

Questions from Pranathi (7 Mar)

1. 440 boys and girls took their semestral examinations. 340 of them passed Mathematics and 360 of them passed their Mother Tongue papers. 40 of them failed both papers. How many children passed both their Mathematics and Mother Tongue papers?

Solution:

Let 1 unit be the number of children who passed both subjects

340 passed Mathematics $\begin{cases} \rightarrow 1 \text{ unit} \\ \rightarrow 340 - 1 \text{ unit (passed Mathematics only)} \end{cases}$

360 passed Mother Tongue $\begin{cases} \rightarrow 1 \text{ unit} \\ \rightarrow 360 - 1 \text{ unit (passed Mother Tongue only)} \end{cases}$

4 groups of students:

- Passed Mathematics only $\rightarrow 340 - 1 \text{ unit}$
- Passed Mother Tongue only $\rightarrow 360 - 1 \text{ unit}$
- Passed both subjects $\rightarrow 1 \text{ unit}$
- Failed both subjects $\rightarrow 40$

$$40 + 1 \text{ unit} + 360 - 1 \text{ unit} + 340 - 1 \text{ unit} \rightarrow 440$$

$$740 - 1 \text{ unit} \rightarrow 440$$

$$1 \text{ unit} \rightarrow 300$$

Ans: 300 students passed both Mathematics and Mother Tongue papers.

2. In a Maths Competition, 3 challenging problem sums, Problem 1, Problem 2 and Problem 3 were given.

40 children answered at least one problem correctly.

15 children answered Problem 1 correctly.

20 children answered Problem 2 correctly.

25 children answered Problem 3 correctly.

If only 2 children answered all problem sums correctly,

a. how many children answered only two problem sums correctly?

b. how many children answered only one problem sum correctly?

Solution:

7 groups of students:

Group A : Correct for Problem 1 only

Group B : Correct for Problem 2 only

Group C : Correct for Problem 3 only

Group D : Correct for Problems 1 and 2 only

Group E : Correct for Problems 1 and 3 only

Group F : Correct for Problems 2 and 3 only

Group G : Correct for all problems

Let 1 unit be those who answered only 2 problems correctly (Groups D + E + F)

Counting 15 children who answered Problem 1 correctly → Groups A + D + E + G

Counting 20 children who answered Problem 2 correctly → Groups B + D + F + G

Counting 25 children who answered Problem 3 correctly → Groups C + E + F + G

$$15 + 20 + 25 = 60 \rightarrow A + B + C + \underbrace{2 \times D + 2 \times E + 2 \times F}_{D + E + F \text{ counted twice}} + \underbrace{3 \times G}_{G \text{ counted thrice}}$$

$$A + B + C + D + E + F + G \rightarrow 40 \text{ (total)}$$

Difference of $60 - 40 = 20$ (extra counting)

$$\underbrace{D + E + F + G + G}_{1 \text{ unit}} \rightarrow 20$$

1 unit

D + E + F counted extra 1 time : 1 unit

G counted extra 2 times : $2 + 2 = 4$

$$1 \text{ unit} \rightarrow 20 - 4 = 16$$

Ans: a. 16 students answered 2 problems correctly.

Students who answered only 1 problem correctly (Groups A + B + C)

$$\begin{array}{l} D + E + F \rightarrow 1 \text{ unit} = 16 \text{ students} \\ G \rightarrow 2 \text{ students} \end{array} \left. \vphantom{\begin{array}{l} D + E + F \\ G \end{array}} \right\} 18 \text{ students}$$

$$A + B + C + \underbrace{D + E + F + G}_{18} \rightarrow 40$$

$$A + B + C \rightarrow 40 - 18 = 22$$

Ans: b. 22 students answered only 1 problem correctly.