

### Phys.115 - Newton's Laws

Imagine that you are holding a book weighing 4 N at rest on the palm of your hand. Complete the following sentences:

- a) A downward force of magnitude 4 N is exerted on the book by \_\_\_\_\_
- b) An upward force of magnitude \_\_\_\_\_ is exerted on \_\_\_\_\_ by the hand.
- c) Is the upward force (b) the reaction to the downward force (a)?
- d) The reaction to force (a) is a force of magnitude \_\_\_\_\_, exerted on \_\_\_\_\_ by \_\_\_\_\_. Its direction is \_\_\_\_\_.
- e) The reaction to force (b) is a force of magnitude \_\_\_\_\_, exerted on \_\_\_\_\_ by \_\_\_\_\_. Its direction is \_\_\_\_\_.
- f) That the forces (a) and (b) are equal and opposite is an example of Newton's \_\_\_\_\_ law.
- g) That the forces (b) and (e) are equal and opposite is an example of Newton's \_\_\_\_\_ law.

Suppose now that you exert an upward force of magnitude 5 N on the book.

- h) Does the book remain in equilibrium?
- i) Is the force exerted on the book by the hand equal and opposite to the force exerted on the book by the earth?
- j) Is the force exerted on the book by the earth equal and opposite to the force exerted on the earth by the book?
- k) Is the force exerted on the book by the hand equal and opposite to the force exerted on the hand by the book?

Finally, suppose that you snatch your hand away while the book is moving upward.

- l) How many forces then act on the book?
- m) Is the book in equilibrium?
- n) What balances the downward force exerted on the book by the earth?