Appendix A

Linear Motion and Momentum	Symbol	Meaning	SI Unit	SI Prefix
$x = x_0 + v_0t + \frac{1}{2}at^2$	x	Position	meter	m
$v^2 = v_0^2 + 2ax$	v	Velocity	meter/second	m/s
$v_{average} = \Delta x / \Delta t$	a	Acceleration	meter/sec^2	m/s^2
$a_{average} = \Delta v / \Delta t$	p	Momentum	Newton-sec	N·s or kg·m/s
$p = mv$	m	Mass	kilogram	kg
$p_{total} = p_1^i + p_2^i + ... = p_1^f + p_2^f + ...$	t	Time	Second	s
Rotational Motion and Momentum	ω	Angular Velocity	radians/sec	1/s
$\omega = 2\pi f = 2\pi/T$	*f*	Frequency	Hertz	Hz or 1/s
$T = 1 / f$	T	Period	Second/Rev.	s
$v_{Tangential} = \omega r$	r	Radius	meter	m
$a_{Tangential} = v_{Tangential}^2 / r$	F	Force	Newton	N
Force and Torque	τ	Torque	Newton-Meter	N·m
$F_{net} = F_1 + F_2 + ... = ma_{net}$	θ	Angle	Degrees	°
$F_{centripetal} = ma_{Tangential}$	E	Energy	Joules	J
$\tau = F\Delta x \sin\theta$	KE	Kinetic Energy	Joules	J
Work and Energy	PE	Potential Energy	Joules	J
$E_{tot} = KE + PE$	W	Work	Joules	J
$KE = \frac{1}{2}mv^2$	P	Power	Watt	W or J/s
$PE = mgh$	h	Height	meter	m
$W = F\Delta x \cos\theta$	L	Length	meter	m
$W = P/\Delta t$	L_0	Original Length	meter	m
Modern Physics	c	Speed of Light	meter/sec	m/s
	g	Acceleration due to gravity		m/s^2

Length Contraction: $L = L_0\sqrt{\frac{1 - v^2}{c^2}}$

Constants

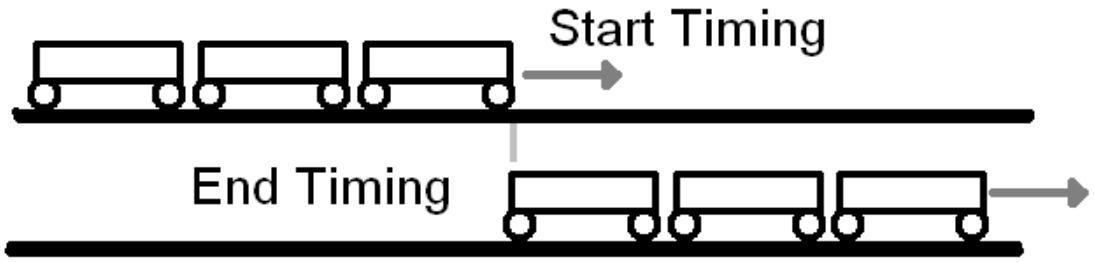
$c = 3.0 \times 10^8$ m/s

$g = 9.8$ m/s^2

Appendix B

Measuring Speed of Ride

To find the speed of a ride, you need to know either a specific length of track or the length of the car/train. If you know the length of the train, and from the ground you can see the point where you want to know the speed, its simply using a stopwatch and timing how long it takes from the front of the ride to pass the point to the rear of the ride passing the same point. From this, divide the length of the train by the time you measured with the stopwatch. If you know the specific length of part of the track, measure when the front of the ride first hits the track, until the front of the ride hits the last part of the known track. It usually works best to take at least three measurements of the same value and use their average as your number.



Measuring Period of a Circular Part of a Ride

A period is a full revolution around a circle, so for a loop or a circular ride, use a stopwatch when the ride first enters the loop or at a specific point of the circle, and stop timing when the front of the ride exits the loop or reaches the same point of the circle. It usually works best to take at least three measurements of the same value and then use their average as your number.