

# INTRODUCTION TO MATH FOR POLITICAL SCIENTISTS

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# ARITHMETIC

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## LET'S START REAL SLOW...

- So we all know that

$$2 + 2 = 4$$

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- But addition and subtraction have some rules

- Communicative:

- Commutative:

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- Commutative:
  - $a \pm b = b \pm a$
- Associative

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- Associative

- $(a \pm b) \pm c = a \pm (b \pm c)$



# MULTIPLICATION

- Multiplication - I have these 4 things 10 times.

4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4

```
## [1] 40
```

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```
## [1] 40
```

Or I could just do

4 \* 10

```
## [1] 40
```

- Just fancy multiplication.

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- Just fancy multiplication.
- I have these four things one of ten times.

```
4 * (1 / 10)
```

```
## [1] 0.4
```

- Communicative

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- $a * b = b * a$



# PROPERTIES OF MULTIPLICATION AND DIVISION

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- $a(b + c) = ab + ac$

- Note that this works for division:  $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$

## PROPERTIES OF EQUALITIES

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## RELATIONSHIPS THAT HOLD WITH (REAL) NUMBERS

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- $a = b \longleftrightarrow b = a$  (Symmetric relationships)
- $a = b$  and  $b = c \Rightarrow a = c$  (Transitive relationships)
  - $a > b$  and  $b > c \Rightarrow a > c$

PEMDAS

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- Parentheses

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- Exponents

# PEMDAS

- Parentheses
- Exponents
- Multiplication and division (left to right)

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- Multiplication and division (left to right)
- Addition and subtraction (left to right)

$$(10 - 48 \div 12 * 2)^2 + 3^2 * (8 - 6)$$