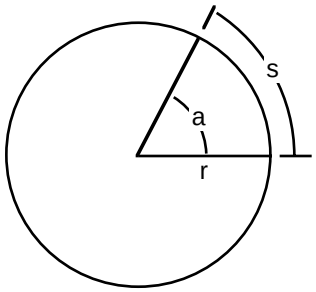
Pulley Speeds

s = length of arc along the circumference of a pulley
r = radius of a pulley
a = angle of rotation in radians




$s = ra$
$s/min$ = speed at the circumference of pulley = $ra/min$

For two pulleys connected by a belt, the speed at the circumference of each pulley is equal.

$s_1/min = s_2/min$

where $s_1$ is the speed at the circumference of pulley 1, and
$s_2$ is the speed at the circumference of pulley 2

Then $r_1a_1/min = r_2a_2/min$

where $r_1$ is the radius of pulley 1,
$r_2$ is the radius of pulley 2,
$a_1/min$ is the angular velocity of pulley 1, and
$a_2/min$ is the angular velocity of pulley 2.

Since
X rev = $2\pi$X radians

then radians = $1/2\pi$ rev

Therefore,
$r_1(X_1/2\pi)$ rev/min = $r_2(X_2/2\pi)$ rev/min

where $X_1$ is the speed of rotation of pulley 1, and
$X_2$ is the speed of rotation of pulley 2.

If the radius and speed of rotation of the first pulley and the speed of rotation of the second pulley is known, the radius of the second pulley is:

$r_2 = (r_1(X_1/2\pi)rev/min) \ / \ ((X_2/2\pi)rev/min)$

This reduces to

$r_2 = r_1 \ (X_1 \ / \ X_{2)}$