RIMC JUNE - 2024

Q. 1.

Sol^n. Let two digit number is xy

and x and y are digits

Acq,
$$x + y = 13 \text{ --- eq. (1)}$$

After interchanging the digits the number is yx.

we Know that

$$xy = 10x + y$$
$$yx = 10y + x$$

$$yx = 27 + xy$$
$$10y + x = 27 + 10x + y$$
$$10y + x - 10x - y = 27$$
$$10y - y + x - 10x = 27$$
$$9y - 9x = 27$$
$$9(y - x) = 27$$
$$y - x = 3 \text{ --- eq. (2)}$$

Sum of eq. (1) and eq. (2)

$$x + y + y - x = 13 + 3$$
$$2y = 16$$
$$y = 8$$

Q. 14.

Sol^n.

$$\sqrt[3]{968} + \sqrt[3]{1375}$$

$$= \sqrt[3]{2 \times 2 \times 2 \times 11 \times 11} + \sqrt[3]{5 \times 5 \times 5 \times 11}$$

$$= \sqrt[3]{2^3 \times 11^2} + \sqrt[3]{5^3 \times 11}$$

$$= \sqrt[3]{2^3} \times \sqrt[3]{11^2} + \sqrt[3]{5^3} \times \sqrt[3]{11}$$

$$= 2 \times \sqrt[3]{121} + 5 \times \sqrt[3]{11}$$

$$= 2\sqrt[3]{121} + 5\sqrt[3]{11}$$

After change '+' by '×', then the answer

$$\sqrt[3]{968} \times \sqrt[3]{1375}$$

$$= \sqrt[3]{2 \times 2 \times 2 \times 11 \times 11} \times \sqrt[3]{5 \times 5 \times 5 \times 11}$$

$$= \sqrt[3]{2 \times 2 \times 2 \times 11 \times 11 \times 5 \times 5 \times 5 \times 11}$$

$$= \sqrt[3]{2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 11 \times 11 \times 11}$$

$$= \sqrt[3]{2^3 \times 5^3 \times 11^3}$$

$$= \sqrt[3]{2^3} \times \sqrt[3]{5^3} \times \sqrt[3]{11^3}$$

$$= 2 \times 5 \times 11$$

$$= 110$$

Q.23.

Ans. → Let the principal be x

so, amount $= \frac{5x}{3}$

we know that,

$$A = P + SI$$

$$SI = A - P$$

$$SI = \frac{5x}{3} - x = \frac{5x - 3x}{3} = \frac{2x}{3}$$

Time = 6 years 8 months

= 6 years $\frac{8}{12}$ year

$= \left(6 + \frac{2}{3}\right)$ years

$= \frac{20}{3}$ years

$$SI = \frac{P \times R \times T}{100}$$

$$\frac{2x}{3} = \frac{x \times R \times 20/3}{100}$$

$$\frac{2x}{3} = \frac{x \times R \times 20}{100 \times 3}$$

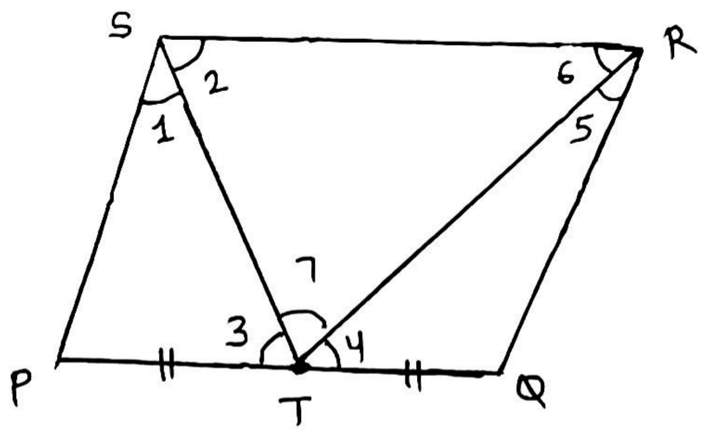
$$\frac{2x \times 100 \times 3}{3 \times x \times 20} = R$$

$$10 = R$$

so, Rate = 10 %

Q.28.

Ans. →



(a) In a parallelogram opposite sides are equal and parallel.

$$PS = RQ \quad \text{and} \quad PQ = SR$$

Given, T is mid point, then

$$PT = TQ$$

ST bisects $\angle S$, then

$$\angle 1 = \angle 2$$

$$\angle 2 = \angle 3 \quad \text{(Alternate angles)}$$

$$\angle 1 = \angle 3$$

so, In ΔPST

$$PS = PT$$

Then, ΔPST Isosceles triangle

$$PS = PT = TQ$$

$$PS = TQ$$

$$RQ = TQ$$

$$QR = QT$$

RIMC DEC-2023

Q. 1.

Sol^n. Let $x = \frac{111110}{111111}$, $y = \frac{222221}{222223}$ and

$$z = \frac{333331}{333334}$$

$$1 - x = 1 - \frac{111110}{111111} = \frac{111111 - 111110}{111111} = \frac{1}{111111}$$

$$1 - y = 1 - \frac{222221}{222223} = \frac{222223 - 222221}{222223} = \frac{2}{222223}$$

$$1 - z = 1 - \frac{333331}{333334} = \frac{333334 - 333331}{333334} = \frac{3}{333334}$$

as well as their inverse,

$$\frac{1}{1-x} = 111111 \ ; \ \frac{1}{1-y} = 111111 + \frac{1}{2} \ ; \ \frac{1}{1-z} = 111111 + \frac{1}{3}$$

we see that

$$\frac{1}{1-x} < \frac{1}{1-z} < \frac{1}{1-y}$$

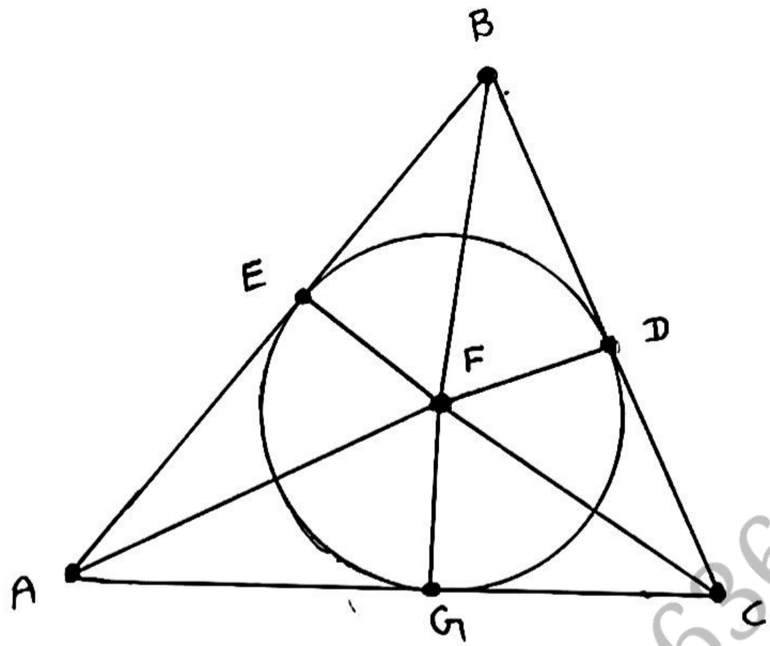
Since all the numbers in question are positive,

$$1 - x > 1 - z > 1 - y$$

There fore, $x < z < y$

Q.5.

Ans. →



ⓐ Given, $\angle FAG = 20^\circ$ $\angle FCG = 30^\circ$

In ΔFAG and ΔFAE

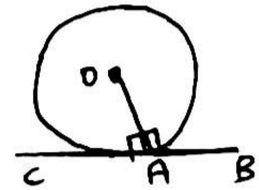
$FA = FA$ (Common Side)

$FG = FE$ (Radius of the circle)

$\angle FGA = \angle FEA$ (Right Angle)

by SSA rule

$\Delta FAG \cong \Delta FAE$



∴ Angle between radius and tangent always 90°.

Also,

$\Delta FCG \cong \Delta FCD$

$\Delta FBD \cong \Delta FBE$

$\angle A = \angle EAF + \angle GAF$

$\angle A = 20^\circ + 20^\circ$ $\because \angle EAF = \angle GAF = 20^\circ$

$\angle A = 40^\circ$

Q.10.

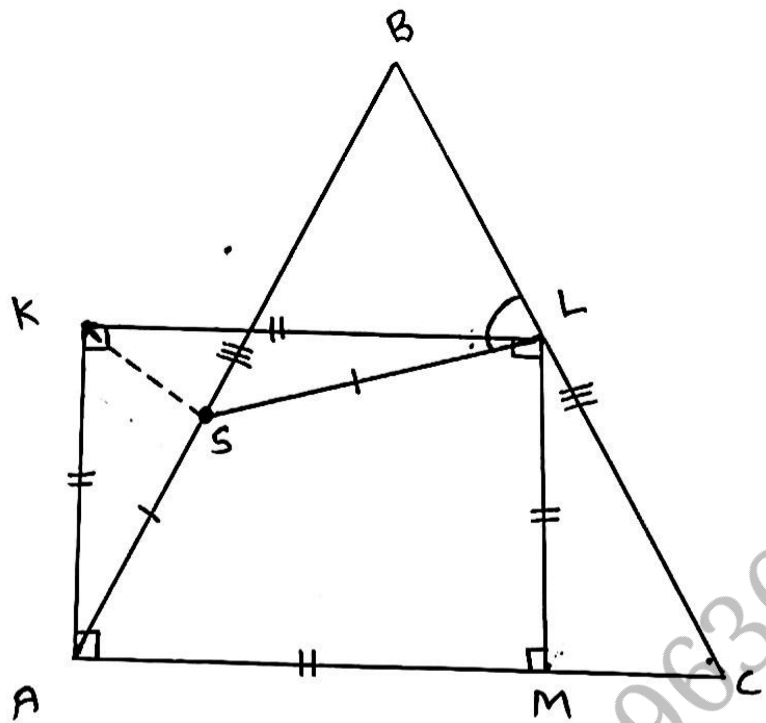
Ans. → Harold ate $\frac{1}{4}$ of the pie. After that,

$1-\frac{1}{4}=\frac{3}{4}$ of the pie was left behind.

The moose ate $\frac{1}{3}\times\frac{3}{4}=\frac{1}{4}$ of the pie. After that, $\frac{3}{4}-\frac{1}{4}=\frac{1}{2}$ of the pie was left behind.

The porcupine ate $\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$ of the pie. After that, $\frac{1}{2}-\frac{1}{6}=\frac{1}{3}$ of the pie was left behind.

$\frac{1}{3}$ of the original pie still remained after the Porcupine left.



Given that,

AKLM → Square (AK = KL = LM = MA)

△ABC → Isosceles Triangle (BA = BC)

AS = SL

After drawing line segment KS

In △KSA and △KSL

KS = KS (common side)

SA = SL (Given)

KA = KL (side of square)

By SSS rule,

$\triangle KSA \cong \triangle KSL$

In congruent triangles ΔKSA and ΔKSL

$$\angle SKA = \angle SKL = \frac{\angle AKL}{2} = \frac{90^\circ}{2} = 45^\circ$$

$$\angle KLS = \angle KAS \longrightarrow \text{eq. } 1$$

$$\angle KSA = \angle KSL$$

In ΔABC,

$$BA = BC$$

then $\angle BAC = \angle BCA$

In square AKLM,

$$KL \parallel AM$$

then $KL \parallel AC$

$\angle BLK = \angle BCA$ [Corresponding Angles are equal]

$$\angle BLK = \angle BCA = \angle BAC \longrightarrow \text{eq. } 2$$

$$\angle SLB = \angle BLK + \angle KLS$$

$$\angle SLB = \angle BAC + \angle KAS$$

$$\angle SLB = \angle KAC$$

$$\angle SLB = 90^\circ$$

The value of $\angle SLB$ is 90°.

RIMC JUNE - 2023

Q. 1.

Ans. → Since 3 predictions were true, then 2 were false.

First we will determine which team won. Suppose that North won. Then 4 predictions – (a), (b), (c), (d) – would be true, which contractions the fact that exactly 3 were true.

Suppose that the game ended in a draw. This makes predictions (a), (c) and (e) false (since in a draw, the total number of goals scored must be even). Thus, at most 2 predictions are true, again a contradiction.

Therefore North lost the game. Then (c) and (d) must be false. This means that the remaining predictions must be true, namely that the game did not end in a draw, North scored against south, and there were exactly 3 goals total. Then South scored 2 goals, and North scored 1.

Q.15.

Ans. → In the sequence,

$$2, 6, 12, 20, 30, \ldots$$

first place $= 2 = 1 \times 2$

second place $= 6 = 2 \times 3$

third place $= 12 = 3 \times 4$

fourth place $= 20 = 4 \times 5$

fifth place $= 30 = 5 \times 6$

sixth place $= 42 = 6 \times 7$

$\vdots$

n^{th} place $= n(n+1) = n \times (n+1)$

The number in the 6^{th} place is 42.

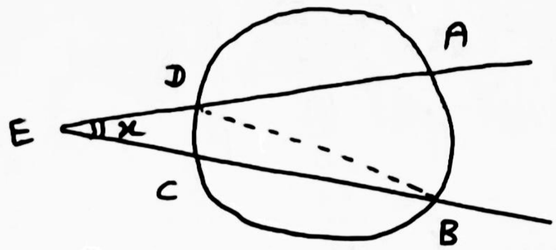
Q.16.

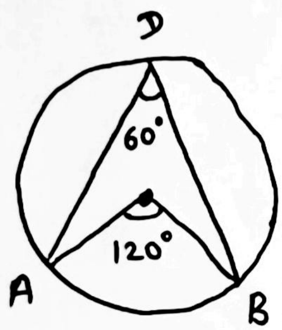
Ans. → when speaking on the phone, the charge in the battery is used $\frac{210}{6} = 35$ times faster than in standby mode.

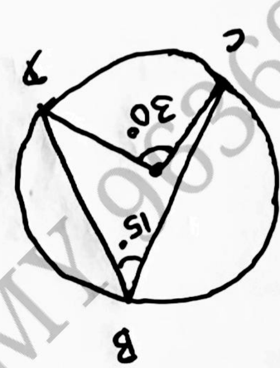
Let's say Alisha has spoken for x hours. Then there is enough charge in the battery for another $(6-x)$ hours of conversation or $35 \times (6-x)$ hours of stand by time.

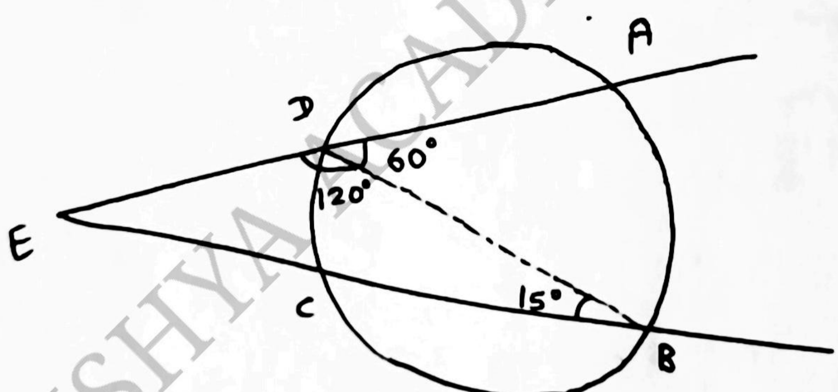
Q.20.

Sol^n.









In ΔDBE

$$\angle DEB + \angle DBE + \angle BDE = 180^\circ$$

$$x + 15^\circ + 120^\circ = 180^\circ$$

$$x + 135^\circ = 180^\circ$$

$$x = 180^\circ - 135^\circ = 45^\circ$$

$$\angle E = x = 45^\circ$$

Q. 29.

Ans. →

$$2^8 + 1 = 256 + 1 = 257$$

$$343 > 257$$

$$(7)^3 > 257$$

$$2^{18} + 1 = 2^{6 \times 3} + 1$$

$$= (2^6)^3 + 1$$

$$= (64)^3 + 1$$

$$(64)^3 + 1 > (64)^3$$

$$\text{No. of cubes} = (64 - 7) + 1$$

$$= 57 + 1$$

$$= 58$$

58 perfect cubes lie between $2^8 + 1$ and $2^{18} + 1$.

Q. 30.

Ans. →