

Rowing newtons law essay sample



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Rowing is a sport where athletes race against each other in boats the sport is done on rivers, on lakes or on the ocean, depending on the type of race and the racing discipline. The goal of rowing is to create enough power, that the boat will travel a long distance, with minimal work. Physics is an important part of rowing. Several rowing terms deal with how the boat will move through the water, by the power of the stroke. Power is the force that drives the boat. The distance travelled is the motion of the boat in the water. The boats are propelled by the reaction forces on the oar blades as they are pushed against the water. When the rower puts pressure on the oar handle it is transferred to the blade and applies pressure on the water, which is the force that accelerates the boat forward. The rower works in a translational system: applying a force F and moving the handle with linear velocity v , hence producing power P (4. 1) | $P = F v$ |

During the drive the center of mass of the whole system moves forward and the center of pressure of the oar goes through the water. The reaction forces on the rowing blade is the sum of the drag and lift forces. Long term performance in rowing is difficult to analyse, and measure because it is significantly affected by weather conditions and differences over the courses.

A rowing boat is not a solid body it contains three separate components: 1.

The Crew, representing 70-80% of the total mass

2. The cox, representing 20-30% of the total mass

3. Oars representing less than 5%, which will be ignored So that means that there is more resistance in the boat than just the weight of the boat and rower.

The implication of Newton's first law is that rowers have to apply force to overcome drag and also they have to maintain linear movement of the boat. When the force through the oars is applied to the blade during the drive it creates a directed reaction force, according to the third Newton law. The forward motion of this reaction force is the only reason of the acceleration of the boat's centre of mass. According to Newton's second law, the magnitude of this acceleration in the boat is proportional to the mass of the system. When the centre of mass of the boat accelerates, it collects kinetic energy, which is spent on overcoming drag resistance and lost as heat to the surroundings of the rowing boat. But, rowing mechanics is not as simple as it looks. It may seem like the main target of the rower is acceleration of the boat and because the rowers sit in the boat the whole system moves as fast as the boat does. This simple observation leads to bad coaching theories, which can harm performance in rowing and the rower himself. Therefore it is important to get a good understanding of the physics so that you don't just accelerate through the drive and the recovery.

Part B.

The way to measure rowing is by measuring how fast the rower rows the distance 500 meters. E. g 1: 45 would be a split as you call the average speed on 500 meter. So if you row 2, 000m in 8 minutes, your av/500m split time is 2 minutes over that distance. However, at any one point in time you may have been rowing a bit slower or a bit faster than your average. You would probably have started slower and got much faster in the last few hundred metres. However we can only measure the term split on an ergometer which is an indoor rowing machine (rowing stimulator) created to

keep the rower fit during bad weather and also ideal for testing because of its very precise measuring. On the water we have a speed coach/stroke coach these are devices created to measure the speed of the boat by a small propeller underneath the boat, or by a magnet placed on the boat and on the seat rolling by. These are great to measure the speed and time travelled in the boat.