Multiplying of Integers

Write each of the repeated additions as multiplication:

⇒ (+2) + (+2) + (+2) + (+2) + (+2) = 5×2 or 2×5

⇒ (-6) + (-6) + (-6) = (-6)×3 or 3×(-6)

which is? Does it matter?

Write each of the multiplications as a repeated addition.

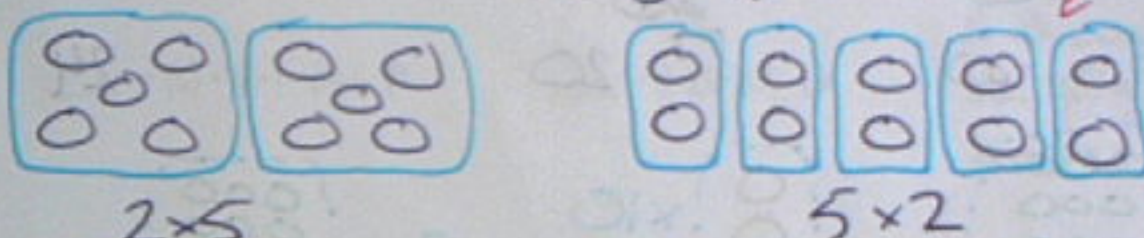
⇒ (+2) × (+5) = 5×2 or 2×5 5+5 or 2+2+2+2+2

⇒ (6) × (-3) = (-6)+(-6)+(-6) or (-3)+(-3)+(-3)+(-3)+(-3)+(-3

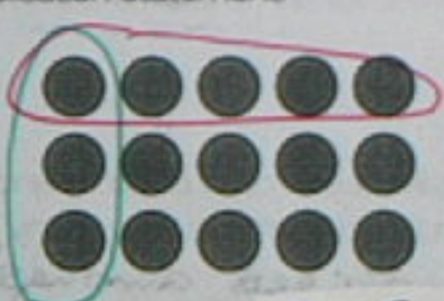
Do these two methods mean the same thing? Is there a difference between these expressions and the previous ones? Let's Draw a picture!

Read 2×5 as "2 groups of 5"
6×(-3) as "6 groups of -3"

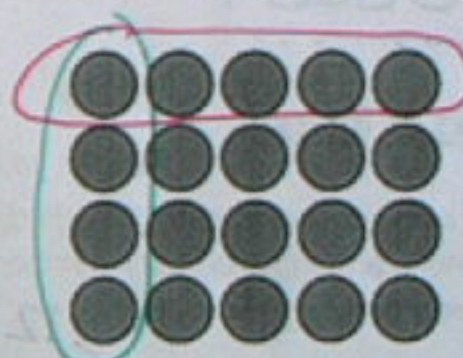
called "ARRAY"



Write each of the following array diagrams as a repeated addition and as a multiplication statement.



- 5+5+5 = 3×5
or
- 3+3+3+3+3 = 5×3



- 5+5+5+5 = 4×5
or
- 4+4+4+4+4 = 5×4

*order doesn't matter "Commutative"

Ways of Showing Multiplication

- ⇒ (a × b) → Cross-Product
- ⇒ (a • b) → Dot Product
- ⇒ (a)(b) → Brackets
- ⇒ a(b) → Coefficient

Tip: when writing negative numbers place the number and negative sign in brackets, to prevent any confusion.

minus? √ All multiply!

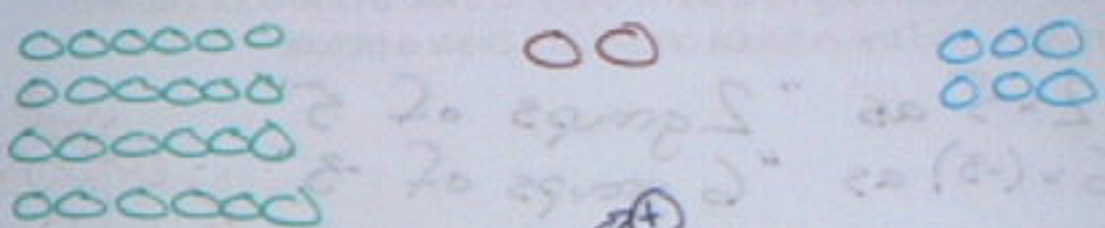
Example: 4 –3 or (4) –3 or (4)(–3) etc.

(+)(+) = (+)
(–)(–) = (+)
(+)(–) =
(–)(+) =

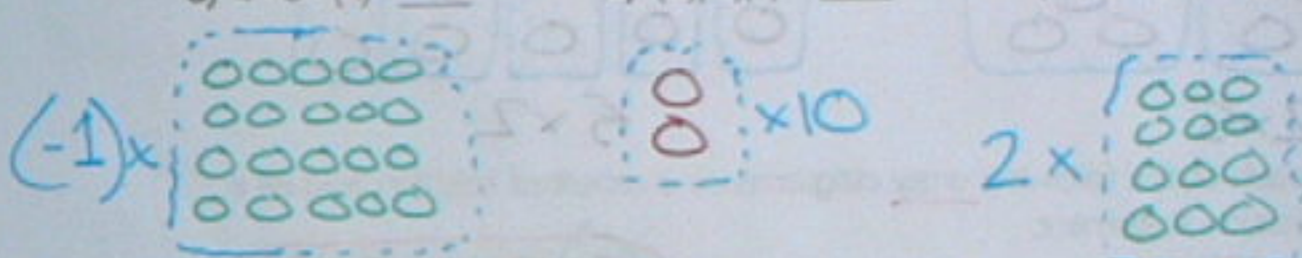
The sign on the 1st (minus) # tells us to deposit (+) or withdraw (–) a # of groups

Complete the following:

a) (+4) × (+6) = 24 b) (–1) × (+2) = –2 c) (–2) × (–3) = 6



d) 4 • 5 • (–1) = –20 e) (10)(–2)(–1) = 20 f) (–4) • (–3) × (2) = 24



Dividing of Integers

Division undoes multiplication. With division, we take a collection of items and divide them amongst certain number groups and we determine how many items are in each group.

12 things divided amongst # of people/groups

Example: write 4 × 3 = 12 as a division statement

12 ÷ 4 = 3 or $\frac{12}{4} = 3$

12 ÷ 3 = 4 $\frac{12}{3} = 4$

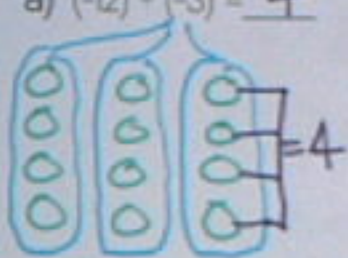
Division

Ways of Showing ~~Multiplication~~

⇒ (a ⟌ b) → Long Division (Vinculum Notation)
⇒ (a ÷ b) → Obelus Sign
⇒ (a / b) → Fraction Notation

Complete the following:

a) (-12) ÷ (-3) = 4



b) (-976) ÷ (8) = -122

c) (0) ÷ (576) = 0

Zero thing shared in 576 groups well each group gets ∅ things

d) (-20) / (-5) = 4

e) (16) / (4) = 4

f) (-4) / (0) = Error?

Think about it 4 things to share in ∅ groups. Makes no sense!

Sign Rule (Multiplying & Dividing ONLY)

If a and b are natural numbers then,

$a \times b = ab$

$(-a) \times (-b) = ab$

$a \times (-b) = -ab$

$(-a) \times b = -ab$

☆ In general, if there is an ***odd*** number of negative (-) signs then the answer will be ***negative*** (-). If there is an ***even*** number of negative (-) signs then the answer will be ***positive*** (+).

Multiplying & Dividing using Integer tiles/chips

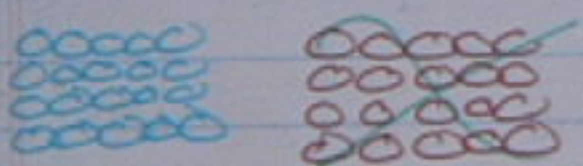
Multiplying

[ ] × [ ]
"groups"

- take away   - #'s
+ add   + #'s

add
[+5] × [4]

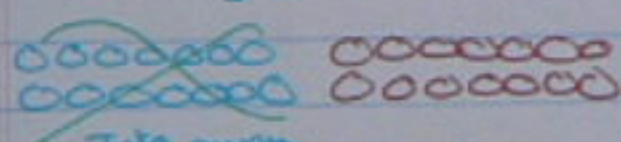
when × or ÷ always add zero pairs to start then do what the process is



"add 5 groups of +4"

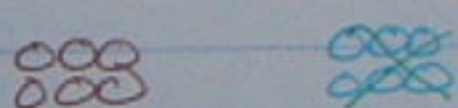
add
[+2] × [-7]
groups

"add 2 groups of -7"



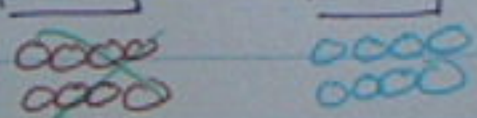
take away
[-3] × [2]

"take away 3 groups of +2"



take away
[-2] × [-4]

"take away 2 groups of -4"



Dividing

[ ] ÷ [ ] ← Always make the 2nd # Positive

group

-#'s   +#

+#'s

[-16] ÷ [4]   have -16 items in 4 groups how many in each group?

= 4

remove (-) on 5

[25] ÷ [-5] => [-25] ÷ [5]

= 5