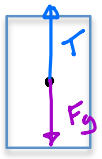
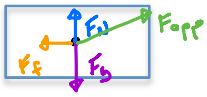
Forces Worksheet 1 (FBD's and Net Force) Name: _____

1) Draw a free body diagram to show the forces involved in the situations below.

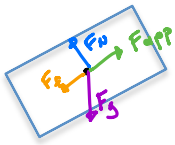
a) A holiday decoration is hanging from the ceiling by a light (massless) string.



b) A child is pulling his younger brother in a sled on snow (friction is involved).

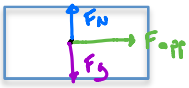


c) In order to move a piano, movers have set up a ramp. They are pulling the piano up the ramp, which is not frictionless. Draw the forces acting on the piano.

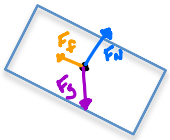


d) The engine of a rocket is pushing the rocket towards the sky.

e) A girl is pushing a box on a frictionless surface.



f) A box is sitting on a rough (friction) inclined plane.



Forces Worksheet 1 (FBD's and Net Force) Name: _____

2) What is the net force in the situations below? (Start with a FBD.)

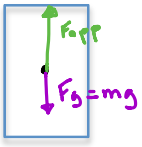
a) A boy pushes a 10.0 kg box with a force of 50 N. The friction force is equal to 10 N. What is the net force acting on the box?

$F_{Net} = F_{app} - F_f$

$F_{Net} = 50N - 10N$

$= \boxed{10\,N}$

b) A engine pushes an 800 kg rocket up with a force of 10 000 N. What is the net force acting on the rocket?



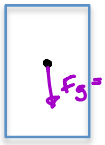
$F_{Net} = F_{app} - F_g$

$F_{Net} = 10{,}000 - (800)(9.8)$

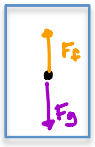
$= \boxed{2000N\ up}$

c) A 1.0 kg rock is dropped from the top of a building. What is the net force if

i. there is no air resistance



ii. there is air resistance (5.0 N)



$F_{Net} = F_g - F_f$

$= 9.8N - 5.0N = \boxed{4.8N}$

d) A boy is trying to push a 10 kg box on a rough floor. He pushes with 19.6 N. The force of friction has a magnitude equal to 20% of the weight of the box. The normal force has a magnitude of 98 N. What is the net force on the box?

$F_f = (0.20)\cdot(10)(9.8)$

$= 19.6N$

$F_{Net} = F_{app} - F_f = 19.6N - 19.6N$

$\boxed{F_{Net} = 0\,N}$