Boys

Girls

$$(-2) - (-4)$$
$$= +2$$
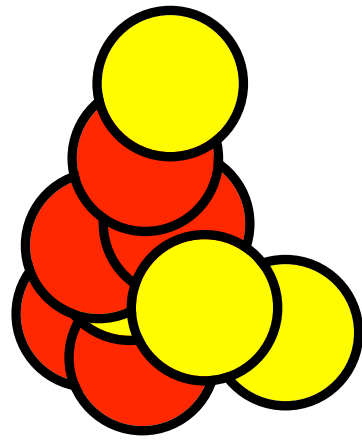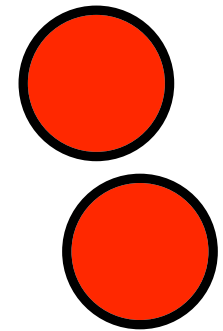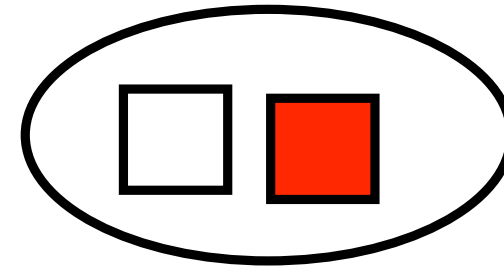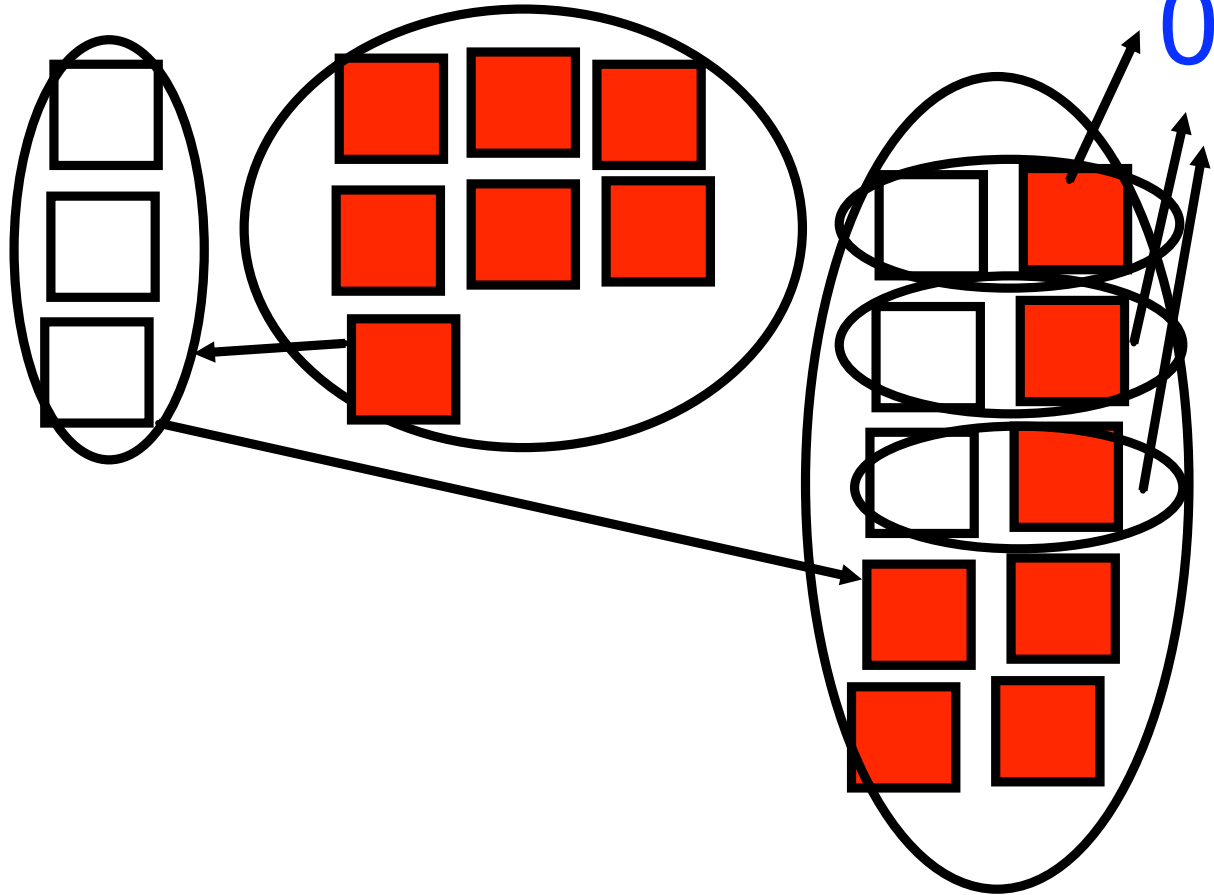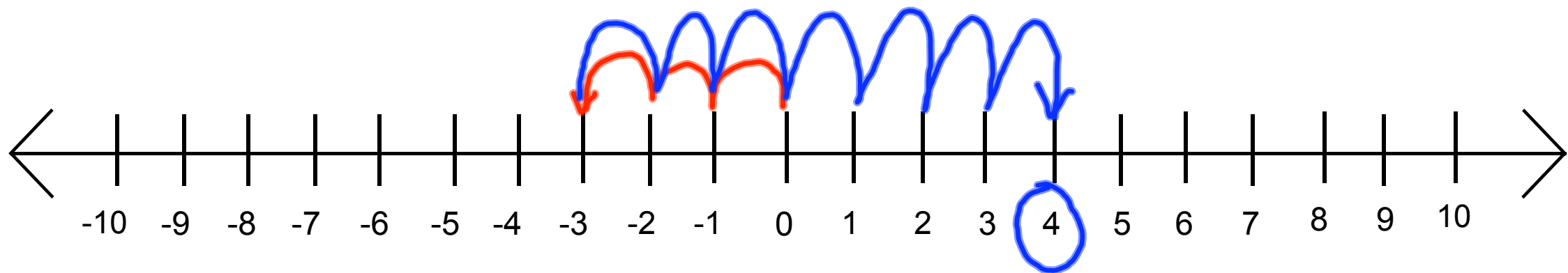$$(+2) - (+5)$$
$$= (-3)$$
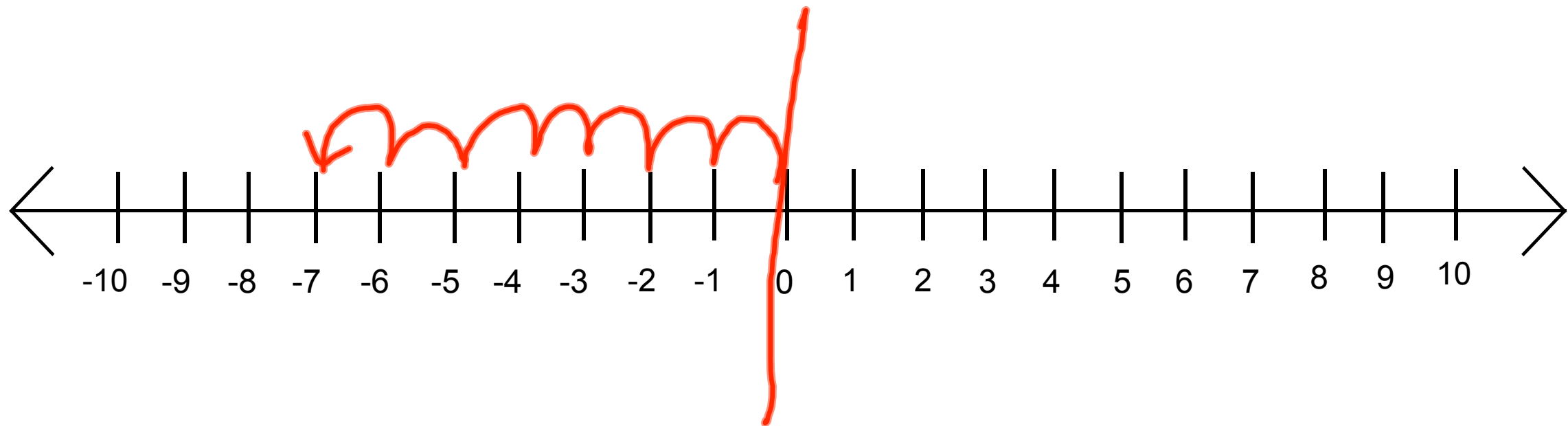
(-3) + (+7) = +4
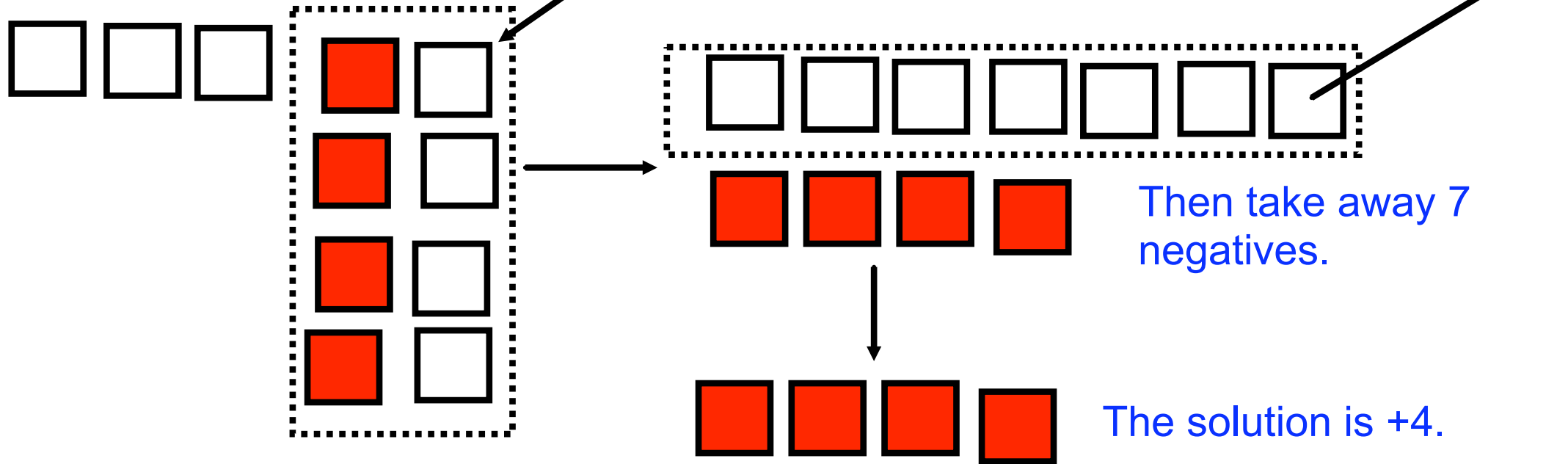
the Zero Model
(+1) + (-1) = 0

0

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
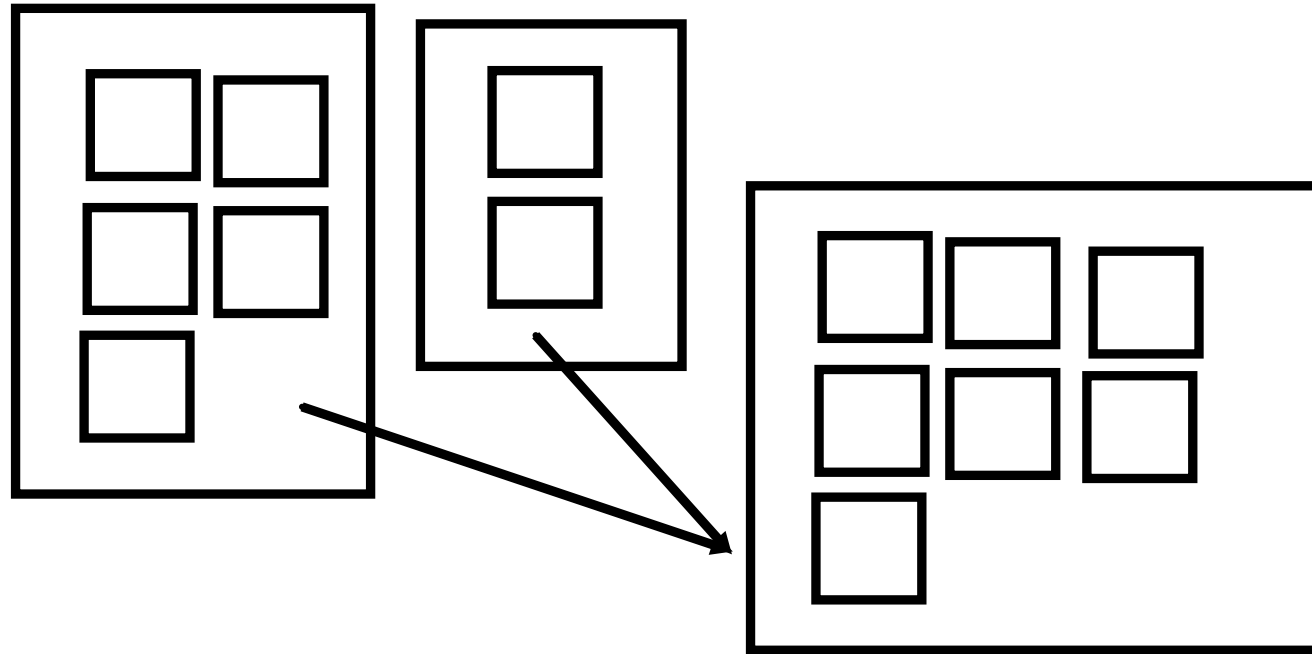
(-5) + (-2) = -7

Add zeros until I have enough tiles to take away 7 negatives.

(-3) - (-7)

Then take away 7 negatives.

The solution is +4.

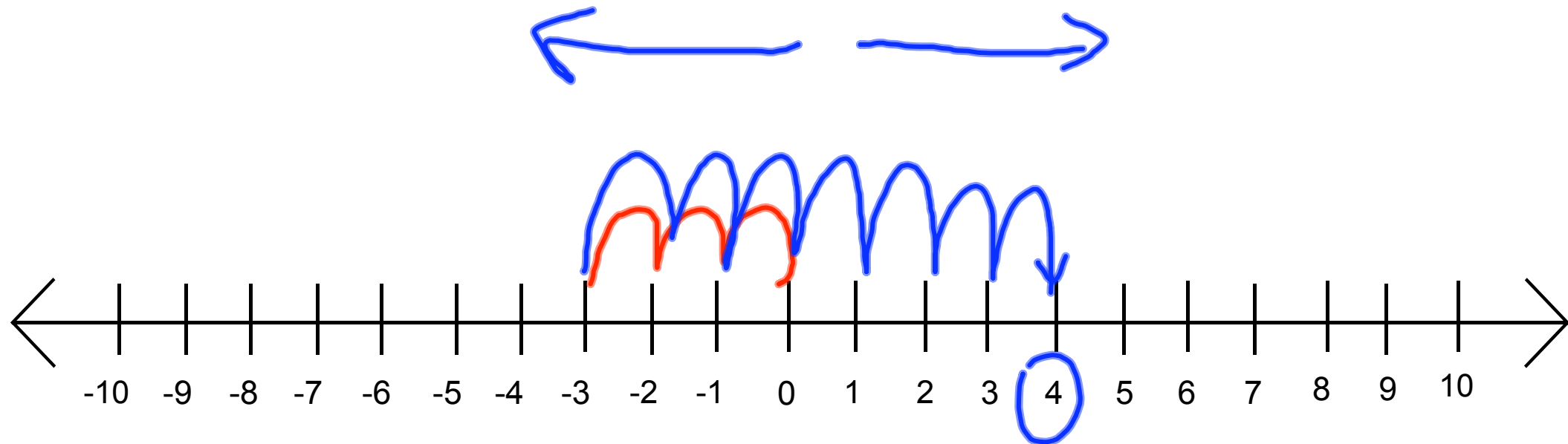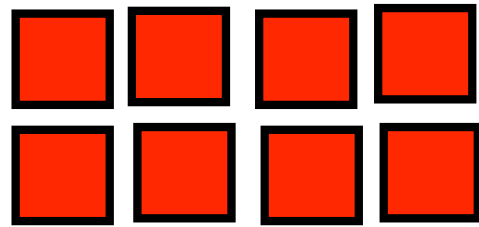(-3) - (-7) = +4

Add zeros until I have enough tiles to take away 4 negatives.

(+8) - (-4)

Take away (-4)

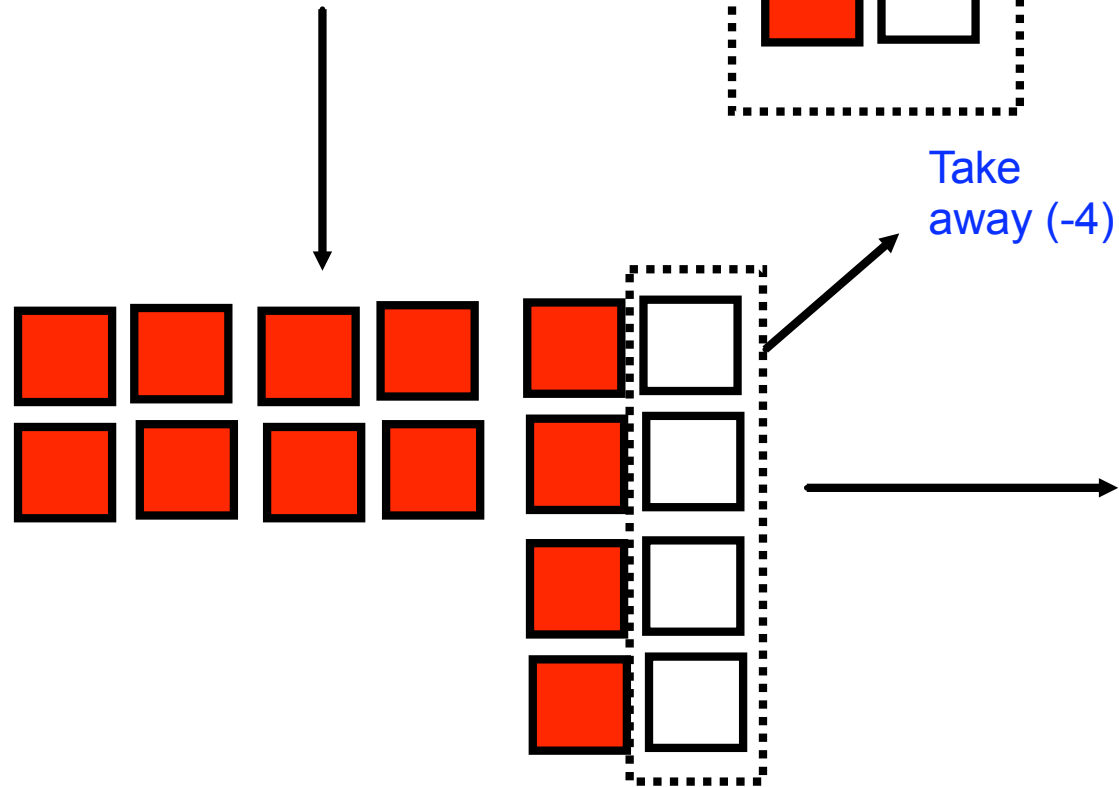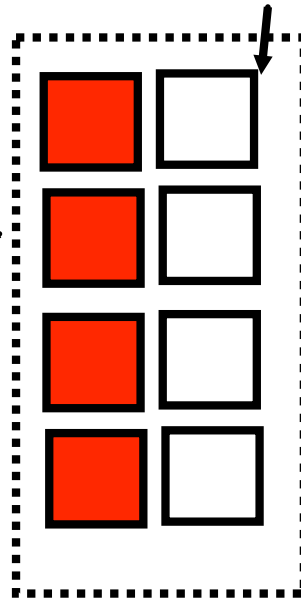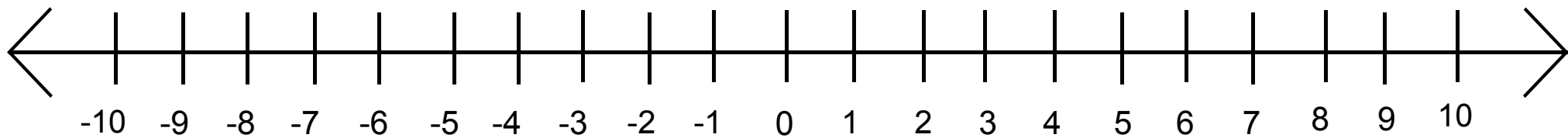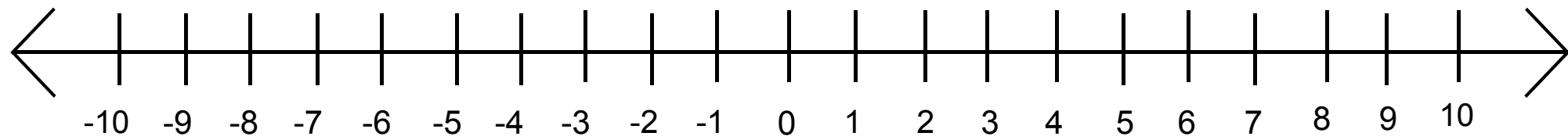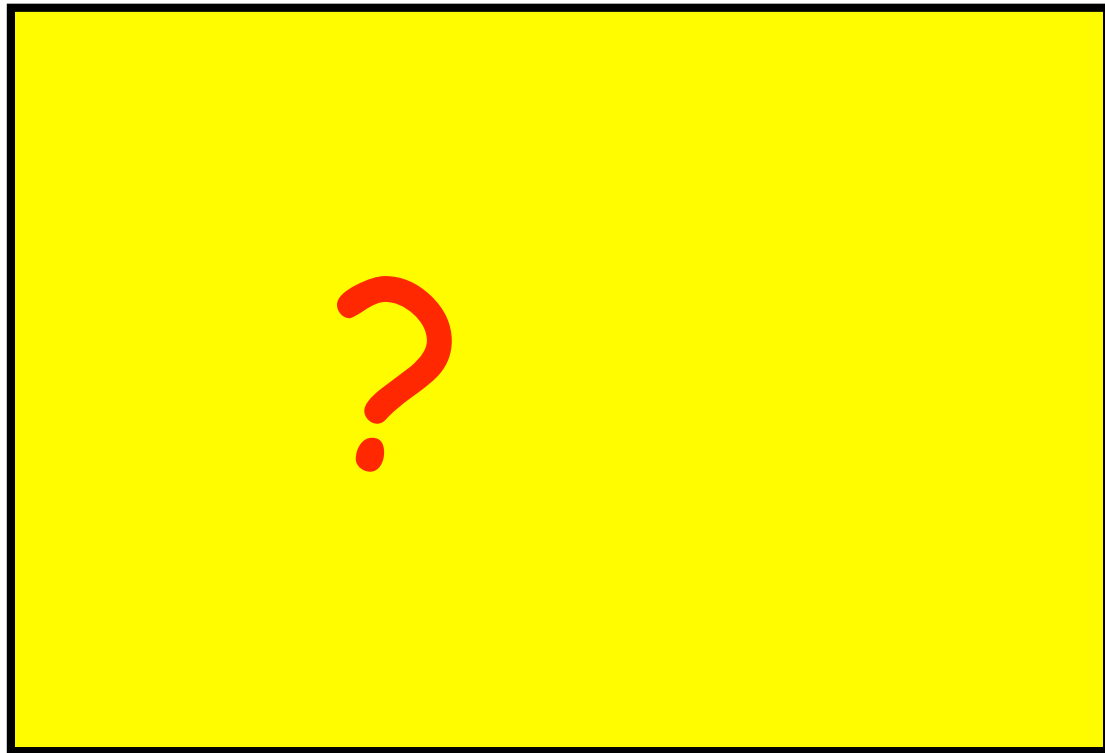(+8) - (-4) = +12

$(-5) + (+7) =$?

?

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
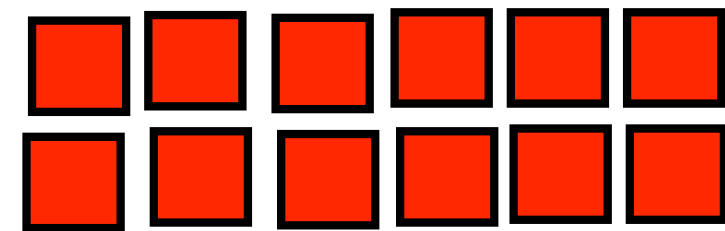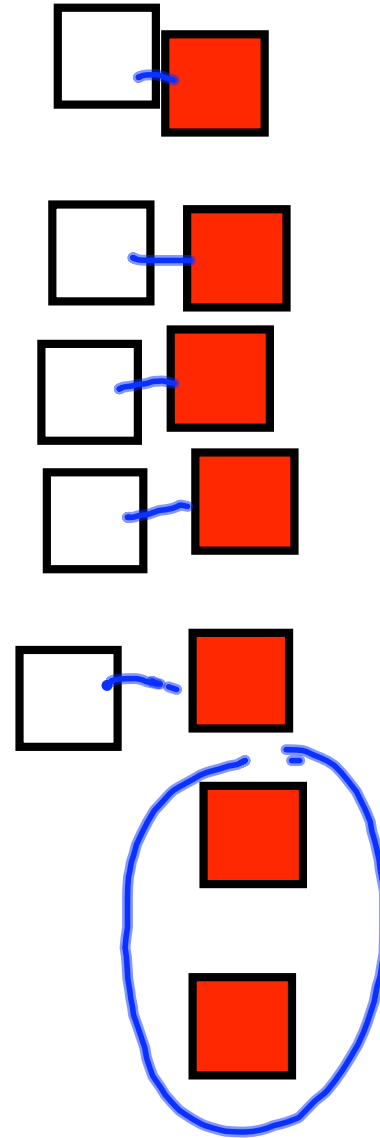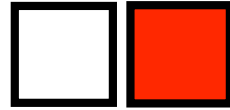
$(-4) - (+6) =$?
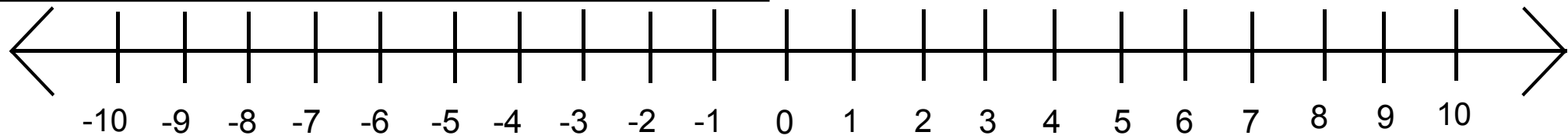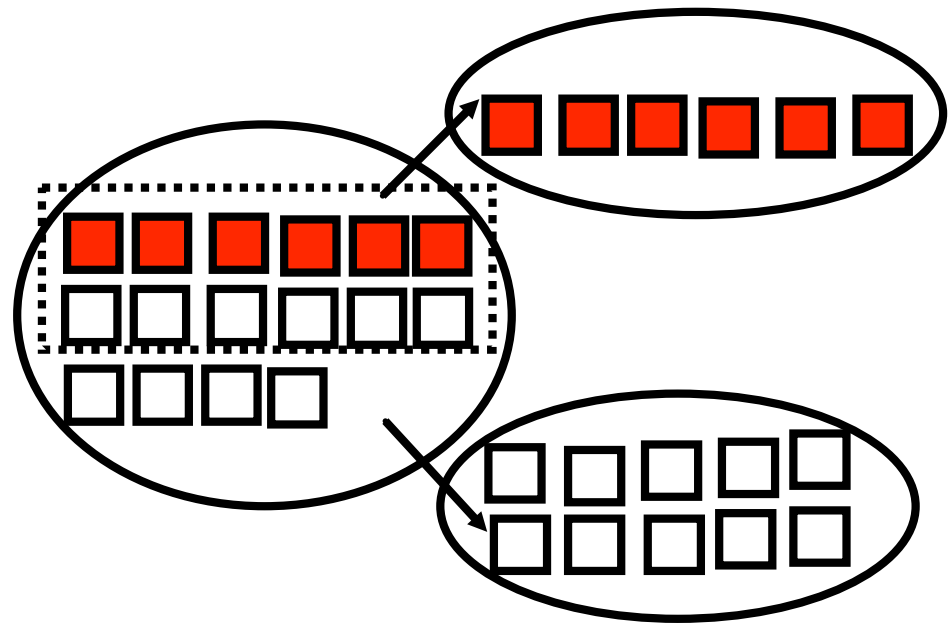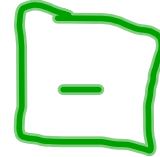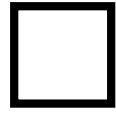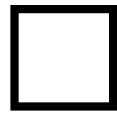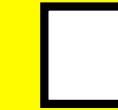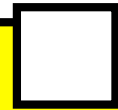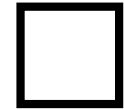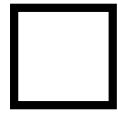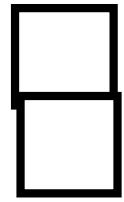
(-3) - (-5)= ?
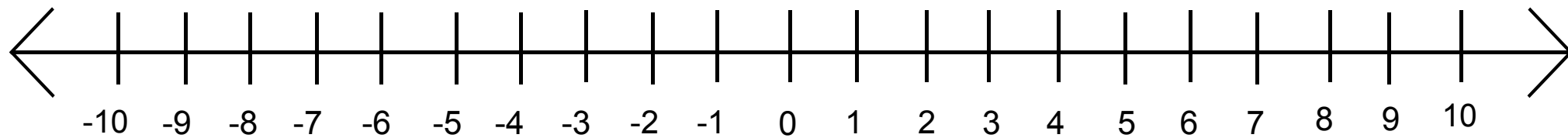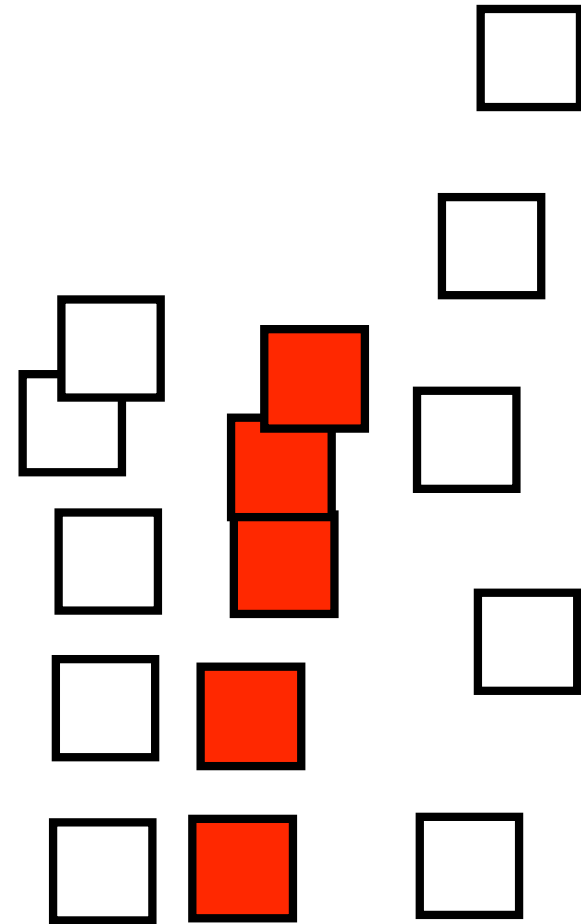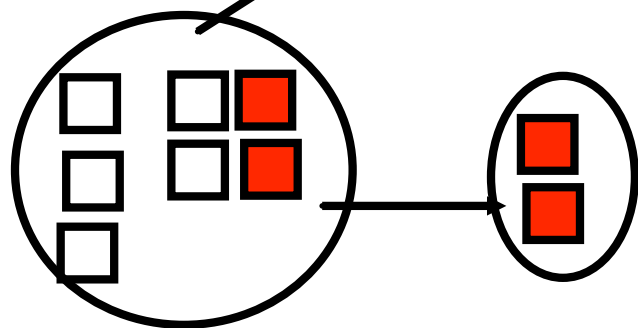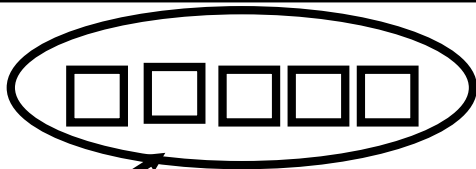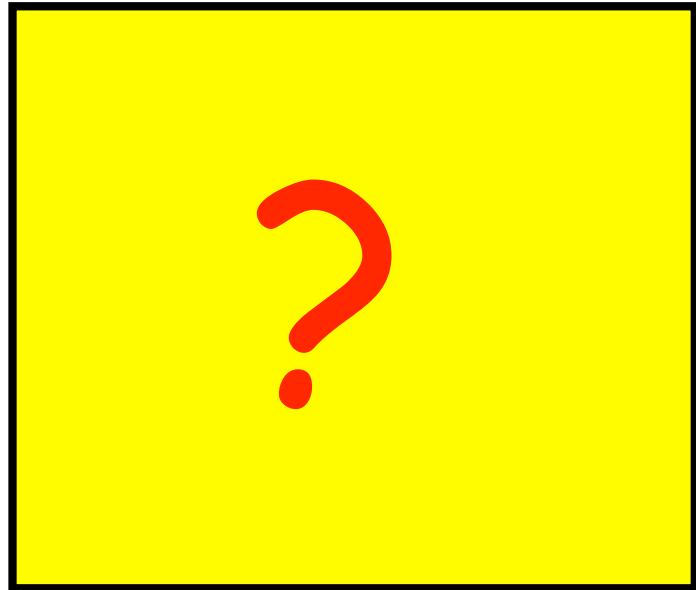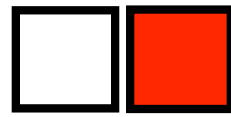
$(+7) - (-5) =$?

?
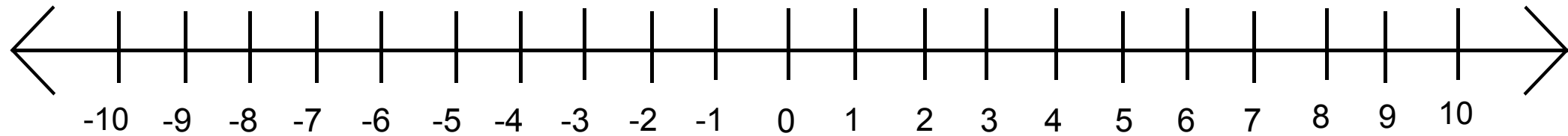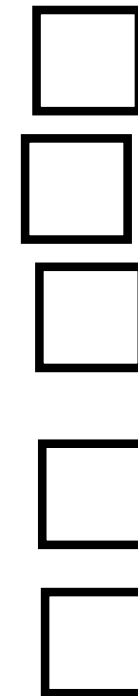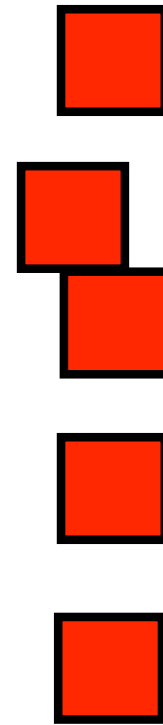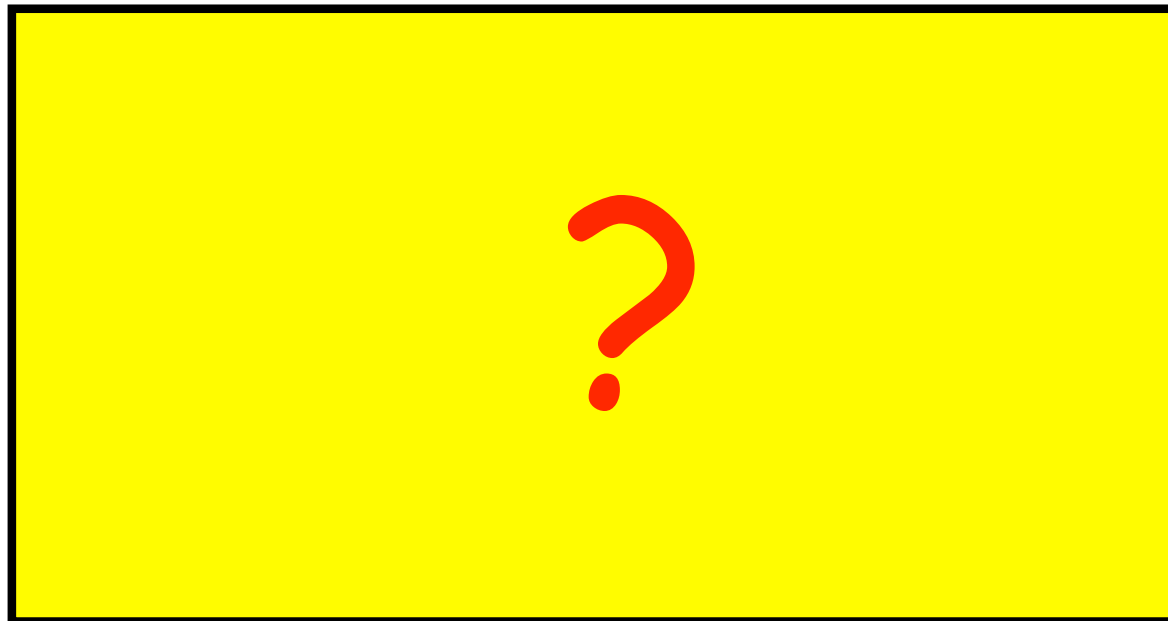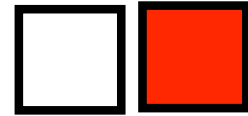
Always start with a bucket of zero and some extra zeros to use.
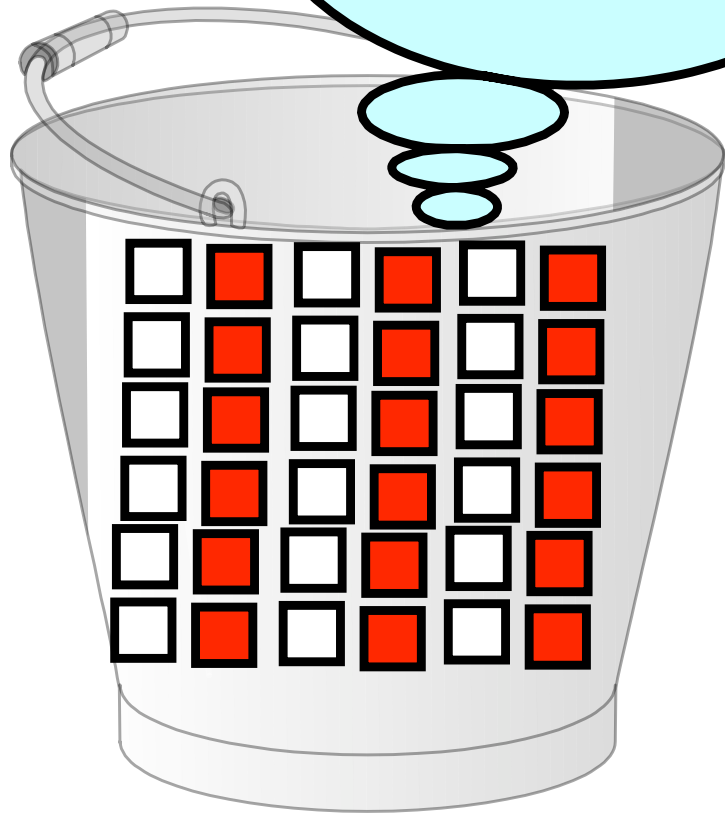
Say it in words:
Add on 3 sets of -2

$$(+3) \times (-2) = -6$$
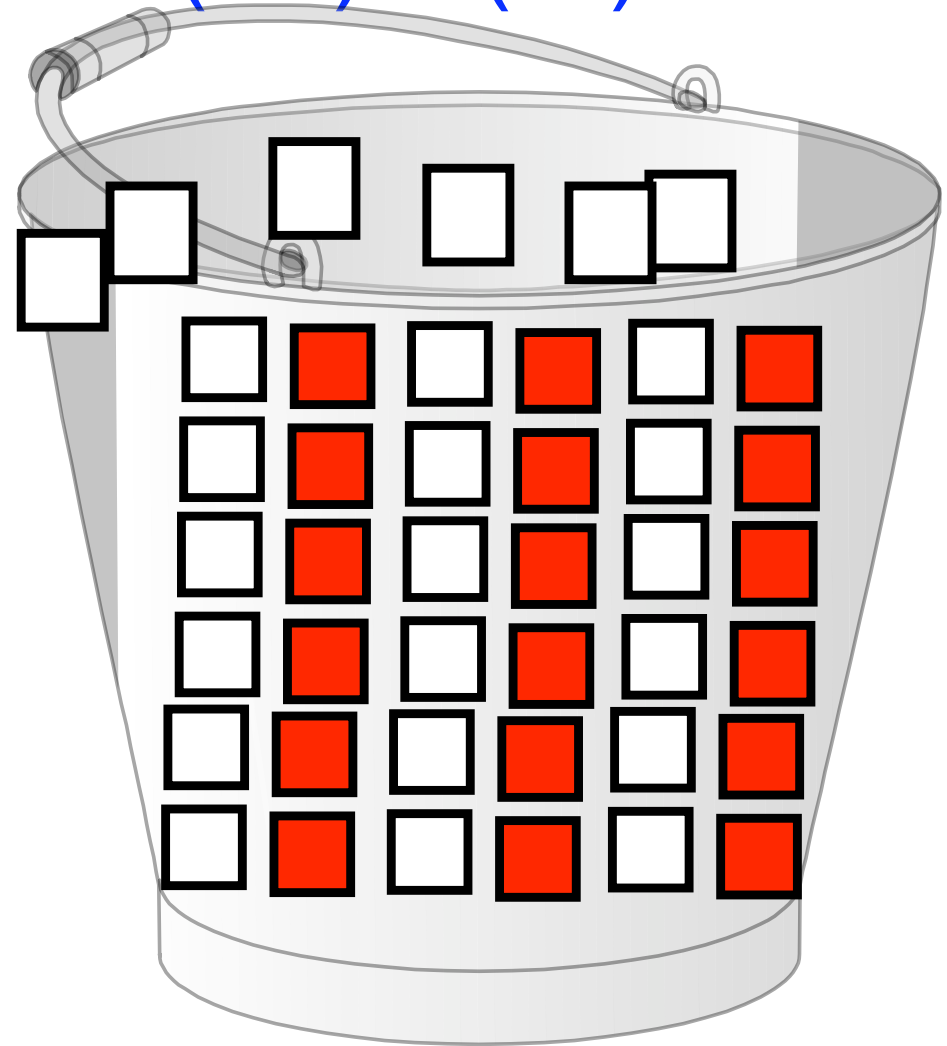
Multiplying Integers

Say it in words:

Take off 5 sets of -2   (-5) x (-2)
                            (-5) x (-2) = +10

Take off 3 sets of +4   (-3) x (+4)
                               (-3) x (+4) = -12

?
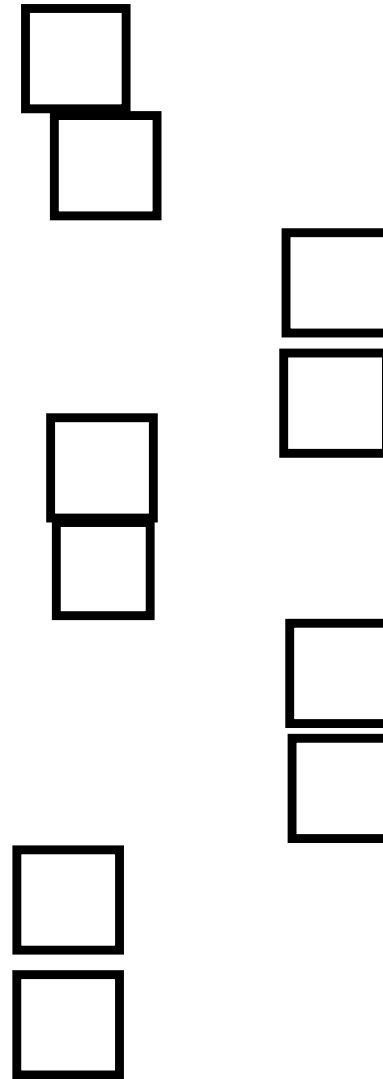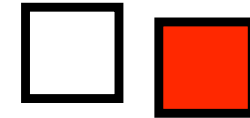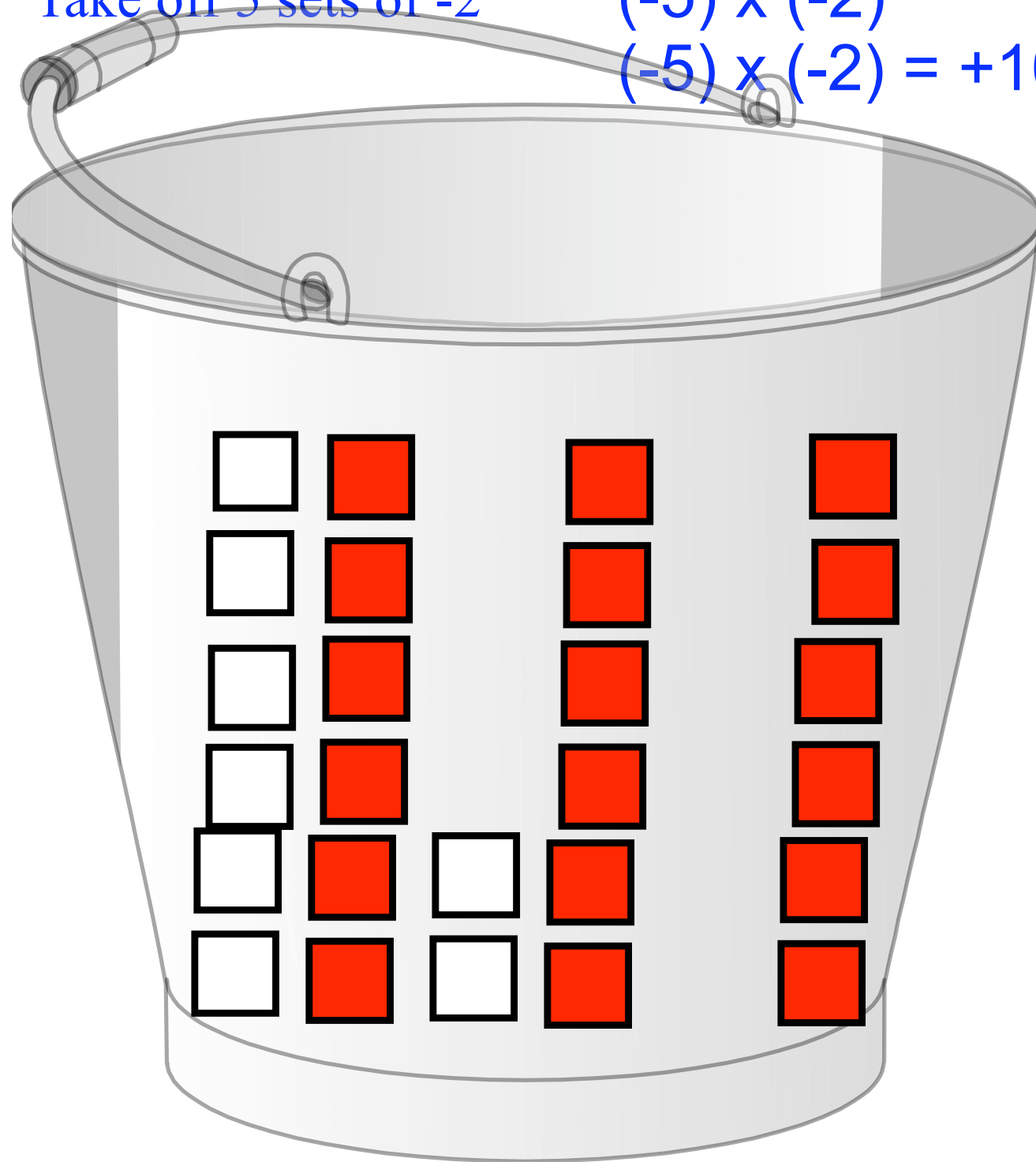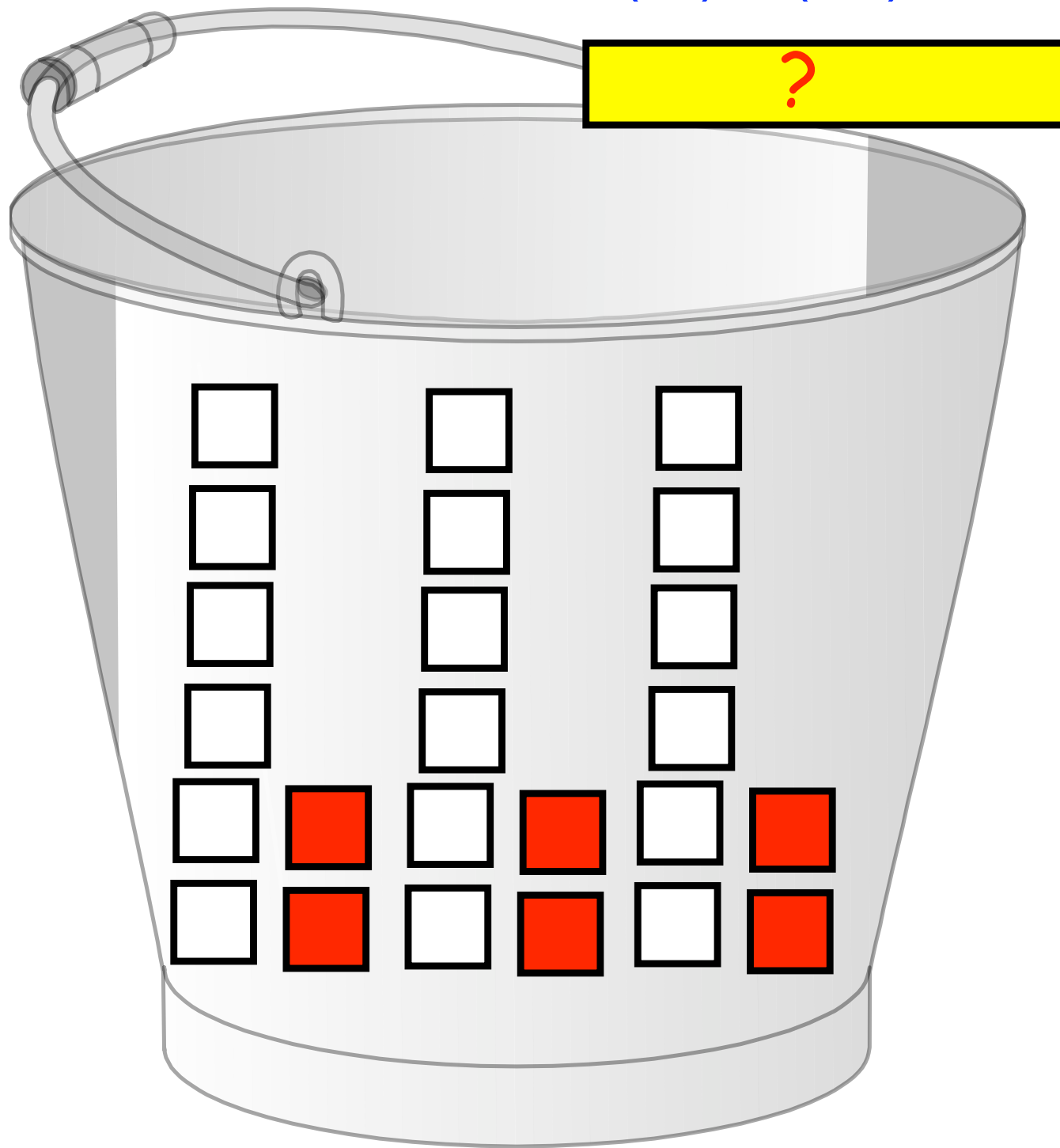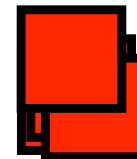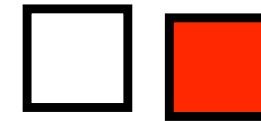
Take off 4 sets of -3　　　　(-4) x (-3)

?
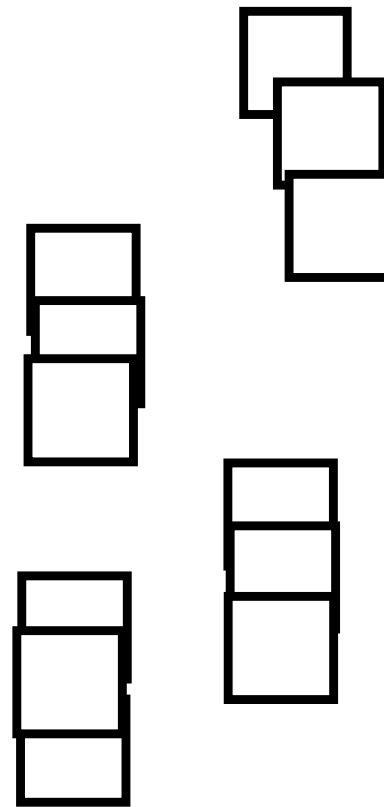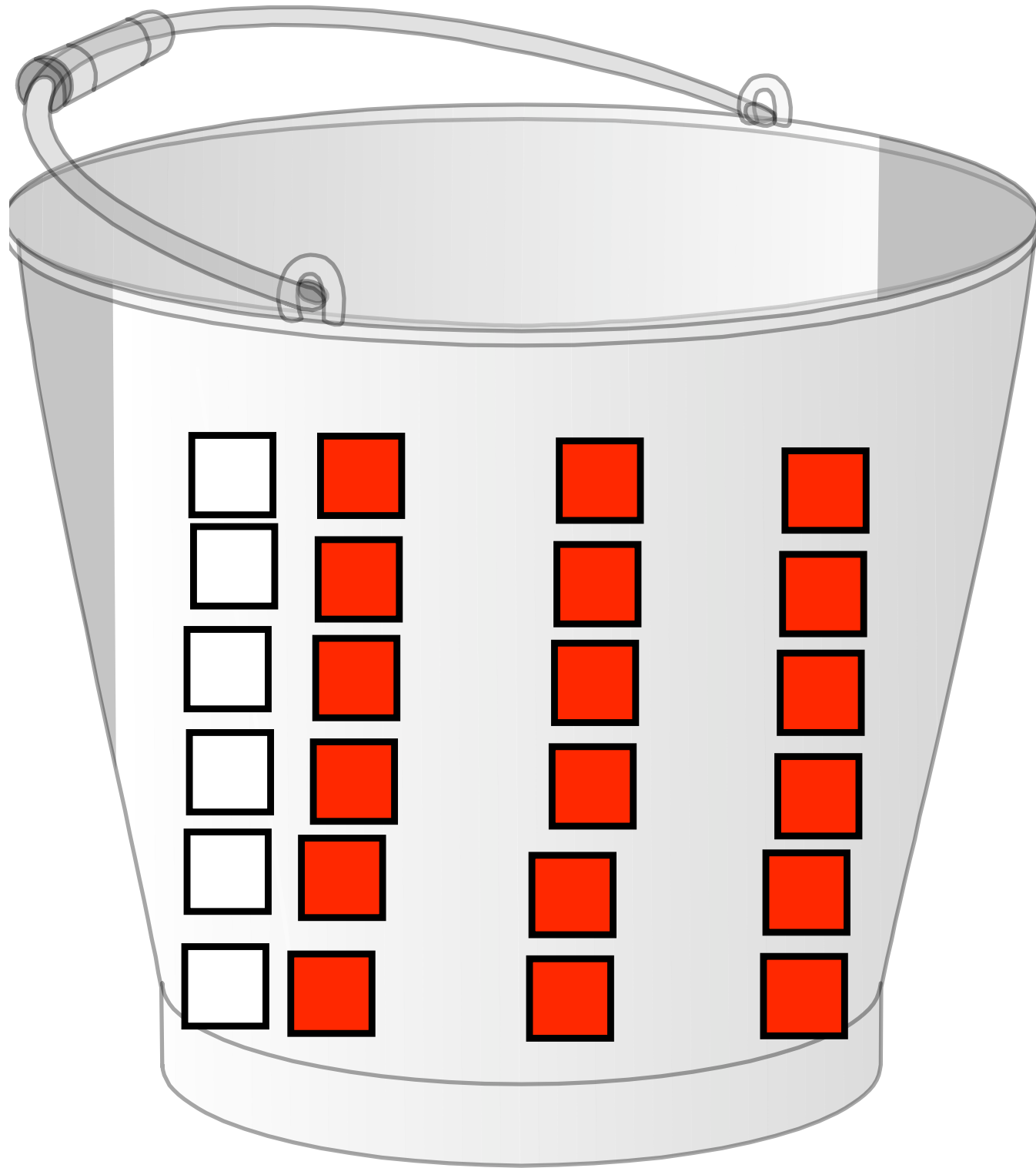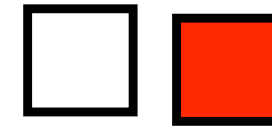
Say it in words:

Add on 3 sets of -3

(+3) x (-3)

(+3) x (-3) = -9

?

?
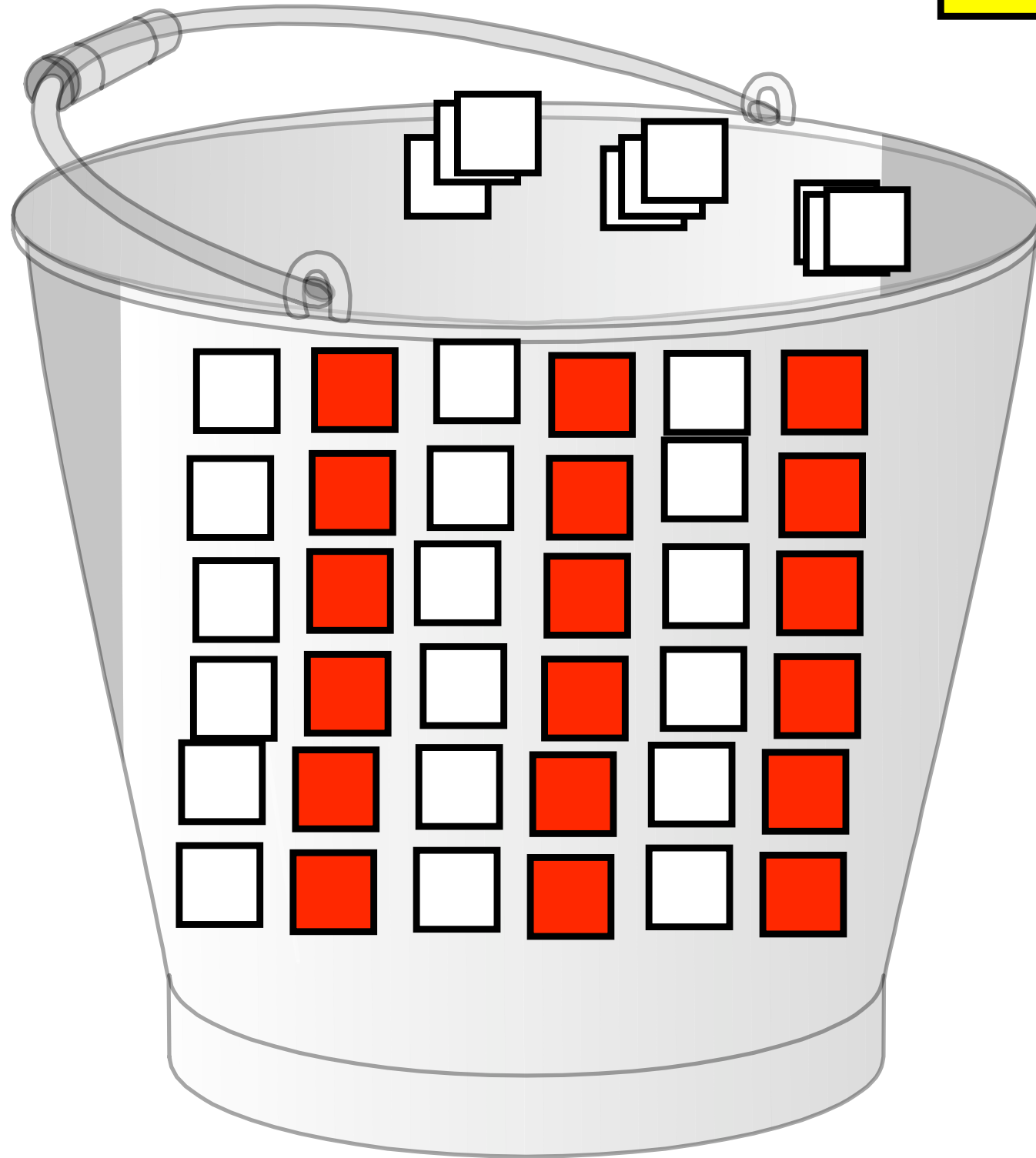
Say it in words: Take off 4 sets of +3
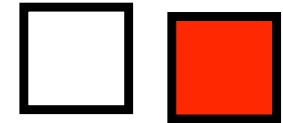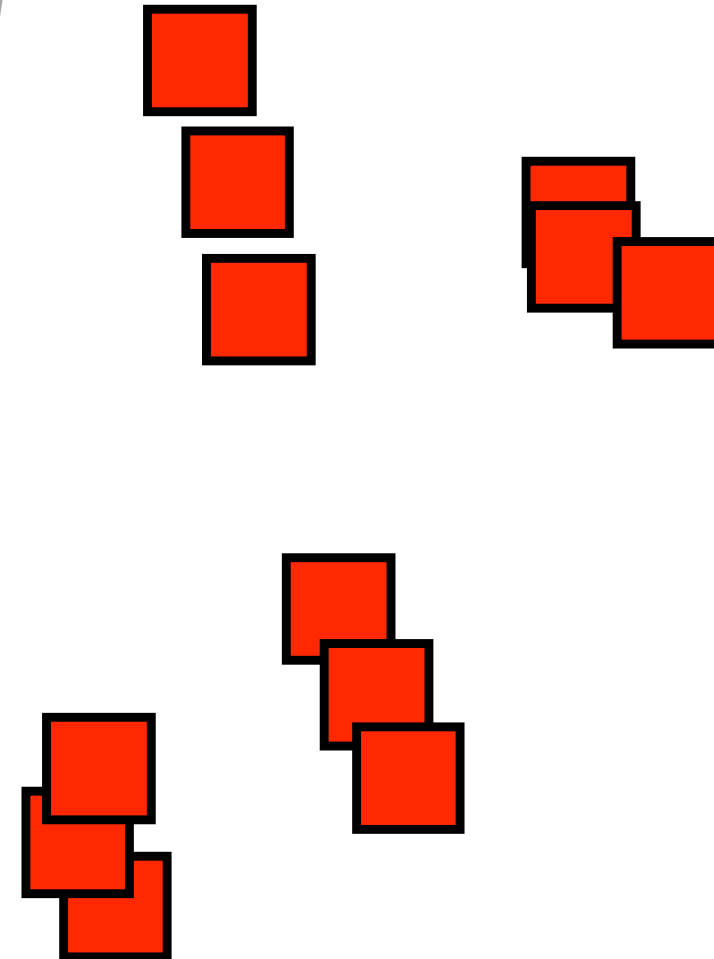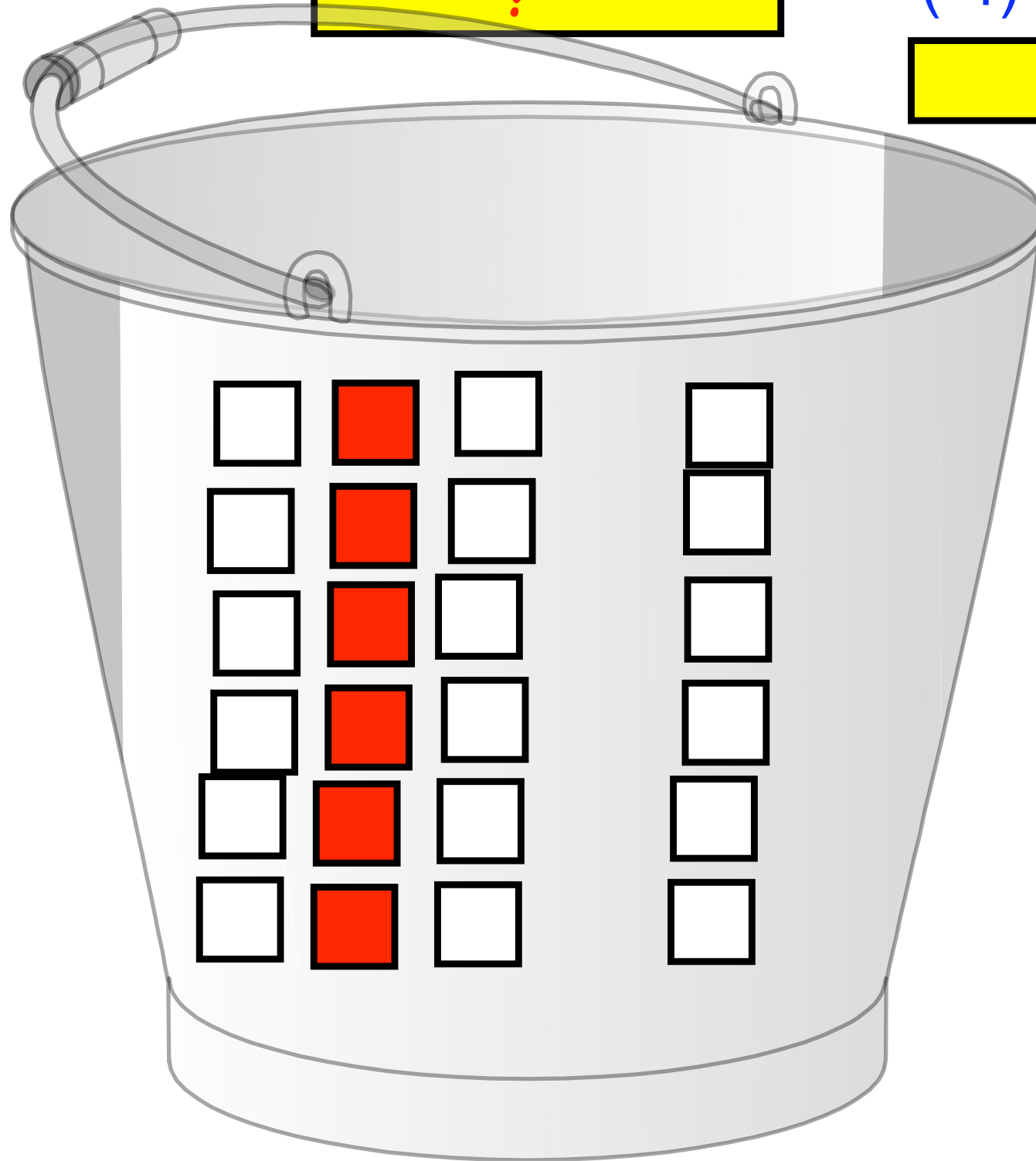
(-4) x (+3)
(-4) x (+3) = -12

?

?

Say it in words: | ? |

(-5) x (-3)

| ? |

$$-n \times +m$$
$$\hookrightarrow -$$

$$+n \times -m$$
$$\hookrightarrow -$$

$$+n \times +m$$
$$\hookrightarrow +$$

$$-n \times -m$$
$$\hookrightarrow +$$

$$2 \times 3 = 6$$
$$3 \times 2 = 6$$
$$6 \div 2 = 3$$
$$6 \div 3 = 2$$

$$3 \times 4 = 12$$
$$4 \times 3 = 12$$
$$12 \div 3 = 4$$
$$12 \div 4 = 3$$

$$-2 \times +4 = -8$$

$$+4 \times -2 = -8$$
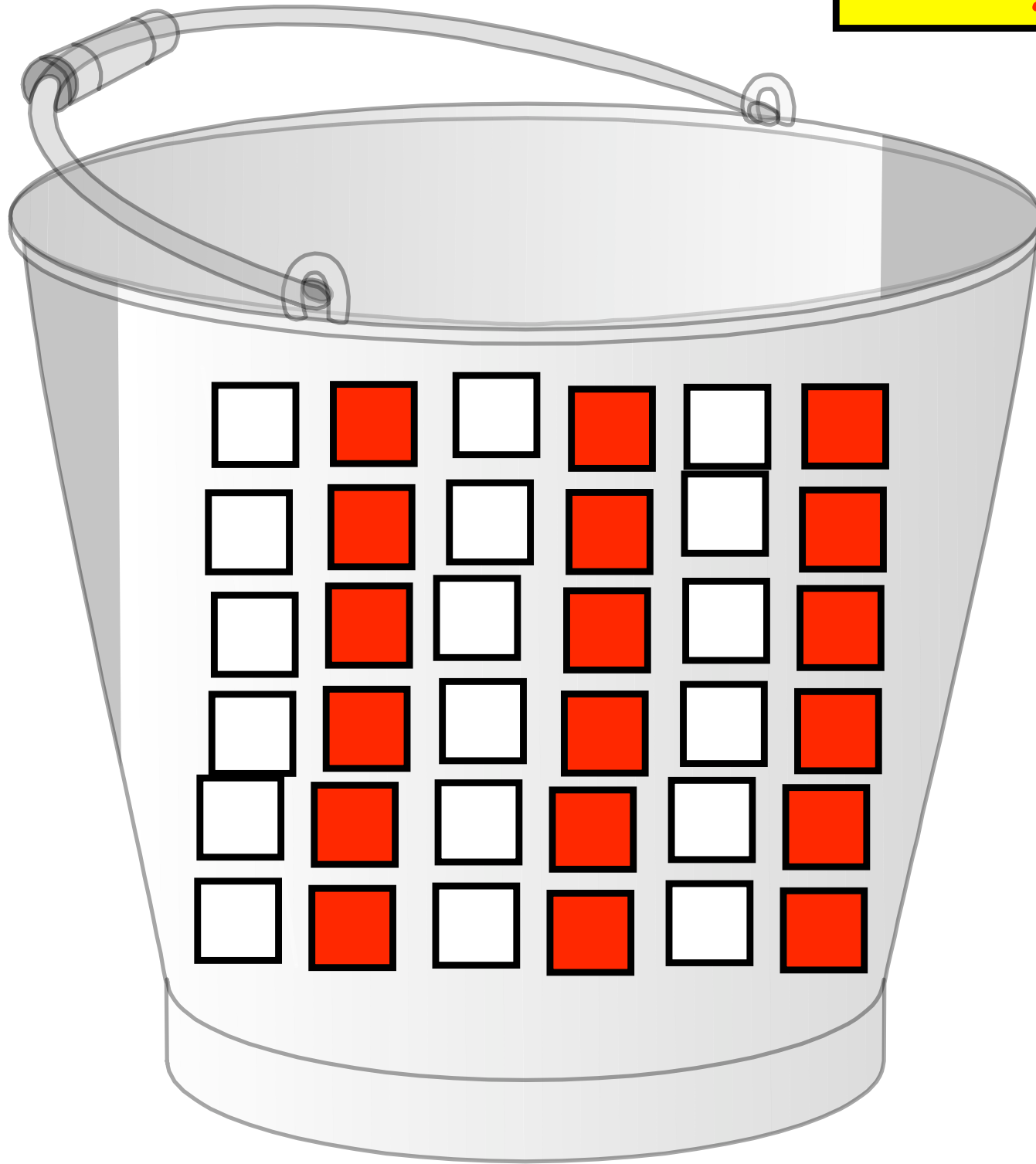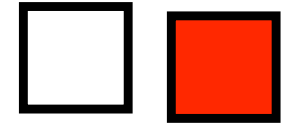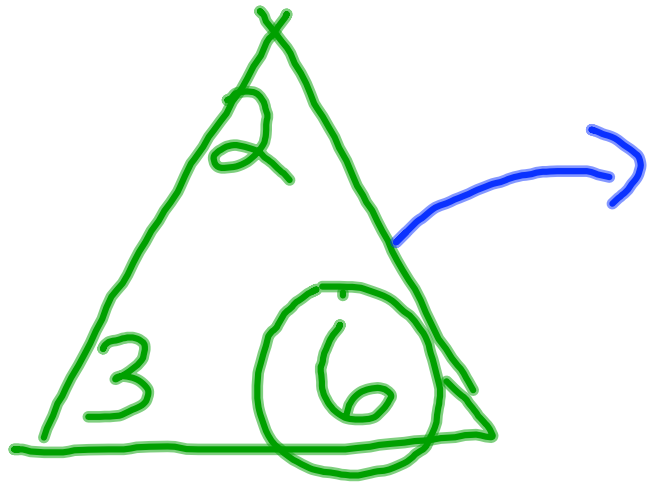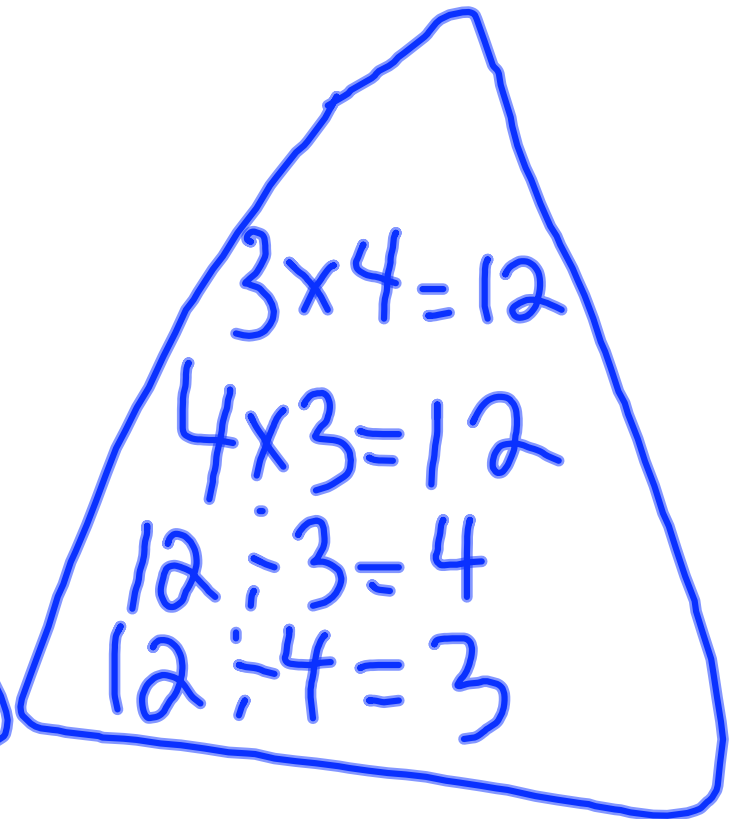
Test
Commutativity

$$-8 \div +4 = -2 \qquad -12 \div -3 = \underline{}$$

$$-8 \div -2 = +4 \qquad -3 \times \underline{} = -12$$

Diving Integers!

Consider, if (+2) x (-4) = (-8) means add two sets of -4 to zero and you get -8, then what does it mean to divide?
We know, because it is in the fact family, that the following is true, but what does this tell us?

$$(-8) \div (-4) = (+2)$$

I want to make a group of -8 using sets of -4.
How many sets of -4 do I need to make -8? Will I add the sets of -4 to the bucket of zero or take them from the bucket of zero?

I would need to add two (+2) sets of -4 to a bucket of zero to make -8. So my solution is +2 meaning add two sets of -4 to the bucket of zero.

$$(+9) \div (+3) = ?$$

$$(+9) \div (+3) = (+3)$$

Think:
How many sets of +3 do I need to make +9?
Will I be adding sets of +3 to the bucket of zero (+ answer) or taking sets of +3 from the bucket of zero (- answer)?
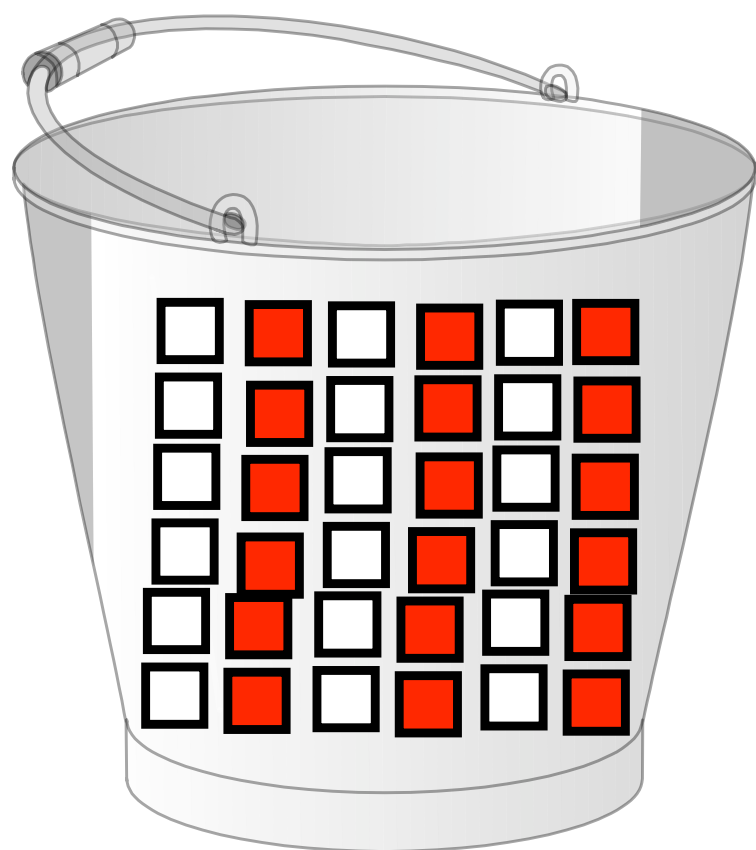
Solution process:
To make the value of the bucket +9 I would need to add three sets of +3, so my solution must be +3.

$$(+8) \div (-4) = ? \quad -2$$

Think:
How many sets of –4 do I need to make +8?
Will I be adding sets of -4 to the bucket of zero (+ answer) or taking sets of -4 from the bucket of zero (- answer)?

$$(+8) \div (-4) = (-2)$$

Solution process:
To make the value of the bucket -8 I would need to take away two sets of -4, so my solution must be -2.

$(-8) \div (+2) = ?$ −4

$(-8) \div (+2) = (-4)$ □ ■

Think:

How many sets of +2 do I need to make -8? Will I be adding sets of +2 to the bucket of zero (+ answer) or taking sets of +2 from the bucket of zero (- answer)?

Solution process:

To make the value of the bucket -8 I would need to take away four sets of +2 so my solution must be -4.

$+2x \_\_\_ = -8$

$12 \div 4$

$3 \times 4 = 12$

$x + 2 = -8$

$$(-6) \div (-3) = ?$$

Think:
How many sets of –3 do I need to make -6?
Will I be adding sets of –3 to the bucket of
zero (+ answer) or taking sets of –3 from the
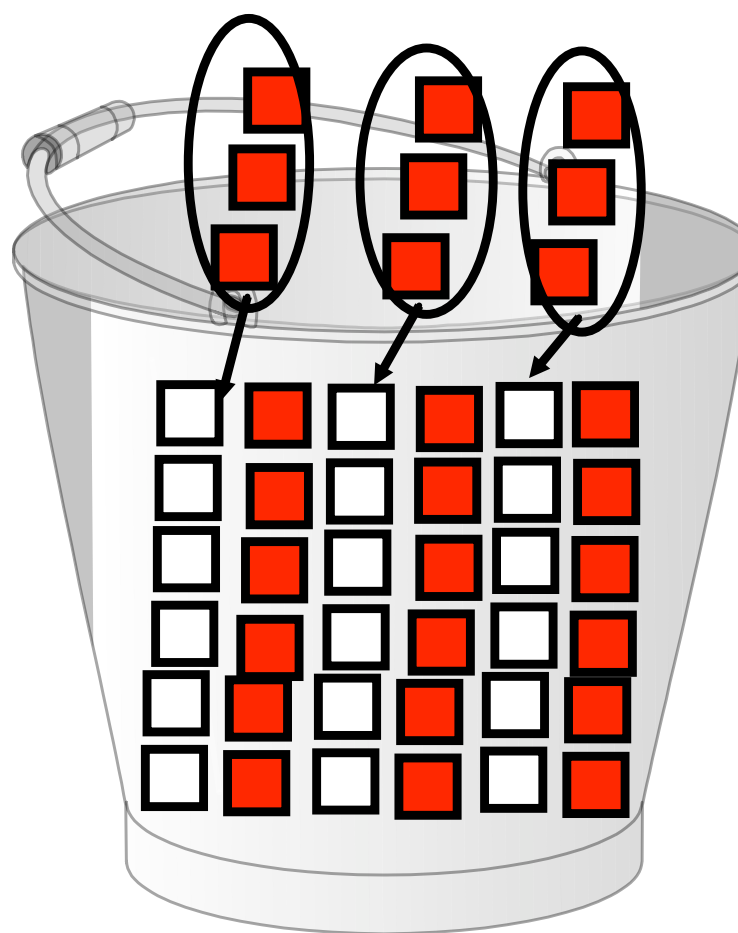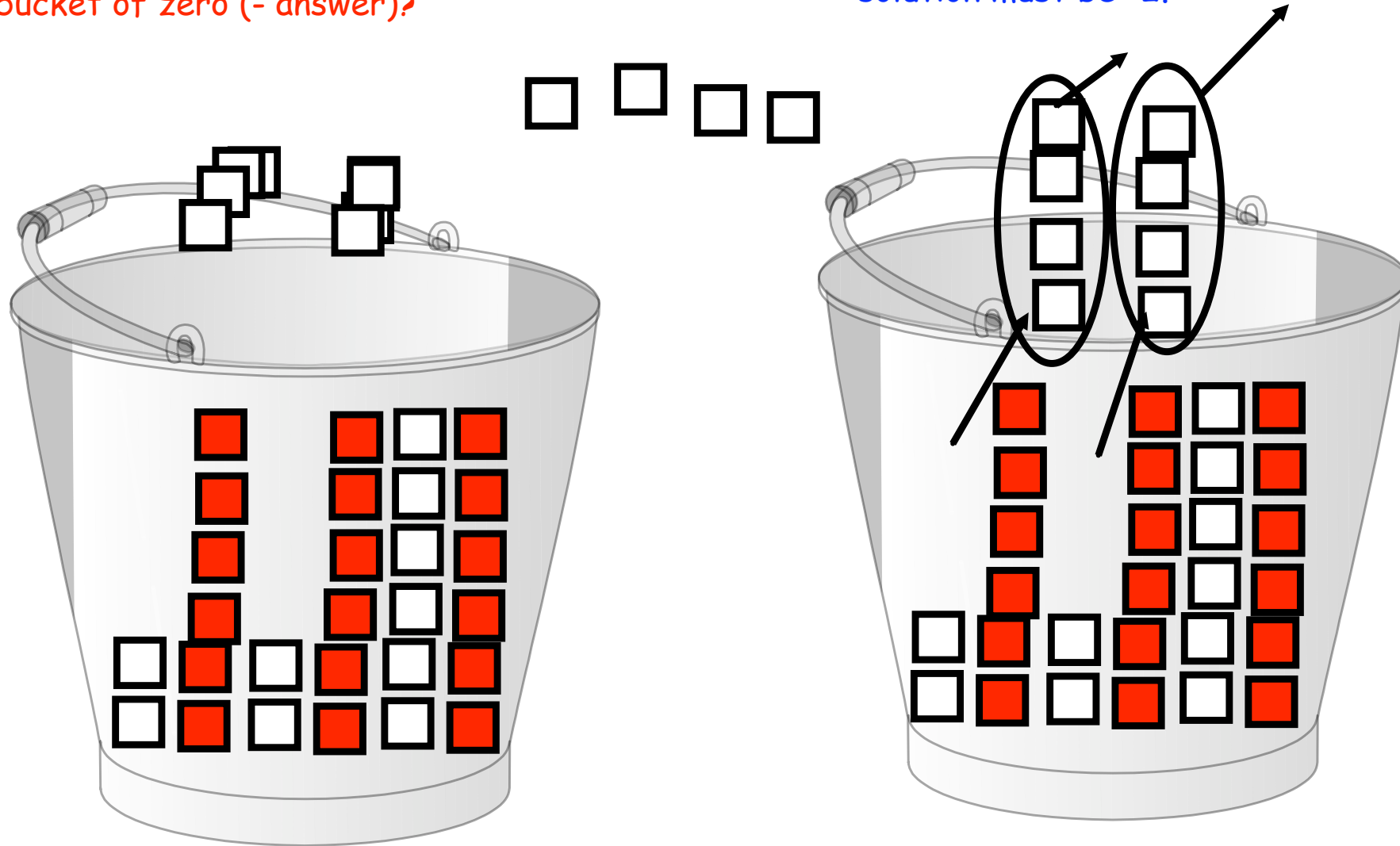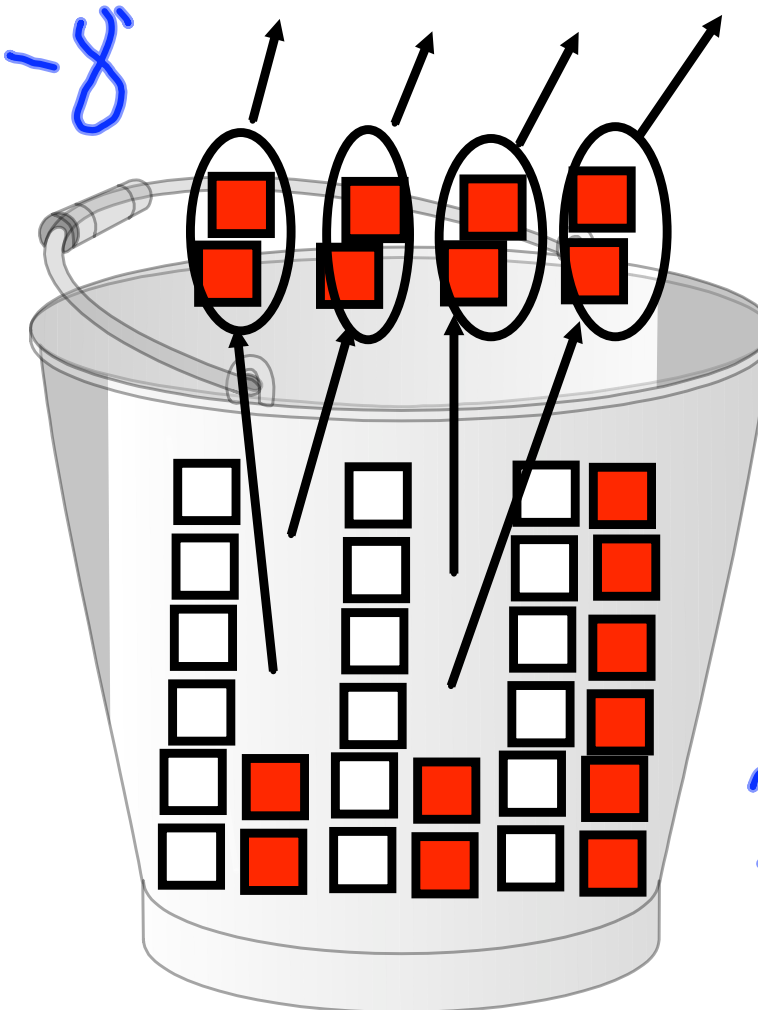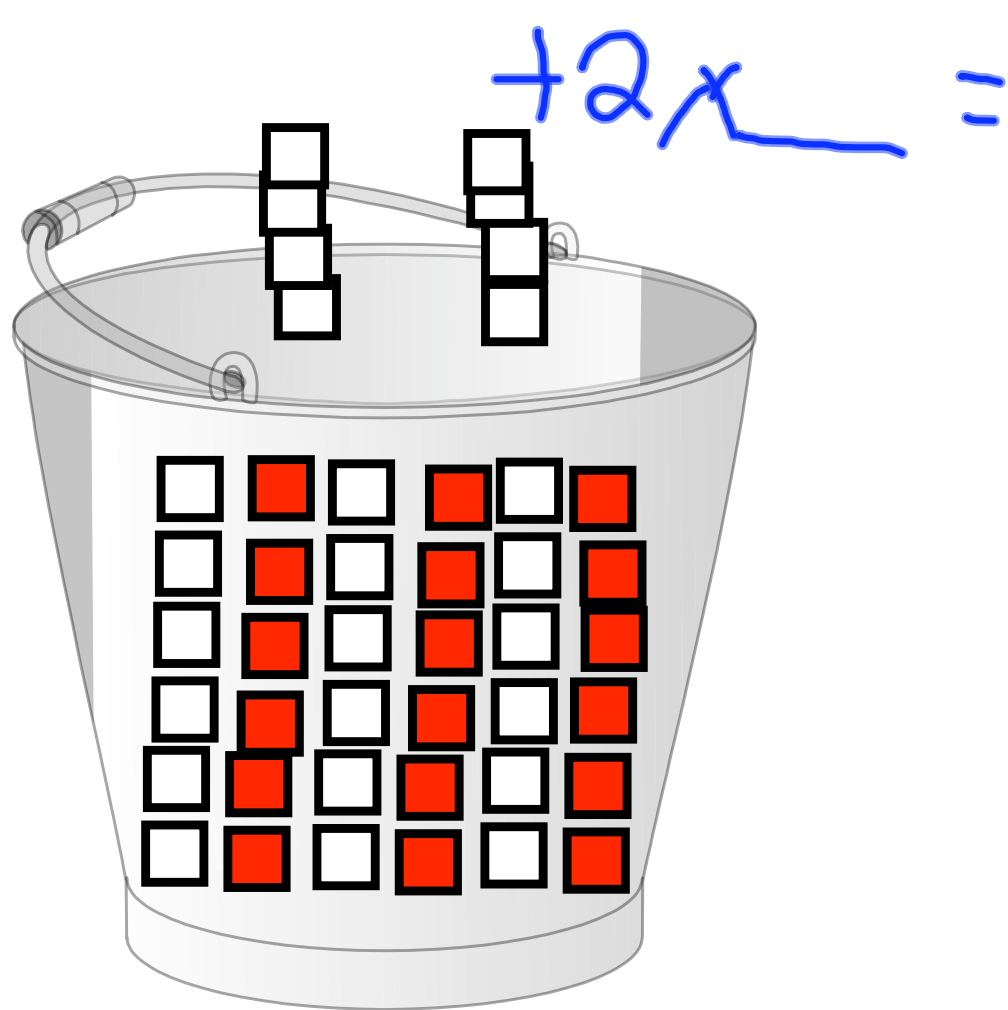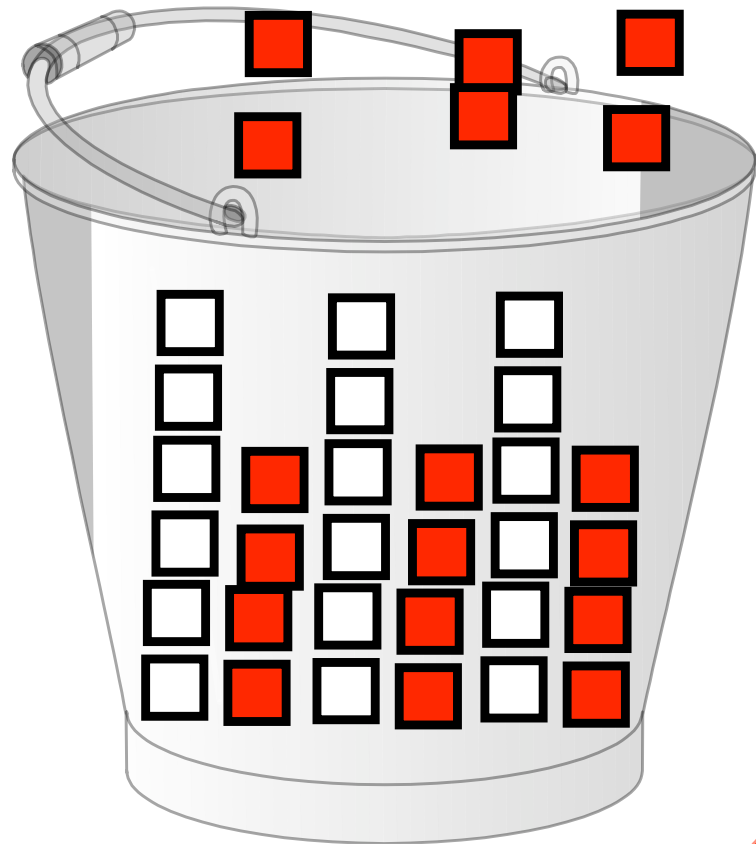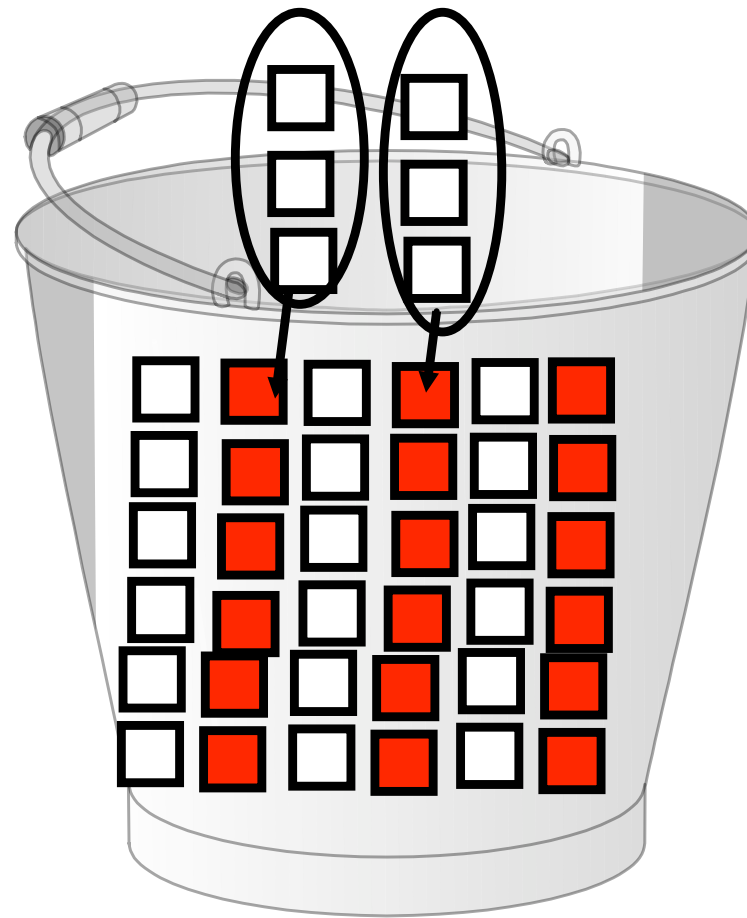bucket of zero (- answer)?

$$(-6) \div (-3) = (+2)$$

Solution process:
To make the value of the bucket -6 I would
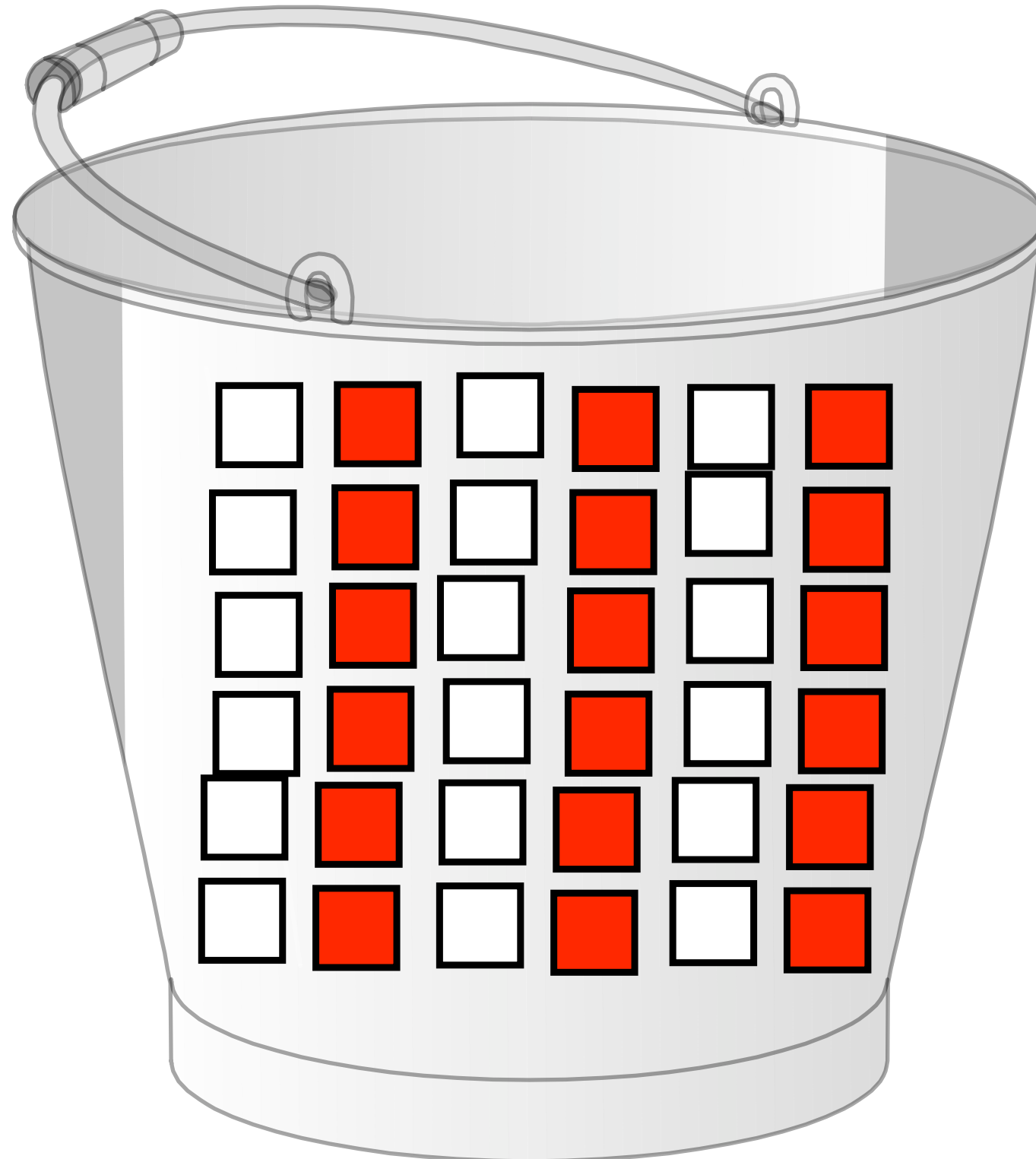need to add two sets of –3, so my solution
must be +2.

$$+2 \times -3 = -6 \qquad -3 \times +2 = -6$$

Say it in words:

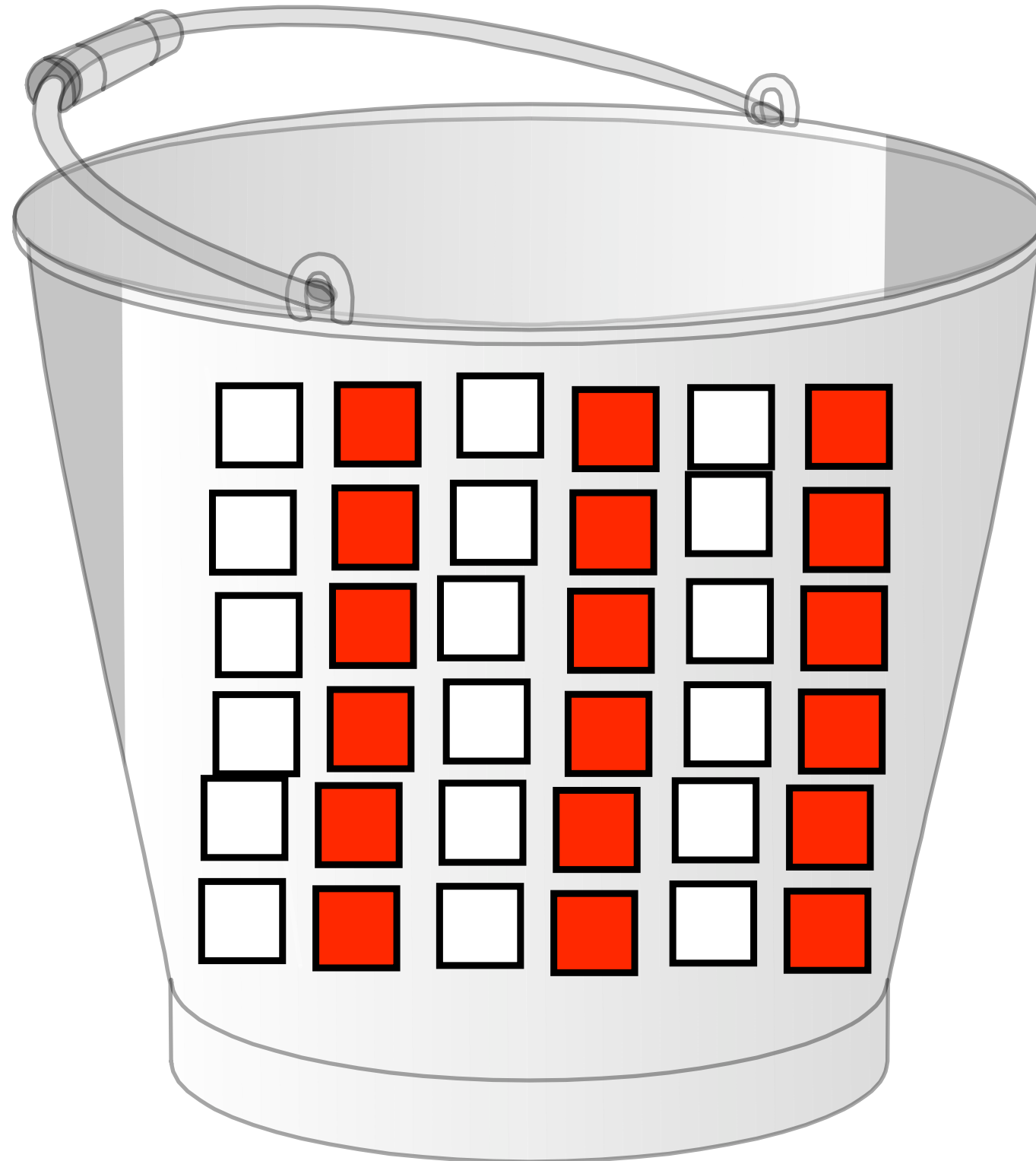How do I make the bucket have a value of -15 if I can only use groups of -3?

$(-15) \div (-3)$

?

Say it in words:

How do I make the bucket have a value of -12 if I can only use groups of +3?
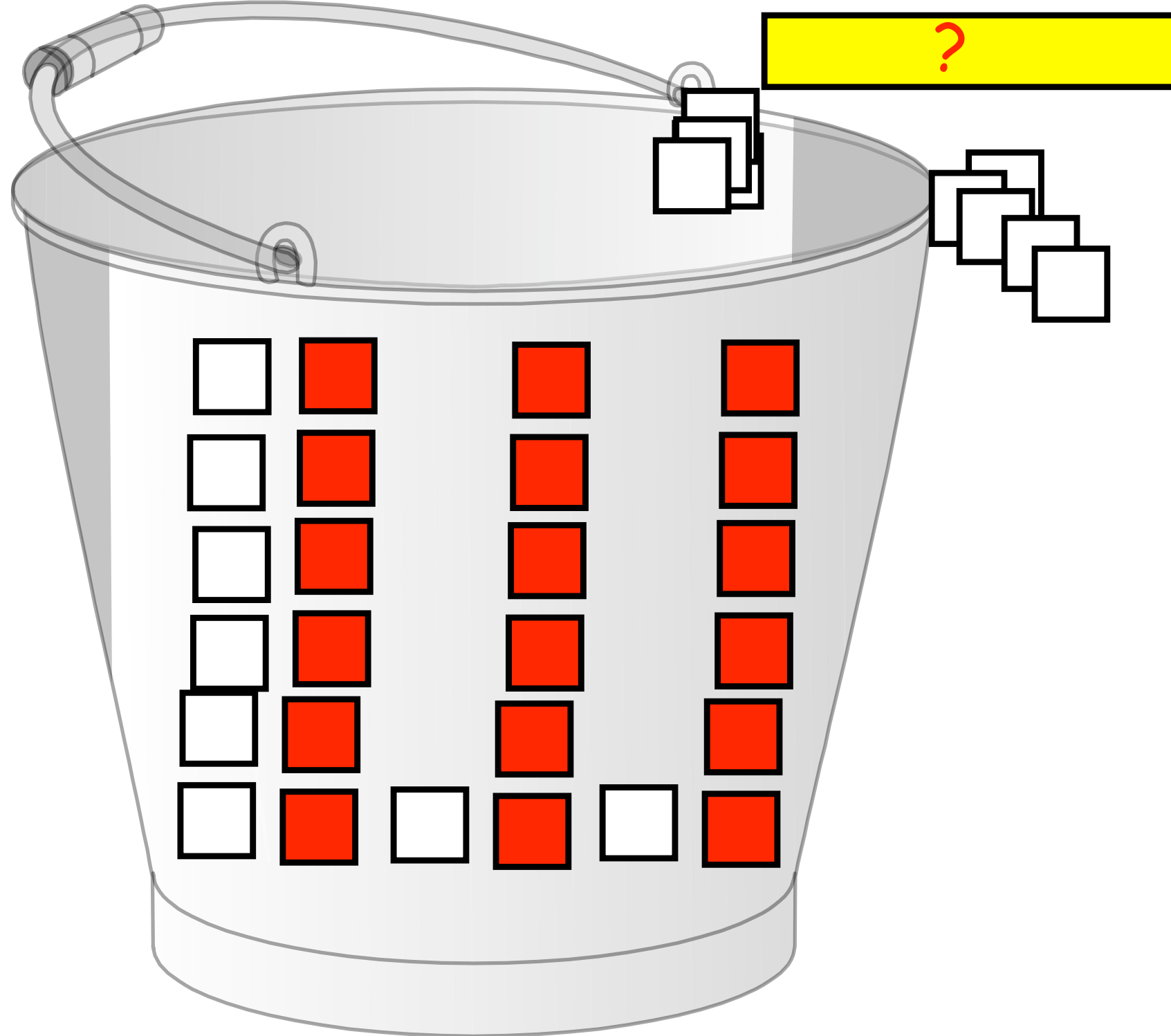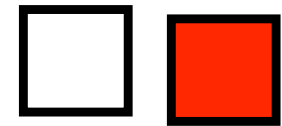
$$(-12) \div (+3)$$

?

Say it in words:

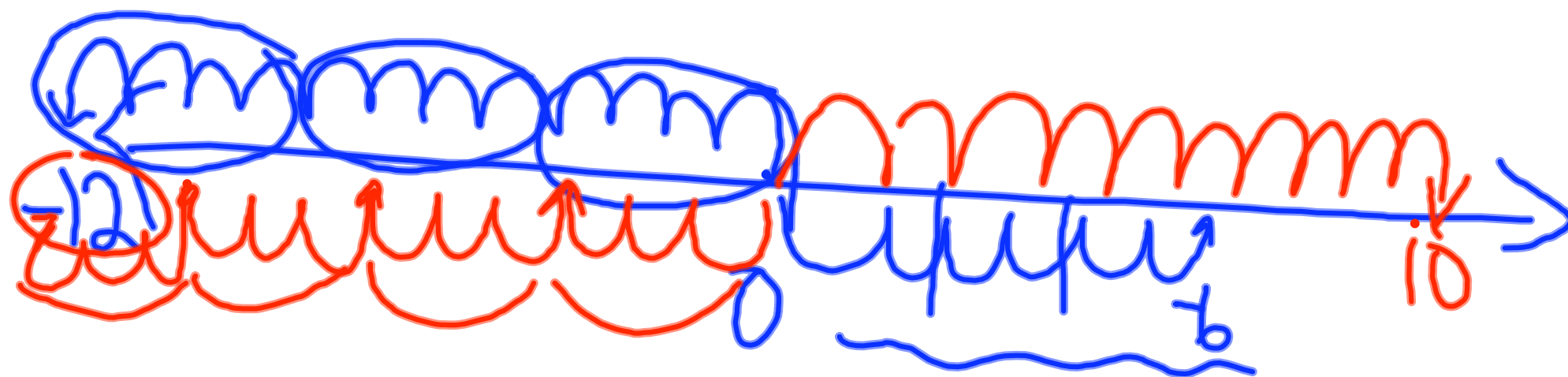How do I make the bucket have a value of +10 if I can only use groups of -2?

(+10) ÷ (-2)
(+10) ÷ (-2) = -5

?

$$+3 \times -4$$

$$-4 \times + 3$$

$$+2 \times + 5$$

$$-3 \times -2$$