

General Science & Ability (Mock-4)

DATE: ___/___/___

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Section-II

Q6

Q6(a)

Given Data:

Ratio of Packs of Candies:

Apple : Berry : Cherry : Date
3 : 6 : 2 : 5

Total Packs of Candies = $3+6+2+5$
 $= 16$

Apple = $35 + \text{Date}$

To Find

No. of Berry candies = ?

Solution:

By given data,

$3\text{Apples} = 6\text{Berries} = 2\text{Cherries} = 5\text{Dates}$

According to given condition

Apples = $35 + \text{Dates}$ — (i)

and,

$3\text{Apples} = 5\text{Dates}$

put (i) in it.

$3(35 + \text{Dates}) = 5\text{Dates}$

$105 + 3\text{Dates} = 5\text{Dates}$

$\Rightarrow 5\text{Dates} - 3\text{Dates} = 105$
 $2\text{Dates} = 105$

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$$\text{Dates} = \frac{105}{2} = 52.5$$

$$\text{Share of Dates} = \frac{5}{16} \times \text{Total candies}$$

$$52.5 = \frac{5}{16} \times \text{Total candies}$$

$$\text{Total candies} = \frac{52.5 \times 16}{5}$$

$$\text{Total candies} = \frac{840}{5} = 168$$

$$\text{Share of Berries} = \frac{6}{16} \times 168$$

$$= 63 \text{ Berries}$$

Q6(c)

Given:

$$\text{Distance} = 36 \text{ km}$$

$$\text{Speed} = 18 \text{ km/hr}$$

$$\text{Starting time} = 1 \text{ pm}$$

To find:

Time at which it reached?

Solution:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{So, Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{36}{18} = 2 \text{ hr.}$$

$$\text{So Time at which it reached} = 1 \text{ P.M.} + 2 \text{ hrs} \\ = 3 \text{ P.M.}$$

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Bicycle reach at 3 P.M.

Q.6(d)

Unscramble

1) STSTAICTIS
STATISTICS

2) LGFBMAR
GAMBLER

Q.6(b)

Given Data:

Tag Price of Camera = 200 \$

Discount = 25%

Tax = 6%

To Find:

Price paid = ?

Solution:

$$\text{Discount \%} = \frac{\text{Discount}}{\text{Tag Price}} \times 100$$

$$25 = \frac{\text{Discount} \times 100}{200}$$

$$\text{Discount} = \frac{25 \times 200}{100}$$

$$\text{Discount} = 50 \$$$

$$\begin{aligned} \text{Price after Discount} &= 200 \$ - 50 \$ \\ &= 150 \$ \end{aligned}$$

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$$\text{Tax Amount} = \frac{\text{Tax \%} \times \text{Price after Discount}}{100}$$

$$= \frac{63 \times 150}{100}$$

$$= 95$$

$$\begin{aligned}\text{Price paid by consumer} &= 150 + 95 \\ &= 245\end{aligned}$$

Q.7(a)

Given:

$$\text{Diameter} = 14 \text{ cm}$$

$$\pi = \frac{22}{7}$$

To Find:

Volume of sphere = ?

Solution:

$$\text{radius} = \frac{\text{Diameter}}{2} = \frac{14}{2} = 7 \text{ cm.}$$

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \left(\frac{22}{7} \right) (7)^3$$

$$= \frac{4}{3} \left(\frac{22}{7} \right) (7)(7)^2$$

$$= \frac{4 \times 22 \times 49}{3}$$

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$$\text{Volume of sphere} = \frac{4312}{3}$$

$$= 1437.3 \text{ cm}^3$$

$$= \frac{1437.3}{1000} \text{ m}^3$$

$$= 1.43 \text{ m}^3$$

Q7(b)

Given Data:

$$\text{Total savings} = 25,000 \text{ Rs.}$$

$$\text{Ratio} = 1:2:3:4:5$$

To Find:

smallest share = ?

Solution:

$$\text{Total shares} = 1+2+3+4+5$$

$$\text{Total shares} = 15$$

$$\text{Smallest share} = \frac{1}{15} \times 25,000$$

$$= 1,666.6 \text{ Rs}$$

Q7(c)

Spot the error & complete the series.

i) $2, 6, 18, 54, 162, 486$

This series satisfy the condition of multiplying by 3

$$2 \times 3 = 6$$

$$2 \times 3 = 6$$

$$6 \times 3 = 18$$

$$18 \times 3 = 54$$

$$54 \times 3 = 162$$

$$162 \times 3 = 486$$

$$486 \times 3 = 1458$$

$$2+2+2=6$$

$$6+6+6=18$$

$$\text{or } 18+18+18=54$$

$$54+54+54=162$$

$$162+162+162=486$$

$$486+486+486=1458$$

ii) 3, 5, 7, 11, 13,

$$3+2=5$$

$$5+2=7$$

$$7+4 \left[\begin{array}{l} 7+2=9 \\ 9+2=11 \end{array} \right]$$

$$11+2=13$$

$$3+2=5$$

$$5+2=7$$

$$7+4=11$$

$$11+2=13$$

It shows that either 9 is

missing or 11 does not fit

in series. As every next number

is formed by adding 2 to previous number.

But in case of 11, it is formed by adding 4 to its previous number.

Q7(d)

Given:

Sides of triangle are = 5cm, 12cm, 13cm.

To find:

Three angles of triangle = ?

Solution:

To confirm, that these sides of triangle

acc of right angle triangle, use
Pythagoras Theorem. $c^2 = a^2 + b^2$.
lets square all three sides of triangle.

$$c^2 = a^2 + b^2$$

$$(13)^2 = (12)^2 + (5)^2$$

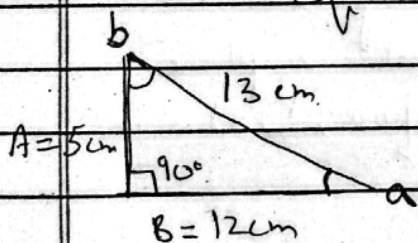
$$169 = 144 + 25$$

$$169 = 169$$

This confirms Hypotenuse of triangle is
13 cm. So Base and perpendicular will
be 5 cm and 12 cm.

So 1 angle of triangle = 90° .

The other two angles will be collectively ~~be~~ equal
equal to 90° .



By dimensions of sides, we know

$$A : B$$

$$5 : 12$$

$$\text{Total} = 17$$

$$\text{So share of A} = \frac{5 \times \text{Total degrees}}{17}$$

$$= \frac{5 \times 90}{17}$$

$$17$$

$$\text{angle a} = 26.5^\circ$$

$$\text{angle b} = \frac{12 \times 90}{17}$$

$$= 63.5^\circ$$

Section-I

Q 2(a)

Data is the New Oil:

The importance of oil is because of dependency of almost all sectors on it. Moreover, It could not be artificially produced from scratch. Also, It is expensive because it is an important resource.

Similarly, Data has become important due to dependency of every sector on it. With the advancement of technology, Data has become an important resource. Though, It could be generated artificially, It is not reliable and can not replace the original data. Therefore, Data is the new oil.

1) Data: core of the Research

Data is the basic need of every experiment and research in any field or sector. Data is required in the field of medicine to calculate prevalence of diseases, efficacy of drugs being used for treatment, effectiveness of any treatment and therapy. It holds great importance also in engineering for development of new machines.

2) Data: Basis of Policy Making.

Any kind of policy being developed, needs to be based on data, mainly demographics. Without proper data, Policy formulation will prove futile. Even any infrastructural development is not possible without data.

3) Data : A daily life need

Even if the life of common man is considered, Data holds great importance. A chef, A tailor, A mason, An architect, A milkman, A shopkeeper, A student — all can not work properly without having data about their respective work. To have better understanding, just take an example of tailor sewing clothes without having measurements. This is how important data is in our daily life.

Conclusion:

Data holds very much importance since beginning. However, Its importance has increased many times with advancement in technology, especially Artificial Intelligence. From an individual's daily life to a country's security depends on data. With the rising importance of data, there is a need of efficient data management and data protection as it is a highly valuable asset of 21st century.

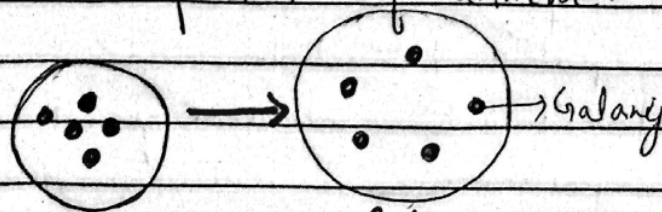
Q2(b)

Expansion of Universe:

Universe is continuously expanding since the start. Universe mainly contains galaxies, meteoroids, Asteroids, comets, gases, energy. Universe is continuously expanding due to dark energy. While the galaxies in it are held together by dark matter. Dark matter and Dark energy collectively comprises of 95% of universe. Multiple theories of universe formation and future suggest that universe is continuously expanding and will expand.

Blowing Balloon:

Blowing a Balloon expands the balloon. If a balloon is filled with few small balls and then it is blown. The size of Balloon will keep on increasing while the size of balls remain same. However, the distance between balls keep on increasing. This is exactly analogous to expansion of universe.



Expansion of Universe

Universe Expansion $\approx$ Balloon Blowing

In case of universe, universe is expanding continuously like a balloon being blown. It is because of the dark energy between galaxies that causes expansion of universe without affecting the size of galaxies. Air being blown in balloon acts like dark energy, increasing ^{size} and expanding the universe without affecting small balls inside balloon. The small balls inside the balloon are representation of galaxies that become distant to each other but do not increase in size. Galaxies do not increase in size due to attraction provided by dark matter within galaxies.

Q.3(a)

Cell in Cell:

Cell is basic structural and functional unit of life. All living organisms are made up of cells. Cells may vary slightly in structure and functions for every species.

Cells form organelles for division of labour. Formation of organelles result in differentiation of task of each organelle. Every organelle performs

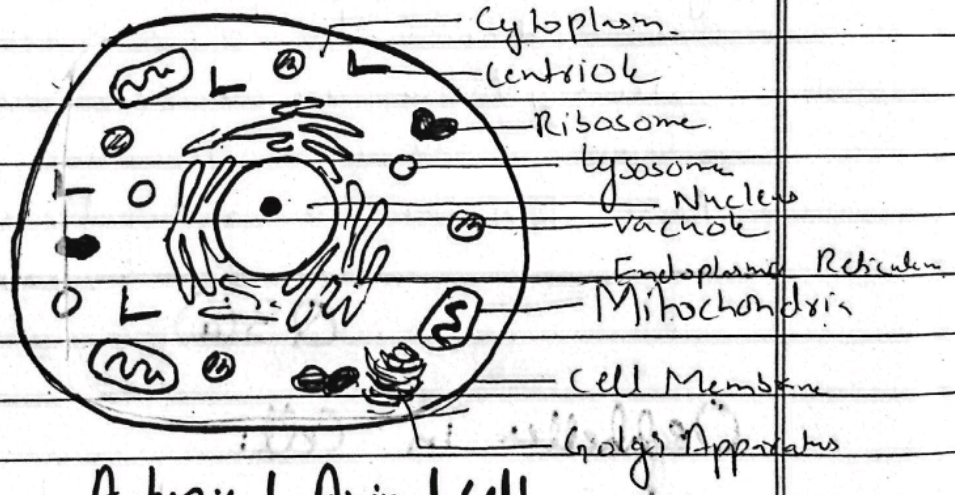
its own task:

Organelles in Cell:

There are different organelles having their specified function in cell. These organelles include cell wall; cell membrane, Cytoplasm, Mitochondria, Ribosomes, Chloroplast, leucoplast, chromoplast, golgi complex, lysosome, centriole.

Nucleus is called the brain of cell as it controls functions of the cell.

Similarly, Mitochondria is called power house of cell due to its ATP production.



A typical Animal cell.

Mitochondria:

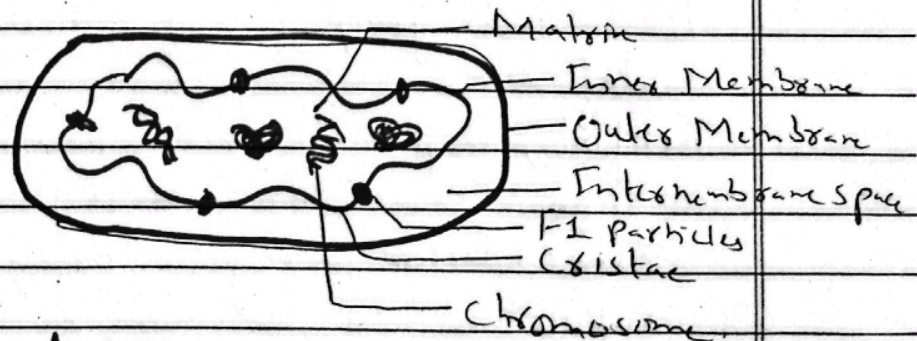
Mitochondria is called the power house of cell as it is involved in production and synthesis of Adenosine Triphosphate (ATP). Mitochondria is a self duplicating organelle.

ATP- the Energy Currency

ATP is the energy currency of cell as it is used in multiple reactions as an energy source.

Structure of Mitochondria.

Mitochondria is a double membrane bounded organelle. Inner membrane of mitochondria has multiple invaginations called cristae. Intermembrane space is present between outer and inner membrane. Inner membrane encloses matrix which contains ribosomes and ~~chromosomes~~ chromosomes. F1 and F₀ protein molecules are also present in inner membrane.



Function of Mitochondria

The main function of mitochondria is production of ATP. ATP provides energy for all chemical reactions. It is present in high number in body structures that need energy. Mitochondria are higher in number in skeletal muscle cell at time of exercise or strenuous activity.

Q3(b)

Doping:

Doping is the addition of any impurity to any substance.

Doping of Semiconductors:

Pure semiconductors belong to group IV of periodic table having four valence electrons.

Such atoms have equal tendency of losing and gaining electrons.

Such atoms do not have free electrons which are necessary for electric current conduction.

To increase their conductivity, semiconductors are doped with elements from group III and group V of periodic table.

Therefore, Doping is the process to increase electrical conductivity of semiconductors by addition of any substance.

Types of Semiconductors:

On the basis of doping substance there are two types of semiconductors. These are

- 1) P-type semiconductor
- 2) N-type semiconductor.

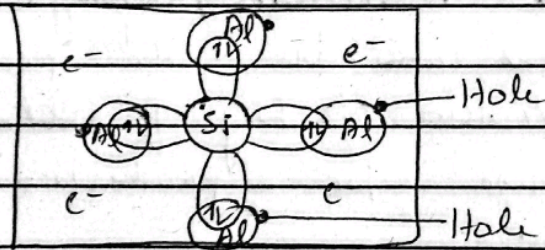
P-type Semiconductor:

These are the types of semiconductors that are produced by doping of slightly electropositive ~~elements~~ of trivalent atoms of group III.

In these semiconductors, there are holes that behave like positive charges.

These atoms have 3 valence electrons that form bond with semiconductor.

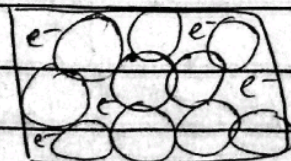
While a hole is left behind. A free electron also comes of 4th group element.



N-Type Semiconductor:

N-Type or Negative Type semiconductors are such semiconductors that are doped with slightly electronegative

Pentavalent element of group V of periodic Table. In this type of doping, there remains a free electron of group V element that serves to conduct electric current.



N-type semiconductor

Qy (b)

Ribosomes:

Ribosomes are present in both eukaryotic and prokaryotic cells. Ribosomes are formed of two units attached together. It is a non-membranous organelle found both in plants and animal cells. It is made up of ribosomal RNA and protein. It is a self-replicating organelle.

~~Ribosome function:~~

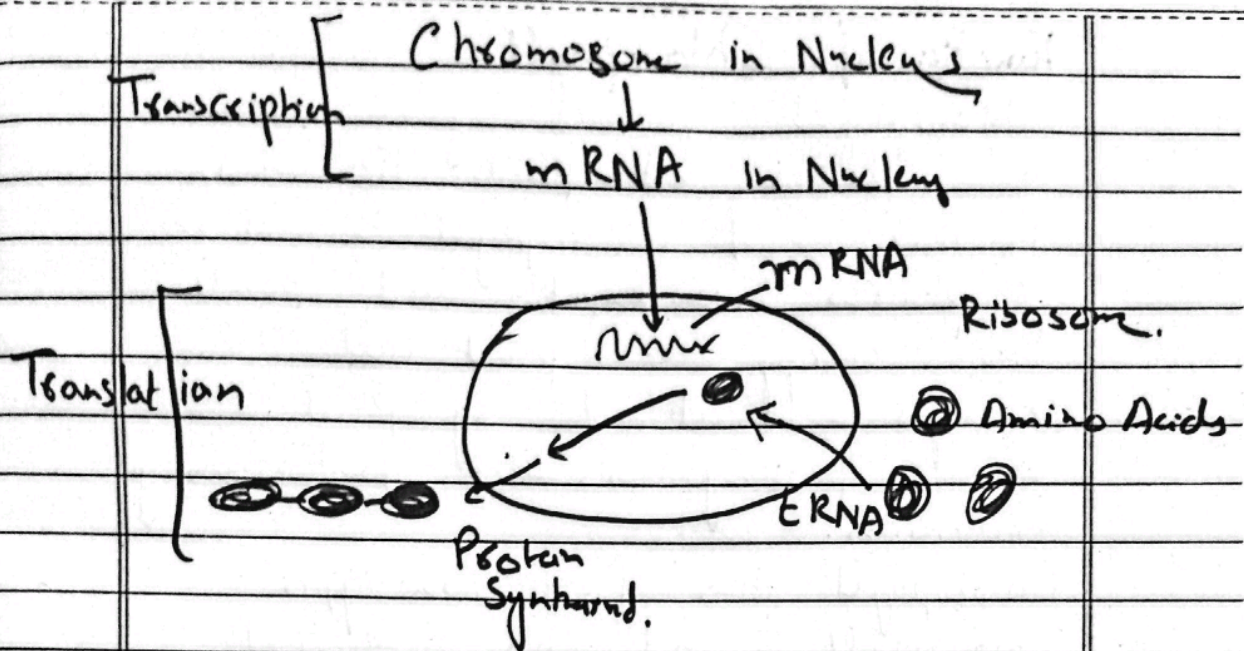
Ribosome - A Protein factory:

Ribosomes are also called protein house or protein factory of cell. It is responsible for production of protein.

Role of Ribosome in Protein Synthesis:

For protein synthesis, Nucleus of the cell sends message in the form of messenger RNA. As this message reaches ribosome. Ribosomal RNA translates this message into protein formation. Ribosomal RNA reads the messenger RNA. transfer RNA transfer Amino Acids from cytoplasm and in this way sequence of messenger RNA is translated into a sequence of Amino Acid. Thus a protein is formed.

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Q4(a)

Chlorophyll:

Chlorophyll is a green coloured pigment present in plant cells. It is present in chloroplast of cell. It is responsible for green colour of plants especially leaves.

Chloroplast structure:

Chloroplast is double membrane bounded organelle present in plant cells. It contains grana and stroma. Stacks of Thylakoids are arranged in Grana. Chlorophyll is present in Thylakoids.

Function of Chlorophyll:

Chlorophyll provides green colour to leaves and plants. The main function of chlorophyll is that it captures sunlight and provides the energy to a plant cell. This energy is utilised by plants in photosynthesis - the food producing mechanism.

Chlorophyll has further two types chlorophyll a and chlorophyll b that perform their assigned function.

However, the major role of chlorophyll is food production by capturing sunlight efficiently and making its energy available for chemical reaction.

Chlorophyll is the major factor that differentiates plants from other kingdoms and provides food source to other animals of other kingdoms.

Q5(a)

Pakistan - A Populous Country:

The population in Pakistan is 241 Million. Pakistan is the 5th most populous country in the world. This huge population poses a serious burden on a struggling economy and limited resources.

Causes of Population Explosion in Pakistan.

- 1) Unawareness among masses
- 2) Child labours
- 3) Lack of strict population control policy.
- 4) Poverty:
- 5) Lack of Education.

Control Measures:

- 1) Awareness among masses through local government and religious entities.
- 2) Strict Punishments on Child labours.
- 3) Use of Contraceptives.
- 4)