

Happy Monday! Last week we talked about the crane pad, an area in which the crane operates. This week's wind study will look a little closer at a specific part of the crane... the wooden platforms!

If we recall from the last wind study, the wooden platforms are constructed using thick, rectangular cuts of wood. The wooden platforms need to be sturdy to support the weight of the crane and provide stability as the crane lifts objects. In this wind study we are going to calculate the forces exerted on the wooden platforms to show just how sturdy they are.

Remember that a force is a push or pull that is a result of an object's interaction with its surroundings. For example, any time you pull on a door handle, you are exerting a force on the door handle. And anytime you push a grocery cart, you are exerting a force on the grocery cart. Both these examples insinuate that an object only experiences force if it is in motion; however, that is not true, an object at rest can still interact with its surroundings.

Let's take a book sitting on a table as another example. The book is not moving, but it is still experiencing forces; two forces to be specific: the force of gravity and a normal force. The force of gravity is exerted upon all objects on earth and is defined as:

$$\text{Force of Gravity } (F_g) = \text{mass } (m) \times \text{acceleration of gravity } (g).$$

If the book is currently experiencing the force of gravity, how is it able to sit still on the table? This is where the normal force comes into play. The normal force ( $F_n$ ) is a force exerted by a stable object (in this case a table) upon an object with which it is in contact (the book). The image below displays how the normal force and force of gravity interact with the book in this scenario.

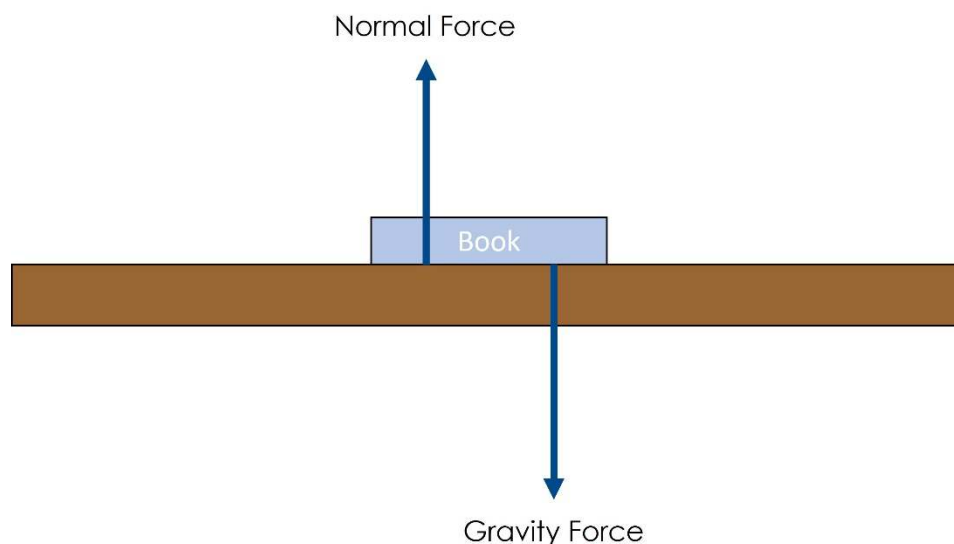


Figure 1: Example of forces on a stationary object

In the case of a stationary object, the normal force and the force of gravity have equal magnitudes but are exerted in opposite directions, hence why the book on the table does not move.

Now that we have an understanding of the forces on a stationary object, let's jump into the questions!

**Level 1:** Let's assume a crane is sitting on its wooden platform in the crane pad. If the mass of the crane is 17,943 lbs, what is the force the crane is exerting on the wooden platform? Assume  $g = 9.8 \text{ m/s}^2$ , give the answer in Newtons (N).

**Level 2:** If the mass of the wooden platform is 3,056 lbs, what is the force exerted on the wooden platform by the ground when the crane is sitting on the wooden platform? Assume  $g = 9.8 \text{ m/s}^2$ , give the answer in Newtons (N).