F=ma Worksheet

Show all work!!! FBD, Drawings, F_{net} equations, givens, motion equations, substitutions and answers.

1. A 95 kg person falls at terminal (constant) velocity through the air while skydiving. What is the net force acting on the person?

$F_{NET} = 0$ For Constant Velocity

2. A 25 kg box is pulled by a net force of 150 N. What would its acceleration be?

$F_{Net} = ma$

$150 = 25a$

$a = \frac{150}{25} = 6 m/s^2$

3. If a child on a bike produces a net force of 180 N and is observed to accelerate at a rate of 3.0 m/s^2. What is the total mass of the child and his bike?

$F_{NET} = ma$

$180 = 3m$

$m = 180/3 = 60 kg$

4. A 1.800 Kg cart starts from rest and accelerates through a distance of 1.2 m in 2.1 s. What is the net force acting on the cart?

$V_i = 0$

$V_f = *$

$d = 1.2$

$a = ?$

$t = 2.1$

$F_{NET} = ma$

$M = 1.8 kg$

NEED a? →

$d = v_i t + \frac{1}{2} a t^2$ ($v_i t = 0$)

$1.2 = \frac{1}{2} a (2.1)^2$

$1.2 = \frac{1}{2} a (4.41) = 2.205a$

$a = \frac{1.2}{2.205} = 0.544 m/s^2$

$F = 1.8 (.544) = 0.98 N$

5. A 2.3 kg cart is moving at 2.1 m/s when a net force of 3.5 N acts in the direction of movement. How fast will the cart be traveling after 5.0 s?

$V_i = 2.1$
$V_f = ?$
$d = *$
$a =$
$t = 5$

WE NEED To find "a" So that WE can Find V_f

$F_{NET} = ma$
$3.5 = 2.3a$
$a = \frac{3.5}{2.3} = 1.52 m/s^2$

$V_f = V_i + at$
$V_f = 2.1 + 1.52(5)$
$V_f = 9.7 m/s$

6. A 1500 kg car drifts along a level road and slows down from +35 m/s to +25 m/s in 30 seconds. What is the net force acting on the car?

$V_i = 35$
$V_f = 25$
$d =$
$a = ?$
$t = 30$

$F_{net} = ma$
~~$F_{NET} =$~~
$F_{net} = 1500a$
$F_{NET} = 1500(-0.333)$
$F_{NET} = -500 N$

$V_f = V_i + at$
$25 = 35 + 30a$
$-10 = 30a$
$a = -0.333$

7. On Mars, you observe a freely falling object drop 1.83 m in one second (remember in free fall we start from rest). What will the 61 kg girl weigh on Mars?

$V_i = 0$
$V_f =$
$d = 1.83$
$a =$
$t = 1.0$

First Find "a"
$d = V_i t + \frac{1}{2} a t^2$
$1.83 = \frac{1}{2} a (1)^2$
$a = 2(1.83)$
$a = 3.66 m/s^2 = g$

$F_g = mg = 61(3.66)$
$F_g = 223 N$

8. The g on Jupiter (cloud tops) is estimated at 26 m/s^2. How much would a 2.1 Kg camera weigh there?

$F_g = mg = (2.1)(26) = 54.6 N$

(2) 6.0 m/s^2 (3) 60 kg (4) 1.0 N (5) 9.7 m/s (6) -500 N (7) 223 N (8) 54.6 N