GEAR RATIO VS SPEED RATIO

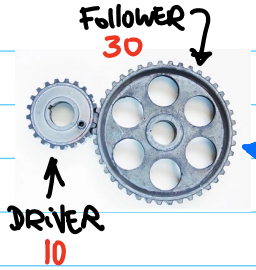
GEAR RATIOS AND SPEED RATIOS TALK ABOUT RELATED BUT VERY DIFFERENT THINGS.

SO... TIME TO **Break it down!**

GEAR RATIO [SIZE COMPARISON]

→ COMPARES GEAR SIZE BASED ON THE # OF TEETH
→ "HOW BIG IS ONE GEAR COMPARED TO ANOTHER"

GEAR RATIO : # of TEETH on follower GEAR / # of TEETH on DRIVER GEAR



EXAMPLE → DRIVER GEAR = 10 TEETH
FOLLOWER GEAR = 30 TEETH

$$\text{GEAR RATIO} = \frac{30}{10} = 3:1$$

THIS MEANS... follower GEAR = 3x BIGGER THAN DRIVER

KEY IDEA

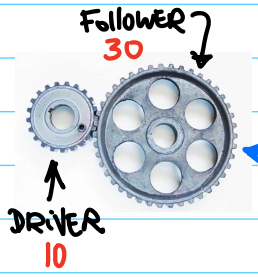
GEAR RATIO is ABOUT SIZE, NOT SPEED (Motion)

SPEED RATIO [MOVEMENT/SPEED COMPARISON]

→ COMPARES HOW FAST THE GEARS ROTATE
→ "HOW MANY TURNS DOES ONE GEAR MAKE COMPARED TO THE OTHER?"
→ "HOW FAR (CIRCUMFERENCE) DOES ONE GEAR TRAVEL VS. ANOTHER?"

SPEED RATIO = $\frac{\text{SPEED of DRIVER GEAR}}{\text{SPEED of FOLLOWER GEAR}}$ OR $\frac{\text{DRIVER DISTANCE}}{\text{FOLLOWER DISTANCE}}$

OR $\frac{\text{\# of DRIVER TEETH}}{\text{\# of FOLLOWER TEETH}}$



EXAMPLE → DRIVER GEAR = 10 TEETH
FOLLOWER GEAR = 30 TEETH

[SPEED RATIO = $\frac{10}{30}$ = 1:3]

THIS MEANS... DRIVER TURNS 3x FOR EVERY 1 TURN of follower. THE follower ROTATES SLOWER.

[KEY IDEA] SPEED RATIO is ABOUT SPEED (MOTION), NOT SIZE

GEAR / SPEED RATIOS ARE ALWAYS INVERSE of EACHOTHER

IF... GEAR RATIO = 3:1 [follower is LARGER]

THEN... SPEED RATIO = 1:3 [follower TURNS SLOWER]



SMALL DRIVER
BIG FOLLOWER

- GEAR RATIO is BIG
- SPEED Ratio is small
- RESULT → LESS SPEED
  MORE TORQUE

EX: Biking UP A Hill



BIG DRIVER
small FOLLOWER

- GEAR RATIO is small
- SPEED RATIO is Big
- RESULT → MORE SPEED
  LESS TORQUE

EX: CRUISING on FLAT BIKE PATH

GEAR RATIO TELLS YOU HOW BIG THE GEARS ARE.

SPEED RATIO TELLS YOU HOW FAST THE GEARS SPIN.

GEAR RATIO

- COMPARES GEAR SIZE
- USES # of TEETH
- TELLS HOW BIG GEARS ARE
- $\frac{\text{FOLLOWER}}{\text{DRIVER}}$ = G. RATIO
- LINKED to TORQUE



SPEED RATIO

- COMPARES GEAR ROTATION
- USES ROTATION SPEED OR DISTANCE
- TELLS HOW FAST GEARS SPIN
- $\frac{\text{DRIVER}}{\text{FOLLOWER}}$ = S. RATIO
- LINKED to SPEED