Name KEY Hour _____

Forces Practice Quiz

What is a force? push or pull Unit? N or $kg \cdot m/s^2$

What **unit** will you be left with if you divide force by mass? m/s^2 $\frac{kg \cdot m/s^2}{kg}$

If you apply constant force, how is the a affected by m? inverse - 1 goes up, other goes down

Why is the force of friction negative? opposes motion, slows down, or a is negative

What slows down a falling object? air resistance

What is inertia? property of matter to resist changes in motion

How do you find weight if you know lbs? ÷ 2.2 into kg x gravity

A semi collides with a sports car. ~~Which has greater force? Acc?~~ greater deceleration same force, smaller car > a

What is a g-force? how many x your weight you are experiencing

What is meant by ~~a negative g, like -1 g's~~ 0.25 g's? you feel 1/4 your weight

A heavy car weighs 3500 lbs and needs a force of 6550 N to accelerate from rest to a speed of 65 mph. Calculate the time it will take to reach that speed.

$m = \frac{3500\ lb}{2.2} = 1591\ kg$

$F = 6550\ N$

$v_i = 0$

$v_f = 65\frac{m}{hr} \times \frac{1609\ m}{1\ mi} \times \frac{1\ hr}{3600\ s} = 29.05\ m/s$

(1) $F = m \cdot a$

$6550 = (1591)a$

$a = 4.12\ m/s^2$

(2) $a = \frac{v_f - v_i}{\Delta t}$

$4.12 = \frac{29.05 - 0}{\Delta t}$

$\Delta t = 7.05\ sec$

You are riding the Northern Lights (I think it is now called Ghost Zone) ride at MOA and have a scale in your chair. Your resting weight is 175 lbs. At the top your weight is 105 lbs and at the bottom you find your weight to be 245 lbs.

a. Find the **acceleration** at the bottom when you feel heavier. (it will be negative) How many **g-forces** do you feel?

rest $175\ lb = 79.5\ kg = -780\ N$

top $105 = 47.7\ kg = -468\ N$

bottom $245 = 111\ kg = -1091\ N$

bottom $F = m_{rest}(9.8 + a)$

$-1091\ N = 79.5(-9.8 + a)$

$-13.72 = -9.8 + a$

$a = -3.92\ m/s^2$

g force = $\frac{\text{total force}}{\text{W (at rest)}}$

$\frac{-1091}{-780} = 1.4\ g's$

b. Find your **acceleration** at the top when you feel lighter. How many **g-forces** do you feel?

top $F = m_{rest}(-9.8 + a)$

$-468 = 79.5(-9.8 + a)$

$-5.89 = -9.8 + a$

$a = 3.91\ m/s^2$

g force = $\frac{-468}{-780} = 0.6\ g's$

A toy car (mass=25.5 g) starts at rest and travels 2.3 meters in 1.75 sec. What **force** did the car need to move that fast? What is the **weight** of the car?

$m = .0255\ kg$

$\Delta x = 2.3\ m$

$\Delta t = 1.75\ sec$

① Find a

$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$

$2.3 = \frac{1}{2} a (1.75)^2$

$a = 1.50\ m/s^2$

② $F = m \cdot a$

$(.0255)(1.5\ m/s^2)$

$F = .038\ N$

③ $W = m \cdot gravity$

$(.0255)\ 9.8$

$W = 0.25\ N$