YOUNG SCIENTIST ACTIVITY BOOK

CLASS - VIII

Sample Pages

EDUHEAL FOUNDATION
• LEARNING FOR LIFE •

DISCOVER ● INVENT ● EXPERIMENT ● EXPLORE

CLASS - VIII

SYLLABUS GUIDELINES

CLASS - VIII

Questions	Key concepts	Activities/ Processes
Food ***Crop production*** Crop production : How are different food crops produced? What are the various foods we get from animal sources?	Crop production: Soil preparation, selection of seeds, sowing, applying fertilizers, irrigation, weeding harvesting and storage; nitrogen fixation, nitrogen cycle.	Preparing herbarium specimens of some crop plants; collection of some seeds etc; preparing a table/chart on different irrigation practice and sources of water in different parts of India; looking at roots of any legume crop for nodules, hand section of nodules.
Micro-organism What living organisms do we see under a microscope in a drop of water? What helps make curd? How does food to bad? How do we preserve food?	Micro organisms-useful and harmful.	Making a lens with a bulb; Observation of drop of water, curd, other sources, bread mould, orange mould under the microscope; experiment showing fermentation of dough - increase in volume (using yeast) - collect gas in balloon, test in lime water.
2. Materials ***Materials in daily life*** Are some of our clothes synthetic? How are they made? Where do the raw materials come from? Do you we use other materials that are synthetic?	Synthetic clothing materials. Other synthetic materials, especially plastics; usefulenss of plastics and problems associated with their excessice use.	Survey on use of synthetic materials. Discussion.
Do we use cloth (fabric) for purposes other than making clothes to weat? What kind of fabric do we see around us? What are they used for?	There are a variety of fibrous materials in use. A material is chosen based on desired property.	Testing various materials-for action of water, reaction on heating, effect of flame, electrical conductivity, thermal conductivity, tensile strength.
Different kinds of materials and their reaction. Can a wire be drawn our of wood? Do copper or aluminium also rust like iron? What is the black material inside a pencil? Why are electrical wires made of aluminium or copper?	Metals and non-metals.	Simple observations relating to physical properties of metals and non-metals, displacement reactions, experiments involving reactions with acids and bases. Introduction of word equations.
How things change/react with one another What happens to the wax when a candle is burnt? Is it possible to get this wax back? What happens to kerosene/natural gas when it is burnt? Which fuel is the best? Why?	All fuels release heat on burning. Fuels differ in efficiency, cost etc. Natural resources are limited. Burning of fuels leads to harmful by products.	Experiments with candles. Collecting information. Discussions involving whole class.

3. The World of the Living ***Why conserve*** What are reserve forests/sanctuaries etc? How do we keep track of our plants and animals? How do we know that some species are in danger of disappearing? What would happen if you continuously cut trees?	Conservation of biodiversity/wild life/ plants; zoo, sanctuaris, forest reserves etc. flora, fauna endangered species, red data book; endemic species, migration.	Discussion on whether we find as many diverse plants/ animals in a 'well kept area' like a park or cultivated land, as compared to any area left alone. Discussion on depletion of wild life why it happens, on poaching, economics.
The cell What is the internal structure of a plant what will we see if we look under the microscope? Which cells from our bodies can be easily seen? ARe all cells similar?	Cell structure, plant and animal cells, use of stain to observe, cell organelles - nucleus, vacuole, chloroplast, cell membrane, cell wall.	Use of a microscope, preparation of a slide, observation of onion peel and cheek cells, other cells from plants e.g. *HYdrilla leaf, permanent slides showing different cells, tissues, blood smear; observation of T.S. steam to see tissues; observing diverse types of cells from plants and animals (Some permananet slide).*
How babies are formed How do babies develop inside the mother? Why does our body change when we reach our teens? How is the sex of the child determined? Who looks after the babies in your homes? Do all animals give birth to young ones?	Sexual reproduction and endocrine system in animals, secondary sexual characters, reproductive health; internal and external fertilisation.	Discussion with counsellors on secondary sexual characters, on how sex of the child is determined safe sex, productive health observation on eggs, young one, life cycles.
4. Moving things, People and Ideas ***Idea of force*** What happens when we push or pull anything? How can we change the speed, direction of a moving object? How can we shape the shape of an object?	Idea of force-push or pullo; change in speed, direction of moving objects and shape of objects by applying force; contact and non-contact forces.	Observing and analysing the relation between force and motion in a variety of daily-life situation. Demonstrating change in speed of a moving object, its direction of motion and shape by applying force. Measuring the weight of an object, as a force (pull) by the earth using a spring balance.
Friction What makes a ball rolling on the found slow down?	Friction-factors affecting friction, sliding and rolling friction, moving; advantages and disadvantages of friction for the movement of automobiles, airplanes and boats/ ships; increasing and reducing friction.	Demonstrating friction between rought/ smooth surfaces of moving objects in contact, and wear and teat of moving objects by rubbing (earaser on paper, ard board, sand paper). Activities on static, sliding and rolling friction. Discussion on other methods of reducing friction and ways of increasing friction.
Pressure Why are needles made pointed? Why does a balloon burst if too much air is blown into it? Why does an inverted glass/bottle/pitcher resist being pushed down into water? How can air/liquids exert pressure?	Idea of pressure; pressure exerted by air/liquid; atmospheric pressure.	Observing the dependence of pressure exerted by a force on surface area of an object. Demonstrating that air exerts pressure in a variety of situations.

		Demonstrating that liquids exert pressure. Designing an improvised manometer and measuring pressure exerted by liquids. Designing improvised pressure detector and demonstrating increase in pressure exerted by a liquid at greater depths.
Sound How do we communicate through sound? How is sound produced? What characterises different sounds?	Various types of sound; sources of sound; vibration as a cause of sound; frequency; medium for propagation of sound; idea of noise as unpleasant and unwanted sound and need to minimise noise.	Demonstrating and distinguishing different types (loud and feeble, pleasant/musical and unpleasant/noise, audible and inaudible) of sound. Producing different types of sounds. using the same source. Making a '*Jal Tarang'*. Demonstrating that vibration is the cause of sound. Designing a toy telephone. Identifying various sources of noise. (unpleasant and unwanted sound) in the locality and thinking of measures to minimise noise and its hazards (noise-pollution).
5. How Thing Work ***Electric current and circuits*** Why do we get a shock when we touch an electric appliance with went hands? What happens to a conducting solution when electric current flows through it? How can we coat an object with a layer of meatal?	Water conducts electricity depending on presence/ absence of salt in it. Other liquids may or may not conduct electricity. Chemical effects of current. Basic idea of electroplating.	Activity to study whether current flows through various liquid samples (tap water, salt, solution, lemon juice, kerosene, distilled water if available). Emission of gases from salt solution. Deposition of Cu from copper sulphate solution. Deposition of Cu from copper sulphate solution. Electric pen using KI and starch solution. Simple experiment to show electroplating.
6. Natural Phenomeana ***Rain, thunder and lightning*** What is lightning? What safety measures should we take against lightning strickes?	Clouds carry electric charge. Positive and negative charges, attraction and repulsion. Principle of lightning conductor.	Discussion on sparks. Experiments with comb and paper to show positive and negative charge. Discussion on lightning conductor.
Light What are the differences between the image formed on a new utensil and an oil one? Why is there this difference? When you see your image in the mirror in appears as if the left is on the right why?	Law of reflection. Characteristics of image formed with a plane mirror.	Exploring laws of reflection using ray source and another mirror. Locating the reflected image using glass sheet and candles
why don't we see images on all surfaces around us? What makes things visible? How do we see image of our back in a mirror?	Regular and diffused reflection Reflection of light from an object to the eye Multiple reflection.	Discussion with various examples Activity of observing an object through an object through a straight and bent tube; and discussion. Observing multiple image formed by mirrors placed at angles to each other. Making a kaleidoscope.

Why do we sometimes see colours on oil films on water? What is inside our eye that enables us to see?	Dispersion of light Structure of the eye	Observing spectrum obtained on a white sheet of paper/wall using a plane mirror inclined on a water surface at an angle of 45° Observing reaction of pupil to a shining torch. Demonstration of blind spot.
Why are some people unable to see?	Lens becomes opaque, light not reaching the eye. Visually challenged use other sense to make sense of the world around. Alternative technology available Role of nutrition in relation to blindness.	Description of case histories of visually challenged people who have been doing well in their studies and careers. Activities with Braille sheet.
Night sky What do we see in the sky at night? How can we identify stars and planets?	Idea about heavely bodies/celestial objects and their classification - moon, planes, stars, constellations. Motion of celestial objects in space; the solar system.	Observing and identifying the objects moving in the sky during the day and at night. Observing and identifying some prominent stars and constellations. Observing and identifying some prominent planets, visible to the naked eye, (Venus, Mars, Jupiter) in the night sky and their movement. Design and preparing models and charts of the solar system, constellations, etc. Role play and games for understanding movement of planets, stars etc.
Earthquakes What happens during an eqrthquake? What can we do minimise its effects?	Phenomena to earthquakes.	Looking at structures/ large objects and guessing what will happen to them in the event of an earthquake; activities to explore stable and unstable structures.
7.Natural Resources ***Man's intervention in phenomena of nature*** What do we do with wood? What if we had no wood? What will happen it we go on cutting trees / grass without limit? What will happen it we go on cutting trees / grass without limit?	Consequences of deforestation: scarcity of products for humans and other living beings, change in physical properties of soil, reduced rainfall. Reforestation; recycling of paper	Narration and discussions. Project - Recycling of paper.
What do we do with coal and petroleum? Can we create coal and petroleum artificially?	Formation of coal and petroleum in nature. (fossil fuels?) Consequences of ocer extraction of coal and petroleum.	Discussion
Pollution of air and water what are the various activities by human beings that make air impure? Does clear, transparent water indicate purity?	Water and air are increasingly getting polluted and therefore become scarce for use. Biological and chemical contamination of water on soil and living beings; effect of soil containing excess of fertilisers and insecticides on water resources. Potable water.	Case study and discussion. Purification of water by physical and chemical methods including using sunlight. Discussion on other methods of water purification.

Cell and City

Team Page:

☺ All living organisms are composed of cells, They are the functional & structural unit of life. Their details are visible only through a microscope. As a basis for understanding this concept, know these :

a. cells function similarly in all living organisms.

b. the characteristics that distinguish plant cells from animals cells include chloroplasts and cell walls.

c. the nucleus is the centre for genetic information in plant and animal cells.

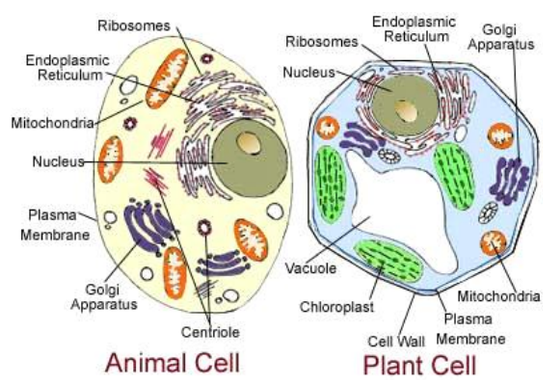
d. mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight for photosynthesis.

Here's how

In this activity you need to match the city part with the cell part based upon the functions performed by them. Some of the suggested city analogies are given in the table. These are jumbled up.

a. Prepare a table of cell organelles & city analogies.

b. Match the cell organalles & suggested, city organelles on the table prepared.



Cell Organelles (choose one)

Cell Membrane	Mitochondria
Cell Wall	Nucleus
Cytoplasm	DNA
Endoplasmic Reticulum	RNA
Ribosomes	Nucleolus
Golgi Bodies	Lysosomes
Chloroplasts	Vacuole
Nuclear Membrane	Protoplasm
Proteins	Chromosomes

Suggested City Analogies (you can think of your own tool!)

City border	City Hall
Original Blueprints	Rolled up blueprints
Copy machine	Lawns
Air or atmosphere	Lumber or brick yard
Lumber or bricks	City Hall Fence with security guard
City Wall	Warehouses, water tower, garbage dumps
Solar Energy Plants	Energy Plants
Post Office or UPS	Waste Disposal/ Recyclers
Highway or road system	Copies of Blueprints

(Answer in the YSAB)

Lemon Power

Everyone of us is very much familiar with lemon or 'nimbu'. Besides making refreshing 'nimbu-pani', can you imagine what else can you make from lemon? Make batteries! Sounds strange isn't it? Yes, you are going to make lemon-battery here.

What do you need?

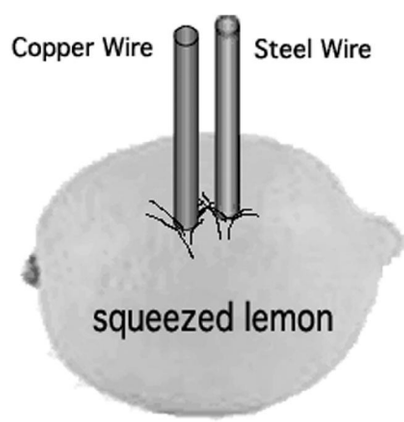
- ☺ Thick copper wire (Thin wires will work too, but thick wire is stiffer)
- ☺ Wire clippers
- ☺ Steel paper clip
- ☺ Sheet of coarse sandpaper
- ☺ Lemon

What to do?

1 Have your older friend or an adult strip 5 cm of insulation off the copper wire. Clip the 5 cm of bare wire with the clippers.

2 Straighten out the paper clip and cut about 5 cm of the straightened steel wire.

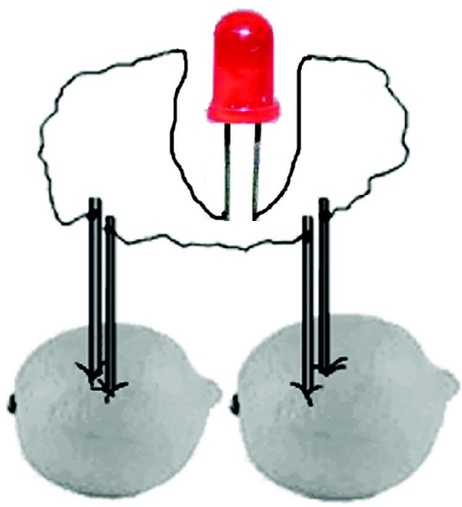
3 Use sandpaper to smooth any rough



spots on the ends of the wire and paper clip.

4 Squeeze the lemon gently with your hands. But don't rupture the lemon's skin. Rolling it on a table with a little pressure works great.

5 Push the pieces of the paper clip and the wire into the lemon so they are as close together as you can get them without touching.



6 Moisten your tongue with saliva. Touch the tip of your wet tongue to the free ends of the two wires.

You should be able to feel a slight tingle on the tip of your tongue and taste something metallic.

What's going on

The lemon battery is called a voltaic **battery**, which changes chemical energy into electrical energy.

The battery is made up of two different metals (the steel paper clip and the copper wire). These are called **electrodes**, which are the parts of a battery where electric current enters or leaves the battery. The electrodes are placed in a liquid containing an **electrolyte**, which is a solution that can conduct electricity.

In a solution of water and an electrolyte, like the citric acid in the lemon, an excess of electrons collects on one end of the electrodes. At the same time, electrons are lost from the other electrode.

Touching the electrodes to your tongue closes the circuit and allows small electric current to flow. A single lemon produces about 7/10 of a volt of electricity. If you connected two lemons together, you can power LED (light emitting diode). (Use a length of thin, flexible wire to connect the steel wire of one lemon to the copper wire of the other lemon. Then attach thin wires from the other two wires in the lemons to where a battery's positive and negative poles connect to power the watch.)

The tingle felt in your tongue and the metallic taste is due to the movement of electrons through the saliva on your tongue.

Note About Lemon Energy

The lemon "battery" cannot be used to light a small flashlight's light bulb. Why? The reason is that the lemons produce only a very small current (about one milliampere). This is not enough electric current to light the bulb. Even with multiple lemons, the amount of current flowing through the wire is not enough. Though the voltage is high enough (1.5 volts with two lemons), the current is too weak. But it is a great experiment!

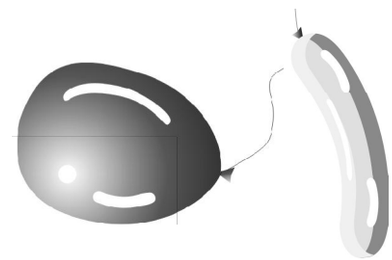
Fun Science with Balloons

Isn't it great fun to pop balloons filled with chocolates and colourful, shining fillers on your or on your friend's birthday? Since, balloons are very fragile things, they get easily popped on pricking with a sharp object like needle or on getting heat. Weaken the rubber and cause it to burst. However, in the following experiment you will find out how you can hold a balloon directly in a flame without breaking the balloon; and also stick a needle through a balloon without bursting it.

The Fireproof Balloon

you will need:

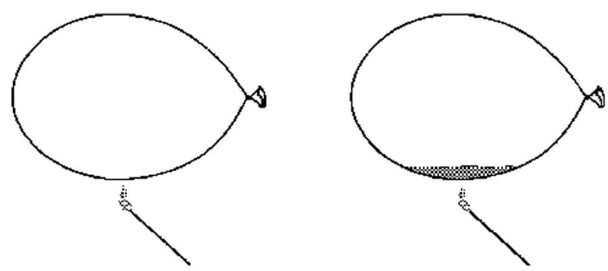
- ☺ two round balloons, not inflated
- ☺ several matches
- ☺ water



Here's How :-

1. Inflate one of the balloons and tie it closed. Place 60 milliliters ($\frac{1}{4}$ cup) of water in the other balloon, and then inflate it and tie it shut.

2. Light a match and hold it under the first balloon. Allow the flame to touch the balloon. What happens? The balloon bursts, perhaps even before the flame touches it.



3. Now light another match. Hold it directly under the

water in the second balloon. Allow the flame to touch the balloon. What happens with this balloon? The balloon doesn't break. You may even see a black patch of soot form on the outside of the balloon above the flame.

You know why?

Why does the balloon with no water break in the flame? The flame heats the rubber of both the balloons. The rubber of the balloon without water becomes so hot, that it becomes too weak to resist the pressure of the air inside the balloon.

How does the balloon with water in it resist breaking in the flame? When water inside the balloon is placed in the flame, the water absorbs most of the heat from the flame. Then, the rubber of the balloon does not become very hot. Because the rubber does not become hot, it does not weaken, and the balloon does not break.

Water is a particularly good absorber of heat. It takes a lot of heat to change the temperature of water as much heat to raise the temperature of 1 gram of water by 1°C than it does to raise the temperature of 1 gram of iron by the same amount. On the other hand, when water cools, it releases a great deal of heat. Water takes longer time to get heated and takes very less time to release the heat.

Find out

1. Why the areas near oceans or other large bodies of water donot get as cold in winter as areas at the same latitude further inland?

2. Why Mumbai enjoys a maritime climate all round the year?

Needle Through a Balloon

you will need

- ☺ balloons
- ☺ long wooden or metal skewers
- ☺ petroleum jelly (Vaseline)
- ☺ a sharp needle
- ☺ cellophane tape

Here's How

1. Blow up a balloon – not too full – and tie the opening shut.

2. Dip the tip of a skewer in Vaseline and spread the Vaseline along the entire length of the skewer.

3. If you are careful, you should be able to push the skewer all the way through the balloon without popping it. Insert the skewer with a gentle twisting motion into the end of the balloon opposite the knot. Continue pushing and twisting the skewer until the tip emerges from the other end, near the knot.

Why doesn't the balloon burst?

Now try to stick the skewer into the side of the balloon. What happens?

The rubber in the balloon consists of many long molecules that are linked together. It's similar to the way all of noodles in a plate of Maggi stick together. These long molecules are called polymers; when molecules of a polymer are chemically attached to each other, it is called cross-linking. [You will learn about polymer cross links in detail in higher classes.] These links hold the polymer molecules together and allow them to stretch…up to a point. When the force or tension pulling on the cross-links is too great, they will break, and the polymer will pull apart.

Look at the rubber near the ends of the balloon where you first inserted the skewer. Does it look lighter or darker than the rubber in the rest of the balloon?

The rubber at the ends of the balloon is stretched out less than in the middle of the balloon. Therefore, there is less force pulling on it. This allows the tip of the skewer to break some polymer cross-links, push aside the molecules of rubber, and slide into the balloon. However, enough cross-links remain so that the balloon holds together.

In the side of the balloon, there are fewer polymer molecules. When you push the tip of the skewer through the rubber in the side of the balloon and the skewer breaks a few of the cross-links, the tension on the remaining cross-links is too great, and the balloon bursts.

Do you think there is a way to stick a sharp needle through the side of a balloon without popping it?

Put a small piece of cellophane tape on the side of the balloon and press it down well. Now take the needle and press it through the tape and into the balloon. Does the balloon burst?

The tape sticks to the rubber in the balloon and will not allow the rubber to stretch to the breaking point when the needle pierces the balloon. In other words, the tape reinforces the cross links, and the balloon stays together.

Answer to Cell and City

Cell Organelles	City Analogies
Cell Membrane	City border
Cell Wall	City Wall
Cytoplasm	Lawns
Endoplasmic Reticulum	Highway or road system
Ribosomes	Lumber or brick yard
Golgi Bodies	Post Office
Chloroplasts	Solar Energy Plants
Nuclear Membrane	City Hall Fence with security guard
Mitochondria	Energy Plants
Nucleus	City Hall
DNA	Original Blueprints of the city
RNA	Copies of Blueprints
Nucleolus	Copy Machine
Lysosomes	Waste Disposal/ Recyclers
Vacuole	Warehouses, water towers or garbage dumps
Protoplasm	Air or atmosphere
Chromosomes	Rolled up blueprints
Proteins	Lumber or bricks

Nationwide Interactive Science Olympiad, 2007

Sample Paper

SCIENCE

1. Scientists study the nature of the material of celestial bodies with the help of
   (a) Asteroids (b) Meteorites (c) Meteors (d) Soil

2. Ozone which protects life on earth from harmful Ultra violet rays of the sun is a pollutant at the

   (a) Stratosphere (b) Exosphere
   (c) Ionosphere (d) Ground level

3. Soil is important for plant growth because it
   (a) does not let plant roots grow too deeply
   (b) makes the earth's surface hard
   (c) contains nutrients to help plants grow
   (d) moves easily from one place to another.

4. Which of the following is correct:
   i. Most abundant gas in the atmosphere is nitrogen
   ii. Air pressure can be measured with a nanometer
   iii. Oxygen is a Green house gas.
   iv. Acid rain mainly contains nitric acid and sulphuric acid
   (a) i & iv (b) i & ii (c) iii & iv (d) ii & iii

5. Match the following & choose the correct answer

I. The heaviest part of an atom	j. ion
II. They have mass but no charge	k. valency
III. Cl^- is a/an	l. radical
IV. Combining capacity of oxygen is 2, that is its	m. nucleus
V. NH_4^+ is a/an	n. neutrons

   (a) I-k; II-m; III-n; IV-j; V-l (b) I-m; II-n; III-j; IV-l; V-k

(c) I-m; II-n; III-l; IV-j; V-k (d) I-m; II-n; III-j; IV-k; V-l

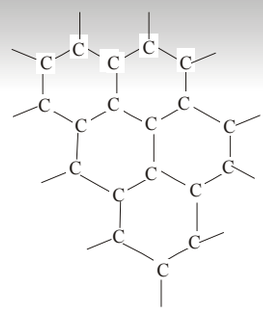
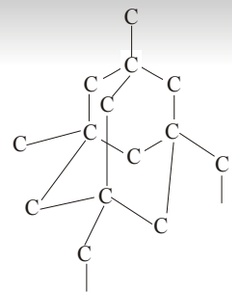
6. (a)  (b) 

Fig. (a) and (b) shows two different arrangements of carbon atoms. They are called

(a) Isotropes (b) Allotropes (c) Isobars (d) Isomers

7. Nodules on the roots of leguminous plants contain

(a) Bacteria (b) Blue-green algae

(c) Fungi (d) Viruses

8. Now a days species of *Bacillus, Pseudomonas & Proteus* are used

(a) For fermentation (b) For sewage treatment

(c) As fertilizers (d) For curing diseases

9. Choose the correct answer/ answers -

i. Convex lens can also be used as magnifying lens

ii. Image formed by a plane mirror is called real image

iii. A concave lens is thinner in the middle than at the edges

iv. The image formed by a convex lens is real, inverted and very large, then the object must be placed at infinity

(a) i & iii (b) ii & iii (c) ii & iv (d) All correct

10. Which of the following phrases about heat transfer properties best matches the use of silvered layer for the inside of a glass thermos flasks?

(a) Poor conducter of heat

(b) Good reflector of heat radiation

(c) Good conductor of heat

(d) Good absorber of heat radiation

MENTAL ABILITY

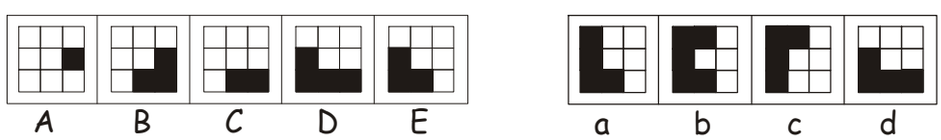
11. In a certain code GARIMA is written as 725432 and TINA as 6482. How is MARTINA written in that code?
(a) 3256482 (b) 3265842 (c) 3645862 (d) 3658426

12. Deepa moved a distance of 75 metres towards the north. She then turned to the left and walking for about 25 metres, turned left again and walked 80 metres. Finally, she turned to the right at an angle of 45°. In which direction was she moving finally?
(a) North-east (b) North-west (c) South-east (d) South-west

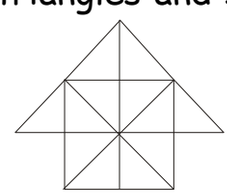
13. If L denotes ×, M denotes ÷, P denotes + and Q denotes –, then 16 P 24 M 8 Q 6 M 2 L 3 = ?

(a) $\frac{13}{6}$ (b) $-\frac{1}{6}$ (c) $14\frac{1}{2}$ (d) 10

14. **Direction :** The following question consist of five figures marked A, B, C, D and E called the problem figures followed by five other figure marked 1, 2, 3, 4 and 5 called the Answer figures. Select a figure from amongst the Answer figure which will continue the same series as established by the five Problem figures.



15. Count the number of triangles and squares in the figure given below :



(a) 26 triangles, 5 squares (b) 26 triangles, 6 squares
(c) 27 triangles, 6 squares (d) 27 triangles, 5 squares

16. Pick the correct statement about computers.
(a) Computers process data with human intervention after the program has been fed
(b) All comparisons are made in the control section
(c) The arithmetic-logic section of the CPU selects, interprets and executes the program steps
(d) Computers have the built-in ability to obey different types of instructions

17. X controls and guides the interpretation, flow and manipulation of all data and information. X sends control signals until the required operations are done properly by ALU and memory. What is X in the above statement?
(a) CPU (b) CU (c) ALU (d) Program

18. Data is recorded on a CD-ROM by.....on its surface which creates a difference in the reflectivity of the surface. When information has to be read, a laser beam is used to detect these variations in reflectivity.
(a) Demagnetizing (b) Etching
(c) Decoding (d) Depolarizing

19. MS-paint, MS-word, Tally, MS-excel, Lotus 123 are
(a) Accounting softwares (b) Word softwares
(c) Application softwares (d) Utility softwares

20. Working of the WAN generally involves
(a) Telephone lines (b) Microwaves
(c) Satellites (d) All of these

Answer key :-

1. (c)	2. (d)	3. (c)	4. (a)	5. (d)
6. (b)	7. (a)	8. (b)	9. (a)	10. (b)
11. (a)	12. (c)	13. (d)	14. (b)	15. (b)
16. (d)	17. (b)	18. (b)	19. (c)	20. (d)