Friction Force = $f = \mu N$

1. A 7.6 kg object is resting on a horizontal surface. What is the normal force on the object?

$N = F_g$ since the object is not accelerating in the y direction.

$N = F_g = mg = (7.6\ kg)(9.8 m/s^2) = 74.48\ N$

2. A 7.6 kg object is pulled along a horizontal surface. If the coefficient of friction is 0.20, what is the force of friction? $N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (7.6\ kg)(9.8 m/s^2) = 74.48\ N$

$f = \mu N = (0.20)(74.48\ N) = 14.896\ N$

3. A 9.6 kg object is pulled along a horizontal surface. If the coefficient of friction is 0.11 what is the force of friction? $N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (9.6\ kg)(9.8 m/s^2) = 94.08\ N$

$f = \mu N = (0.11)(94.08\ N) = 10.35\ N$

4. A 20.0 N object is pulled along a horizontal surface at a constant velocity by a 3.0 N force, what is the coefficient of friction? $N = 20.0\ N$

Since it being pulled by a constant velocity the applied force will equal the friction force

$F_A = 3.0\ N = f = \mu N = \mu(20.0\ N)$ Solving for μ gives the following

$\mu = 3.0\ N / 20.\ N = 0.15$

5. A 16.2 kg object is pulled along a frictionless surface by an applied force of 10.2 N, what is the normal force acting on it? $N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (16.2\ kg)(9.8 m/s^2) = 158.76\ N$

The 10.2 N applied force is extra information. The fact it is friction less is also extra information.

6. A 6.2 kg object is pulled along a horizontal surface by a force of 22.0 N. If its acceleration is 1.1 m/s^2 , what is the coefficient of friction between the two surfaces?

$N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (6.2\ kg)(9.8 m/s^2) = 60.76\ N$

$a_x = 1.1\ m/s^2$

$m = 6.2\ kg$

$F_A = 22.0\ N$

$f = \mu N$

$F_{net\,x} = F_A - f = ma_x$

$= F_A - \mu N = ma_x$

$= 22.0\ N - \mu(60.76\ N) = (6.2\ kg)(1.1\ m/s^2)$

Solve for μ by subtracting 22.0 N and then dividing by -60.76 N

$\mu = 0.25$

7. A 1250 kg car traveling at 60.0 km/h comes to a sudden stop in 4.25 seconds. What is the coefficient of friction acting on the brakes?

$N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (1250\ kg)(9.8 m/s^2) = 12{,}250\ N$

a_x = To find this we need take the change in velocity divided by the change in time. We do need to convert 60.0 k/h to m/s doing a picket fence we get that v =16.67 m/s

dividing by time we get a =-3.92 m/s^2

m = 1250 kg

$f = \mu N$

$F_{net\,x} = -f = ma_x$

$= -\mu N = ma_x$

$= -\mu(12{,}250\ N) = (1250\ kg)(-3.92\ m/s^2)$

Solve for μ by dividing by -12,250 N

μ = 0.4

8. A 950 kg car traveling at a constant velocity of 28 m/s, has a coefficient of friction of 0.125 acting on its axle. How much force is required by the engine to maintain its speed?

$N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (950\ kg)(9.8 m/s^2) = 9310\ N$

$a_x = 0$, since it is traveling at a constant speed.

m = 950 kg

$F_A = f$, because constant speed implies the forces are balanced

$f = \mu N$

$F_{net\,x} = F_A - f = ma_x = 0$

$F_A = f = \mu N$

$F_A = (0.125)(9310\ N) = 1163.75\ N$

9. A 1425 kg dragster exerts 13,900 N of force and accelerates from 0 to 100.0 km/h in 3.25 s. What is the coefficient of friction acting on the car?

$N = F_g$ since the object is not accelerating in the y direction

$N = F_g = mg = (1425\ kg)(9.8 m/s^2) = 13{,}965\ N$

a_x = To find this we need take the change in velocity divided by the change in time. We do need to convert 100.0 k/h to m/s doing a picket fence we get that v =27.78 m/s

dividing by time we get a = 8.547 m/s^2

m = 1425 kg

F_A = 13,900 N

$f = \mu N$

$F_{net\,x} = F_A - f = ma_x$

$= F_A - \mu N = ma_x$

$= 13{,}900\ N - \mu(13{,}965\ N) = (1425\ kg)(8.547\ m/s^2)$

Solve for μ by subtracting 13,900 N and then dividing by -13,965 N

μ = 0.123