Rotational velocity (RV)

This diagram shows a pulley of 70mm diameter on the INPUT shaft. A belt connects this to the OUTPUT pulley of 35mm diameter. For every 1 revolution of the driver shaft the OUTPUT shaft turns twice. The ratio is 1:2.
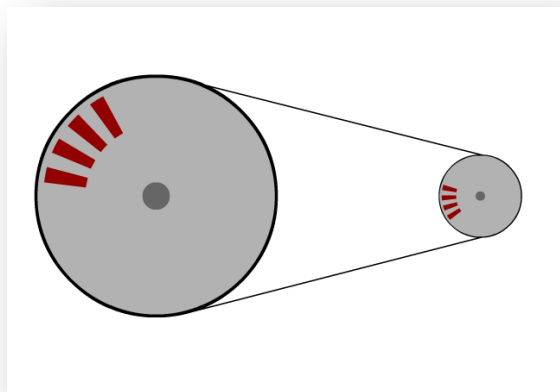
There is an INCREASE in the speed of the output shaft compared to the input shaft.

This speed ratio (Velocity Ratio or RV) can be worked out using the Formula:

RV = DIAMETER OF OUTPUT PULLEY DIAMETER OF INPUT PULLEY
So for the example the:

RV = 35 70 = 1:2 (for every turn of the INPUT pulley the OUTPUT turns twice)

If the system has a smaller pulley as the INPUT and a larger pulley as the OUTPUT then the driven shaft turns slower than the driver shaft.

There is a DECREASE in the speed of the output shaft compared to the input shaft.
So for the example above the:

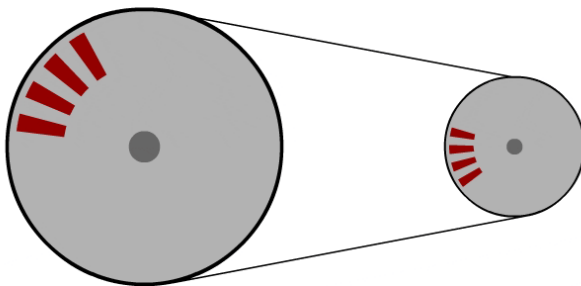RV = 70 35 = 2:1 (for every 2 turns of the INPUT pulley the OUTPUT turns once)

Example

INCREASING the output speed

Diameter of input pulley = 90mm

Diameter of output pulley = 30mm

RV = 30 / 90 = 1:3

DECREASING the output speed

Diameter of input pulley = 20mm

Diameter of output pulley = 80mm

RV = 80 / 20 = 4:1