5.NF To Multiply or not to multiply?

Alignments to Content Standards

- Alignment: 5.NF.A
- Alignment: 5.NF.B.6

Tags

• *This task is not yet tagged.*

Some of the problems below can be solved by multiplying $\frac{1}{8} \times \frac{2}{5}$, while others need a different operation. Select the ones that can be solved by multiplying these two numbers. For the remaining, tell what operation is appropriate. In all cases, solve the problem (if possible) and include appropriate units in the answer.

a. Two-fifths of the students in Anya's fifth grade class are girls. One-eighth of the girls wear glasses. What fraction of Anya's class consists of girls who wear glasses?

b. A farm is in the shape of a rectangle $\frac{1}{8}$ of a mile long and $\frac{2}{5}$ of a mile wide. What is the area of the farm?

c. There is $\frac{2}{5}$ of a pizza left. If Jamie eats another $\frac{1}{8}$ of the original whole pizza, what fraction of the original pizza is left over?

d. In Sam's fifth grade class, $\frac{1}{8}$ of the students are boys. Of those boys, $\frac{2}{5}$ have red hair. What fraction of the class is red-haired boys?

e. Only $\frac{1}{20}$ of the guests at the party wore both red and green. If $\frac{1}{8}$ of the guests wore red, what fraction of the guests who wore red also wore green?

f. Alex was planting a garden. He planted $\frac{2}{5}$ of the garden with potatoes and $\frac{1}{8}$ of the garden with lettuce. What fraction of the garden is planted with potatoes or lettuce?

g. At the start of the trip, the gas tank on the car was $\frac{2}{5}$ full. If the trip used $\frac{1}{8}$ of the remaining gas, what fraction of a tank of gas is left at the end of the trip?

h. On Monday, $\frac{1}{8}$ of the students in Mr. Brown's class were absent from school. The nurse told Mr. Brown that $\frac{2}{5}$ of those students who were absent had the flu. What fraction of the absent students had the flu?

i. Of the children at Molly's daycare, $\frac{1}{8}$ are boys and $\frac{2}{5}$ of the boys are under 1 year old. How many boys at the daycare are under one year old?

j. The track at school is $\frac{2}{5}$ of a mile long. If Jason has run $\frac{1}{8}$ of the way around the track, what fraction of a mile has he run?

Commentary

Many real world problems appear similar. Even when children might know what operation to choose when the problem only involves whole numbers, they often are confused with fractions. It is also important for students to know that $\frac{1}{8} \times \frac{2}{5}$ is equal to $\frac{2}{5} \times \frac{1}{8}$

Solutions

Solution: Solutions with explanations

a. Multiplication is appropriate and $\frac{2}{40}$ or $\frac{1}{20}$ of the girls in the class wear glasses.

b. Multiplication is appropriate and the farm has an area of $\frac{2}{40}$ square mile.

c. This problem cannot be solved by multiplication. Instead we subtract $\frac{1}{8}$ from the $\frac{2}{5}$ that was available to find that $\frac{2}{5} - \frac{1}{8} = \frac{16}{40} - \frac{5}{40} = \frac{11}{40}$ of the pizza is left. The related question involving multiplication would be: "There is $\frac{2}{5}$ of a pizza left. If Jamie ate $\frac{1}{8}$ of that part of the pizza, what fraction of the original whole pizza would he have eaten?"

d. Multiplication is appropriate and $\frac{2}{40}$ or $\frac{1}{20}$ of the boys have red hair.

e. This is a challenging question. Students are unlikely to see it as a problem to multiply $\frac{1}{8}$ times $\frac{2}{5}$, since those are not the numbers in the problem. However it can be solved as a missing multiplier problem (which is really a division problem) by noting that $\frac{1}{20}$ is $\frac{1}{8}$ times the fraction of people who wore red and also wore green. Symbolically $\frac{1}{20} = (\frac{1}{8}) \cdot n$ where n is the fraction of people at the party who wore red who also wore green. Thus the answer is that n = $\frac{2}{5}$. An alternative solution can be seen by assuming that there is a total of 40 people at the party who wore red and/or green. The $\frac{1}{20}$ wearing both would be 2 people. The number of people wearing red is $\frac{1}{8}$ of the 40 people, namely 5 people wearing red. The 2 people wearing both red and green represent $\frac{2}{5}$ of the 5 people wearing red. So while the answer to the question is not the result of multiplying $\frac{2}{5}$ and $\frac{1}{8}$, this product is related to the problem situation. This problem gives an opportunity for the teacher to discuss the importance of what is the whole being considered. In particular, the question is not about the fraction of all the people who are wearing both red and green, rather the fraction of those who wear red who also wear green.

f. This is an addition problem. $\frac{2}{5} + \frac{1}{8} = \frac{21}{40}$ of the garden was planted in potatoes or lettuce.

g. This problem looks like it could be solved by multiplication but $\frac{2}{5}$ times $\frac{1}{8}$ only gives the fraction of the tank of gas that is used up during the trip. One way to find the fraction of the tank of gas left in the tank, would be to subtract the fraction of the tank that was used during the trip from the fraction at the start of the trip, namely $\frac{2}{5}$ - $\frac{1}{20}$ = $\frac{7}{20}$.

h. The fraction of the absent students who had the flu was $\frac{2}{5}$, just as the nurse said! Multiplying the two fractions would give what fraction of the whole class had the flu, which is not what the question asked.

i. The fraction multiplication here would only tell what fraction of the children at the daycare are boys under 1. To find out how many boys that is, one needs to know how many children are at the daycare center. Multiplying $\frac{1}{20}$ times the number of children would tell how many boys are under 1.

j. Multiplication is appropriate and Jason has run $\frac{2}{40}$ or $\frac{1}{20}$ of a mile.