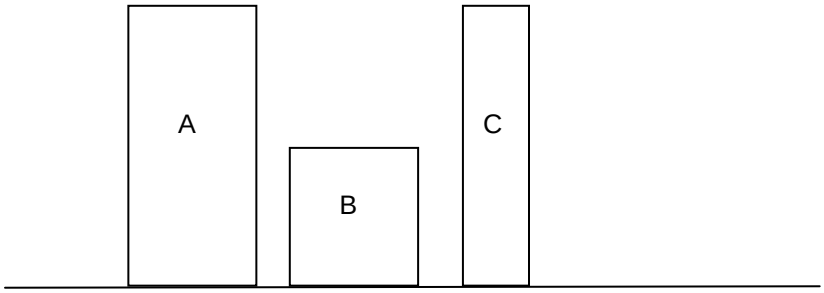
Preparation for Problem Solving II

Another important skill in doing physics problems is to be able to visualize the physical process being analyzed. It is difficult to construct diagrams or algebraic relations if you cannot visualize what's going on. These simple set-ups will provide a foundation for visualizing both mechanical systems as well as models for non-mechanical systems.

Words to Set-Ups

Use the set of objects provided by your instructor to physically set-up what is described here. Work in groups of at least two and make sure everyone in you group agrees with the final set-up. Have your instructor check that your set-up precisely matches the description.



(1) A large rectangular block is placed on the table with its smallest face in contact with the table. An identical block is placed on top of the first block with the second block's largest face on top of the first block. [How many correct variations of this set-up can you come up with?]

(2) Three blocks are stacked on an inclined plane with the smallest block in the middle and the largest block on top.

(3) Place a type C-block so that one of its largest faces is in contact with the table. Place an A-block on the table with its smallest face on the table. Place the two blocks such that the smallest face of the C block is two lengths (longest dimension) of the large block away from the second largest face of the large block.

(4) A B-block is placed with its largest face on an inclined surface. A C-block is placed on top of the B-block with its smallest face touching the B-block. The ramp is then inclined to the maximum angle that can be achieved without the C-block toppling.

(5) A C-block is placed on top of a B-block so that it lies across the diagonal of the largest face of the B-block. The C-block is centered on this diagonal. An A-block is placed small-face-down on top of the C-block and is rotated so as to make a right angle with the C-block. [How many right angles does the C-block make with the A-block?]

(6) An A-block is on the table with its largest side down. Place a B-block on its largest side so that its smallest side is touching the smallest side of the A-block.

(7) Place 2 C-blocks on the inclined plane, with the smallest faces touching the inclined plane. The two C-blocks should be separated by a distance equal to the longest side of a B-block. Place an A-block on top of the C-blocks with the largest face of the A-block touching the tops of the C-blocks.

The next two exercises have you construct models that show key states of physical processes.

(8) Two trains are located 200 miles apart. One train (use a single A-block) leaves station A heading toward station B at the same time a second train (use a B-block) leaves station B heading toward station A. The two trains pass each other 50 miles from station A. Using two A-blocks and two B-blocks, construct a physical model that shows both states (instants) described.

(9) A California condor flying over the desert admires the beautiful hues and shading of the soft dusk light. She looks down and sees telephone poles (C-blocks) on a straight, horizontal road. From experience, the condor knows that the distance between the poles is equal to the height of one pole. She spots two cars (use B-blocks) approaching each other with constant speeds. One car is at pole #1, the other is at pole #7. She notices that the car at pole #1 is traveling twice as fast as the car at pole #7, so—without a calculator!—she quickly predicts where the cars will pass. Place two B-blocks in the observed positions. Leave them there and place two more B-blocks in the predicted passing positions.

Now it's your turn!

(10) Write (in words) the description of three different challenge set-ups for your partner(s). One description should be of unstacked blocks on a horizontal surface—describe distances and orientations. The second description should be of blocks stacked on a horizontal surface. The third description should be of blocks stacked on an incline. Exchange written descriptions with your partner(s). Construct the set-ups that your partner has described (on paper) for you.