

SENSING SENSATIONS & FORCE FACTORS



1. Here you are in a chair. Show the size and direction of the force the **chair** is exerting you. On what part of your body is this force exerted?



2. Here you are standing up. Show the size and direction of the force the ground is exerting on you. On what part of your body is the force exerted?



3. Here you are lying on the ground. Show the size and direction of the force the ground is exerted?



4. Here you are upside down and strapped into a chair. Show the size and direction of the force that keeps you from falling out. What is exerting this force and on what part of your body is it exerted?

5. Based on your answers to the previous questions, how could you tell what position you were in if your eyes were closed?

FORCE FACTORS:

A force factor enables you to express the size of a force you are experiencing as a multiple of your weight. Remember, your weight is the force, mg, that is exerted on you by gravity.

TO CALCULATE A FORCE FACTOR, divide the force being applied to a person or object by the normal weight of that person or object.

$$\text{Force Factor} = \frac{\text{Force being applied}}{\text{Weight}}$$

EXAMPLES OF HOW TO USE A FORCE FACTOR

When you are experiencing a force factor:

EQUAL to 1, you feel **NORMAL**. **RIGHT NOW** you feel a force on your seat exactly equal to your weight as the seat supports you.

GREATER than 1, you **FEEL HEAVIER** than normal and feel pressed into the chair. In reality, the chair is pressing up on you which you interpret as being pushed down.

LESS than 1, you **FEEL LIGHTER** than usual and can feel as if you are almost lifting out of the chair. This is how you feel when an elevator starts down suddenly.

At a given point on a ride, everyone, regardless of mass, experiences the same force factor.

On a certain ride a 50 kg girl is being pushed with a force of 1500 Newtons.

(a) What force-factor is she experiencing?

If we round g off to 10 m/sec^2 she weighs 500 Newtons.

$$\text{Force factor} = \frac{\text{Force being applied}}{\text{Weight}} = \frac{1500 \text{ newtons}}{500 \text{ newtons}} = 3$$

(b) If her friend weighs 120 pounds, what force in pounds is her friend feeling?

They will feel the same force-factor. This time, the number given is the person's weight. Her normal weight is 120 pounds, but she is experiencing a force-factor of 3 and is therefore feeling a force of 3 times her normal weight. The force on her must be $3 \times 120 \text{ pounds} = 360 \text{ pounds}$.

YOUR TURN, SHOW YOUR WORK

An 80 kg boy is on a ride where he is feeling a force of 2000 Newtons.

(a) What force factor is he experiencing?

Force Factor = _____

(b) What force is his 500 newton girl friend feeling?

Force felt = _____ newtons

If your answers were a force-factor of 2.5 and 1250 newtons, you've got it!!