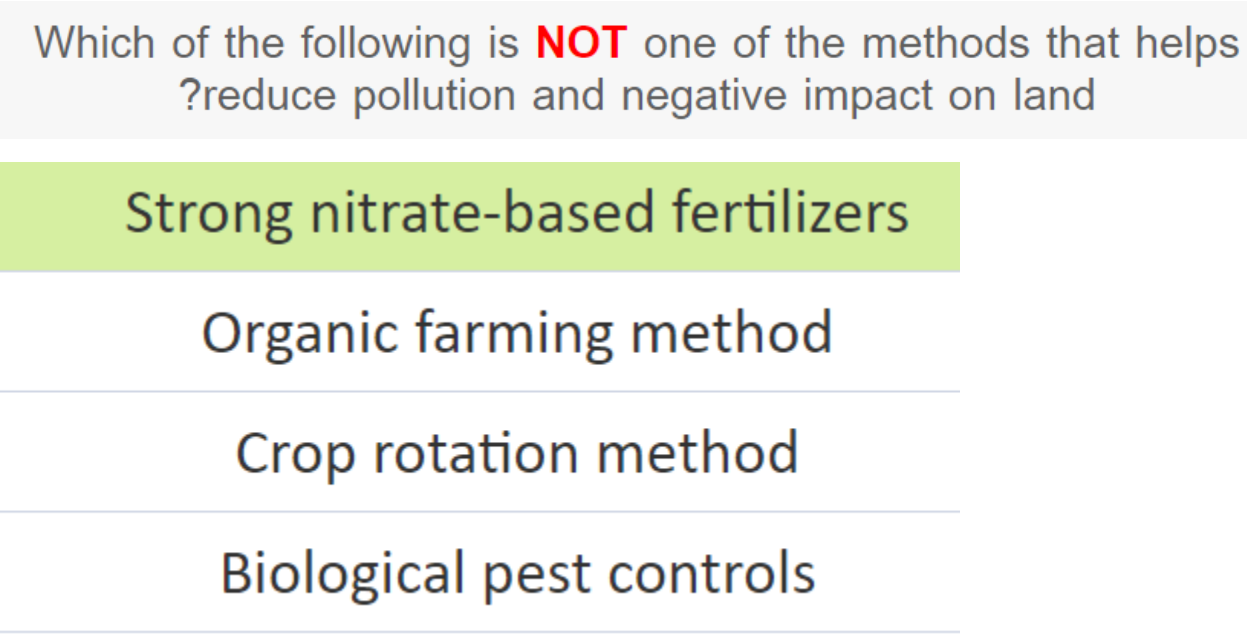
Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Q: human population after middle of nineteenth century

A. Increase
B. Decrease
C. Constant

Q: Which of the following is not negative on the land?

A. used fertilizers, herbicides, pesticides.
B. Deforestation
C. Urban development
D. Organic farms



Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

Which of the following is <u>not</u> considered as a source of water pollution?

A–Chlorofluorocarbons (CFCs)

B–Industry

C–Human waste

D–Oil and gas

20. Describe the impact of human activity on air and the types of air pollution textbook,
figure 32
Page 216, 217

Q: Which is the following <u>not</u> types of air pollution?

A. Human waste
B. Smog
C. CFCs
D. Acid precipitation

Types of air pollution

Have you ever observed a thick, brown haze on the horizon? The brown haze that you see forms from vehicle exhaust and factory and power plant pollution. This haze is often referred to as photochemical smog. **Photochemical smog** is a term used to describe the pollution that results from the reaction between sunlight and vehicle or factory exhaust.

Smog Major sources of photochemical smog include cars, factories, and power plants. Pollutants are released into the air when fossil fuels, such as gasoline are burned, as shown in **Figure 32,** emitting sulfur-, nitrogen-, and carbon-based compounds. These compounds react with oxygen in the presence of sunlight. One of the products of this reaction is ozone (O_3). Ozone that forms high in the atmosphere protects you from ultraviolet (UV) radiation from the Sun. Ozone near Earth's surface, however, can cause

Subject: Science / Inspire Grade : 9 General term: 2 Academic Year : 2023/2024

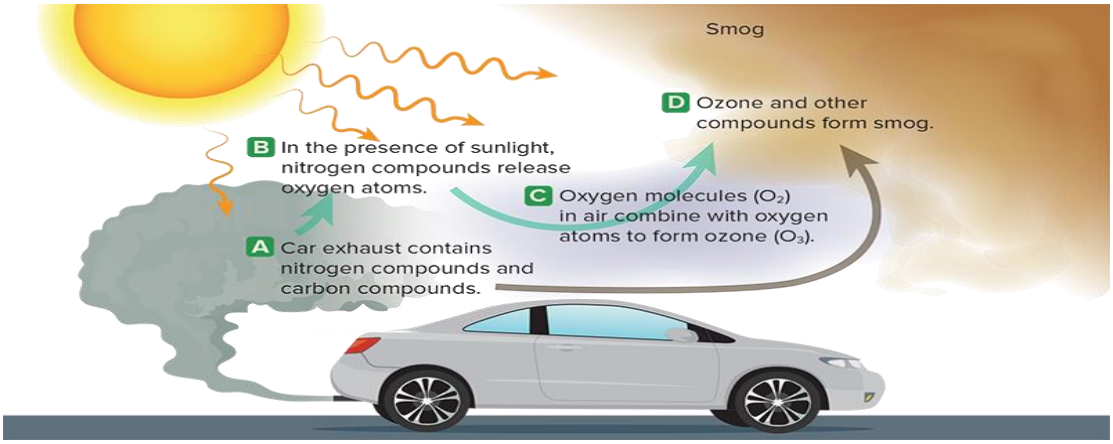


Figure 32 Exhaust from cars contributes to smog formation. Sunlight helps fuel reactions that form smog compounds. These compounds include nitrogen-based compounds and ozone.

CFCs The protective ozone high in the atmosphere is concentrated in a layer roughly 20 km above Earth's surface. This layer is called the ozone layer, and it is at risk of being destroyed. Chlorofluorocarbons (CFCs) are compounds that leak from old air conditioners and refrigerators and react with ozone. This reaction destroys ozone molecules. Even though the use of CFCs has been declining due to environmental laws, these compounds can remain in the atmosphere for decades.

Acid precipitation When sulfur-, nitrogen-, and carbon-based compounds from vehicles and factories react with moisture in the air, they form acids. When acidic moisture falls from the sky as precipitation, it is called **acid precipitation**. Acid precipitation can corrode metals and cause harm to plants and animals.

Q: term describe pollution that result reacts from sunlight and vehicle or factory exhaust is

A. Photochemical smog
B. Acid precipitation
C. CFCs

Teacher: Aref Daradkeh