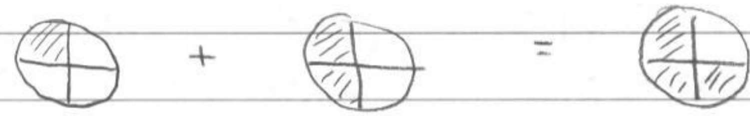
Lesson 2 : Equations in fractional form & Formulas

Fraction Review

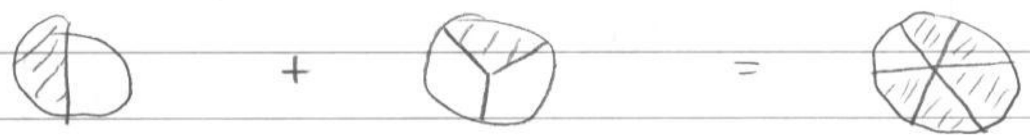
① Addition / subtraction : LCD !!



$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

numerator ← how many pieces we have
denominator ← how many pieces whole is divided into

· when adding, need same size pieces, so whole must by divided same way (Thus, LCD = lowest common denom)



$$\left(\frac{3}{3}\right)\frac{1}{2} + \frac{1}{3}\left(\frac{2}{2}\right) = ?$$

$$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

② Multiplication

$$\left(\frac{\text{num1}}{\text{denom1}}\right) \times \left(\frac{\text{num2}}{\text{denom2}}\right) = \frac{\text{num1} \times \text{num2}}{\text{denom1} \times \text{denom2}}$$

- just like cutting
- multiply straight across. NO CROSS MULT!

③ Division

$$\left(\frac{\text{num1}}{\text{denom1}}\right) \div \left(\frac{\text{num2}}{\text{denom2}}\right) = \left(\frac{\text{num1}}{\text{denom1}}\right) \times \left(\frac{\text{denom2}}{\text{num1}}\right)$$

★ flip the one you're dividing by and multiply

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- How do fractions come up in equations?

ex: $\frac{2}{3}x = 6$ divide by $\frac{2}{3}$ like we divided

$\left(\frac{3}{2}\right)\frac{2}{3}x = 6\left(\frac{3}{2}\right)$ by 2 in $2x$, but, $\div$ by $\frac{2}{3}$

$x = 9$ is like $\times$ by $\frac{3}{2}$

ex: $\frac{x}{2} + \frac{3x}{4} = \frac{5}{4}$ must combine x's on left side, but to add, need LCD

$\left(\frac{2}{2}\right)\frac{x}{2} + \frac{3x}{4} = \frac{5}{4}$

$\frac{2x}{4} + \frac{3x}{4} = \frac{5}{4}$

$\frac{5x}{4} = \frac{5}{4}$ mult by 4 on both sides and both denoms cancel

$\frac{5x}{5} = \frac{5}{5}$

$x = 1$

ex: $\left(\frac{4}{4}\right)\frac{x-1}{3} - \frac{x+2}{4}\left(\frac{3}{3}\right) = \frac{7}{6}$ can get LCD of all 3, but only need LCD of the x terms we need to combine

$\frac{4(x-1)}{12} - \frac{3(x+2)}{12} = \frac{7}{6}$

$\frac{4x-4}{12} - \frac{3x+6}{12} = \frac{7}{6}$

$\frac{4x-4-(3x+6)}{12} = \frac{7}{6}$

$\frac{4x-4-3x-6}{12} = \frac{7}{6}$

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$$\left(\frac{12}{1}\right)\frac{(x-10)}{12} = \frac{7}{\cancel{6}}\left(\frac{\overset{2}{\cancel{12}}}{1}\right)$$

$$x - 10 = 14$$
$$\underline{+10} \quad \underline{+10}$$
$$x = 24$$

How can we check our solutions?
- we solved and found what x equals, so just plug that number into the <u>original</u> equation instead of the x and see if the equality holds true

ex: $3x + 3 = 12$
$$\underline{-3} \quad \underline{-3}$$
$$\frac{3x}{3} = \frac{9}{3}$$
$$x = 3$$ ← so where ever there is an x, putting in 3 should be equivalent

<u>Check:</u>
$$3(3) + 3 = 12$$
$$9 + 3 = 12$$
$$12 = 12$$ Yes, so $x = 3$ is correct

Re-arranging Formulas

- #s are just symbols, as are letters, but we have defined rules for performing ops on #s (ie, we know $2+1=3$) we do not have those rules for letters, so $a+b$ is just $a+b$.
- to solve for a variable in any equation, we always do the same thing, except in the case of letters, we cannot combine.

ex: Solve for V.

$$h = \frac{V}{B}$$

V is being ÷ by B, so we × by B to undo

$$(B)\,h = \frac{V}{\cancel{B}}\,(\cancel{B})$$

$$Bh = V \Longleftarrow \text{Solution}$$

Why useful? Can make more mistakes if plugging in #s right away.

ex: Solve for r

$$\frac{V}{\pi h} = \frac{\pi r^2 \cancel{h}}{\pi \cancel{h}}$$

r is being squared and × by πh, so undo backwards

$$\sqrt{\frac{V}{\pi h}} = \sqrt{r^2}$$

$$\sqrt{\frac{V}{\pi h}} = r$$