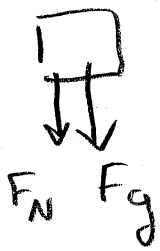
Unit VIII: Worksheet 2

(1) (a) $F_C = \frac{mv^2}{r} = \frac{55(65)^2}{380} = 611.5 = 610\,N$

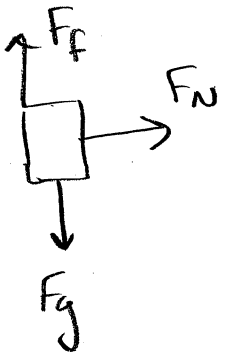
(b) 

(plane is upside down, therefore the normal force from the seat is pointing down)

(c) $F_C = F_N + F_g = 610\,N$

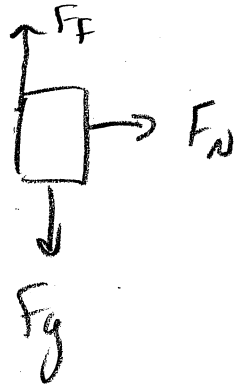
$F_N = 610 - F_g = 610 - 55(10) = 60\,N$

The woman feels lighter than normal as $F_N < F_g$.

(2) 

The person is moving in a circle. Therefore a centripetal force exists. The centripetal force points towards the center of the circular path. In this case, the normal force is pointing in the direction of the centripetal force. This means that $F_N = F_C$.

2 continued.



The frictional force is holding the person in place. It must be equal to the gravitational force as these are the only forces acting in the vertical direction

$$F_f = F_g$$

$F_f = \mu F_N$ definition of frictional force.

$F_g = \mu F_N$ as stated above

$F_g = \mu \frac{mv^2}{r}$ since $F_N = F_c = \frac{mv^2}{r}$

$mg = \mu \frac{mv^2}{r}$ since $F_g = mg$

$v = \sqrt{\frac{gr}{\mu}}$ rearranging the equation

$v = \sqrt{\frac{10(1.5)}{.5}} = \underline{2.7 \text{ m/s}}$