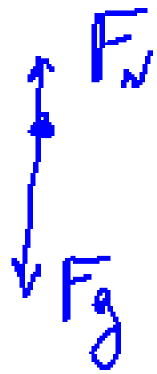
Unit 3 Review WS

1. B
2. C
3. A
4. A
5. B

6. An equal 10N force in the opposite direction

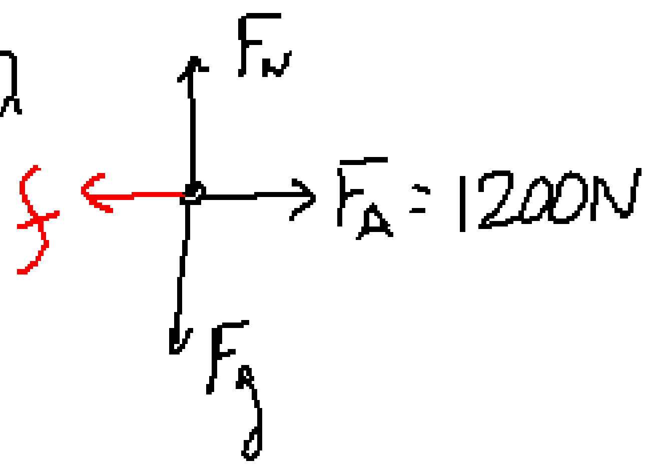
7. Apparent weight (Normal force) will be less than F_g since acceleration is negative (downward)



8. You are an object in motion You keep moving straight until the car door acts on you.

9. Both experience equal impact force The Bug experiences a greater change in momentum.

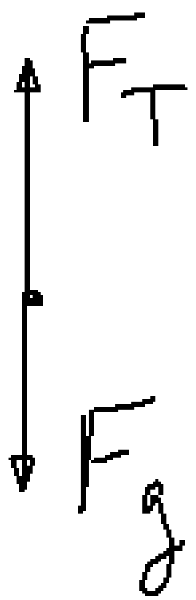
10a



Since it moves at a constant velocity, the car must have an equal friction force acting on it. $f = 1200N$

11. Since the bucket is in equilibrium, the forces acting on it must balance each other. Therefore, the force of gravity equals the tension in the rope.

FBD



$$F_g = mg$$

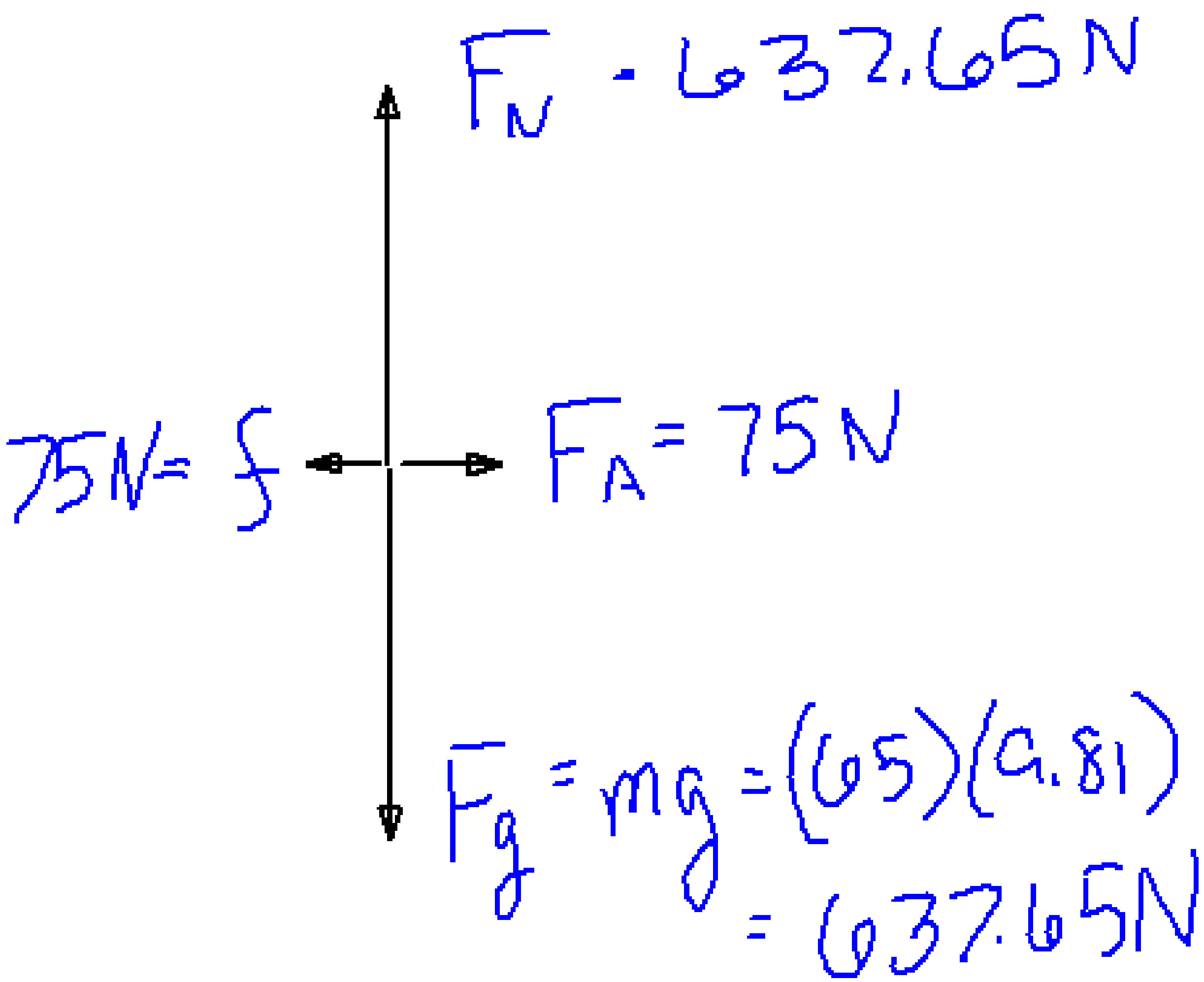
$$F_g = (4.2\,kg)(9.81\,m/s^2)$$

$$= 41.20\,N$$

$$F_N = F_g = 41.20\,N$$

12. Since the object has constant velocity, it is in equlibrium. All the forces must be equal: $F_N = F_g$ and $F_A = F_f$

Since the applied force equals the Friction forces you can substitute 75 N for the friction. The Normal force is equal to the weight.



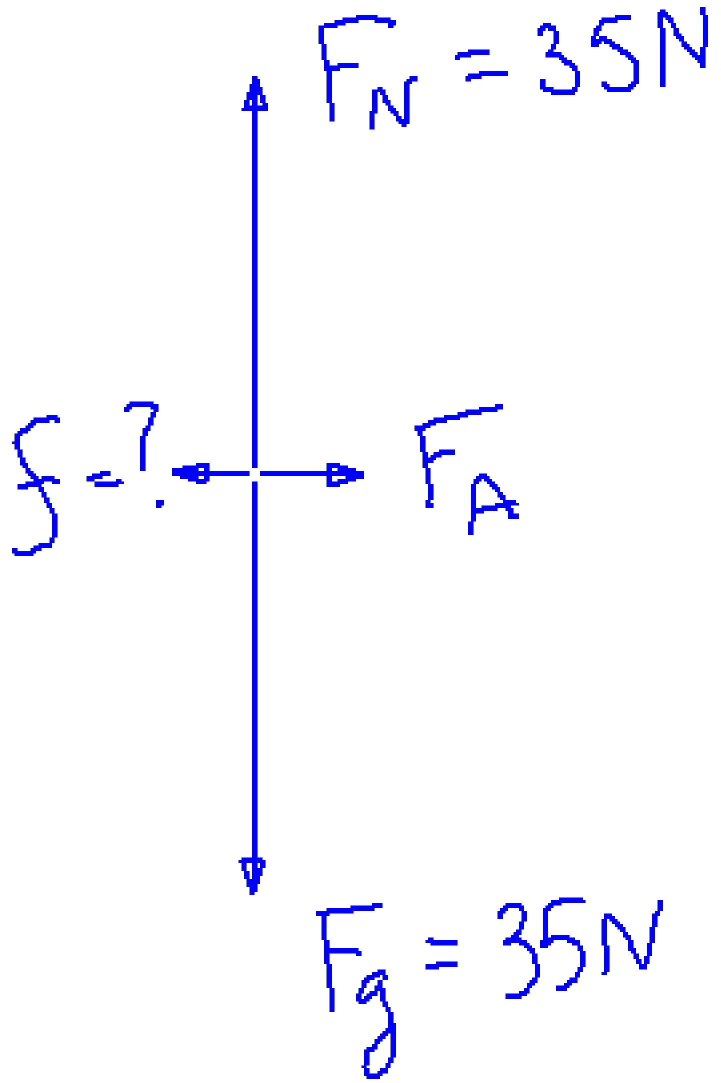
$\mu = ?$

$f = \mu N$

$75 = \mu\, 637.65$

$\underline{\mu = .12}$

13. It is moving at a constant velocity so Applied Force equals Friction Force. Solving for friction requires the coefficient of friction (μ) and the normal force, which is equal to the weight.



$$f = \mu N$$

$$f = (0.4)(35)$$

$$f = 14\,N$$

14. *Make a list of all of your vaiables. Since you are solving for Force you can use either Newton's second Law or Impulse Momentum. It is your choice.*

$vi = 0\ m/s$

$vf = 43\ m/s$

a

$t = 0.45\ s$

Δx

$m = 0.25\ kg$

Solve for "a" first

$V_f = V_i + at$

$43 = 0 + a(.45)$

$a = 95.56\ m/s^2$

$F_{Net} = ma$

$F_{Net} = 0.25(95.56)$

$F_{Net} = 23.89\ N$

$vi \cdot 0\ m/s$

$vf = 43\ m/s$

$a = ?$

$t \quad 0.45\ s$

$\Delta x = ?$

$m = 0.25\ kg$

$Ft = m(V_f - V_i)$

$F(.45) = (.25)43$

$F = 23.89\ N$

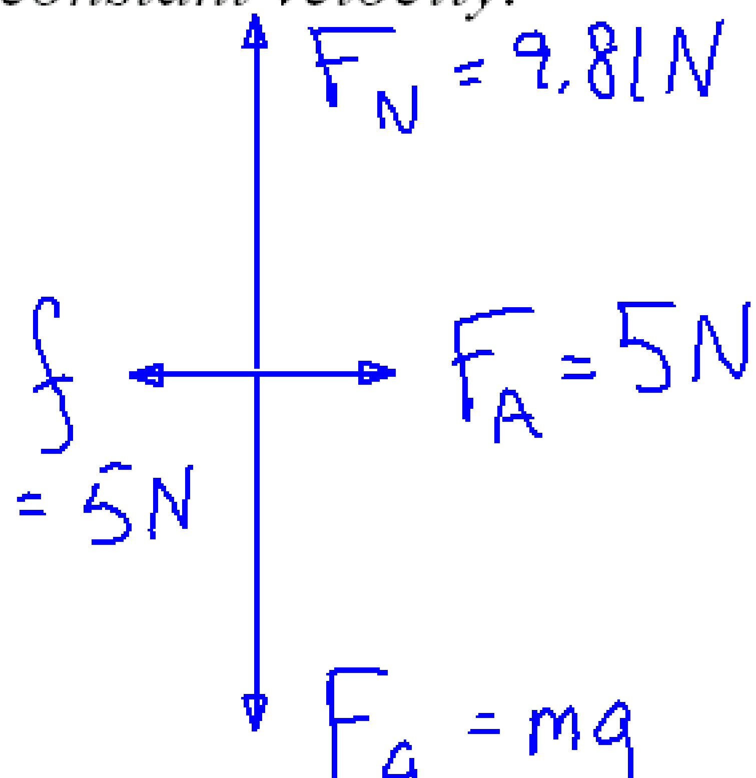
15. Use $p = mv$

$$p = mv$$

$$p = .185(25.5)$$

$$\underline{p = 4.72\ kgm/s}$$

16. There must be friction since it is at constant velocity.



$$= 1(9.81)$$

$$\underline{= 9.81N}$$

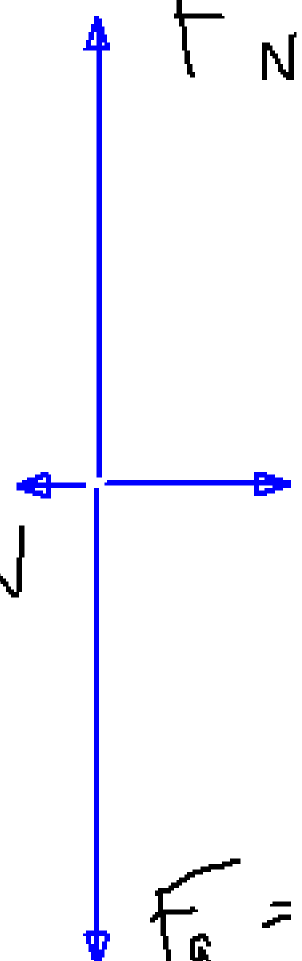
$$\underline{F_{Net} = 0}$$

$$\underline{a = 0}$$

17. Since the applied force is bigger than the friction force, the truck will accelerate.
Use Newton's Second Law to solve for the acceleration.

(A)

$F_N = 9025.2\,N$



$f = 115\,N$

$F_A = 300\,N$

$F_g = mg = (920)(9.81)$

$F_g = 9025.2\,N$

(B)

$$F_{Net} = F_A - f$$

$$= 300 - 115$$

$$F_{Net} = 185\,N$$

(C)

$$a = \frac{F_{Net}}{m} = \frac{185\,N}{920\,kg}$$

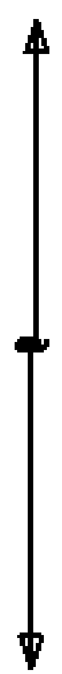
$$a = .201\,m/s^2$$

18.

Part A

Apparent Weight is equal to Normal Force!!!

She moves at a constant velocity so all forces are equal.



$F_N = 490.5N$

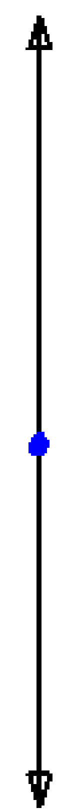
apparent weight $= 490.5N$

$F_g = mg = 50(9.81)$

$\underline{490.5N}$

Part B

Since there is (+) acceleration, the upward forces must be greater than downward forces. Normal force must be greater than weight! (weight doesn't change)



$F_N = ?$

$F_g = 490.5N$

$F_{NET} = ma$

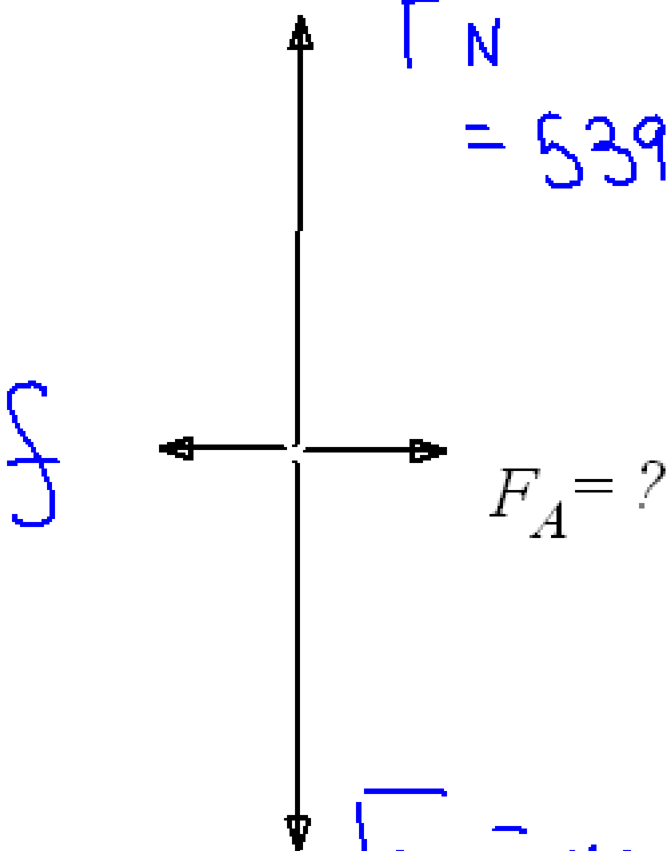
$F_N - F_g = ma$

$F_N - 490.5 = (50)(2.5)$

$\underline{F_N = 615.5N}$

19. You want to answre what the applied force is. The applied force has to be equal to the <u>friction force</u> since the object is moving at a constant velocity.

$F_N = 539.55N$



$F_g = mg = (55)(9.81)$

$\underline{F_g = 539.55N}$

$F_A = f$

$f = \mu N$

$= (0.15)(539.55)$

$f = 80.93N$

$\underline{F_A = 80.93N}$

20. Your can solve using Newton's Second Law or Impulse-Momentum. This time I am using Impulse-Momentum because it is easier.

$v_i =$ 0 m/s

$v_f =$ 57.3 m/s

$a =$?

$t =$ 3.5 s

$\Delta x =$?

$m =$ 6,000 kg

$$Ft = m(v_f - v_i)$$

$$F(3.5) = (6000)(57.3 - 0)$$

$$F = 98{,}228.57\ N$$

21. *Since the ball is heading towards the batter, it has (+) velocity initially and then has (-) velocity after being hit.*

Part A

$vi = +42\ m/s$

$vf = -58\ m/s$

$t =$

$m = 0.145\ kg$

$$\Delta p = m(v_f - v_i)$$

$$\Delta p = 0.145(-58 - 42)$$

$$\Delta p = -14.5\ kg\,m/s$$

Part B $t = .00046\ s$

$$Ft = \Delta p$$

$$F(.00046) = -14.5$$

$$F = -31521.7N$$