

Question no. 1

(a)

Q. Numbers that 1 or 9 in unit's digit.

1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59
61, 69

Total numbers = 14
with 1 or 9 as unit

$$\begin{aligned}\text{Percentage of such numbers} &= \frac{14}{70} \times 100\% \\ &= 20\%\end{aligned}$$

20% of numbers from 1 to 70 have 1 or 9
in the unit's digit



(b)

Given Data

$$\left. \begin{array}{l} 5\% \text{ of } A \\ 4\% \text{ of } B \end{array} \right\} \text{ is } \frac{2}{3}^{\text{rd}} \text{ of sum of } \left(\begin{array}{l} 6\% \text{ of } A \\ 8\% \text{ of } B \end{array} \right)$$

Solution

$$5\% \text{ of } A = \frac{5}{100} \times A$$

$$= 0.05 A$$

$$4\% \text{ of } B = \frac{4}{100} \times B$$

$$= 0.04 B$$

$$6\% \text{ of } A = \frac{6}{100} \times A$$

$$= 0.06 A$$

$$8\% \text{ of } B = \frac{8}{100} \times B$$

$$= 0.08 B$$

$$5\% A + 4\% B = \frac{2}{3} \text{ of } (6\% A + 8\% B)$$

$$0.05A + 0.04B = \frac{2}{3} (0.06A + 0.08B)$$

Q.105 D

$$\frac{5A}{100} + \frac{4B}{100} = \frac{2}{3} \times \left(\frac{6A}{100} + \frac{8B}{100} \right)$$

$$3 \times \left(\frac{5A + 4B}{100} \right) = \frac{2}{3} \left(\frac{6A + 8B}{100} \right) \times 3$$

$$\cancel{100} \times 15A + 12B = \frac{12A + 16B}{\cancel{100}} \times \cancel{100}$$

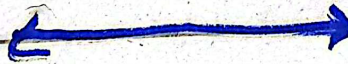
$$15A - 12A + 12B - 16B = 0$$

$$3A - 4B = 0$$

$$3A = 4B$$

$$\frac{A}{B} = \frac{4}{3}$$

$$\boxed{A:B = 4:3}$$



(C)

Given Data

$$A : B : C : D$$

$$5 : 2 : 4 : 3$$

C gets 1000 more than D

B's share = ?

Solution

$$\text{Total shares} = A + B + C + D$$

$$= 5 + 2 + 4 + 3$$

$$= 7 + 7$$

$$= 14$$

$$C's \text{ share} = \frac{4}{14} \text{ of total}$$

$$D's \text{ share} = \frac{3}{14} \text{ of total}$$

$$\frac{4}{14} x = 1000 + D's \text{ share}$$

$$\frac{4}{14} x = 1000 + \frac{3}{14} x$$

$$\frac{4x}{14} - \frac{3x}{14} = 1000$$

$$\frac{x}{14} = 1000$$

$$x = 14000$$

$\therefore$ Total amount of money = 14000/-

$$\begin{aligned} A's \text{ share} &= \frac{5}{14} \times 14000 - 1000 \\ &= 5000/- \end{aligned}$$

$$B's \text{ share} = \frac{2}{14} \times 14000 - 1000$$

$$B's \text{ share} = 2000/-$$

$$C's \text{ share} = \frac{4}{14} \times 14000 - 1000$$

$$C's \text{ share} = 4000/-$$

$$D's \text{ share} = \frac{3}{14} \times 14000 - 1000$$

$$= 3000/-$$

Hence proved that C gets 1000 more than D.

and

$$B's \text{ share} = \text{Rs. } 2000/-$$

(d)

Given Data

40% of a number = $\frac{2}{3}$ of another number

Solution

let first number = a

let second number = b

ratio of $\frac{a}{b} = ?$

40% of a = $\frac{2}{3}$ of b

$$\frac{40}{100} a = \frac{2}{3} b$$

$$\frac{4a}{10} = \frac{2}{3} b$$

$$12a = 20b$$

$$\frac{a}{b} = \frac{20}{12}$$

$$\frac{a}{b} = \frac{5}{3}$$

$$\boxed{a:b = 5:3}$$

The ratio of first number to
the second number = $5:3$

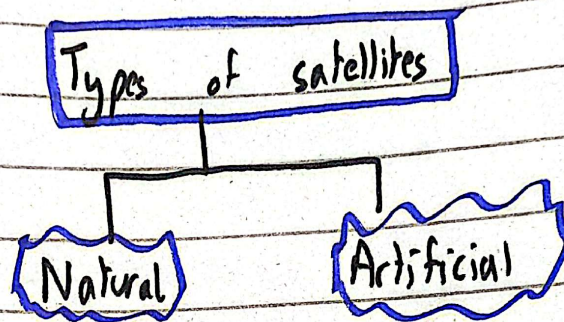


Question no. 2

(a)

Satellite: -

A satellite is a ^{body} ~~machine~~ that orbits another celestial body



Artificial Satellites

Machines that are launched in space to orbit ~~around~~ earth

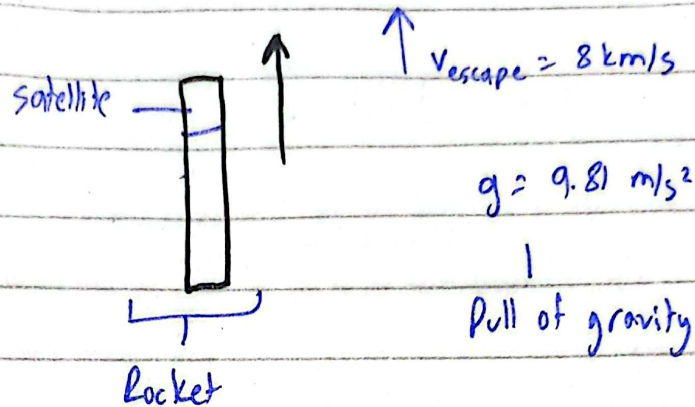
How a satellite is launched

A satellite is launched from the surface of earth with a velocity that is called escape velocity. When a rocket reaches the escape velocity, it

Escapes from the force of gravity.

Escape velocity

For earth, the escape velocity is nearly 8 km/s



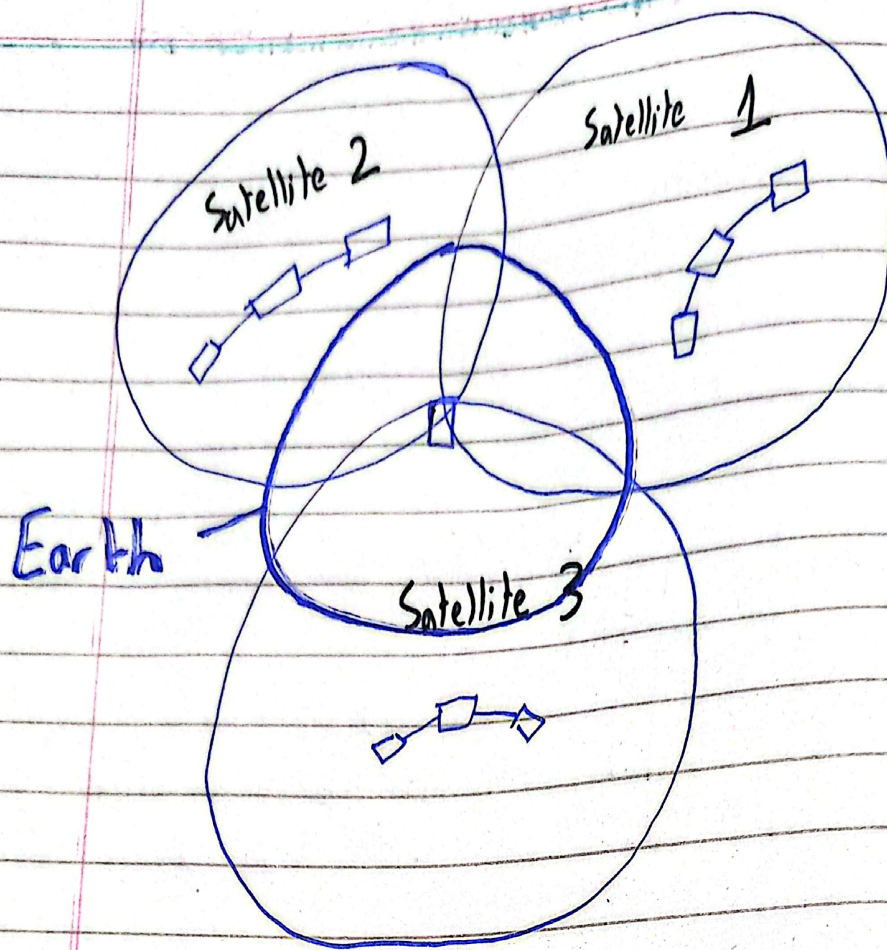
Working Principle of GPS

GPS

GPS stands for Global Positioning System.

Working principle of GPS

GPS operates on the principle of Trilateration.



Trilateration

Step 1

The mobile phone sends radio waves.
radio waves have velocity of c , light
 $c = 3 \times 10^8 \text{ m/s}$

Step 2

2 satellites reflect the radio waves
and give a range of the
emission of signal

Step 3

A third satellite gives the pinpoint location of the source of signal.

Hence, GPS utilizes trilateration to pinpoint a location. It then depicts this on a map.

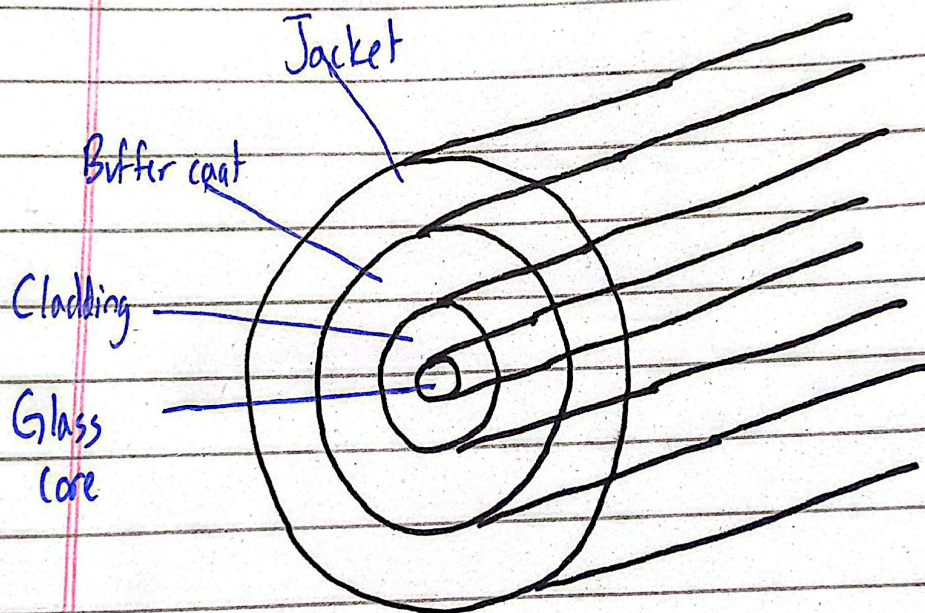


(b)

Optical Fiber

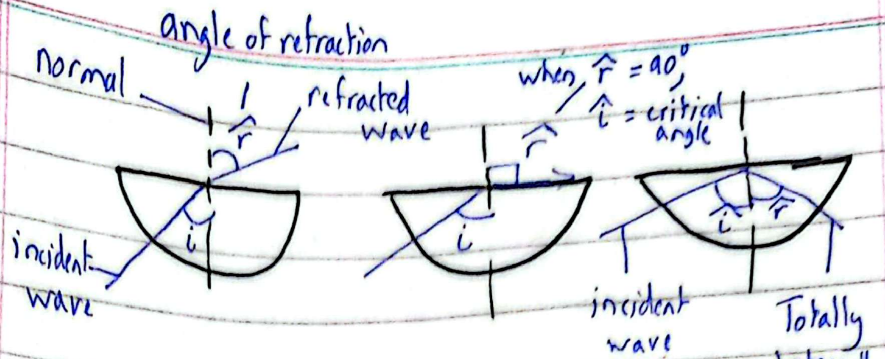
An optical fiber is a hair thin piece of glass that transports light as a signal.

Structure of Optical Fiber

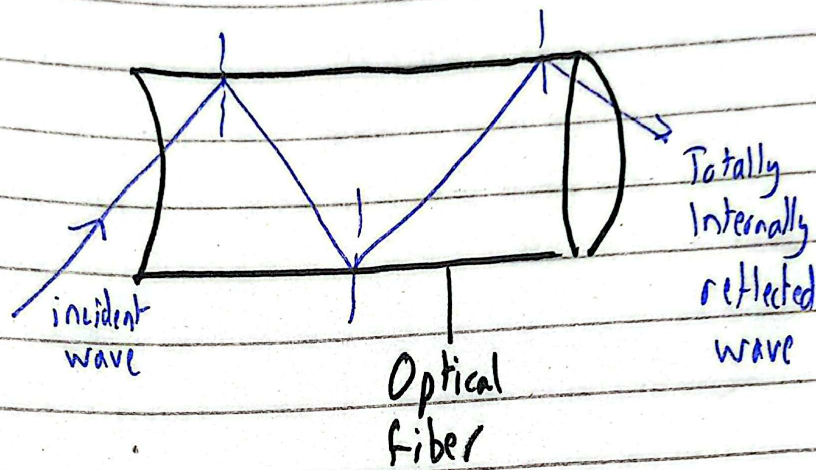


Working Principle of Optical Fiber

It works on the principle of Total Internal Reflection



According to Snellen's law, after $\hat{i}$ at $\hat{r} = 90$, wave will be Totally Internally Reflected.



→ Angle of incidence is kept higher than critical angle.

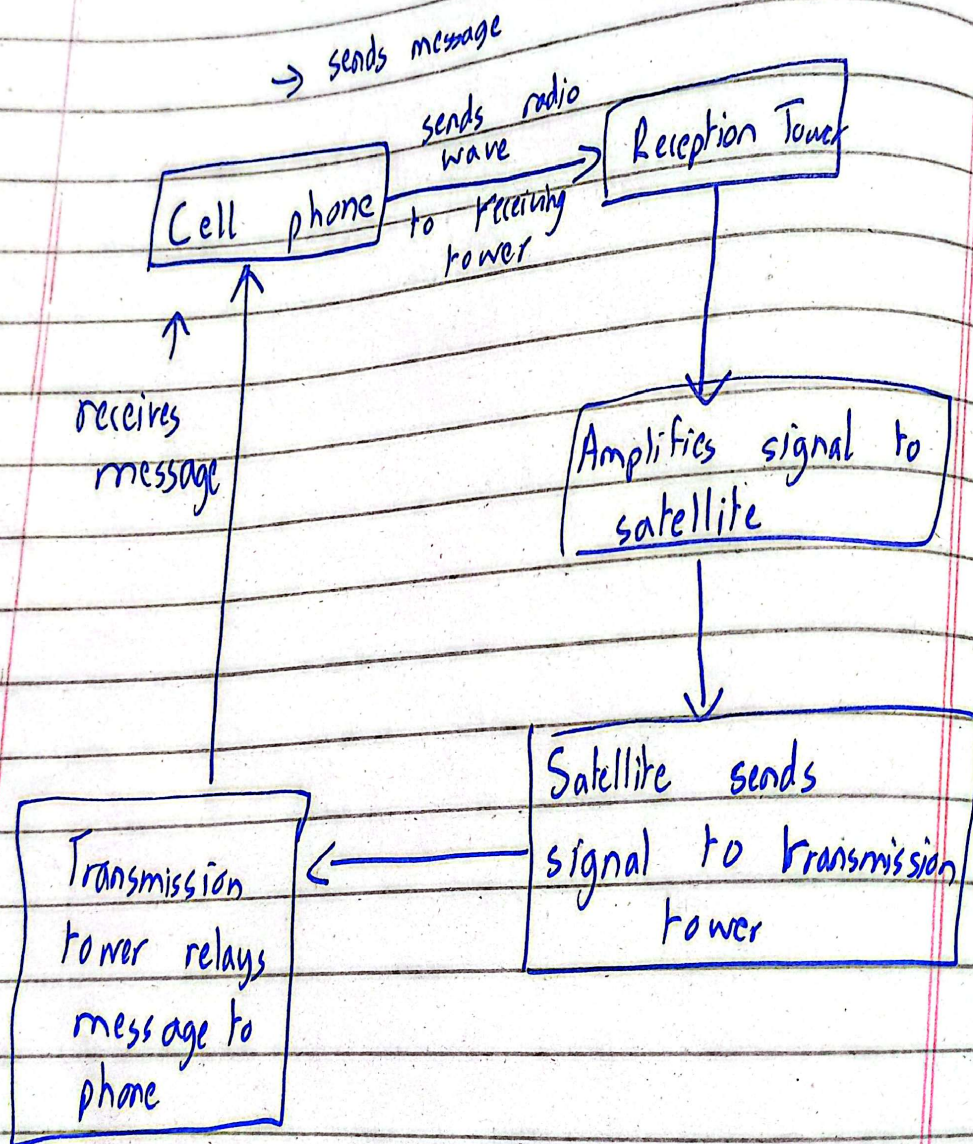
As a result, the angle of refraction is greater than 90° ; total internal reflection takes place.

Hence, optical fibers rely on TIR, for transmission of data.

(C)

Working of a cell phone

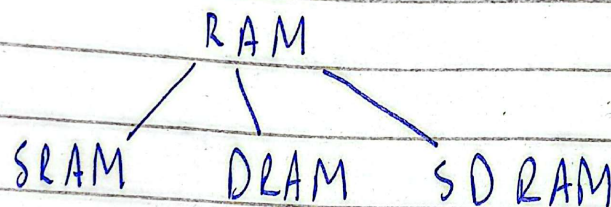
Cell phones utilize radio waves for telecommunication. They act first as the transmitter, then as a receiver. This way a two way communication is possible.



(d)

RAM

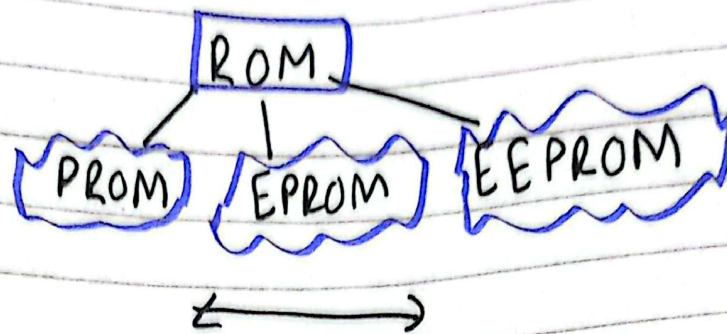
RAM stands for Random Access Memory. It is volatile in nature. It stores temporary information. If power source is turned off, memory is deleted. It is a primary form of computer memory. It is less expensive than ROM. RAM is further comprised of three types.



ROM

ROM stands for Read Only Memory. It is non-volatile in nature. It stores permanent information. If power source is turned off, data in ROM is not disappeared. It too is a primary form of memory. It is, however, more expensive than RAM.

ROM also consists of three types.



(b) Software and Hardware.

i) Software

Software refers to the virtual program that dictates the actions of a computer. It commands and directs the working of a computer system.

Example :-

1. Windows
2. Macintosh
3. Linux.

ii) Hardware

It refers to the physical components of a computer system. They receive tasks from a software.

Example

- | | | |
|-------------|---|------------|
| 1. Keyboard | } | For Input |
| 2. Mouse | | |
| 3. Monitor | } | For Output |
| 4. Speaker | | |

end system

