NEWTON'S SECOND LAW PROBLEMS: MULTIPLE OBJECTS
Problems document

Brief answers to these problems are available in the Answers document.

Full solutions to the problems are available in the Solutions document, and in the YouTube videos.

You can find links to these resources at my website:
www.freelance-teacher.com

Links to the documents are also in the video description boxes for the YouTube videos.

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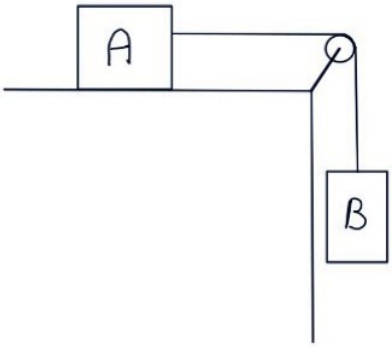
This video series is intended for students who find this material to be difficult, so in the videos I proceed slowly and repeat myself a lot. If you find the videos to move too slowly, you can simply try the problems in this Problems document, study the solutions in the Solutions document, and skip to any particular parts of the videos that cover aspects of the solutions that you find confusing.

Problems begin on next page.

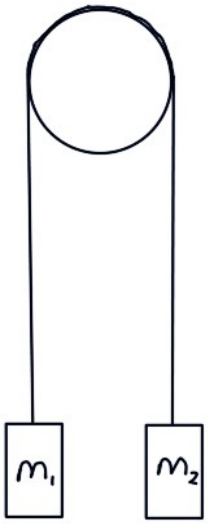
# Video (1)

Two blocks, A and B, are attached by a massless rope that has been slung over a massless, frictionless pulley. Block A has mass 4.5 kg; block B has mass 2.5 kg. Block A is initially held motionless; then it is released and begins sliding along the table. The coefficient of kinetic friction between block A and the table is 0.30.
(a) What is the tension in the rope after the block is released?
(b) How far does block B fall in 2 s after release?



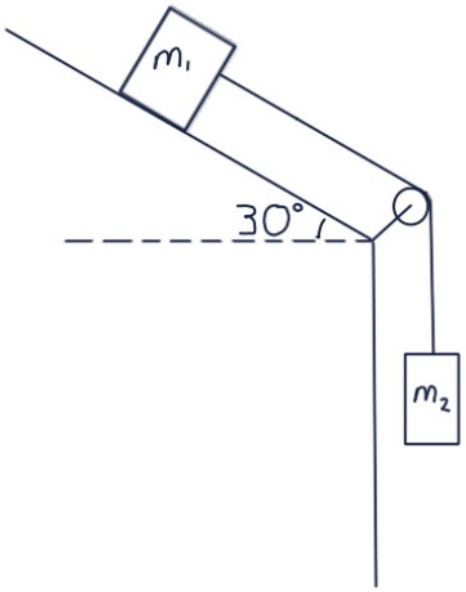
# Video (2)

Two masses, $m_1$ = 30 kg and $m_2$ = 50 kg, are connected by a massless rope that has been slung over a massless pulley. The two masses are initially held at the same height, and then they are released. What is the difference in the heights of the two masses at a time $t$ = 1.5 s after they are released?



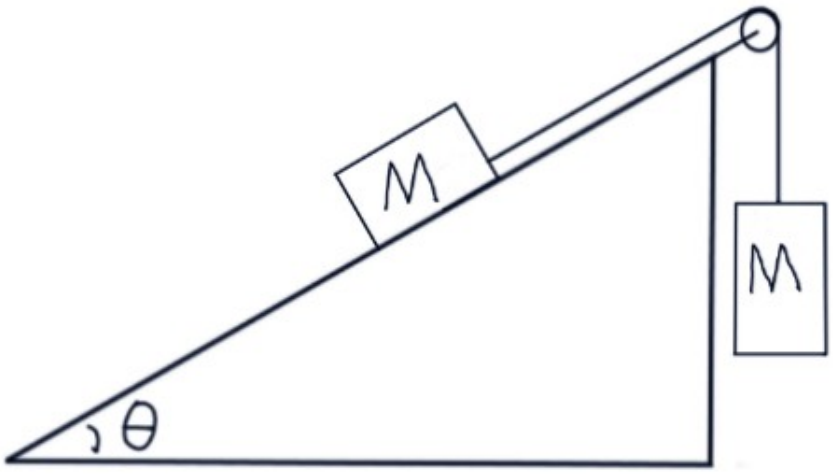
# Video (3)

In the diagram, $m_1$ = 3.0 kg and $m_2$ = 2.0 kg. The pulley is massless and frictionless. Mass 1 is sliding down the incline; mass 2 is falling. There is a coefficient of kinetic friction $\mu_k$ = 0.40 between mass 1 and the incline. Find the acceleration of the masses, and the tension in the rope.



# Video (4)

Two blocks, both with the same mass *M*, are attached by a rope that has been slung over a massless, frictionless pulley. What is the smallest coefficient of static friction $\mu_s$ that will prevent the blocks from moving?




more problems to come