Augustin CARDIT

Answer Sheet A - The Bicycle's Metres of Development.

- comment among very high, high, medium, low, very low

Wheel diameter $D =$ ..70.. cm

Gear ratio X π X D

Front chainring Number of teeth	Rear sprocket Number of teeth	Gear ratio R	Metres of Development	Comment on the gear
26	12	2,16	475 cm	high
36	24	1,5	329,9 cm	medium
49	34	1,44	316.7 cm	medium
26	24	1,1	241,9 cm	low
49	12	4,1	901,6 cm	Very high
36	34	1,05	230,9 cm	low
26	34	0.76	167,1 cm	Very low
36	12	3	659,7 cm	Very high
49	24	2,04	448,6 cm	high

Answer Sheet B - The Power of your legs on the Bicycle .

	Quantity	Units	Formulas	Results	Calculations
4	Selected Gear Ratio		$\frac{\text{Front}}{\text{Rear}}$	4,1	$\frac{49}{12}$
1	Distance d	metres		150 m	
2	Time t	seconds		77 ~~s~~ 77sec 1,17 min	
3	Linear speed V	ms^{-1}	$V_1 = \frac{d}{t}$	$V_1 = 1,94\ m.s^{-1}$	$V = \frac{150}{77}$
4	Wheel radius r	metres	$\frac{D}{2}$	$r = 35$ cm	$\frac{70}{2}$
5	OUTPUT angular velocity ω_1	$rads^{-1}$	$V_1 = W \times r$ $W_1 = \frac{V}{r}$	$W_1 = 0,55$	$w_1 = \frac{1,94}{35}$
6	INPUT angular velocity ω_0	$rads^{-1}$	$W_1 = r \times W_0$ $W_0 = \frac{w_1}{r}$	$W_0 = 0,134$	$W_0 = \frac{0,55}{4,1}$
7	Revolution frequency N	rpm	$\frac{W_0 \times 60}{2\pi} = W$	$N = 12,63$ rpm	$N = \frac{0,134 \times 60}{2\pi}$

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Answer Sheet C - The Gear Ratio of the Car - Selected Gear 2nd

Quantity	Units	Formulas	Results for THIS gear	Calculations
Linear speed 30. kmh^{-1}	ms^{-1}	$V = \frac{d}{t}$	$8,33 m.s^{-1}$	$V = \frac{30}{3.6}$
Revolution frequency N	rpm		$N = 2000$ rpm	
INPUT angular velocity ω_0	$rads^{-1}$	$W_0 = \frac{2\pi \times N}{60}$	$W_0 = 209,44$ rad.s^{-1}	$W_0 = \frac{2\pi \times 2000}{60}$
Wheel radius r	metres	$\frac{D}{2}$	$r = 0,305$ m	$R = \frac{61}{2}$
OUTPUT angular velocity ω_1	$rads^{-1}$	$W_1 = \frac{V_1}{r}$ $V_1 = W_1 \times r$	27.21 rad.s^{-1}	$\frac{8,3}{0,305}$
OUTPUT DRIVETRAIN angular velocity ω_2	$rads^{-1}$	$W_2 = 3,3 \times W_1$	$W_2 = 89,793$ rad.s^{-1}	$W_2 = 3,3 \times 27,21$
THIS gear ratio R	none	$R = \frac{W_0}{W_2}$	$R = 2,33$	$R = \frac{209,44}{89,743}$

2nd gear

30 Km^{-1}

2 000 rpm

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Answer Sheet D - Car Equipped with Bicycle Wheels

Quantity	Units	Formulas	Results for THIS gear	Calculations
Linear speed 30 kmh^{-1}	ms^{-1}	$V = \frac{d}{t}$	$V = 8,33\ m.s^{-1}$	$V = \frac{30}{3.6}$
Revolution frequency N	rpm		2 000 rpm	
INPUT angular velocity ω_0	$rads^{-1}$	$\omega_0 = \frac{2\pi \times N}{60}$	$\omega_0 = 209,44\ rad.s^{-1}$	$\omega_0 = \frac{2\pi \times 2000}{60}$
WHEEL RADIUS r	metres	$\frac{D}{2}$	$r = 0,35\ m$	$r = \frac{0,70}{2}$
OUTPUT angular velocity ω_1	$rads^{-1}$	$\omega_1 = \frac{V_1}{r}$	$\omega_1 = 23,71\ rad.s^{-1}$	$\omega_1 = \frac{8,33}{0,35}$
OUTPUT DRIVETRAIN angular velocity ω_2	$rads^{-1}$	$\omega_2 = 3,3 \times \omega_1$	$\omega_2 = 78,243\ rad.s^{-1}$	$\omega_2 = 3,3 \times 23,71$
THIS gear ratio R	none	$R = \frac{\omega_0}{\omega_2}$	$R = 2,67$	$R = \frac{209,44}{78,243}$

the car is faster with the bicycle wheels because the wheels is larger.

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