Name _Braun_ Date _____

Period _____ Points available: ☐

Physics
Worksheet – Newton's Second Law Problems

Show all work. Use problem solving format.

1. If a plane is flying at a constant speed, are there no forces acting on it? Explain.

   _____
   _____
   _____
   _____
   _____

2. If only one force is acting on an object, can the acceleration be zero? Explain

   _____
   _____
   _____
   _____

3. Describe a situation in which the velocity and acceleration of a car are in the opposite directions.

   _____
   _____
   _____
   _____
   _____

4. What force is required to accelerate a 60kg child on a sled at 1.25m/s^2?

K	U
m=60kg	F
a=1.25 $\frac{m}{s^2}$	

   $\Sigma F = ma$
   $= 60(1.25)$
   $\boxed{F = 75 N}$

5. How much tension must a rope be able to withstand if it is used to accelerate a 960kg car along a frictionless surface at 1.20 m/s^2?

K	U
m=960kg	F
a=1.2 $\frac{m}{s^2}$	

   $\Sigma F = ma$
   $= 960(1.2)$
   $\boxed{F = 1152 N}$

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6. What is the average force required to stop an 1100kg car in 9 seconds if it is traveling 32m/s?

k	v
$m = 1100 kg$	$F =$
$t = 9.0 s$	$a =$
$V_i = 32 \frac{m}{s}$	
$V_f = 0 \frac{m}{s}$	

$\Sigma F = ma$

$= 1100 (-3.56)$

$\boxed{F = -3911 N}$

$\cancel{V_f^2 = V_i^2 + 2ad}$

$0 = 32^2 + 2a(\;)$

$V_f = V_i + at$

$0 = 32 + a(9)$

$-32 = 9a$

$\boxed{-3.56 \frac{m}{s^2} = a}$

7. What is the average force required to accelerate a 7 gram bullet from rest to 125 m/s over a distance of 0.8m in the barrel of a rifle?

k	v
$m = .007 kg$	$F =$
$V_i = 0 \frac{m}{s}$	$a =$
$V_f = 125 \frac{m}{s}$	
$d_f = 0.8m$	

$\Sigma F = ma$

$= .007 (9766)$

$\boxed{F = 68.4 N}$

$V_f^2 = V_i^2 + 2ad$

$125^2 = 0^2 + 2a(.8)$

$a = 9766 \frac{m}{s^2}$

8. A baseball catcher catches a 0.14kg baseball that is traveling 35m/s. The glove moves backward 11.0cm during the catch. What was the average force applied by the catcher?

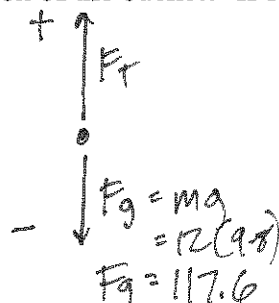| k	v
$m = .14 kg$	F
$V_i = 35 \frac{m}{s}$	
$V_f = 0 \frac{m}{s}$	
$d_f = .11m$	

$\Sigma F = ma$

$= .14 (5568)$

$\boxed{F = -780 N}$

$V_f^2 = V_i^2 + 2ad$

$0 = 35^2 + 2a(.11)$

$a = -5568 \frac{m}{s^2}$

9. A 12.0kg bucket is lowered vertically by a rope that has a tension of 163-N. What is the acceleration of the bucket? Is it up or down?

k	v
$m = 12 kg$	$a =$
$F_T = 163 N$	
$F_g = 117.6 N$	

$\Sigma F = ma$

$F_T - F_g = ma$

$163 - 117.6 = 12a$

$45.4 = 12a$

$\boxed{a = 3.78 \frac{m}{s^2}}$ $\boxed{UP}$

$F_g = ma$

$= 12(9.8)$

$F_g = 117.6$

10. The cable in a 2125kg elevator has a maximum strength of 21,750-N. What is the maximum upward acceleration it can give the elevator without breaking?

k	v
$m = 2125 kg$	a_{max}
$F_T = 21,750 N$	
F_g	
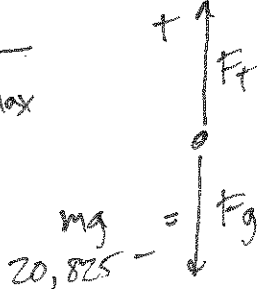
$\Sigma F = ma$

$F_T - F_g = ma$

$21,750 - 20825 = 2125a$

$\boxed{a = 0.44 \frac{m}{s^2}}$

$mg = F_g$

$20,825$

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