

11 Feb '25

Fractions :

- If we say 'we ate $\frac{3}{4}$ of a pizza', it means if we cut the pizza into 4 parts, we ate 3 parts.
- If we say, 'we got 100 pizzas yesterday for a birthday party. And we all finished $\frac{3}{4}$ of those pizzas.'

If means if we divide those 100 pizzas into 4 parts, we ate 3 of those parts.

Each of those 4 parts = $\frac{1}{4} \times 100 = 25$ pizzas.

3 such parts = $3 \times 25 = 75$ pizzas.

So, $\frac{3}{4}$ th of 100 pizzas = $\frac{3}{4} \times 100 = 75$ pizzas.

→ If I have a stick of length ' x ', and I cut $\frac{3}{4}$ th of the stick and threw it away, what will remain?

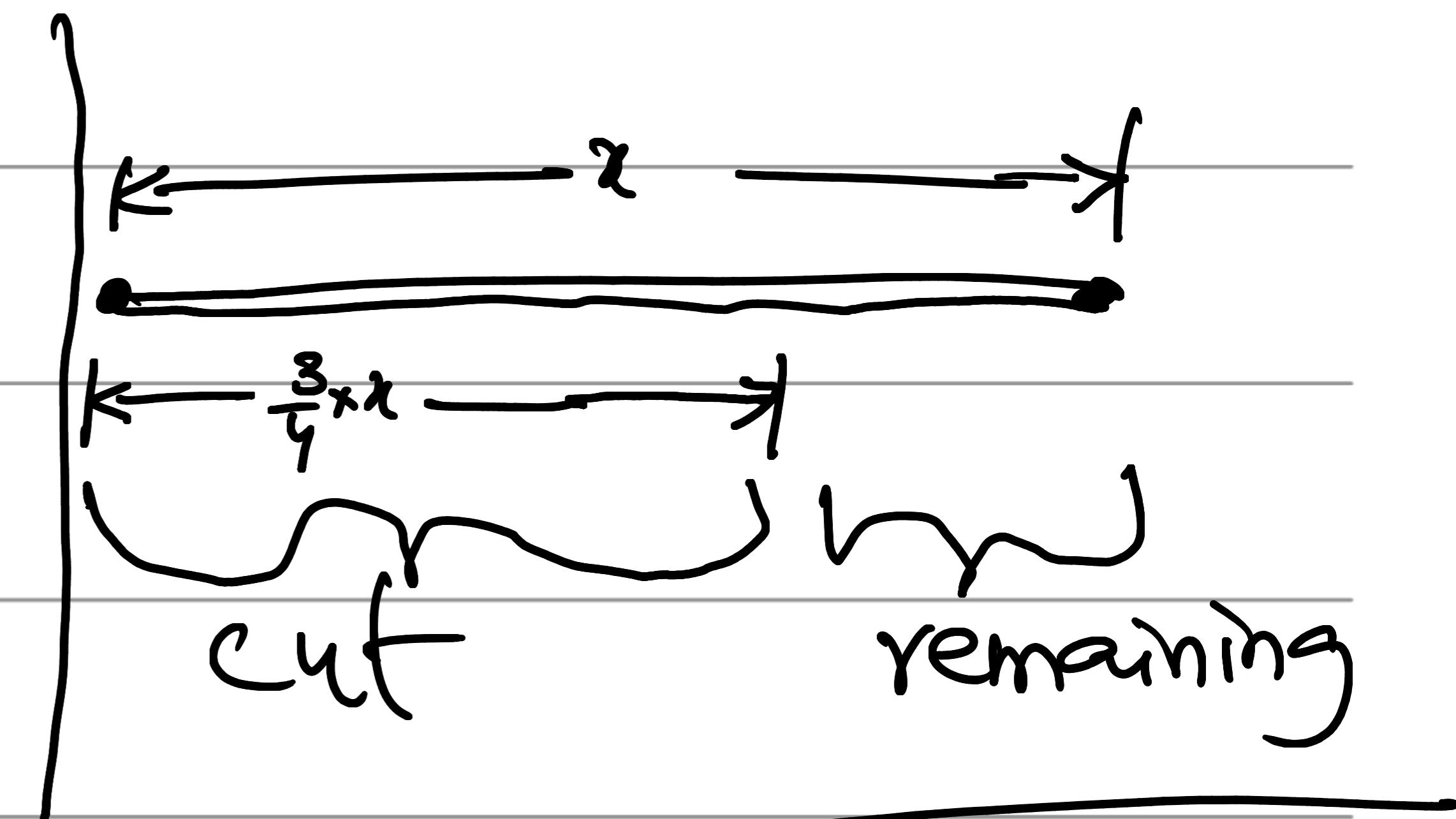
$$\text{Length cut} = \frac{3}{4} \times x$$

$$\begin{aligned}\text{Remaining stick length} \\ = & \text{total length} - \text{length cut}\end{aligned}$$

$$= x - \frac{3}{4} \times x = x \times 1 - x \times \frac{3}{4} = x \times \left(1 - \frac{3}{4}\right)$$

(commutative)

(distributive)



$$= x \times \left(1 - \frac{3}{4}\right) = x \left(1 \times \frac{1}{4} - \frac{3}{4} \times \frac{1}{1}\right) = x \left(\frac{1}{4} - \frac{3}{4}\right)$$

$$= x \times \frac{1}{4}$$

→ Let's say x is $13\frac{2}{3}$ metres.

$$\text{Total length of stick} = x = 13\frac{2}{3} \text{ m} = \frac{13 \times 3 + 2}{3}$$

$$= \frac{41}{3} \text{ m.}$$

$$\text{Length cut} = \frac{3}{4} \times x = \frac{3}{4} \times \frac{41}{3} = \frac{41}{4} = 10\frac{1}{4}$$

Verification:

$$\text{Length remaining} = \frac{1}{4} \times x = \frac{1}{4} \times \frac{41}{3} = \frac{41}{12} \text{ m}$$

Length rem + cut should be ~~(ofc)~~ length

$$\frac{41}{12} + \frac{41}{4} = \frac{41}{12} + \frac{41}{4} \times \frac{3}{3} = \frac{41 \times 4}{3 \times 4} = \frac{41}{3} \text{ m.}$$

→ When we say $\frac{1}{3}$ of a cup of sugar,
and if each cup is 10 grams of sugar

$$\frac{1}{3} \text{ cup} = \frac{1}{3} \times 10 \text{ g}$$

Units of measurement are cups
(or)
grams

→ If you are adding $\frac{1}{4}$ cup & $\frac{2}{3}$ cup of sugar

$$\text{total} = \frac{1}{4} \text{ cup} + \frac{2}{3} \text{ cup} = \left(\frac{1}{4} + \frac{2}{3} \right) \text{ cup} = \frac{11}{12} \text{ cup}$$

$$\begin{aligned} (\text{or}) \text{ total} &= \frac{1}{4} \times 10 \text{ g} + \frac{2}{3} \times 10 \text{ g} = \left(\frac{1}{4} + \frac{2}{3} \right) \times 10 \text{ g} = \frac{11}{12} \times 10 \text{ g} = \frac{110}{12} \text{ g.} \\ &= \frac{10}{4} \text{ g} + \frac{20}{3} \text{ g} = \frac{110}{12} \text{ g.} & &= \frac{11}{12} \times 10 \text{ g} = \frac{110}{12} \text{ g.} \end{aligned}$$

→ So, it's important to always write the units of measurement.

In the previous example, it's cups or grams.

→ Now let's say I have $\frac{2}{3}$ cup sugar. And someone gave me 3 grams of sugar. How much do I have now?

$$\frac{2}{3} \text{ cup} + 3 \text{ g} = \frac{2}{3} \times 10 \text{ g} + 3 \text{ g} = \frac{29}{3} \text{ g}.$$

(We can only add terms if they have same units — e.g. convert them into same units)

Steps for word problems on fractions :

- A fraction 'f' of something 'x'
= $f \times x$
- Try to think of the problem first
in terms of variables and see whether
it's +, -, /, * of fractions.
- Then write your solution in terms of those
variables
- Then replace the variables with values
and perform the computation.
- Write the units of measurement in
each step
- When doing +, - the terms should
have same units ; Not needed
for *, /

Eg: 3 apples + 4 oranges — can't be added

$$3 \text{ apples} + 4 \text{ apples} = 7 \text{ apples}$$

$$3 \text{ fruits} + 4 \text{ fruits} = 7 \text{ fruits}$$

(can be apples

or oranges)

$$\frac{100 \text{ apples}}{4 \text{ groups}} = \frac{25 \text{ apples}}{\text{group}}$$

[Dividing all the apples into 4 groups
— each group will still be apples]

$$\frac{100 \text{ apples} \times \text{group}}{\text{apples}} = \frac{100 \text{ apples}}{25 \text{ apples}} = \frac{4 \text{ groups}}{\text{group}}$$

[Dividing all the apples into groups of 25 apples
each gives 4 groups]

→ Always treat units as a multiplication

$$3 \text{ apples} = 3 \times \text{apple}$$

$$3 \text{ cups} = 3 \times \text{cup} = 3 \times 10^3 \text{ (if 1 cup} = 10^3)$$

$$3 \text{ apples} + 4 \text{ apples} = (3+4) \times \text{apples} = 7 \text{ apples}$$

(distributive law)

$$\frac{3 \text{ apples}}{\text{group}} \times 4 \text{ groups} = 3 \times 4 \times \text{apples}$$

(associative law)

[Each group is 3 apples; 4 such groups; Total = 12 apples]

→ Distance measured in metres.

$$\text{Speed} = \frac{\text{Distance (m)}}{\text{time (sec)}}.$$

If A & B travel 100m distance but A does it 1s and B in 10s — then

$$\text{Speed of A} = \frac{100 \text{ m}}{1 \text{ s}} = 100 (\text{m/s})$$

$$\text{Speed of B} = \frac{100 \text{ m}}{10 \text{ s}} = 10 (\text{m/s})$$

HW: Complete more AI generated
HW problems — follow the
instructions.

HW: Check previous HW AI problems
and their AI solutions