

Bab 2:

Pemfaktoran &

Pecahan Algebra

MATEMATIK TINGKATAN 2



Pemfaktoran

$$5 \overline{)5b + 20}$$

Diagram showing the factorization of $5b + 20$ by 5. A green bracket underlines the terms $5b$ and 20 . Blue arrows point from the underline to the divisor 5. A green arrow points from the underline to the summand $b + 4$.

maka,
 $5b + 20 = 5(b + 4)$

$5 \nmid 20$
ialah
sifir 5

$$4 \overline{)4b - 12}$$

Diagram showing the factorization of $4b - 12$ by 4. A green bracket underlines the terms $4b$ and -12 . Blue arrows point from the underline to the divisor 4. A green arrow points from the underline to the summand $b - 3$.

maka,
 $4b - 12 = 4(b - 3)$

$4 \nmid 12$
ialah
sifir 4



$$3 \overline{)3b^2 - 18b}$$

Diagram showing the factorization of $3b^2 - 18b$ by 3. A yellow box highlights the divisor 3. A green bracket underlines the terms $3b^2$ and $-18b$. Blue arrows point from the underline to the divisor 3. A green arrow points from the underline to the summand $b^2 - 6b$.

$$b \overline{)b^2 - 6b}$$

Diagram showing the factorization of $b^2 - 6b$ by b. A yellow box highlights the divisor b. A green bracket underlines the terms b^2 and $-6b$. Blue arrows point from the underline to the divisor b. A green arrow points from the underline to the summand $b - 6$.

maka,
 $3b^2 - 18b = 3b(b - 6)$

$3 \nmid 18$
ialah
sifir 3

$b^2 \nmid 6b$
kedua-duanya
mempunyai b

Pemfaktoran

$$3 \overline{)6b^2 - 15b}$$

↑ ↑
 $2b^2 - 5b$

$$b \overline{)2b^2 - 5b}$$

↑ ↑
 $2b - 5$

maka,

$$6b^2 - 15b = 3b(2b - 5)$$

$$4 \overline{)12b^2 + 28b}$$

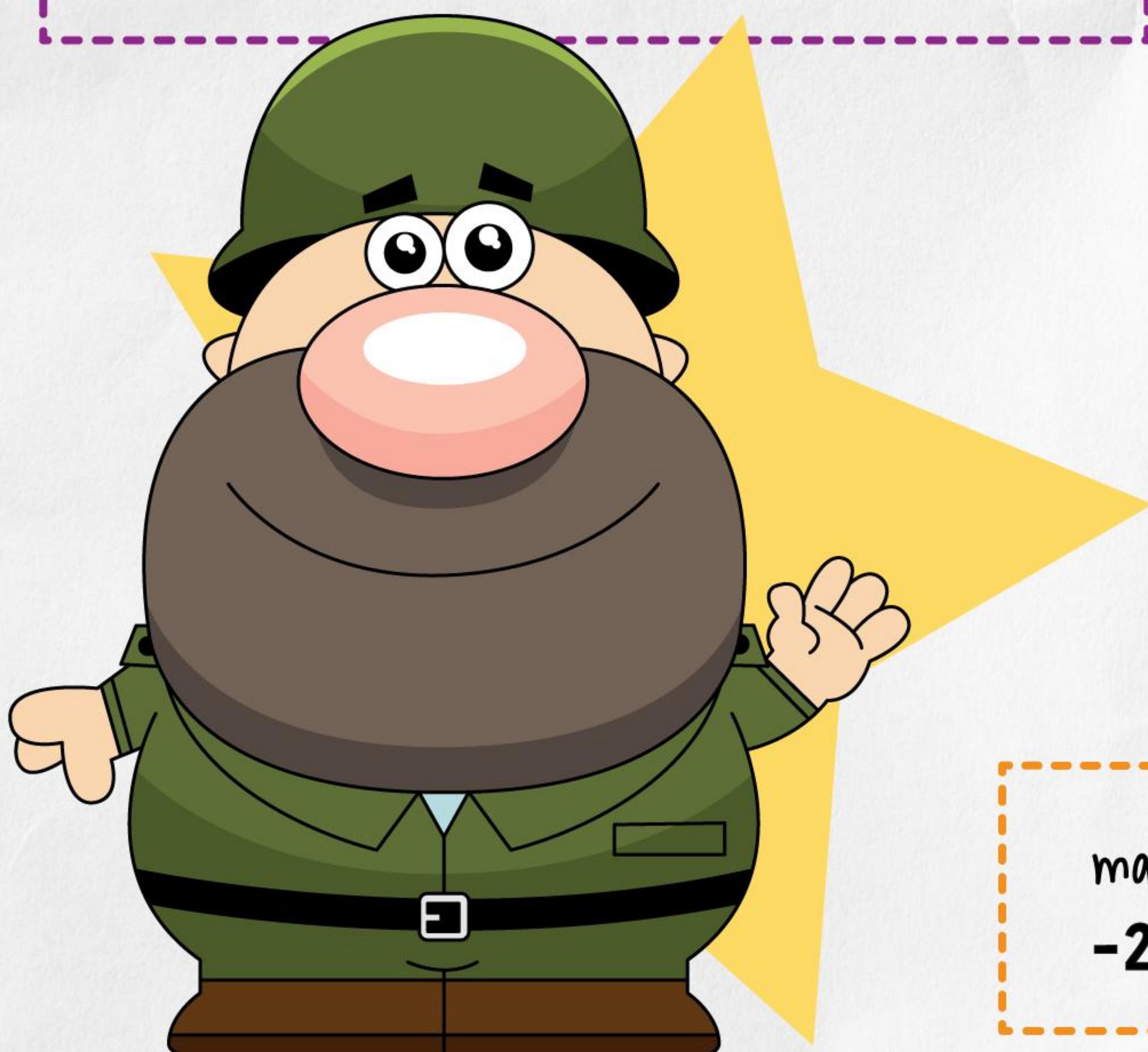
↑ ↑
 $3b^2 + 7b$

$$b \overline{)3b^2 + 7b}$$

↑ ↑
 $3b + 7$

maka,

$$12b^2 + 28b = 4b(3b + 7)$$



$$-5 \overline{-25b^2 + 10b}$$

↑ ↑
 $5b^2 - 2b$

$$b \overline{)5b^2 - 2b}$$

↑ ↑
 $5b - 2$

maka,

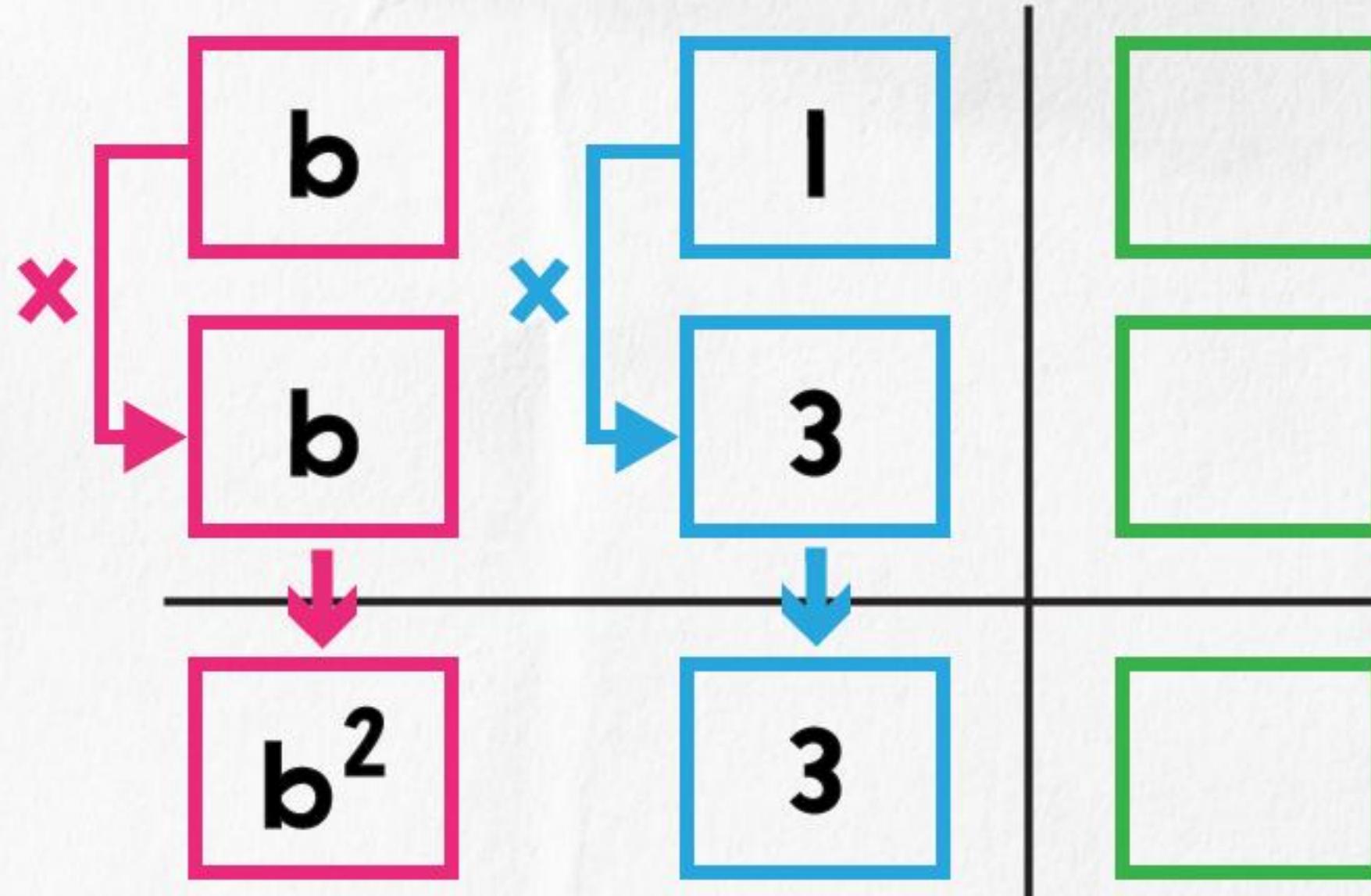
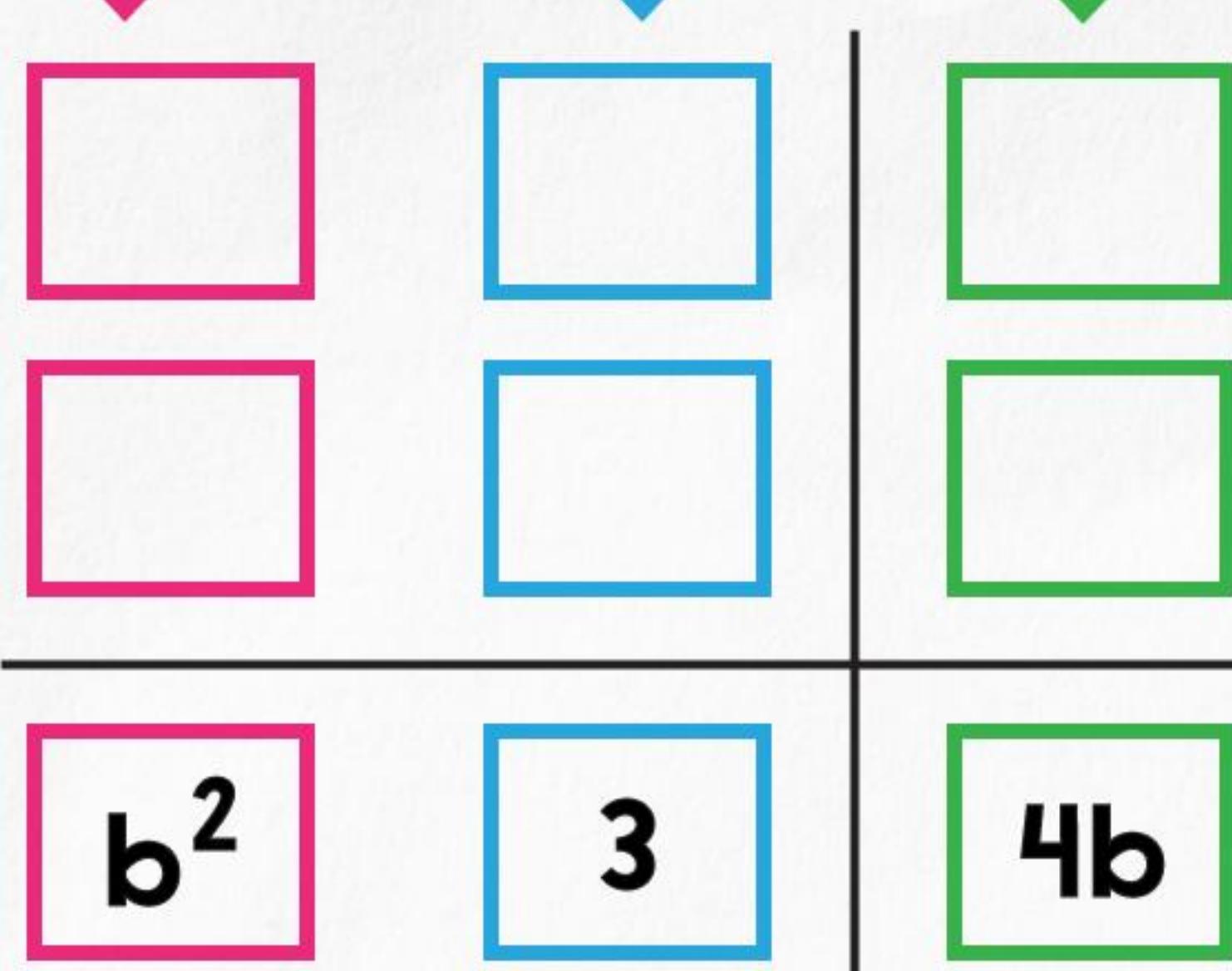
$$-25b^2 + 10b = -5b(5b - 2)$$

boleh
keluarkan
-5 atau 5

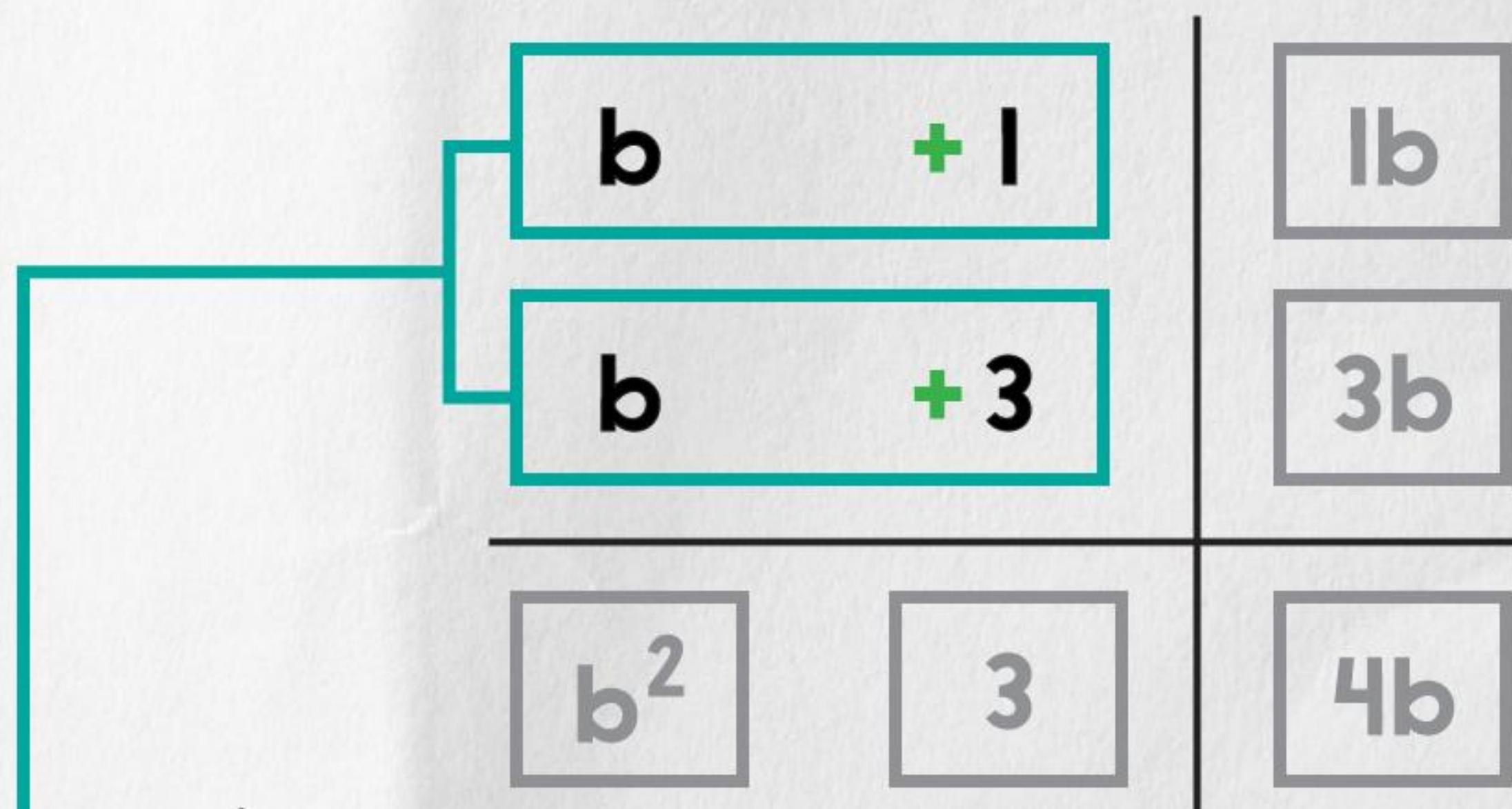
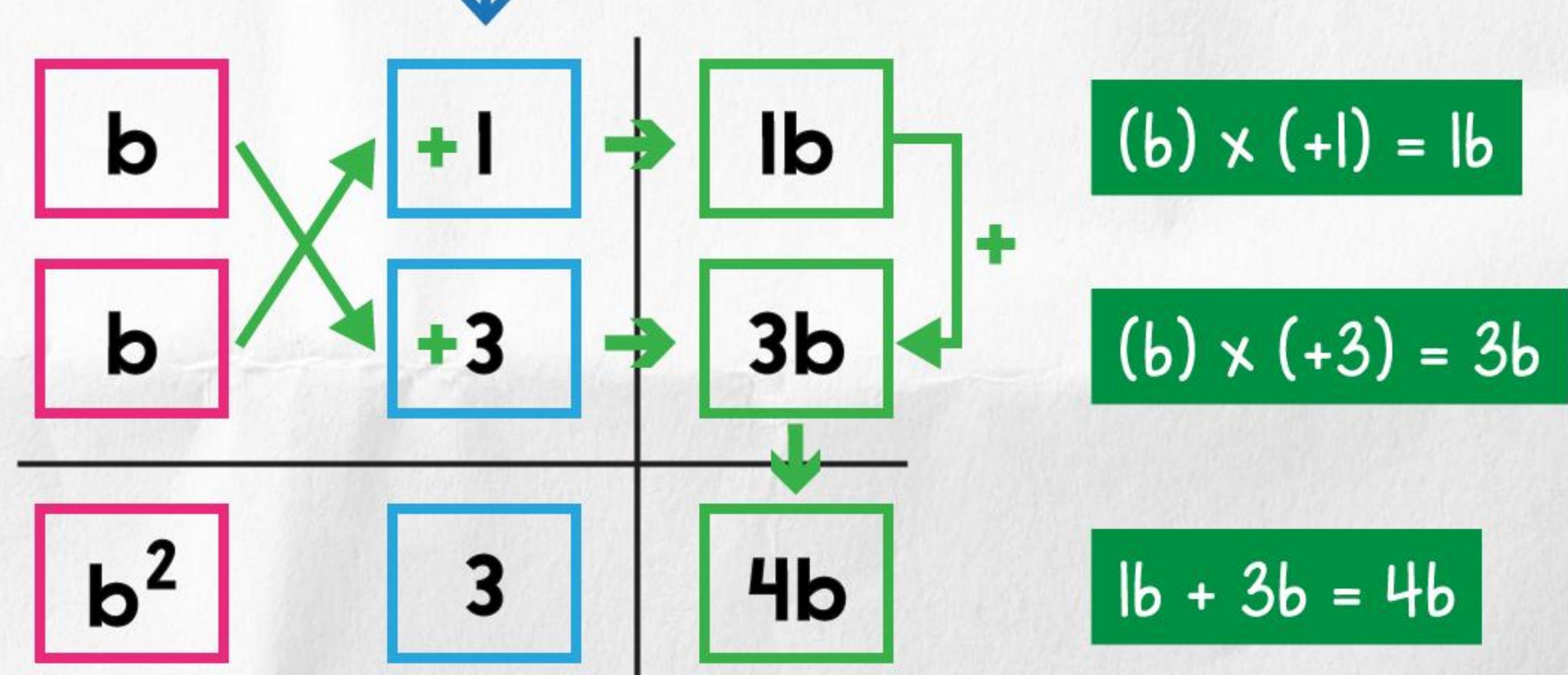
Pemfaktoran

faktorkan

$$b^2 + 4b + 3$$



positif 1
dan
positif 3
tentukan
nilai
3 dan 4b



maka,

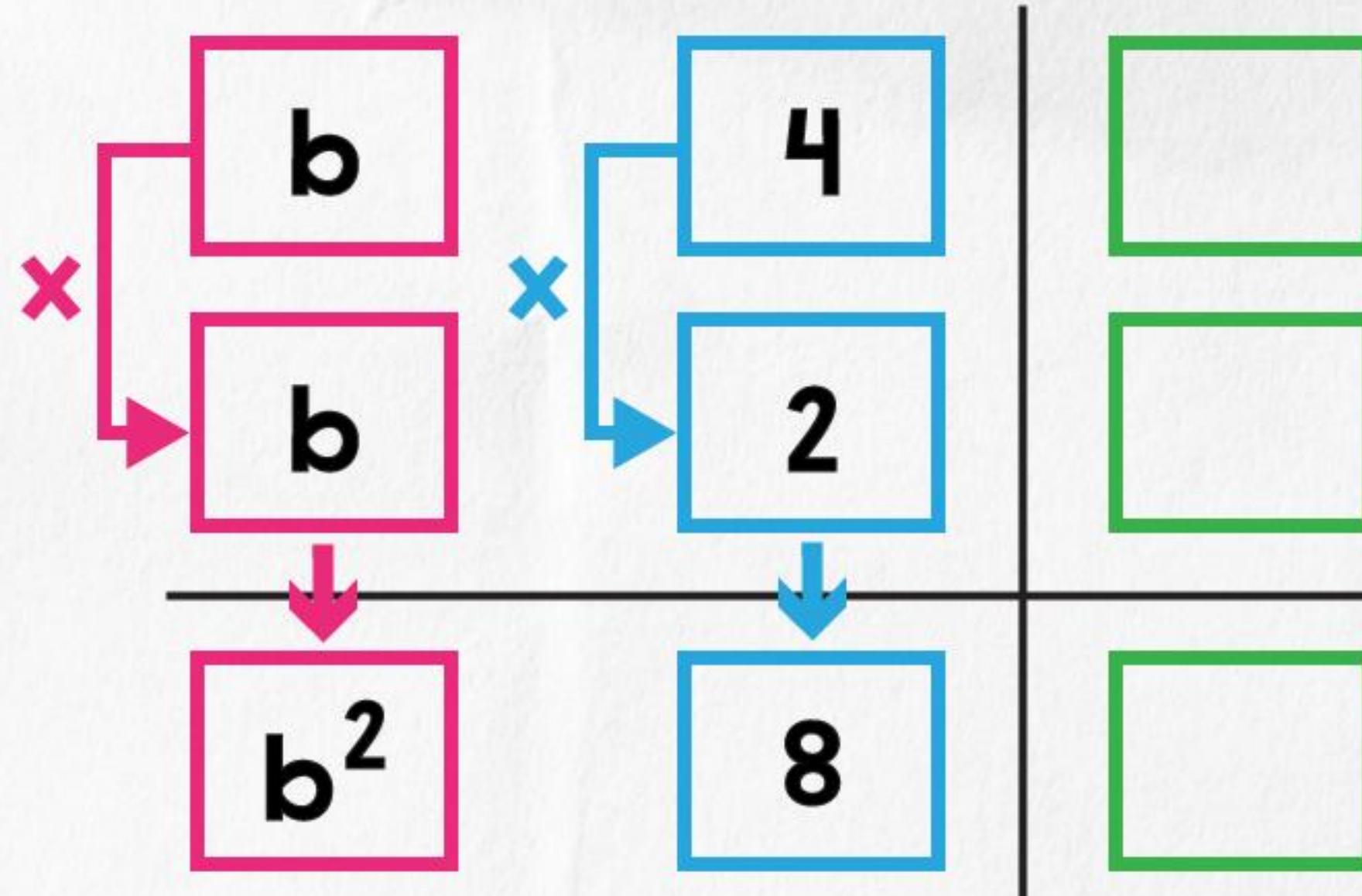
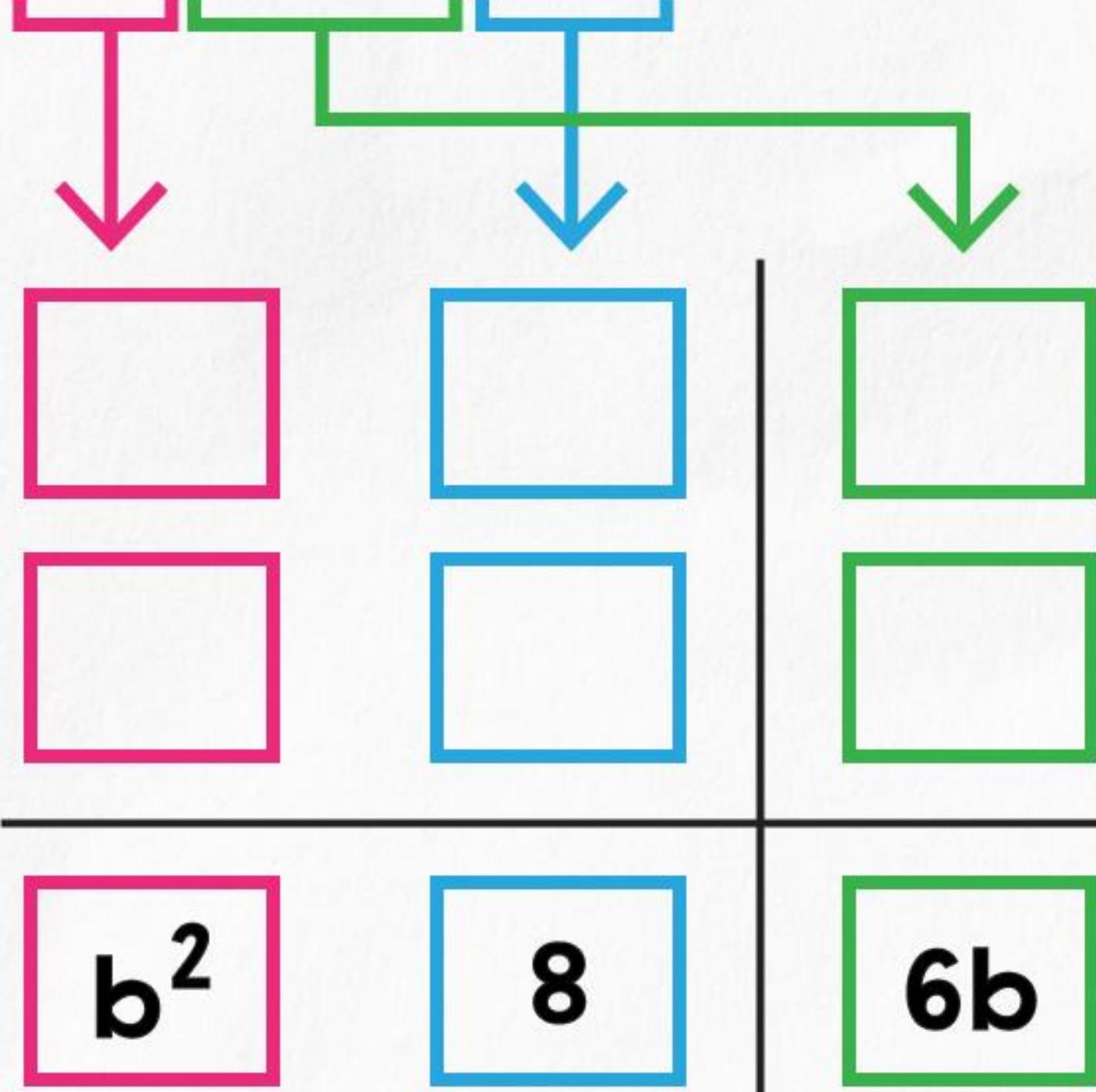
$$\rightarrow b^2 + 4b + 3 = (b + 1)(b + 3)$$



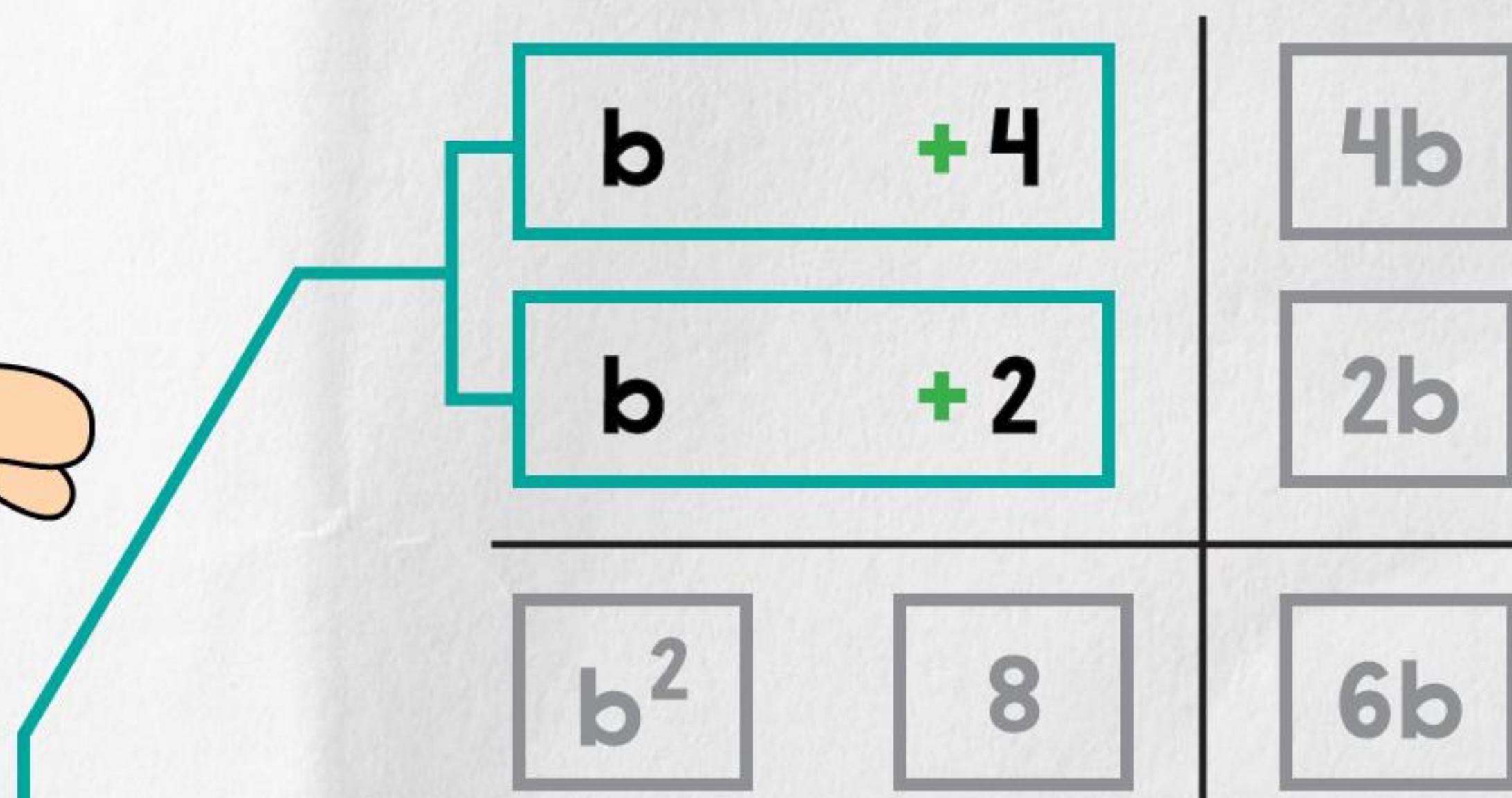
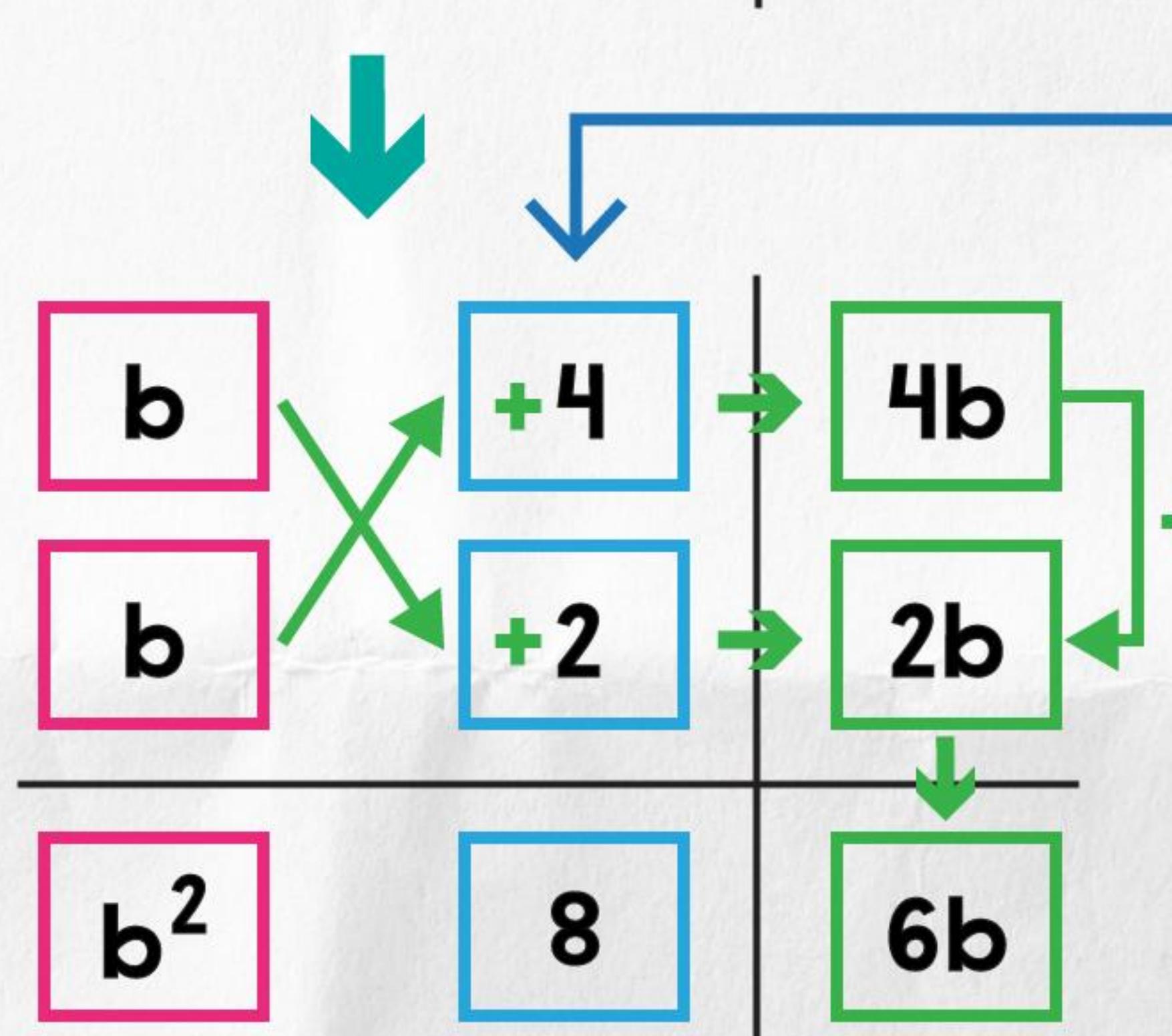
Pemfaktoran

faktorkan

$$b^2 + 6b + 8$$

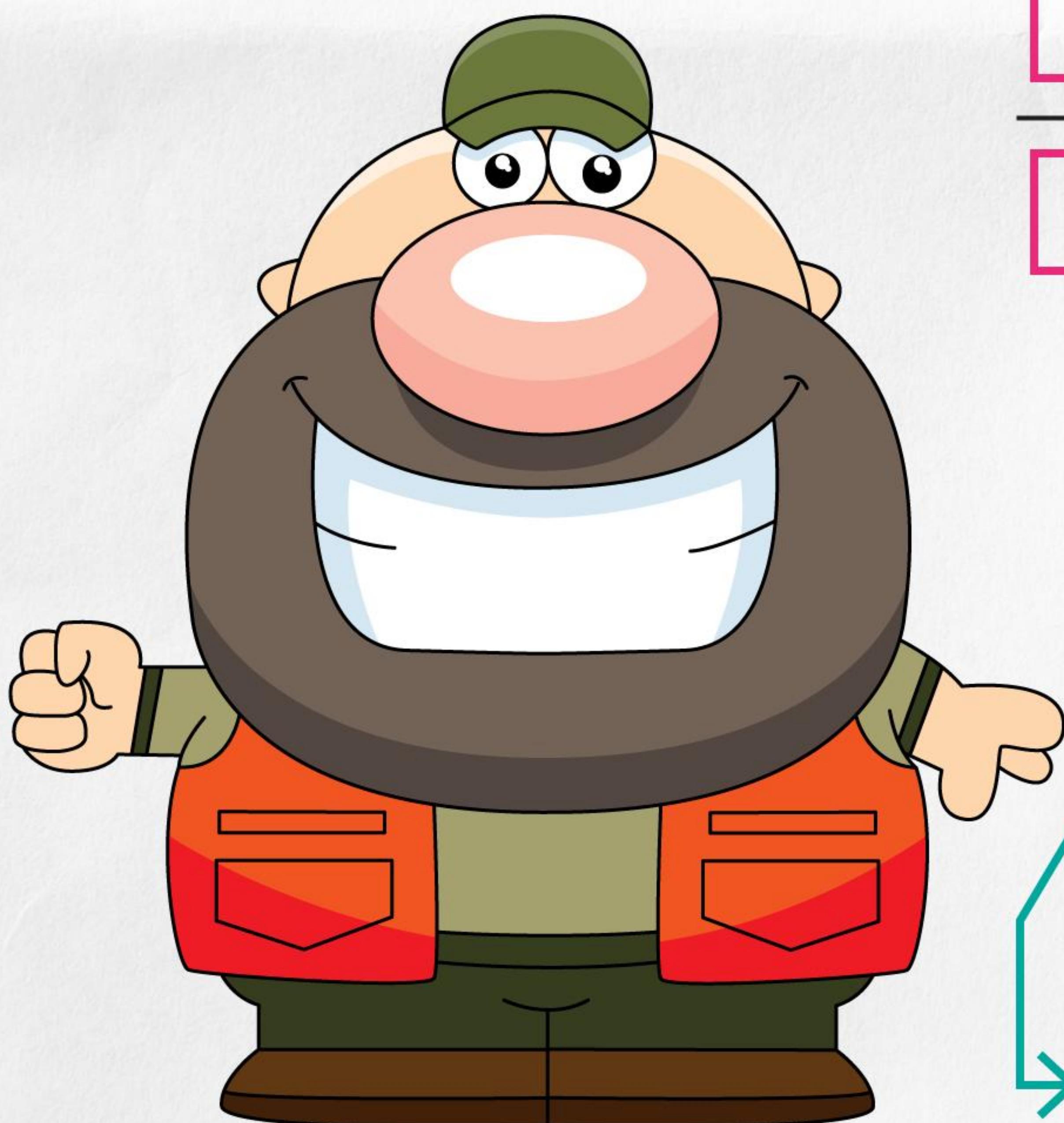


positif 4
dan
positif 2
tentukan
nilai
8 dan 6b



maka,

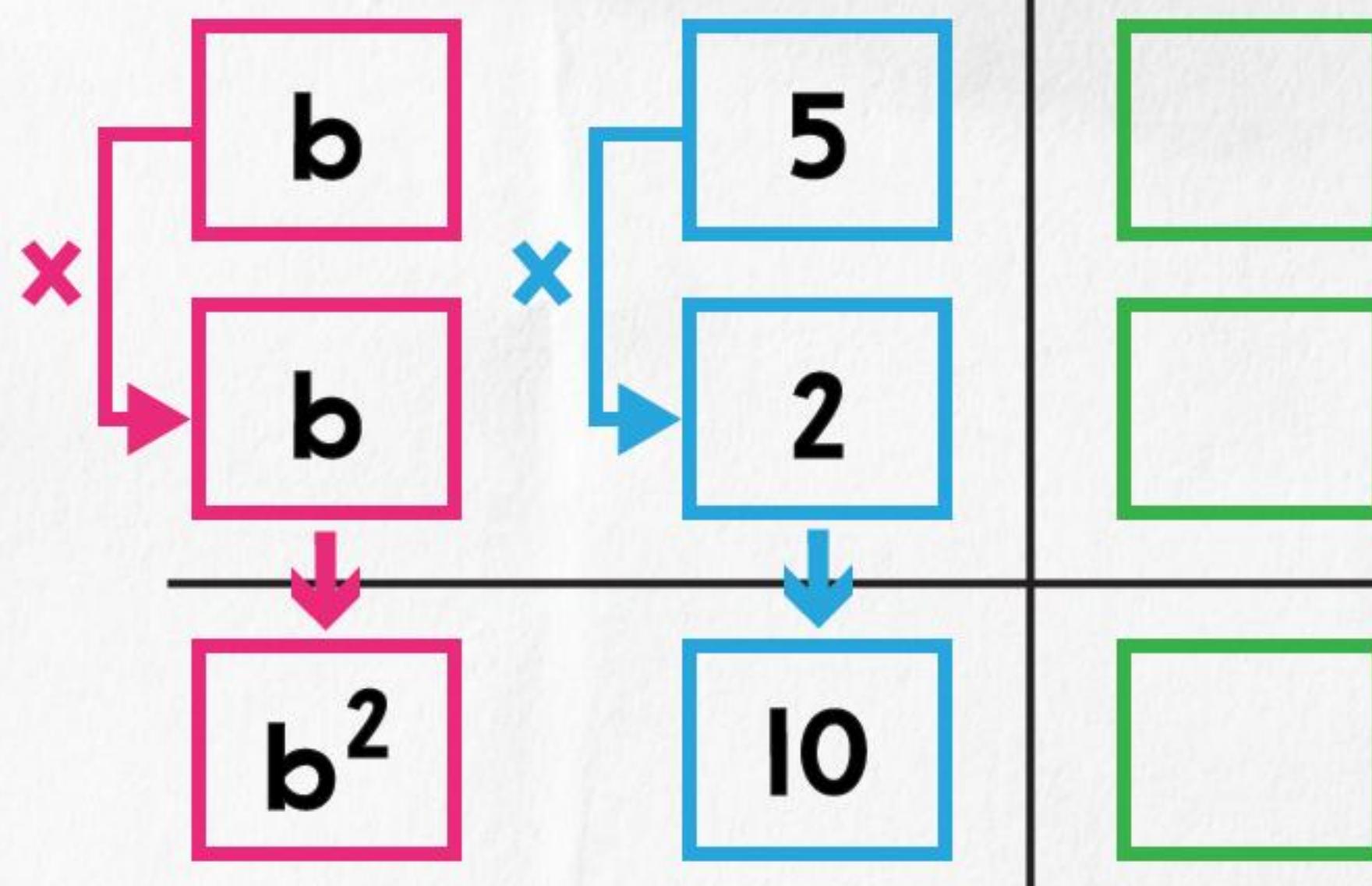
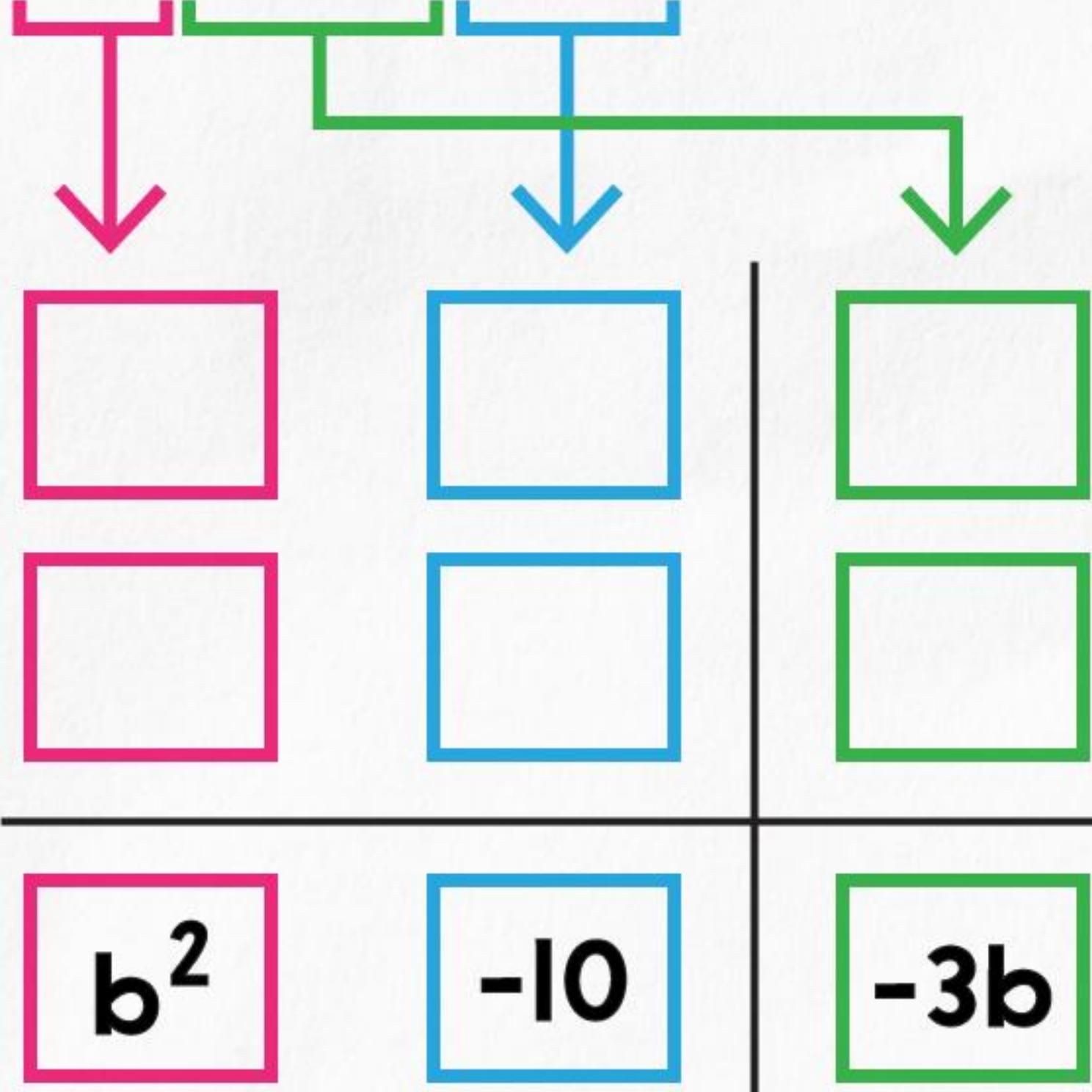
$$b^2 + 6b + 8 = (b + 4)(b + 2)$$



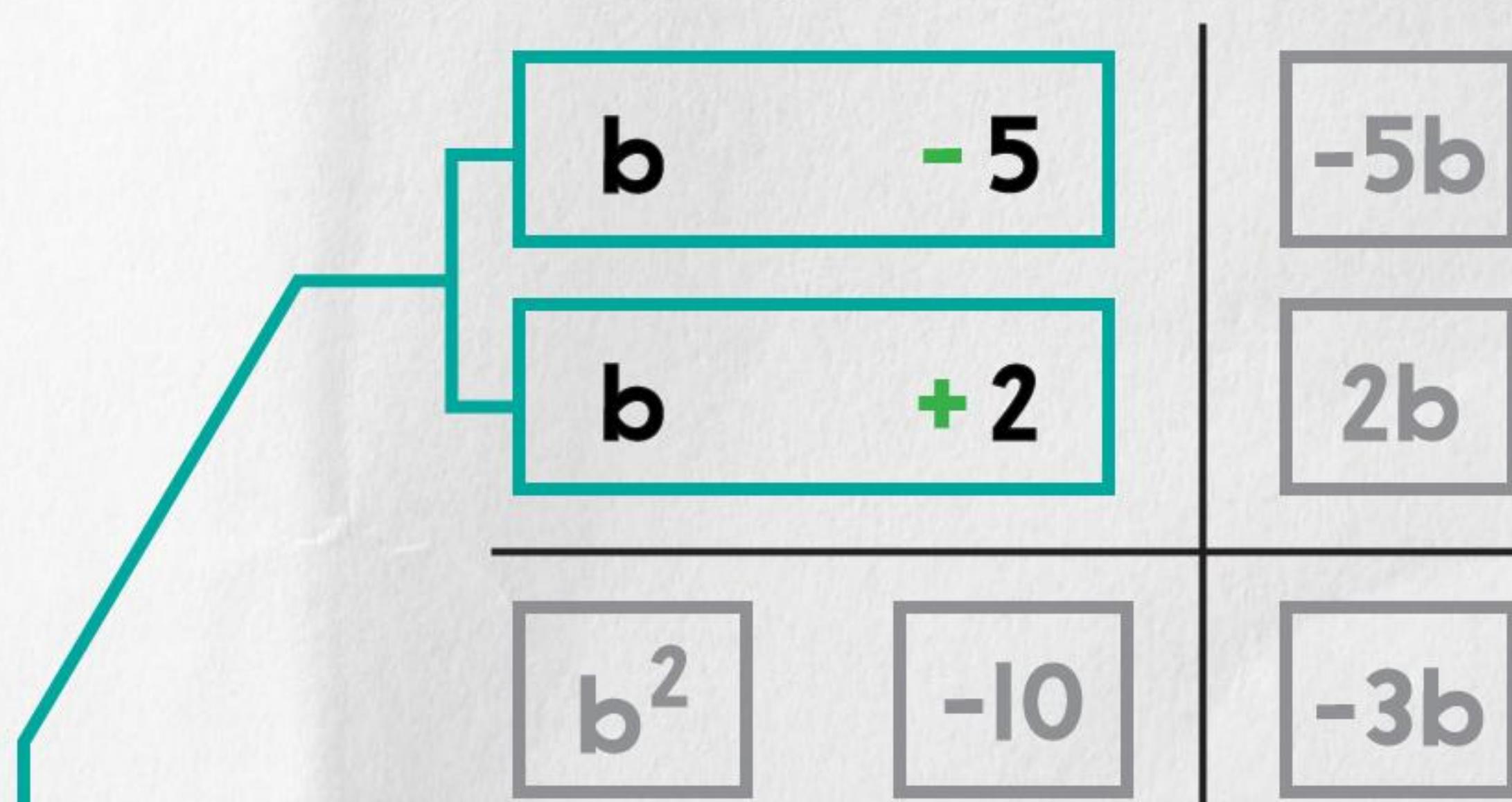
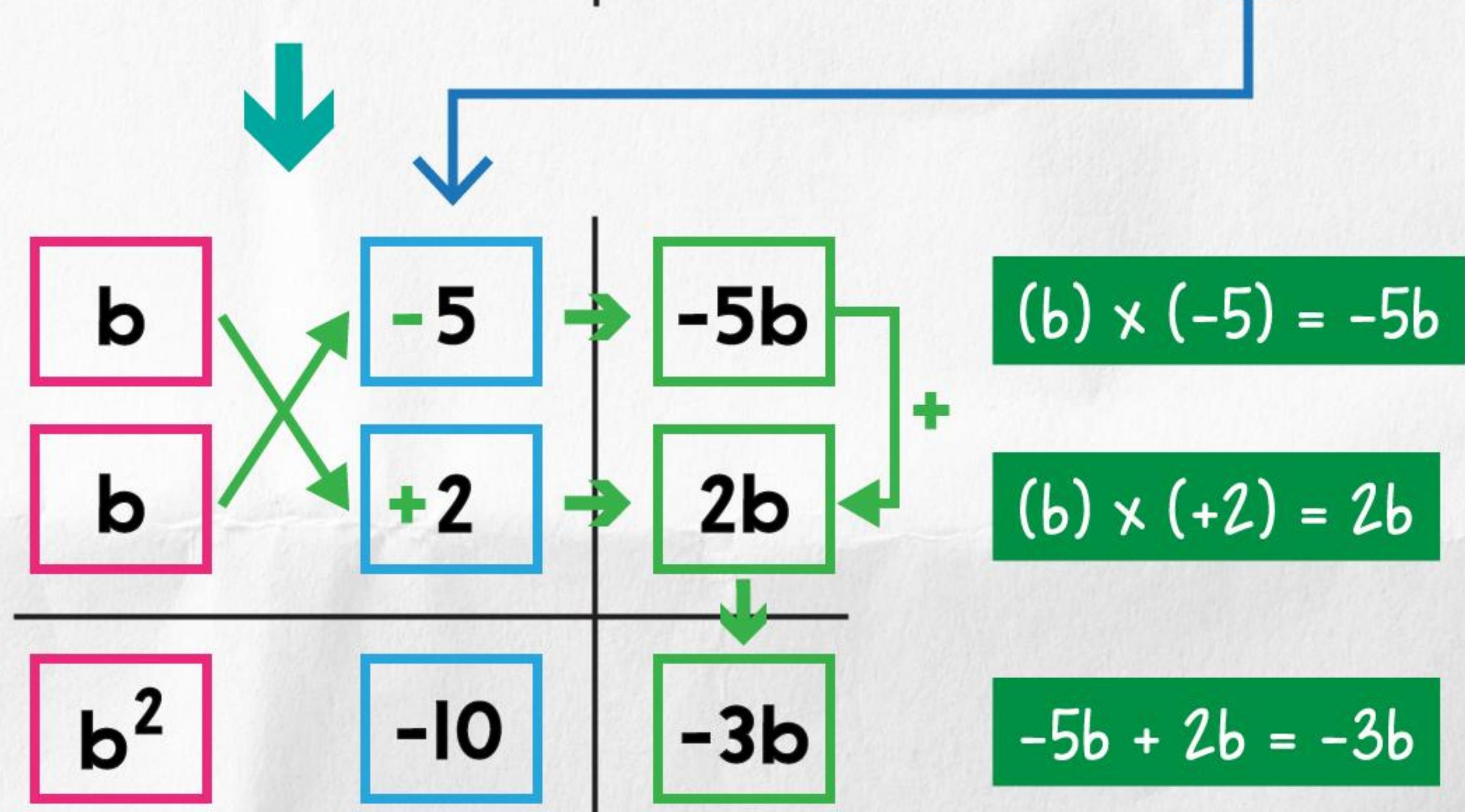
Pemfaktoran

faktorkan

$$b^2 - 3b - 10$$



negatif 5
dan
positif 2
tentukan
nilai
 -10 dan $-3b$



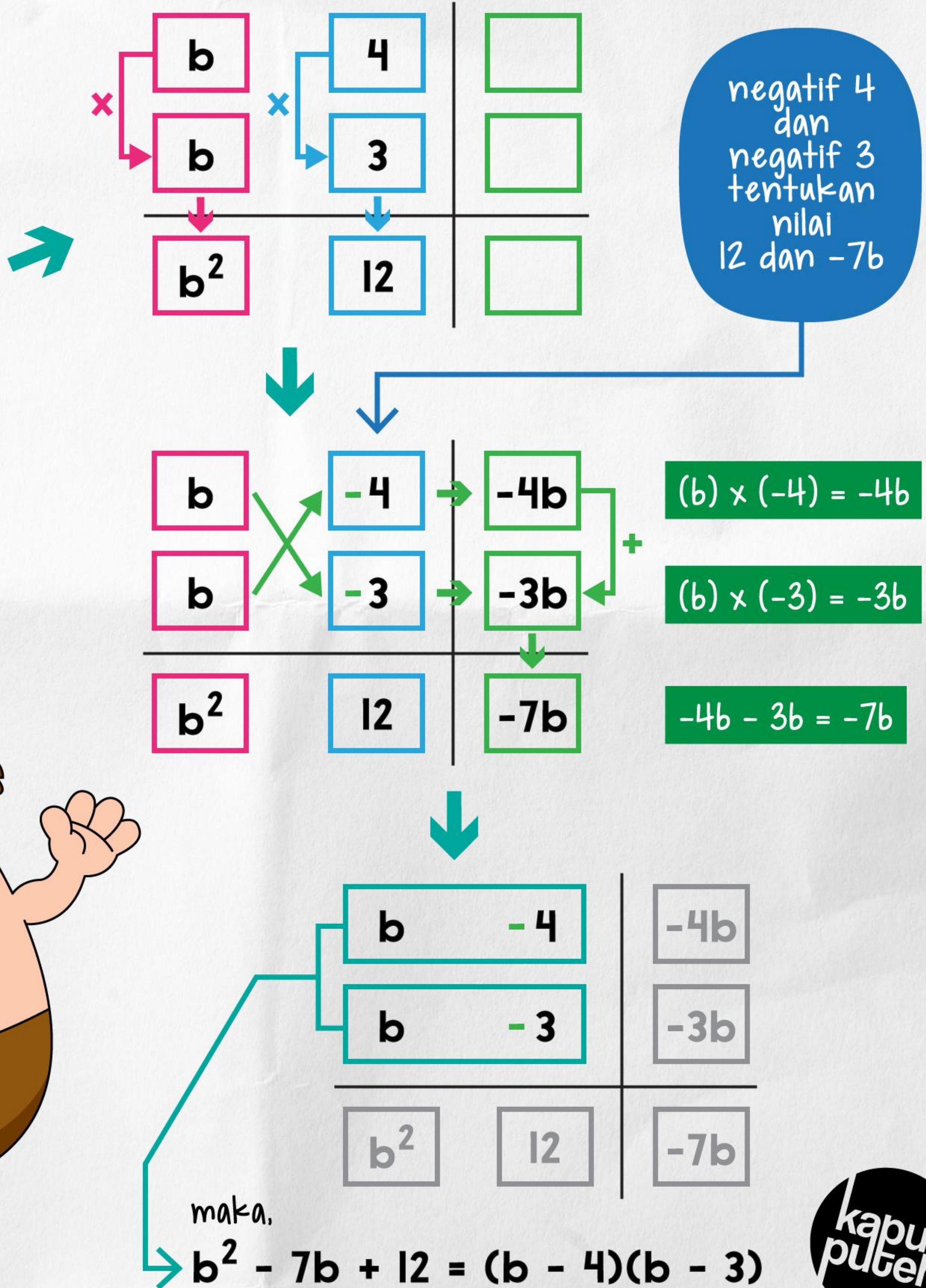
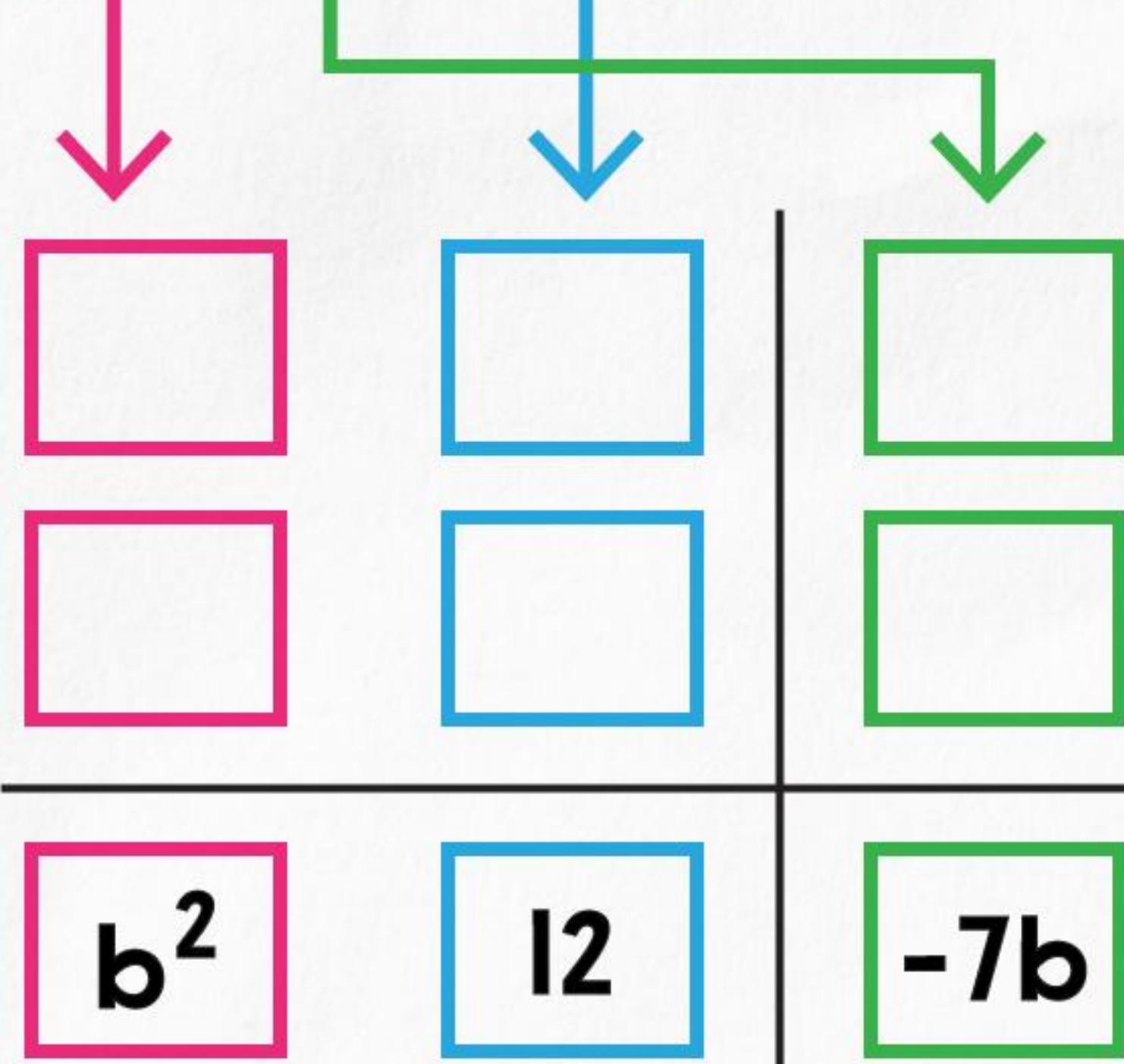
maka,

$$b^2 - 3b - 10 = (b - 5)(b + 2)$$

Pemfaktoran

faktorkan

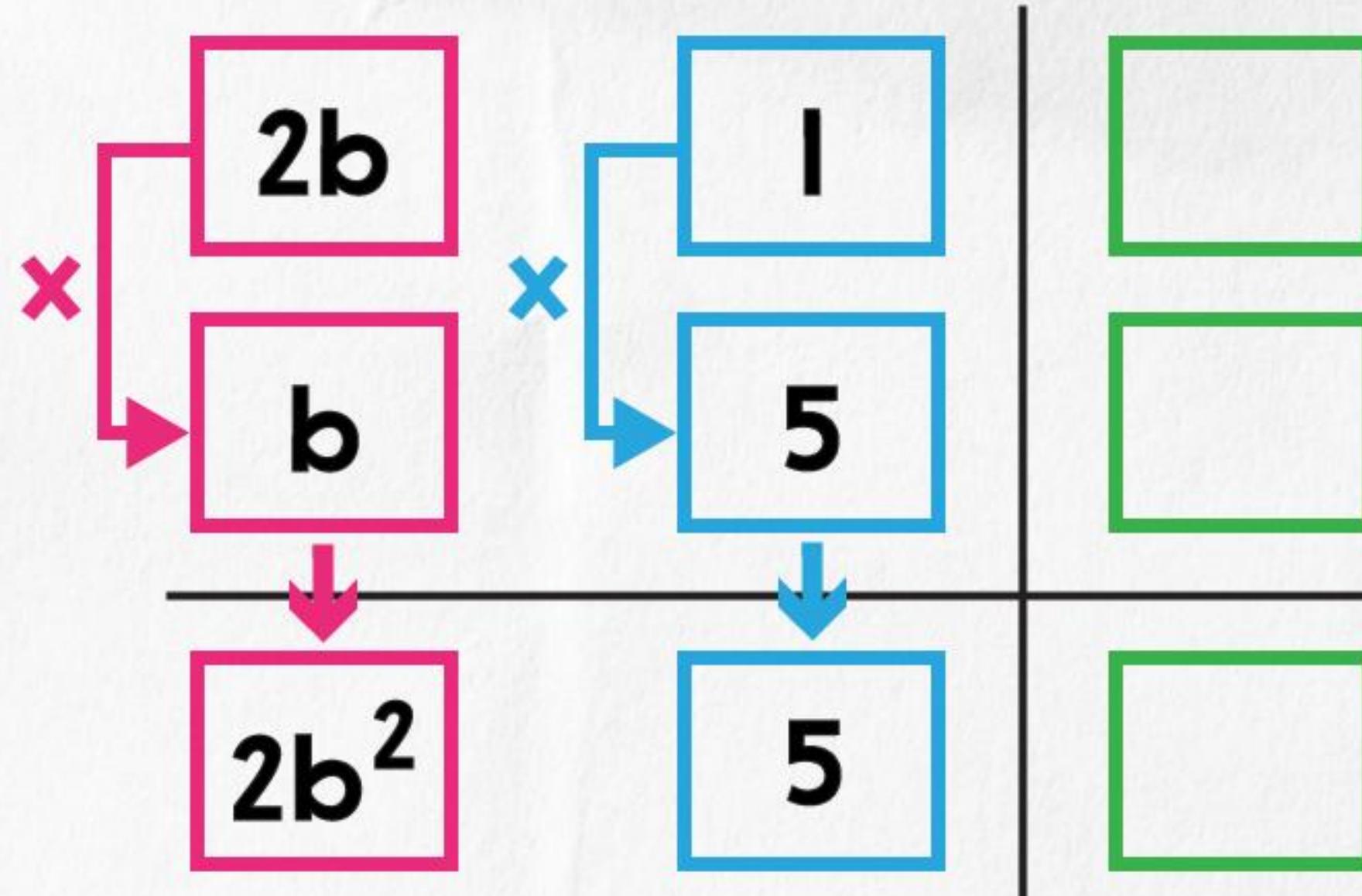
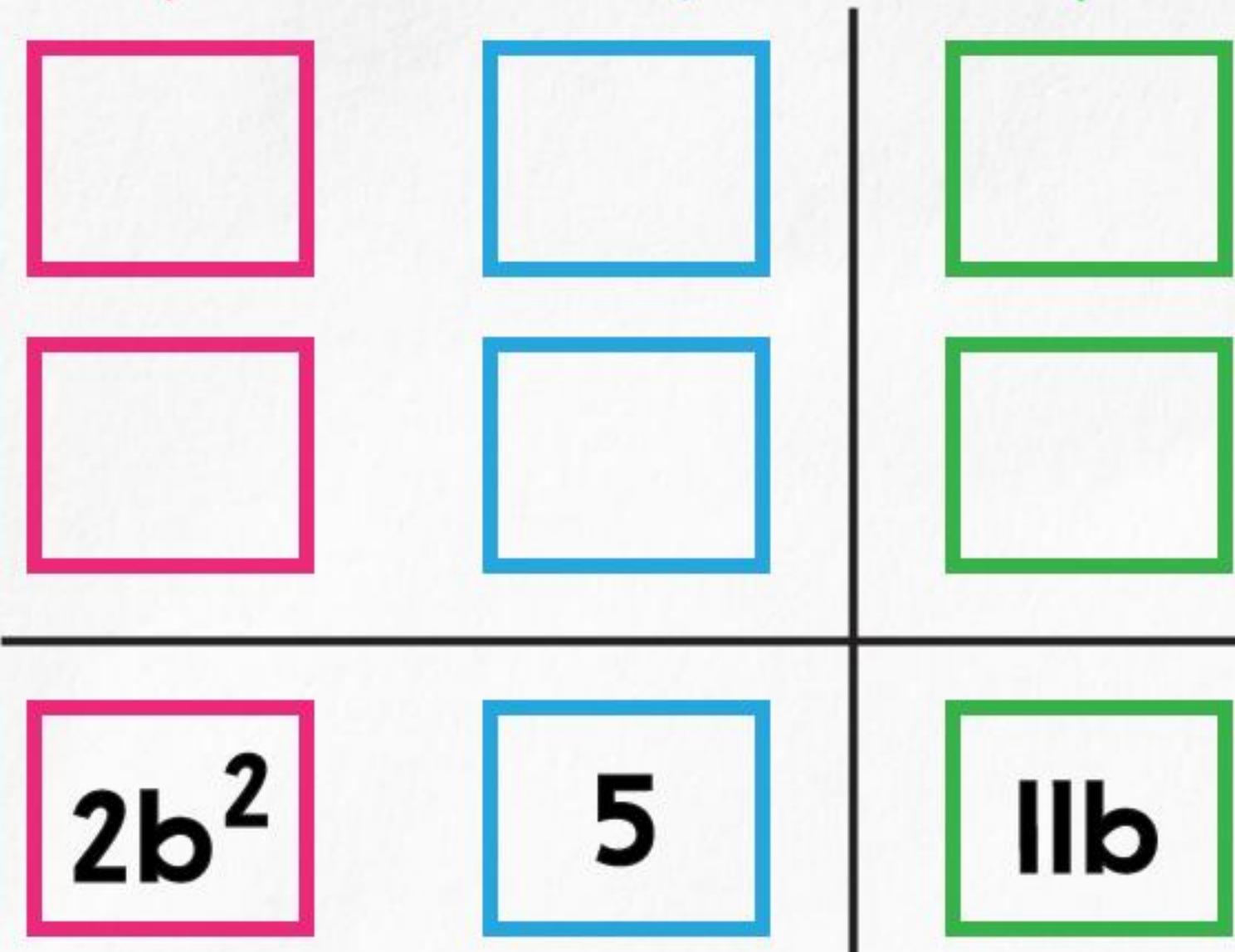
$$b^2 - 7b + 12$$



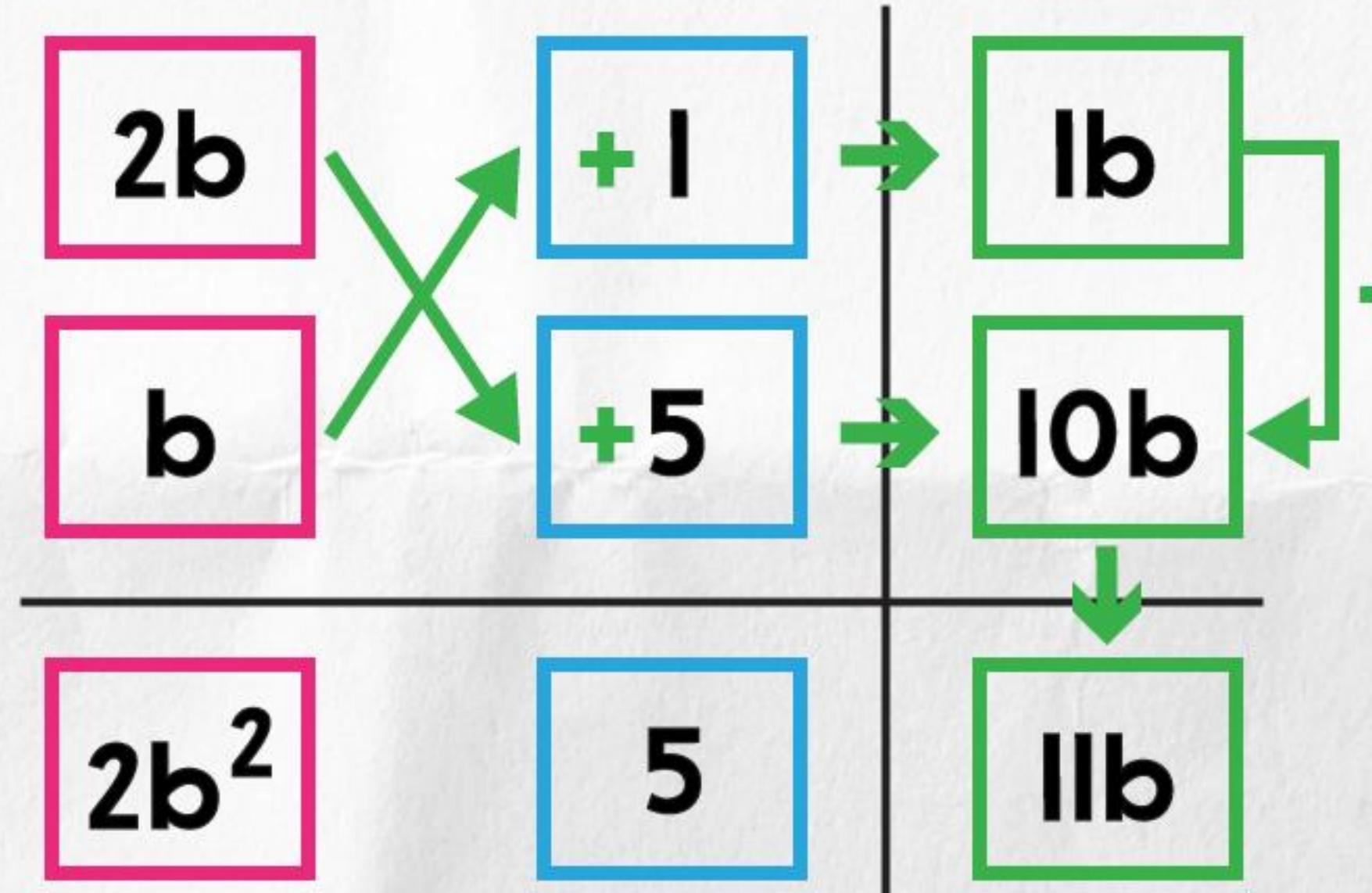
Pemfaktoran

faktorkan

$$2b^2 + 11b + 5$$



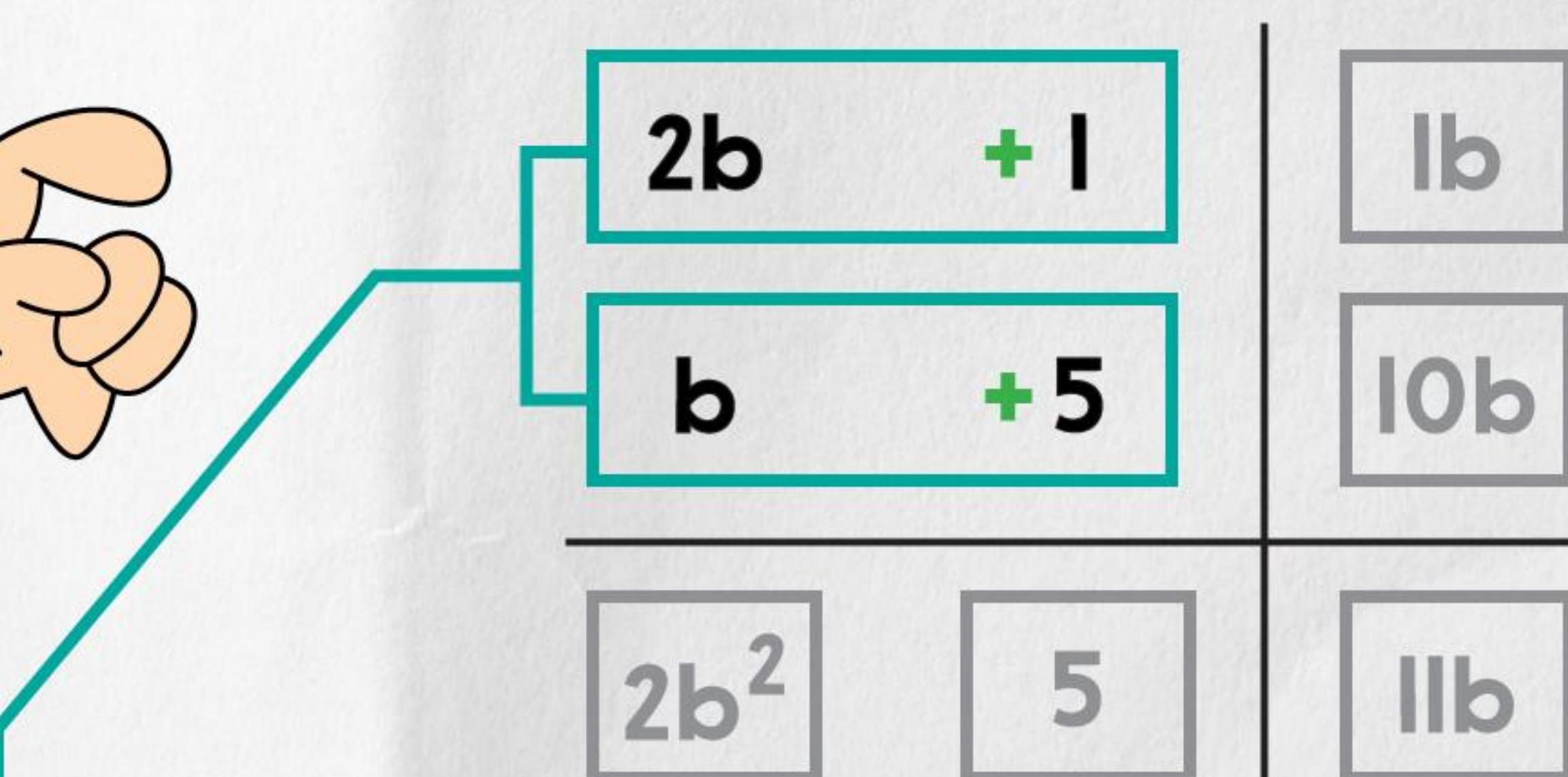
positif 1
dan
positif 5
tentukan
nilai
5 dan 11b



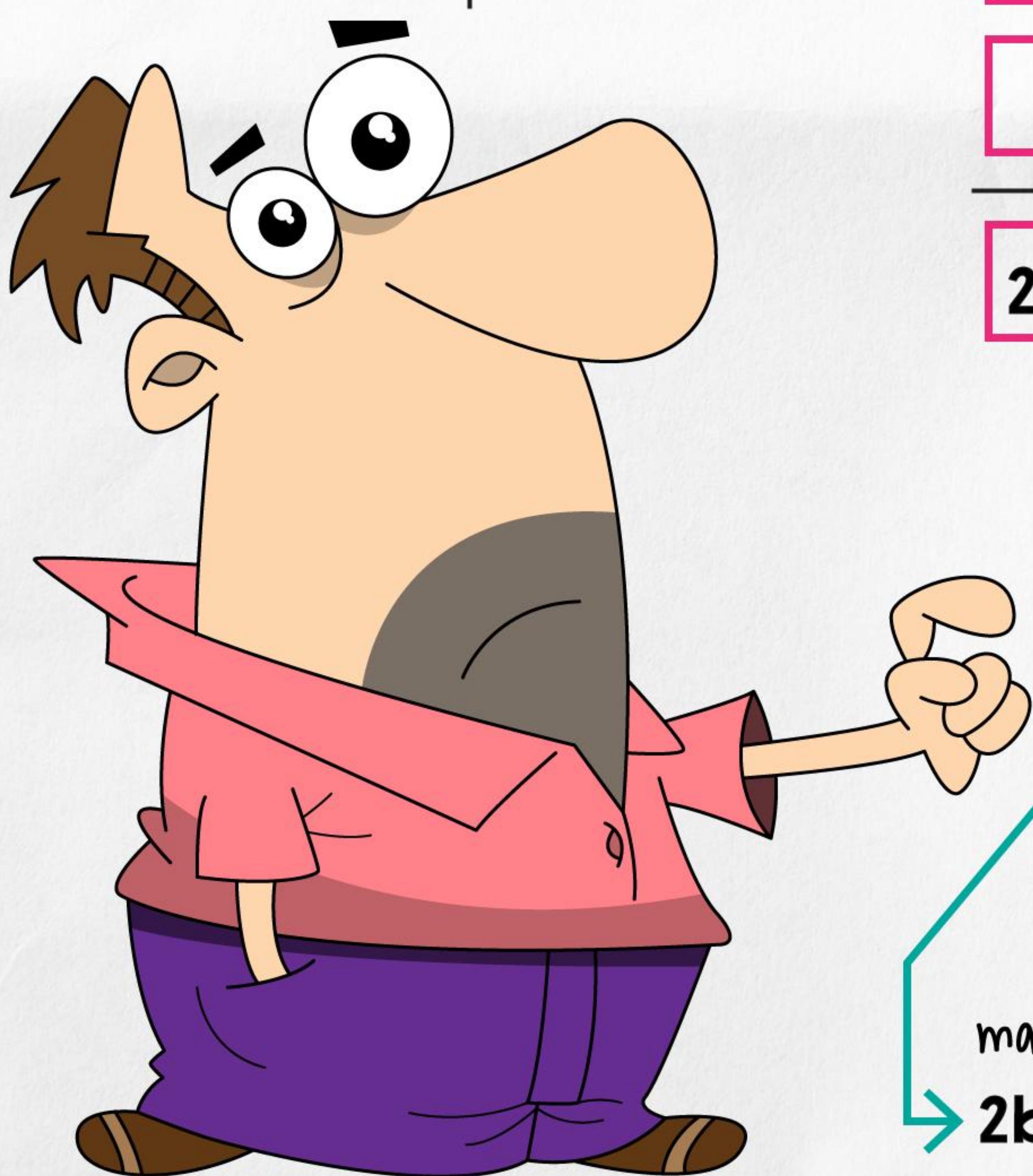
$$(b) \times (+1) = 1b$$

$$(2b) \times (+5) = 10b$$

$$1b + 10b = 11b$$



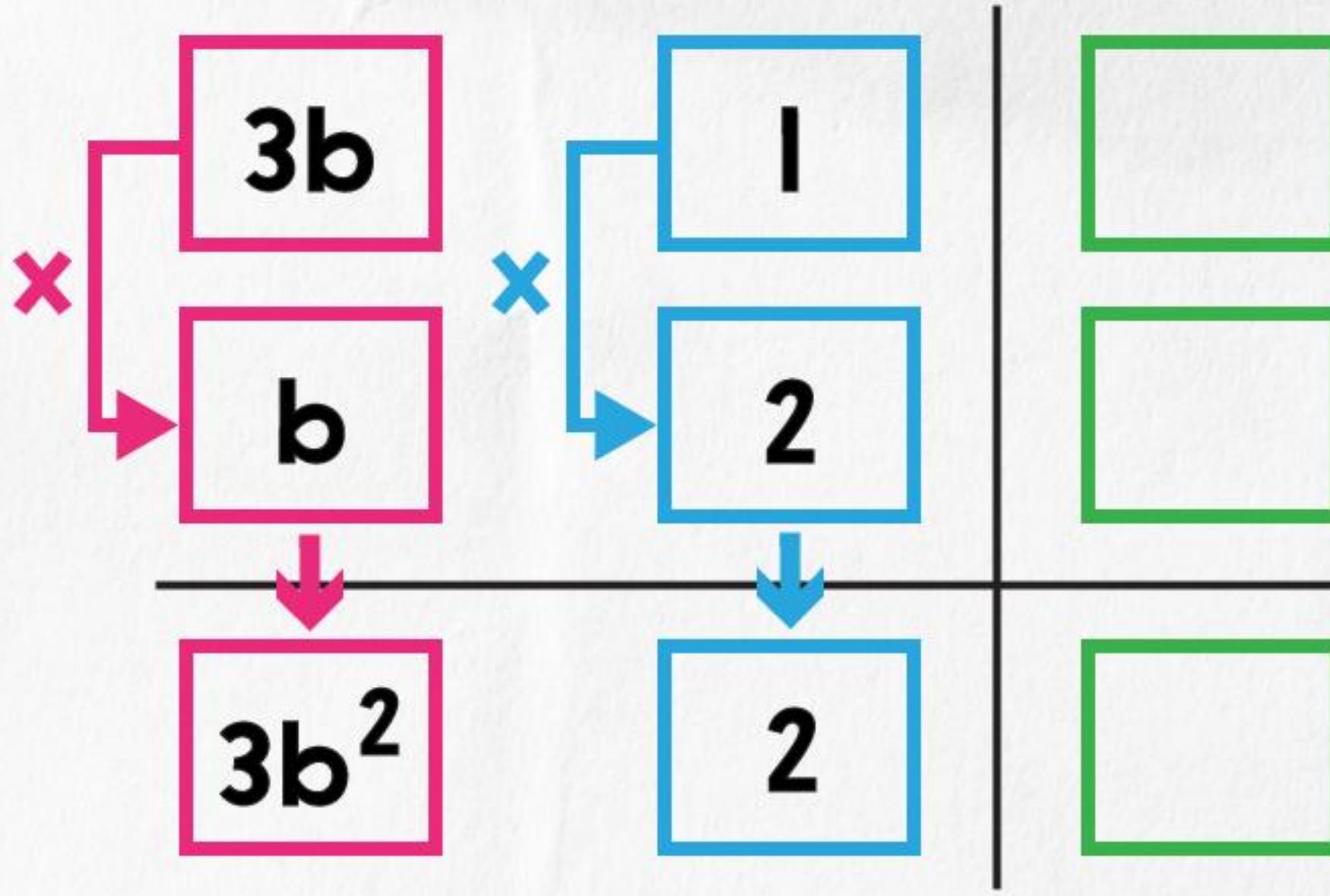
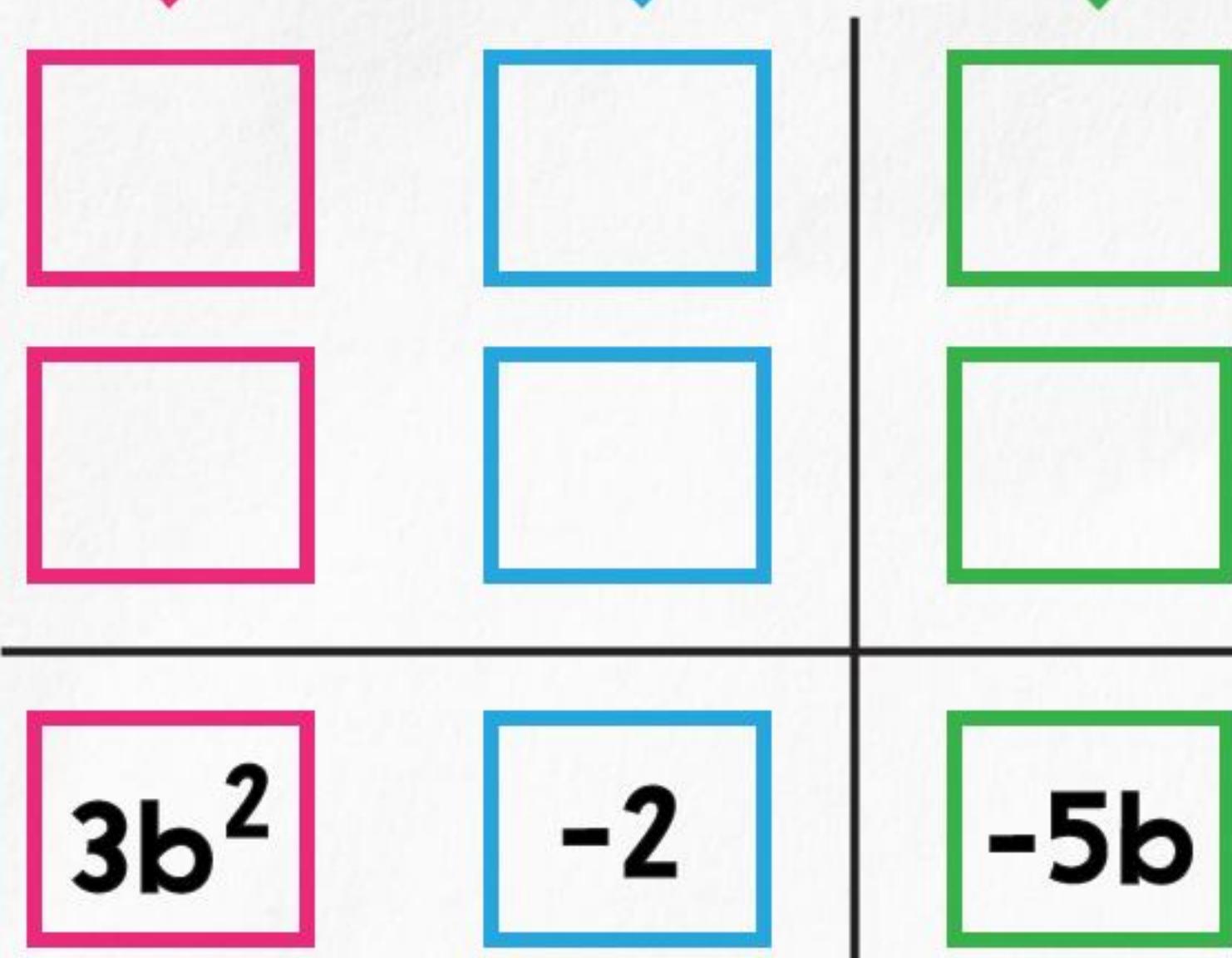
maka,
 $\rightarrow 2b^2 + 11b + 5 = (2b + 1)(b + 5)$



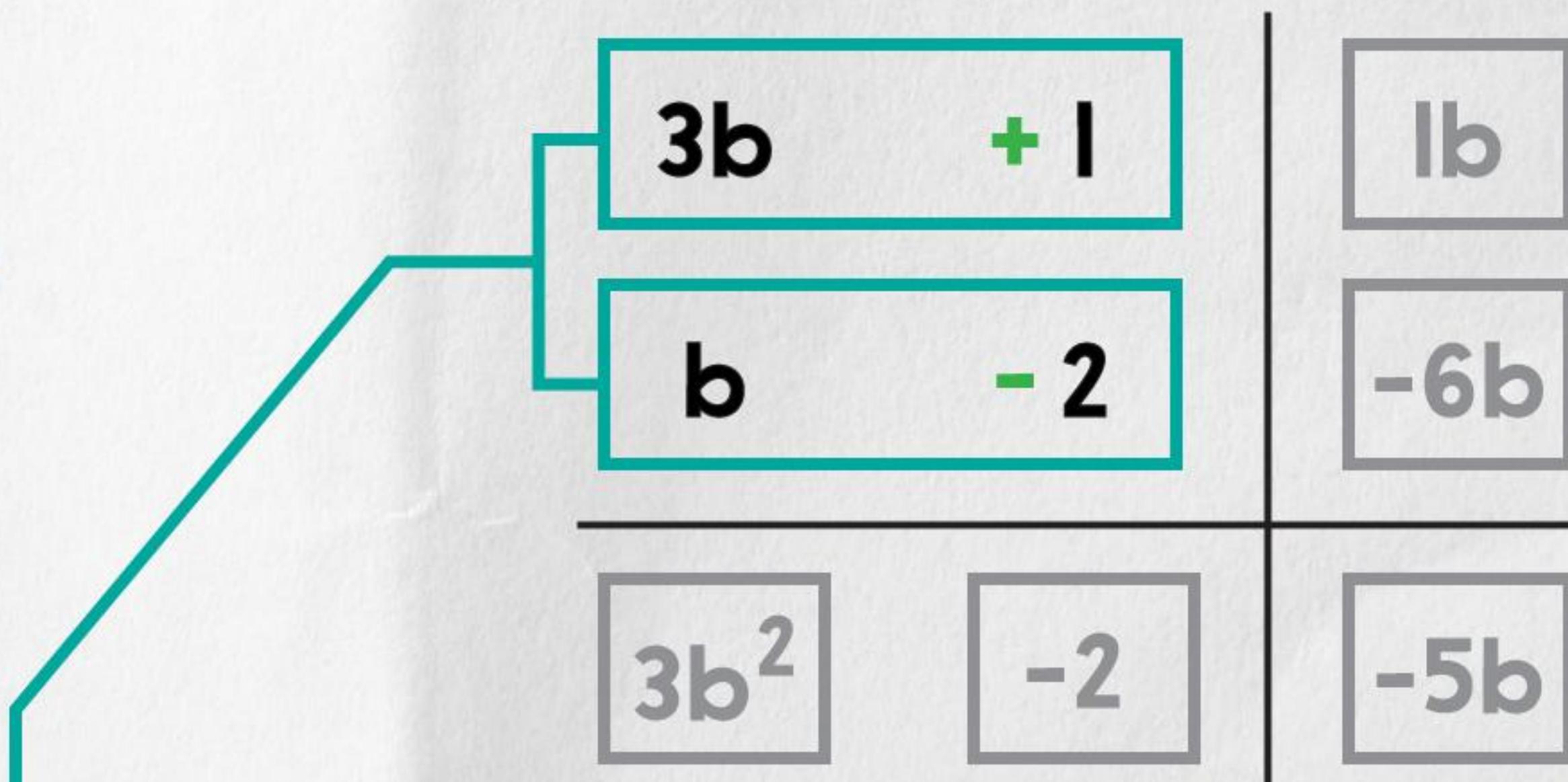
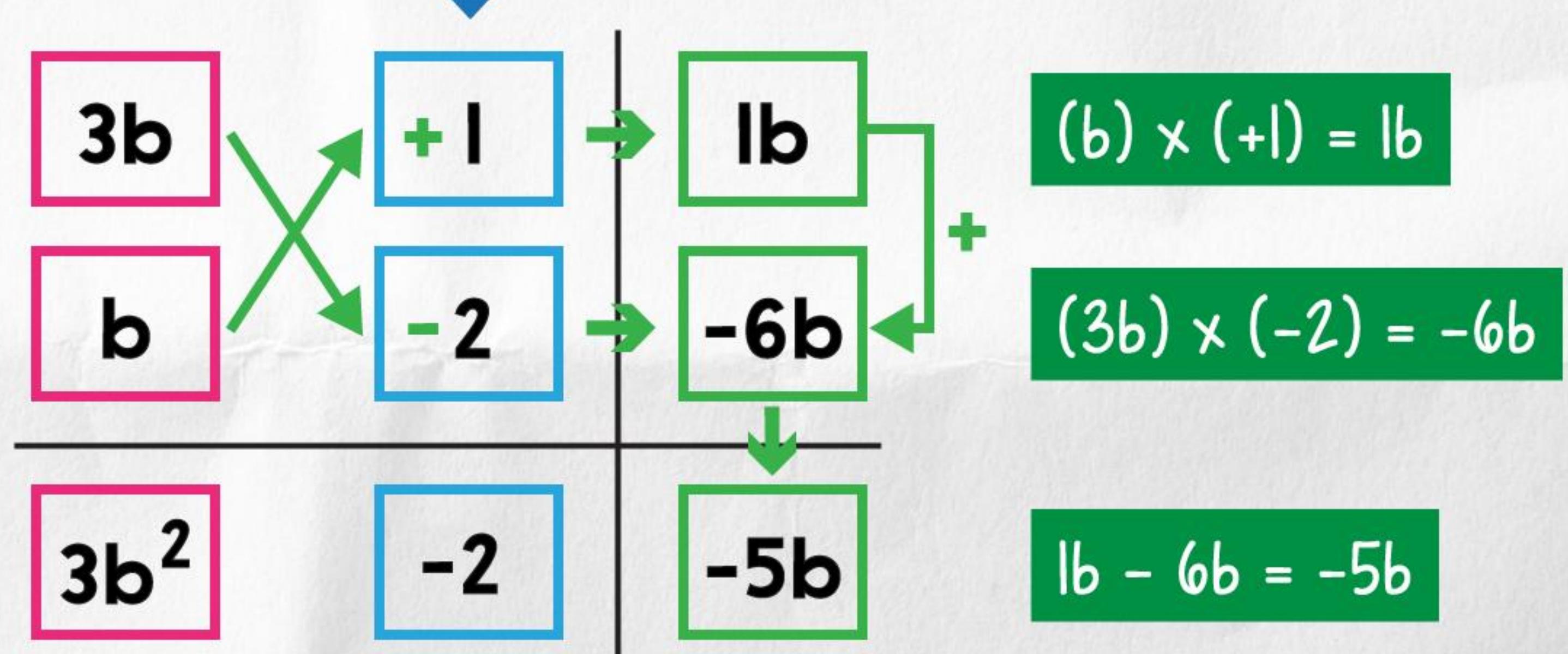
Pemfaktoran

faktorkan

$$3b^2 - 5b - 2$$



positif 1
dan
negatif 2
tentukan
nilai
-2 dan -5b



maka,

$$\rightarrow 3b^2 - 5b - 2 = (3b + 1)(b - 2)$$



UngKapan Algebra

Kembangan

$$3(a + b) = 3a + 3b$$

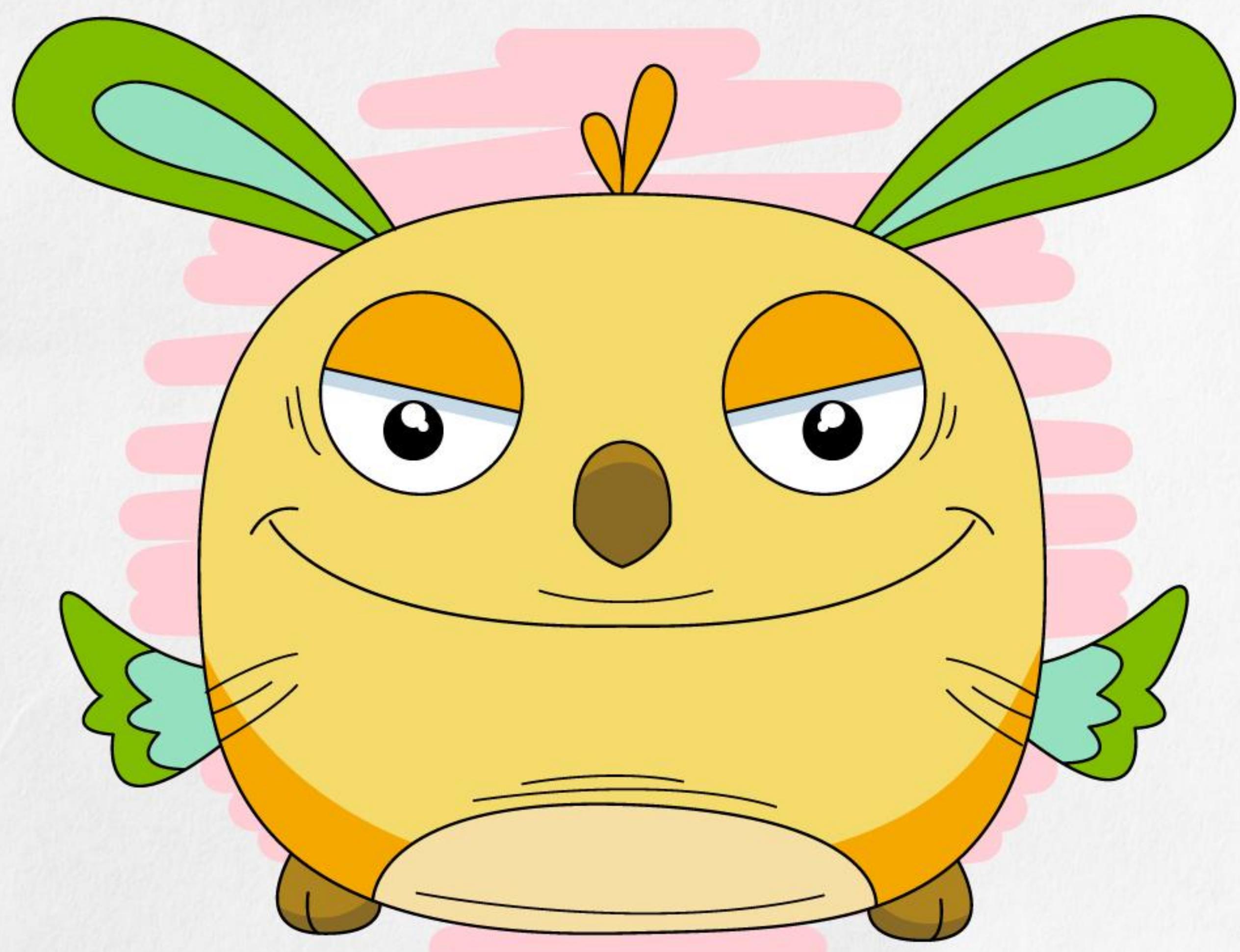
$$4(3a + 5b) = 12a + 20b$$

$$a(2a + 7) = 2a^2 + 7a$$

$$-5(2a - b) = -10a + 5b$$

$$-4(-3a - 2b) = 12a + 8b$$

$$-a(a - q) = -a^2 + qa$$



$$3a(2a + 5b) = 6a^2 + 15ab$$

$$-5b(-a + 2b) = 5ab - 10b^2$$

Ungkapkan Algebra

Kembangan

$$(a)(a) = a^2$$

$$(a)(2) = 2a$$

$$(2a)(3a) = 6a^2$$

$$(2a)(-4) = -8a$$

$$(a + 3)(a + 2)$$

$$\begin{aligned} &= \underline{a^2} + \underline{2a} + \underline{3a} + \underline{6} \\ &= a^2 + 5a + 6 \end{aligned}$$

$$(3)(a) = 3a$$

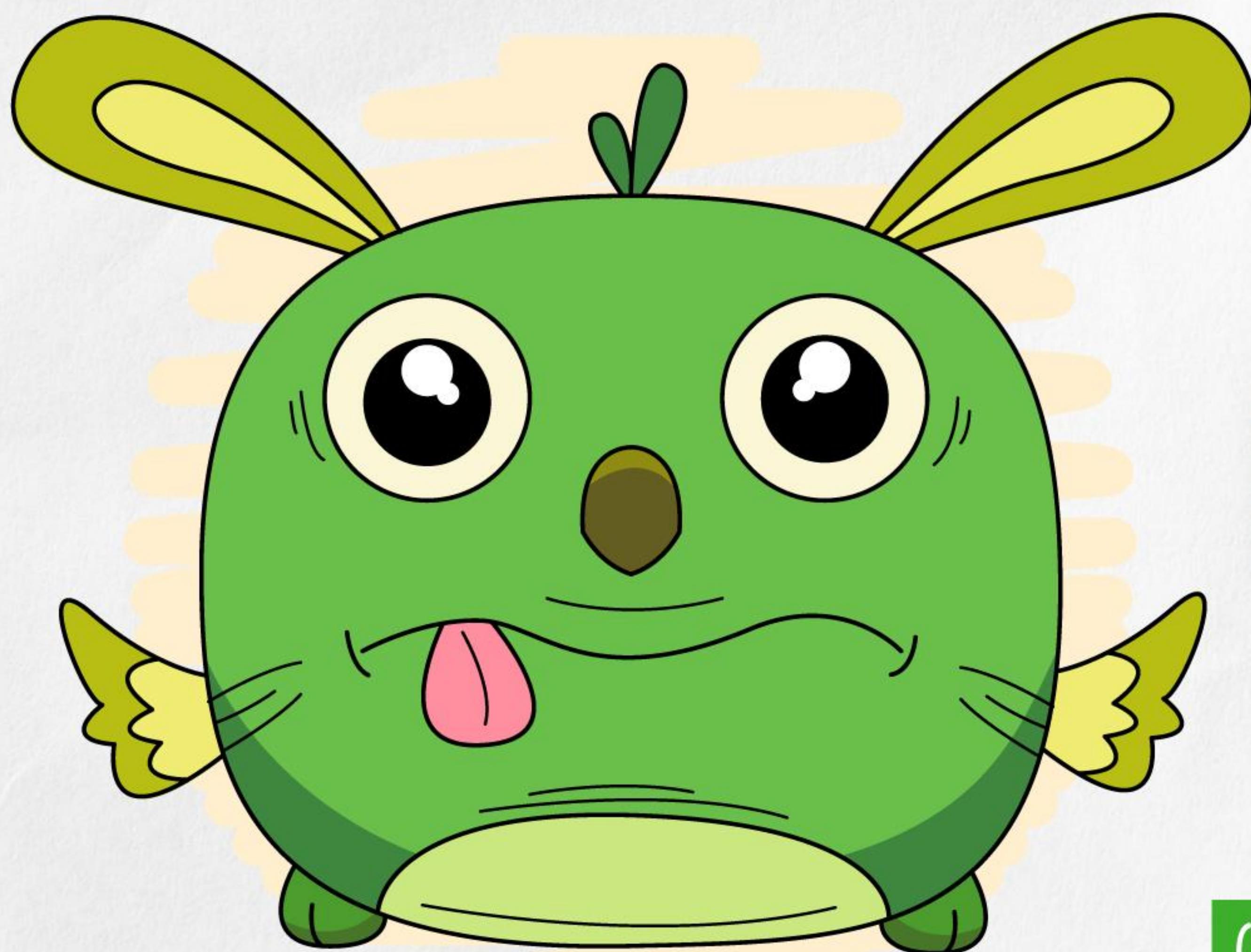
$$(3)(2) = 6$$

$$(2a + 5)(3a - 4)$$

$$\begin{aligned} &= \underline{6a^2} - \underline{8a} + \underline{15a} - \underline{20} \\ &= 6a^2 + 7a - 20 \end{aligned}$$

$$(5)(3a) = 15a$$

$$(5)(-4) = -20$$



$$(-a)(-2a) = 2a^2$$

$$(-a)(-7) = 7a$$

$$(-a + 3)(-2a - 7)$$

$$\begin{aligned} &= \underline{2a^2} + \underline{7a} - \underline{6a} - \underline{21} \\ &= 2a^2 + a - 21 \end{aligned}$$

$$(3)(-2a) = -6a$$

$$(3)(-7) = -21$$

Ungkapan Algebra

Kembangan

$$\begin{aligned}
 & (2a - 5)^2 \\
 &= (2a - 5)(2a - 5) \\
 &= \underline{4a^2} - \underline{10a} - \underline{10a} + \underline{25} \\
 &= 4a^2 - 20a + 25
 \end{aligned}$$

$$\begin{aligned}
 (2a)(2a) &= 4a^2 \\
 (2a)(-5) &= -10a \\
 (-5)(2a) &= -10a \\
 (-5)(-5) &= 25
 \end{aligned}$$

$$\begin{aligned}
 & (5 + 2a)(3 + a) \\
 &= \underline{15} + \underline{5a} + \underline{6a} + \underline{2a^2} \\
 &\Rightarrow = 15 + 11a + 2a^2 \\
 &= 2a^2 + 11a + 15
 \end{aligned}$$

$$\begin{aligned}
 (5)(3) &= 15 & (2a)(3) &= 6a \\
 (5)(a) &= 5a & (2a)(a) &= 2a^2
 \end{aligned}$$



susun semula

$$\begin{aligned}
 (3)(-2) &= -6 \\
 (3)(a) &= 3a \\
 (-4a)(-2) &= 8a \\
 (-4a)(a) &= -4a^2
 \end{aligned}$$

$$\begin{aligned}
 & (3 - 4a)(-2 + a) \\
 &= \underline{-6} + \underline{3a} + \underline{8a} - \underline{4a^2} \\
 &= -6 + 11a - 4a^2 \\
 &= -4a^2 + 11a - 6
 \end{aligned}$$

Ungkapkan Algebra

Permudahkan

$$\begin{aligned}
 & (7 + 4a)(3 - 2a) - 9a \\
 &= 21 - 14a + 12a - 8a^2 - 9a \\
 &= -8a^2 - 14a + 12a - 9a + 21 \\
 &= -8a^2 - 11a + 21
 \end{aligned}$$

$$\begin{aligned}
 & (-3a + 4)^2 - 5a^2 \\
 &= (-3a + 4)(-3a + 4) - 5a^2 \\
 &= 9a^2 - 12a - 12a + 16 - 5a^2 \\
 &= 9a^2 - 5a^2 - 12a - 12a + 16 \\
 &= 4a^2 - 24a + 16
 \end{aligned}$$



$$\begin{aligned}
 & (-3 + 2a)(5 - a) - 4a(a - 1) \\
 &= -15 + 3a + 10a - 2a^2 - 4a^2 + 4a \\
 &= -2a^2 - 4a^2 + 3a + 10a + 4a - 15 \\
 &= -6a^2 + 17a - 15
 \end{aligned}$$

UngKapan Algebra

$$\frac{2a}{7} + \frac{a}{7}$$

$$= \frac{2a + a}{7}$$

$$= \frac{3a}{7}$$

$$\frac{7a}{q} - \frac{5a}{q}$$

$$= \frac{7a - 5a}{q}$$

$$= \frac{2a}{q}$$

$$\frac{4}{5a} + \frac{2}{5a}$$

$$= \frac{4 + 2}{5a}$$

$$= \frac{6}{5a}$$

$$\frac{7}{3a} - \frac{5}{3a}$$

$$= \frac{7 - 5}{3a}$$

$$= \frac{2}{3a}$$



$$-\frac{8b}{11a} + \frac{4b}{11a}$$

$$= \frac{-8b + 4b}{11a}$$

$$= -\frac{4b}{11a}$$

$$-\frac{2s}{8r} - \frac{5s}{8r}$$

$$= \frac{-2s - 5s}{8r}$$

$$= -\frac{7s}{8r}$$

lakukan operasi untuk di atas sahaja kerana pembawahan sama

$$-\frac{8c}{3ab} - \frac{2c}{3ab}$$

$$= \frac{-8c - 2c}{3ab}$$

$$= -\frac{10c}{3ab}$$

UngKapan Algebra

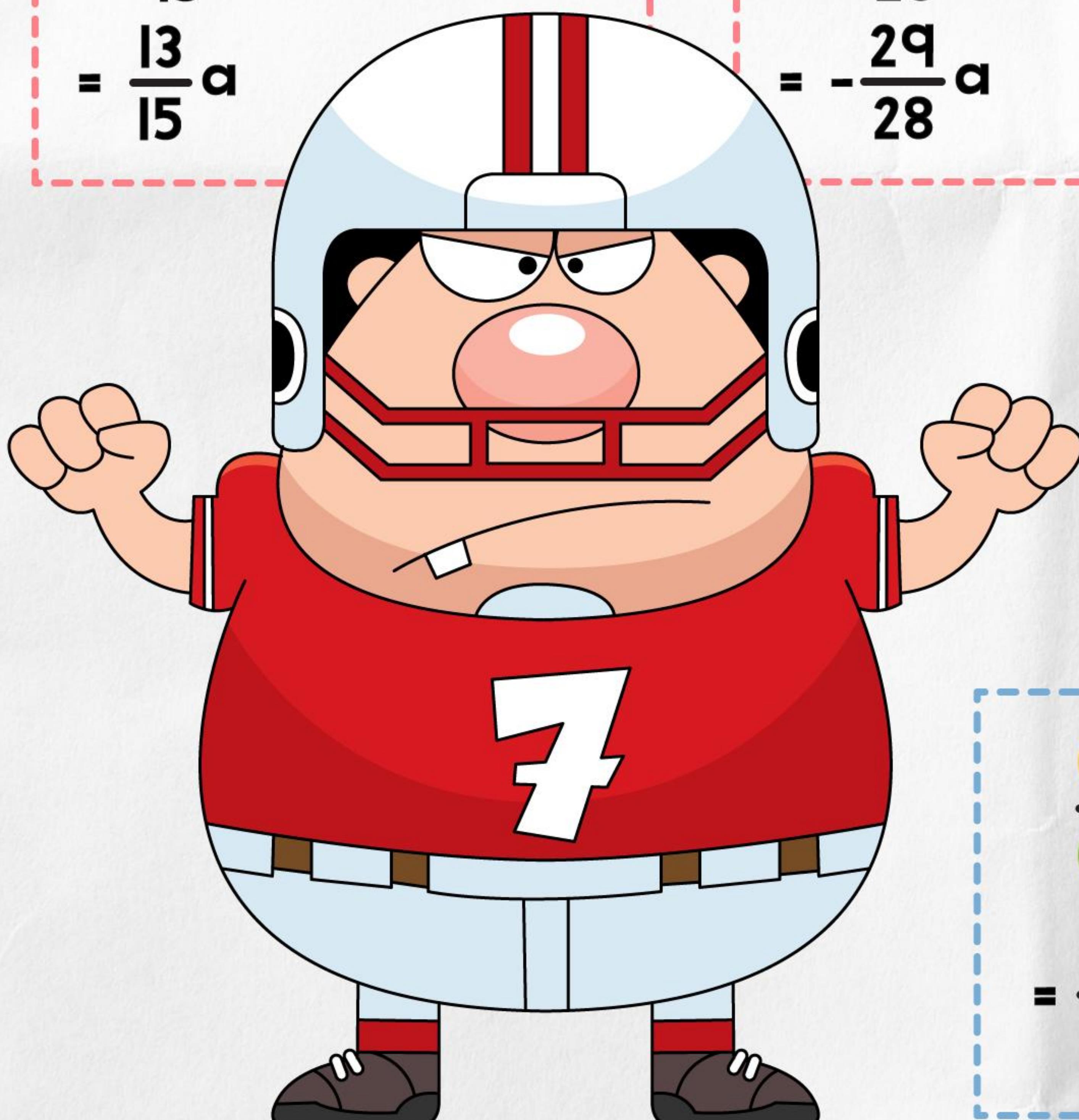
$$\frac{2}{3}a + \frac{1}{5}a$$

$$= \frac{(2a)(5) + (1a)(3)}{(3)(5)}$$

$$= \frac{10a + 3a}{15}$$

$$= \frac{13a}{15}$$

$$= \frac{13}{15}a$$



$$-\frac{3}{4}a - \frac{2}{7}a$$

$$= \frac{(-3a)(7) - (2a)(4)}{(4)(7)}$$

$$= \frac{-21a - 8a}{28}$$

$$= \frac{-29a}{28}$$

$$= -\frac{29}{28}a$$

$$\frac{23a}{20a^2} = \frac{\cancel{23a}}{\cancel{20aa}}$$

$$= \frac{23}{20a}$$

$$\frac{2}{5a} + \frac{3}{4a}$$

$$= \frac{(2)(4a) + (3)(5a)}{(5a)(4a)}$$

$$= \frac{8a + 15a}{20a^2}$$

$$= \frac{23a}{20a^2}$$

$$= \frac{23}{20a}$$

$\frac{\textcolor{yellow}{\bullet}}{\textcolor{green}{\bullet}} \pm \frac{\textcolor{pink}{\bullet}}{\textcolor{blue}{\bullet}}$

$= \frac{(\textcolor{yellow}{\bullet})(\textcolor{blue}{\bullet}) \pm (\textcolor{pink}{\bullet})(\textcolor{green}{\bullet})}{(\textcolor{green}{\bullet})(\textcolor{blue}{\bullet})}$

Ungkapkan Algebra

$$\begin{aligned}
 & \frac{3}{2a} - \frac{1}{5a} \\
 = & \frac{(3)(5a) - (1)(2a)}{(2a)(5a)} \\
 = & \frac{15a - 2a}{10a^2} \\
 = & \frac{13a}{10a^2} \\
 = & \frac{13}{10a}
 \end{aligned}$$

$$\begin{aligned}
 \frac{13a}{10a^2} &= \frac{\cancel{13a}}{\cancel{10aa}} \\
 &= \frac{13}{10a}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{4}{3a} - \frac{a}{7} \\
 = & \frac{(4)(7) - (a)(3a)}{(3a)(7)} \\
 = & \frac{28 - 3a^2}{21a}
 \end{aligned}$$



$$3a^2b = b(3a^2)$$

$$5b = b(5)$$

keluarkan b

$$\begin{aligned}
 & \frac{5}{ab} - \frac{3a}{b} \\
 = & \frac{(5)(b) - (3a)(ab)}{(ab)(b)} \\
 = & \frac{5b - 3a^2b}{ab^2} \\
 = & \frac{\cancel{b}(5 - 3a^2)}{\cancel{b}(ab)} \\
 = & \frac{5 - 3a^2}{ab}
 \end{aligned}$$

UngKapan Algebra

$$\begin{aligned}
 & \frac{4}{a+1} \times \frac{3a+3}{7b} \\
 &= \frac{4}{a+1} \times \frac{3(a+1)}{7b} \\
 &= \frac{(4)(3)(a+1)}{(7b)(a+1)} \\
 &= \frac{(4)(3)}{7b} \\
 &= \frac{12}{7b}
 \end{aligned}$$

$$3a + 3 = 3(a + 1)$$

$$\begin{aligned}
 & 2a - 4 = 2(a - 2) \\
 & 3a - 6 = 3(a - 2)
 \end{aligned}$$

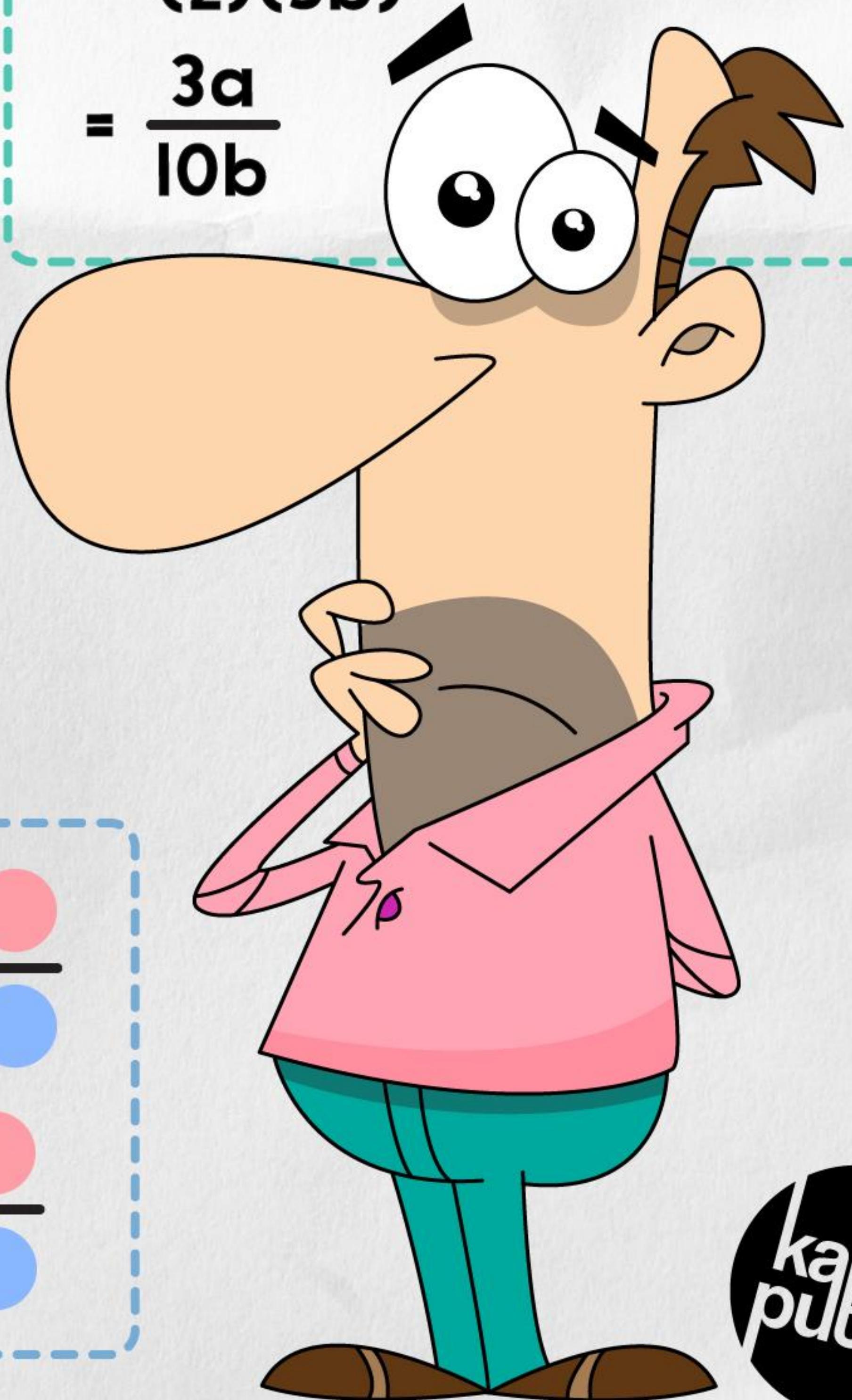
$$4a - 2 = 2(2a - 1)$$

$$\begin{aligned}
 & (2a - 1)^2 \\
 &= (2a - 1)(2a - 1)
 \end{aligned}$$

$$\begin{aligned}
 & \frac{a}{2a - 4} \times \frac{3a - 6}{5b} \\
 &= \frac{a}{2(a - 2)} \times \frac{3(a - 2)}{5b} \\
 &= \frac{(a)(3)(a - 2)}{(2)(5b)(a - 2)} \\
 &= \frac{(a)(3)}{(2)(5b)} \\
 &= \frac{3a}{10b}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{1}{4a - 2} \times \frac{(2a - 1)^2}{3b} \\
 &= \frac{1}{2(2a - 1)} \times \frac{(2a - 1)(2a - 1)}{3b} \\
 &= \frac{(1)(2a - 1)(2a - 1)}{(2)(3b)(2a - 1)} \\
 &= \frac{(1)(2a - 1)}{(2)(3b)} \\
 &= \frac{2a - 1}{6b}
 \end{aligned}$$

$$\begin{array}{c}
 \text{---} \xrightarrow{\quad} \text{---} \\
 | \qquad \qquad | \\
 \text{---} \times \text{---} \\
 | \qquad \qquad | \\
 \text{---} \times \text{---} \\
 | \qquad \qquad |
 \end{array}
 = \frac{\text{---} \times \text{---}}{\text{---} \times \text{---}}$$

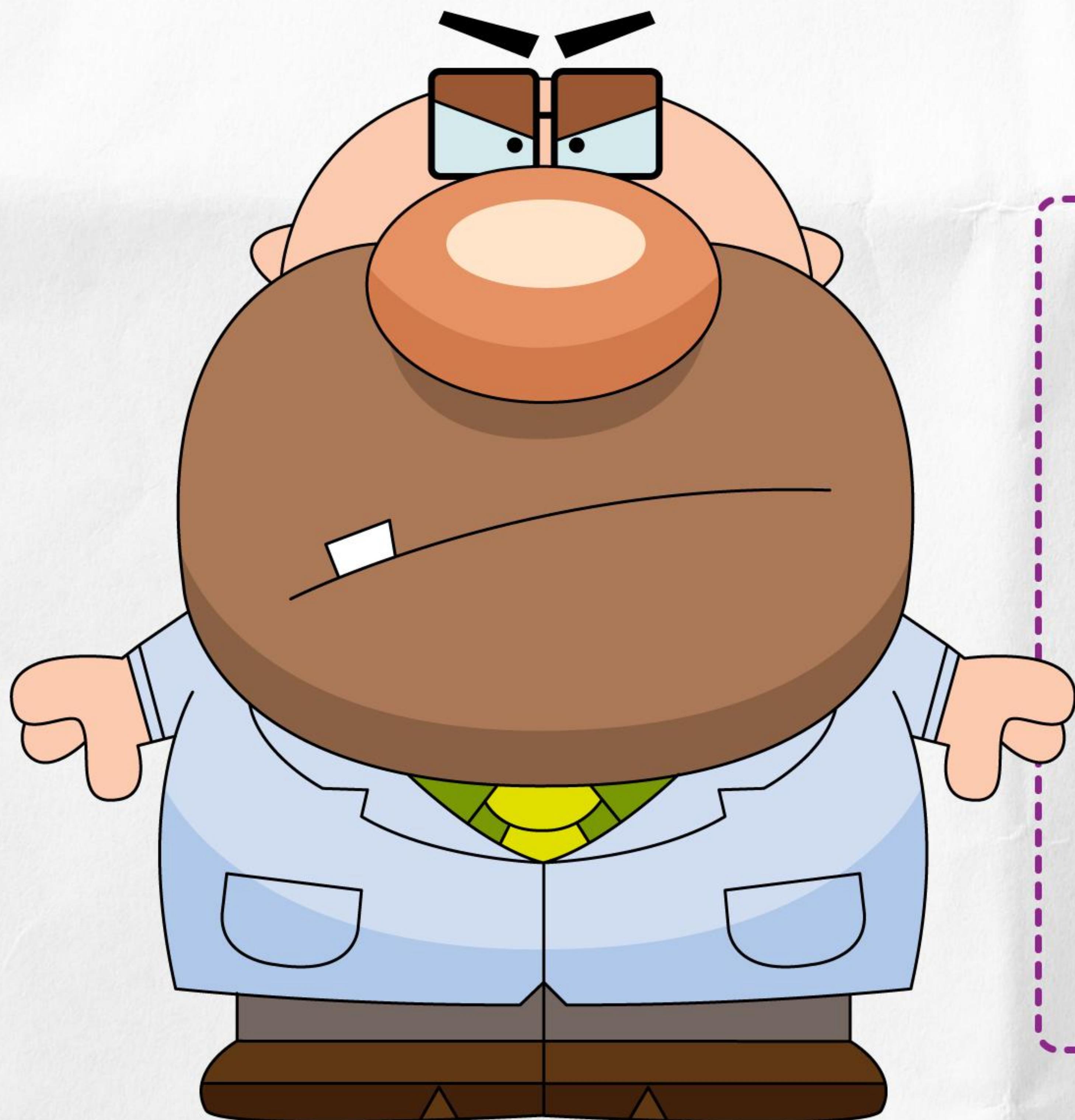
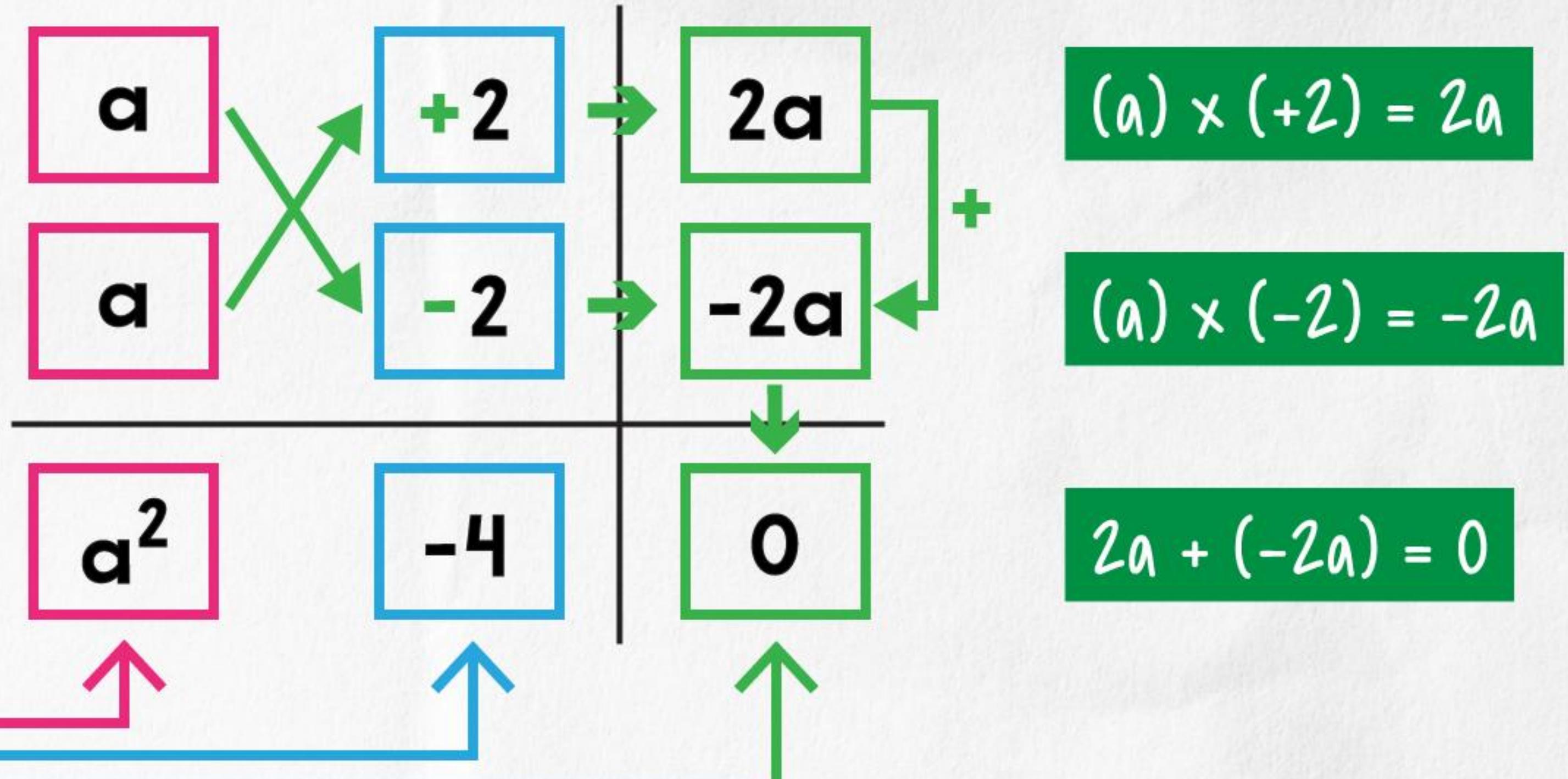
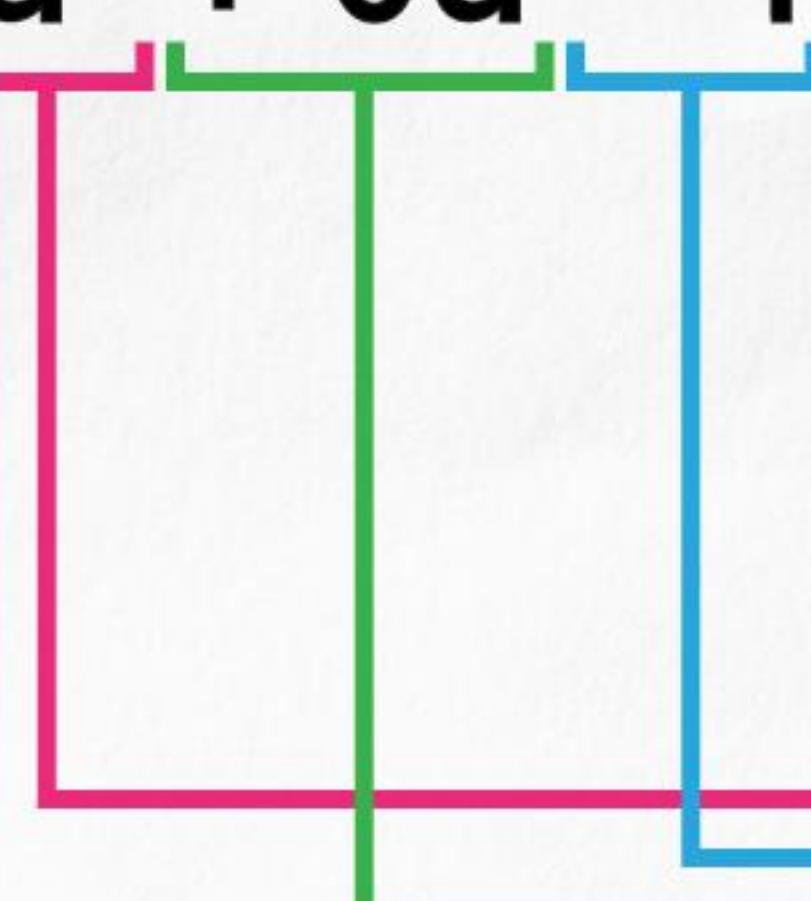


Ungkapkan Algebra

faktorkan

$$a^2 - 4$$

$$= a^2 + 0a - 4$$



$$a^2 - 4 = (a + 2)(a - 2)$$

$$\begin{aligned} & \frac{3}{a - 2} \times \frac{a^2 - 4}{6a} \\ &= \frac{3}{a - 2} \times \frac{(a + 2)(a - 2)}{6a} \\ &= \frac{(3)(a + 2)(a - 2)}{(6a)(a - 2)} \\ &= \frac{3(a + 2)}{6a} \\ &= \frac{a + 2}{2a} \end{aligned}$$

$$\frac{3}{6a} = \frac{1}{2a}$$

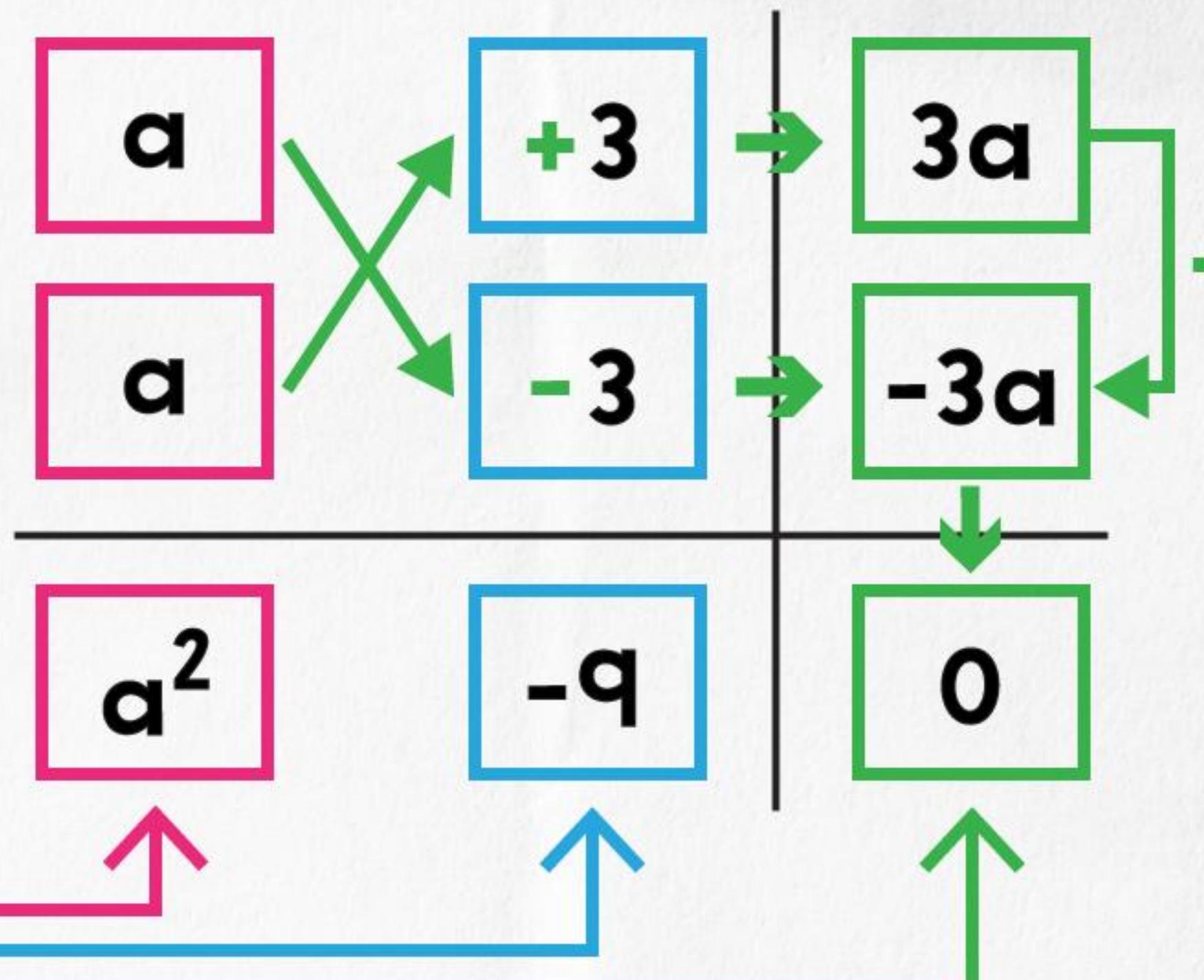
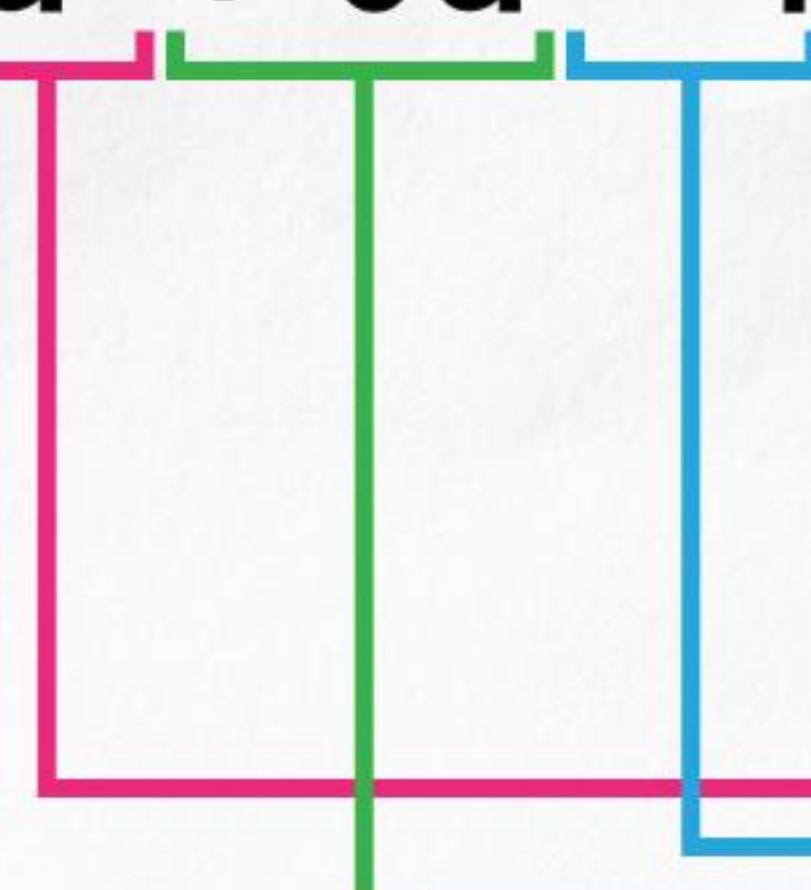
÷2

Ungkapkan Algebra

faktorkan

$$a^2 - q$$

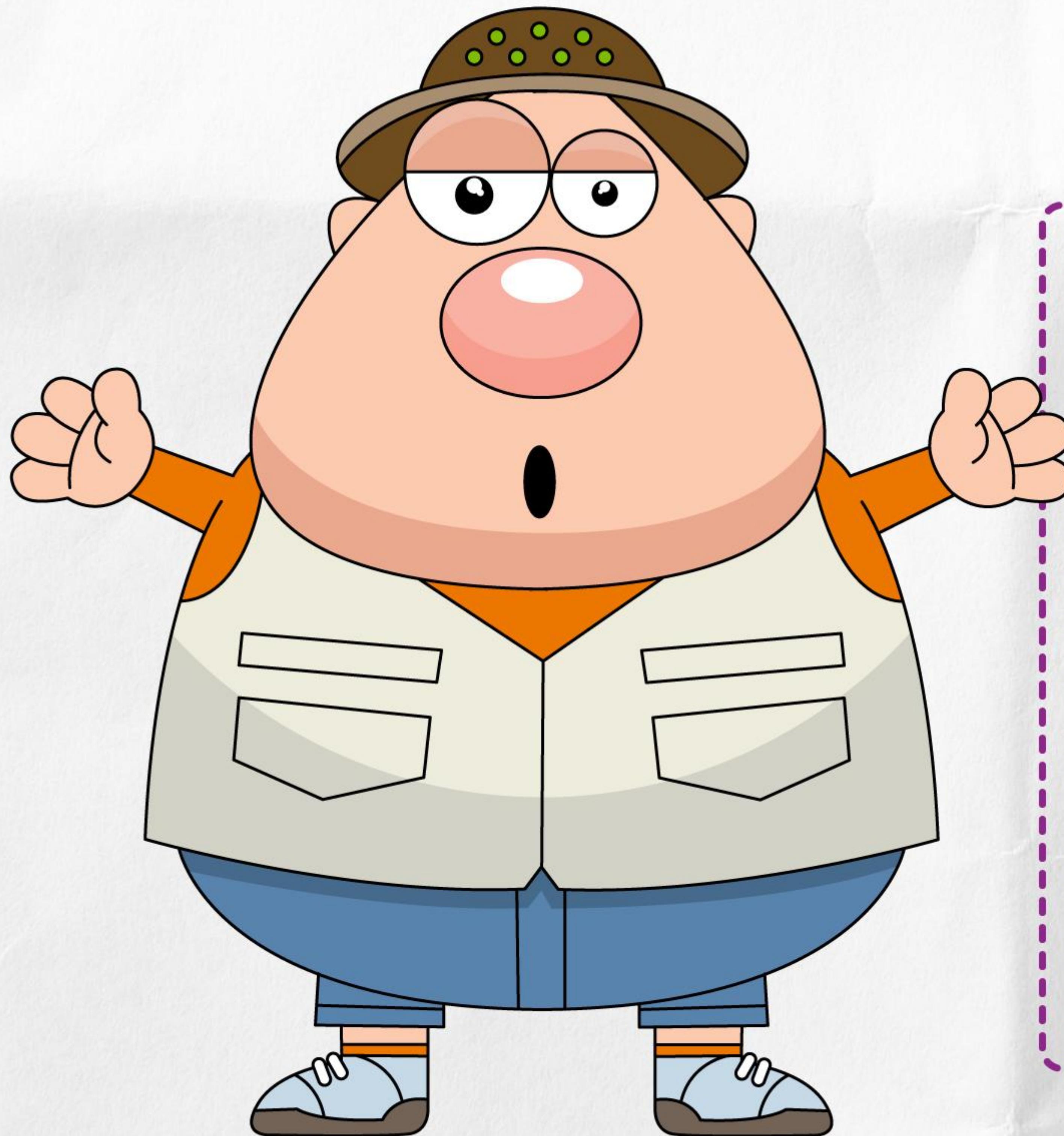
$$= a^2 + 0a - q$$



$$(a) \times (+3) = 3a$$

$$(a) \times (-3) = -3a$$

$$3a + (-3a) = 0$$



$$a^2 - q = (a + 3)(a - 3)$$

$$\begin{aligned} & \frac{4a}{a^2 - q} \times \frac{a + 3}{6} \\ &= \frac{4a}{(a + 3)(a - 3)} \times \frac{a + 3}{6} \\ &= \frac{(4a)(a + 3)}{(6)(a + 3)(a - 3)} \\ &= \frac{4a}{6(a - 3)} \\ &= \frac{2a}{3(a - 3)} \end{aligned}$$

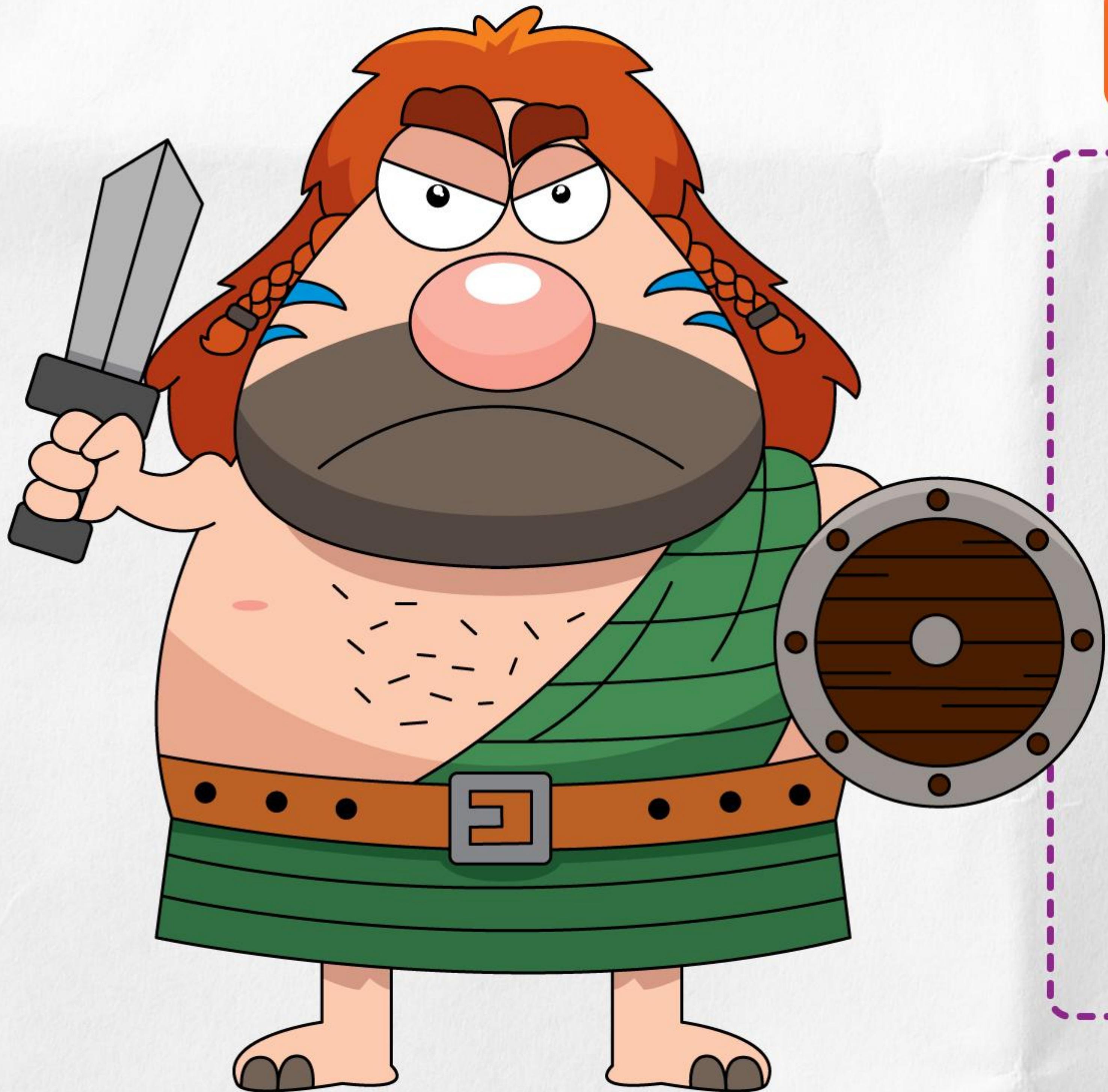
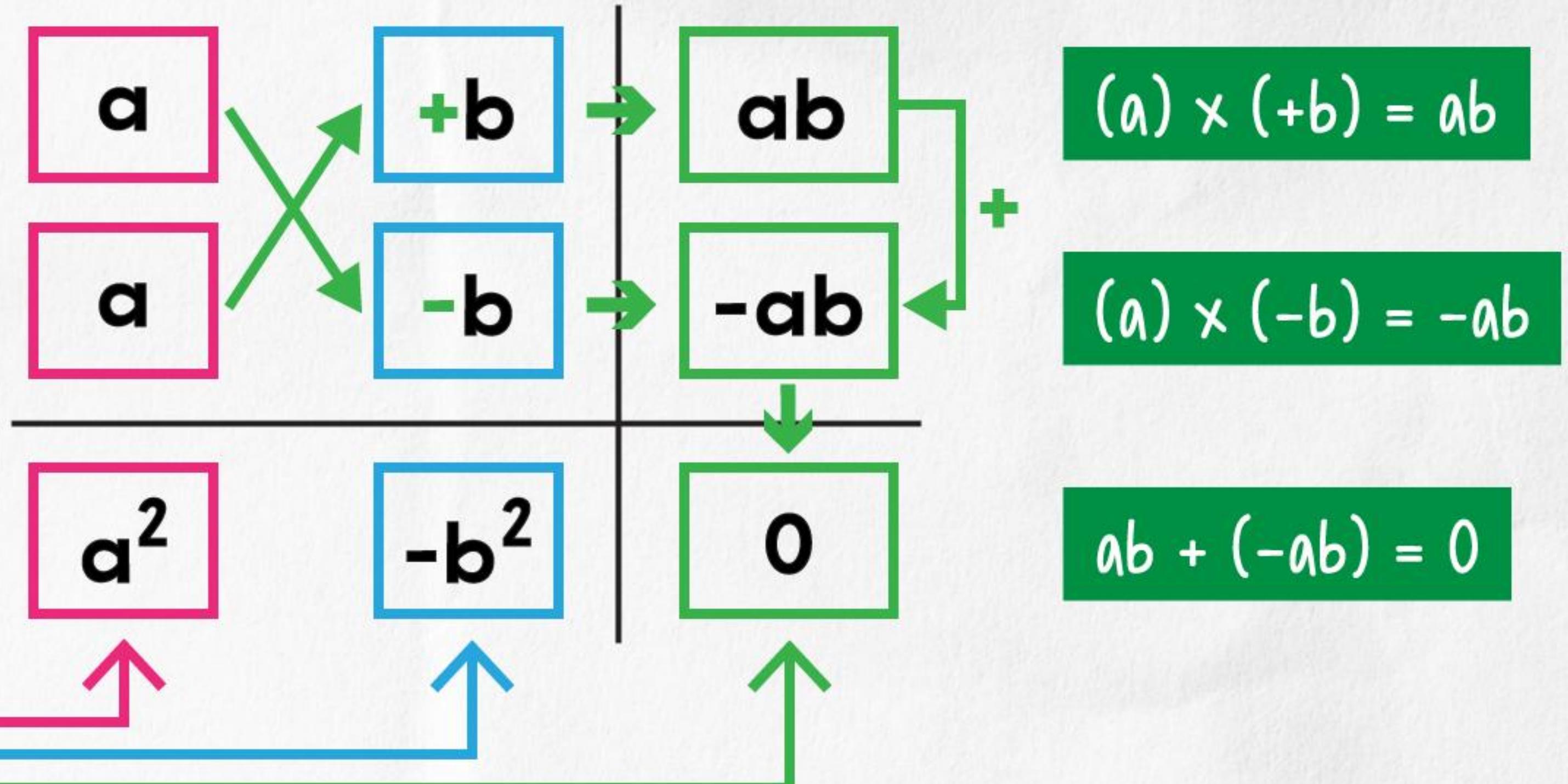
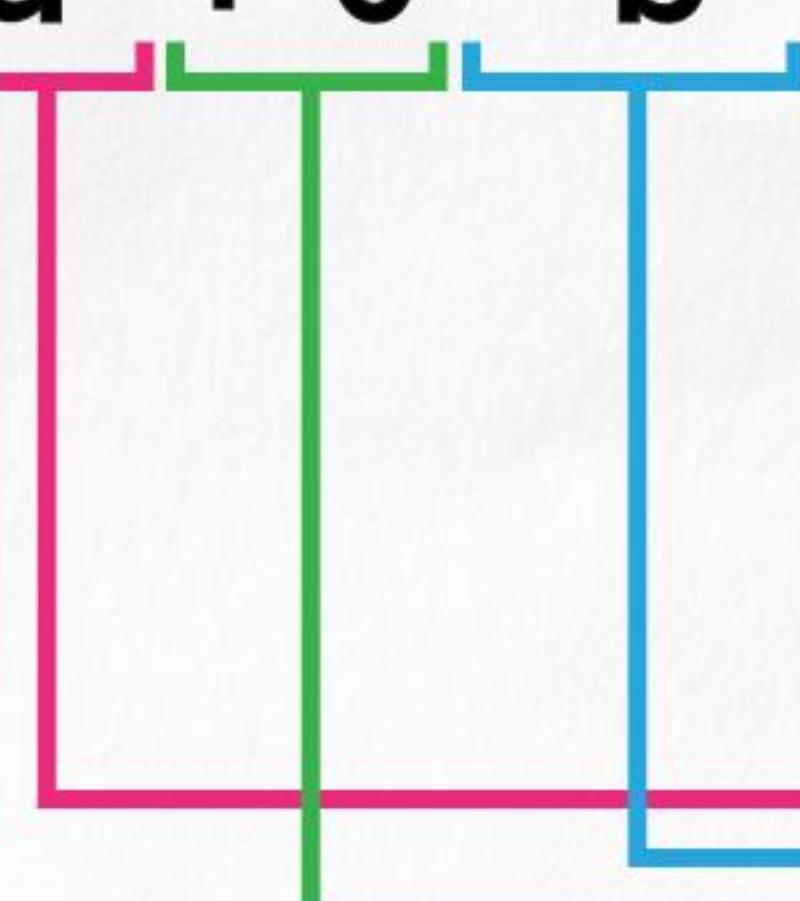
$\div 2$

Ungkapan Algebra

faktorkan

$$a^2 - b^2$$

$$= a^2 + 0 - b^2$$



$$a^2 - b^2 = (a + b)(a - b)$$

$$\begin{aligned}
 & \frac{5a}{a^2 - b^2} \div \frac{20}{a - b} \\
 &= \frac{5a}{(a + b)(a - b)} \times \frac{a - b}{20} \\
 &= \frac{(5a)(a - b)}{(20)(a + b)(a - b)} \\
 &= \frac{5a}{20(a + b)} \\
 &= \frac{a}{4(a + b)}
 \end{aligned}$$

$$\frac{5a}{20} = \frac{a}{4}$$

÷5

K A P U R P U T E H

"success is the sum of small efforts
repeated day in and day out"

