Mathematics

# Axioms and Negative Numbers Worksheet

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# Try this

Calculate each of the following:

**A** $(-18) \times (-5)$

**B** $(-5) \times (-18)$

**C** $90 \div (-5)$

**D** $90 \div (-18)$

**E** $9 \times (-2) \times (-5)$

Can you find any calculations that will have the same value?

**F** $(-5) \times (-10) + (-5) \times (-8)$

**Connect**  Match the word with the description and an example

Distributive law

It doesn't matter how we group the numbers (i.e. which we calculate first)

$3 + 4 + 5 = 3 + 5 + 4$

Commutativity

We get the same answer when we: multiply a number by a group of numbers added together, or do each multiplication separately then add them.

$(3 + 4) + 5 = 3 + (4 + 5)$

Associativity

$5(4 + 2) = 5 \times 4 + 5 \times 2$

The operation can be applied to the numbers in any order.
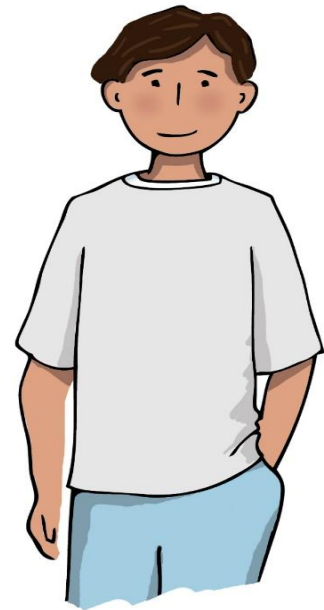
or $= 5 \times 6$

# Connect

The **axioms** for positive numbers also hold for **negative numbers.**

## Commutative

$$a \times b = b \times a$$

## Commutative

$$a + b = b + a$$

Using positive and negative numbers generate examples for each equality.
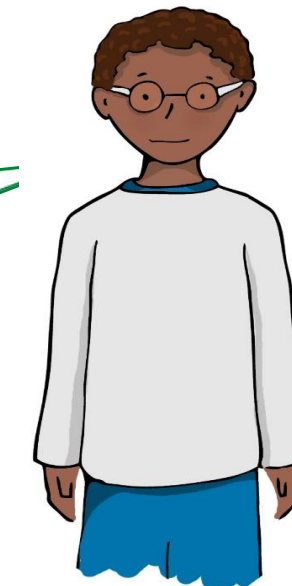
## Distributive

$$a \times b + a \times c = a \times (b + c)$$

## Associative

$$(a \times b) \times c = a \times (b \times c)$$

# Independent task

1. Which pair of calculations are additive inverses?

a)  (-100) x 5

b) (-100) ÷ (-5)

c) 100 + (-5)

d) (-100) + 5

e) 100 x 5

f) (-100) ÷ 5

2. Sort each of the following calculations in to three groups. Each group must have calculations that are **equal.**

a) (-5) x 32

b) 16 x 10

c) (-8) x (-20)

d) $(-6)^3$

e) (-10) x 16

f) 30 x (-5) + 2 x (-5)

g) (-320) ÷ (-2)

h) 36 x (-6)

i) 30 x (-6) + 6 x (-6)

# Explore

Pair each expression with another of equal value.
There should be one left over, can you find it?

| | |
|---|---|
| $810 \times (-5)$ | $81 \div 10 \times (-50)$ |
| $(-81) \times (-50)$ | $-81 \times 5$ |
| $81 \times (-50)$ | $8.1 \times (-5000)$ |

$(-81) \times (-5) + (-81) \times (-45)$