

Frequency trees



Read a frequency tree, find a missing frequency, and convert a frequency to a probability or proportion.

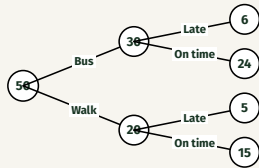
Name _____

Date _____

Show your method

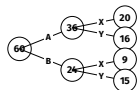
A frequency tree's parent count always equals the sum of its two child counts. To find a probability, divide a frequency by the grand total; to find a proportion within one branch (e.g. "of those who..."), divide by that branch's total instead.

Worked example 50 students travel to school by Bus or Walk. Of those who Bus, 6 are Late. Find the missing frequency for 'Bus, On time', then find $P(\text{Bus and on time})$ of all 50.



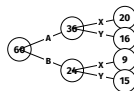
$$\begin{aligned} \text{Bus total} &= 30. \text{ Late} = 6, \text{ so On time} = 30 - 6 = 24. \\ P(\text{Bus and on time}) &= \frac{24}{50} = \frac{12}{25} \end{aligned}$$

1. 60 people were surveyed. How many are in category A?



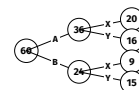
Solution
36 (read directly from the tree)

2. Using the same tree, how many are in A AND X?



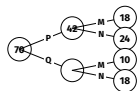
Solution
20 (read directly from the tree)

3. Using the same tree, how many are in total in category X (both branches)?



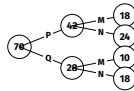
Solution
 $20 + 9 = 29$

4. 70 people were tested. Find the missing frequency for branch Q.



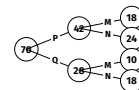
Solution
 $70 - 42 = 28$

5. Using the completed tree, find $P(M \text{ and } Q)$ as a fraction of the 70 total.



Solution
 $\frac{10}{70} = \frac{1}{7}$

6. Of those in branch Q, what proportion are in M?



Solution
 $\frac{10}{28} = \frac{5}{14}$

7. A frequency tree's grand total is 90. One first-stage branch is 54. Find the other first-stage branch's frequency.

Solution
 $90 - 54 = 36$

8. A branch total is 45, and 27 of those are in the 'Yes' sub-branch. What fraction are 'Yes'?

Solution
 $\frac{27}{45} = \frac{3}{5}$

9. Explain what a frequency tree's grand total (the root number) represents.

Solution
The total number of people/items recorded across the whole tree – the sum of every final-stage (leaf) frequency.

Frequency trees (continued)

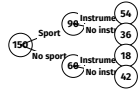


Complete a two-blank tree and compare conditional proportions across branches.

Name _____

Date _____

10. Complete the tree: find BOTH missing frequencies.



Solution

$$\begin{aligned} \text{No sport} &= 150 - 90 = 60 \\ \text{Sport, No instr.} &= 90 - 54 = 36 \end{aligned}$$

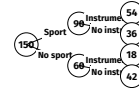
11. Using the completed tree, find $P(\text{no sport and no instrument})$ of all 150.



Solution

$$\frac{42}{150} = \frac{7}{25}$$

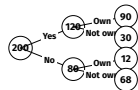
12. Of the students who play sport, what proportion also play an instrument?



Solution

$$\frac{54}{90} = \frac{3}{5}$$

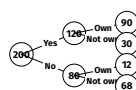
13. Find the TOTAL who 'Own' across both branches.



Solution

$$90 + 12 = 102$$

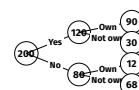
14. Using the same tree, find $P(\text{said Yes and Owns})$ of all 200.



Solution

$$\frac{90}{200} = \frac{9}{20}$$

15. Given that a person said 'No', find the probability they Own.



Solution

$$\frac{12}{80} = \frac{3}{20}$$

16. From Q13's tree, find $P(\text{Own} \mid \text{Yes})$ and $P(\text{Own} \mid \text{No})$. Which group is more likely to own?

Solution

$$\begin{aligned} P(\text{Own} \mid \text{Yes}) &= \frac{90}{120} = \frac{3}{4} \\ P(\text{Own} \mid \text{No}) &= \frac{12}{80} = \frac{3}{20} \end{aligned}$$

'Yes' is far more likely.

17. Explain the difference between a frequency and a probability on a frequency tree.

Solution

A frequency is a count (a whole number); a probability is that frequency divided by a total, giving a value between 0 and 1.

18. A first-stage branch has a frequency of 63, which is 35% of the grand total. Find the grand total.

Solution

$$63 \div 0.35 = 180$$