Block and Tackle Encyclopedia Article

Block and Tackle

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Contents

Block and Tackle Encyclopedia Article.....1

Contents.....2

Block and Tackle.....3

Block and Tackle

A *block and tackle* is a configuration of ropes and pulleys designed to gain a mechanical advantage when lifting objects.

Lifting a heavy object with a single rope wrapped around one pulley wheel requires a pulling force equal to the weight of the object. But by letting a second pulley hang below the first, and wrapping the rope around this second pulley, then back around the top pulley, the force required to lift the object is only one-half the weight of the object. The *mechanical advantage,* the ratio of weight to force applied, is two.

The rope can be looped around the bottom pulley yet again, then back around the top pulley, and the required force will be one-forth the weight, for a mechanical advantage of 4. Still more complicated arrangements can decrease the force even further, making it possible to lift heavy objects that would not be otherwise possible, such as a car engine out of the chassis of a car.

No less *work* is required, though, because the less force required to do the lifting, the greater the distance the rope must be pulled to lift the object. The block and tackle provides a mechanical advantage, but not an energy advantage.

Historically, the block and tackle has proven useful anywhere a force needed to be provided only occasionally and with no great urgency, such as farms and on ships. On ships the block and tackle was used with gears to move equipment such as sails and spars. Block and tackle using steel cable are commonly used in cranes for hoisting equipment.