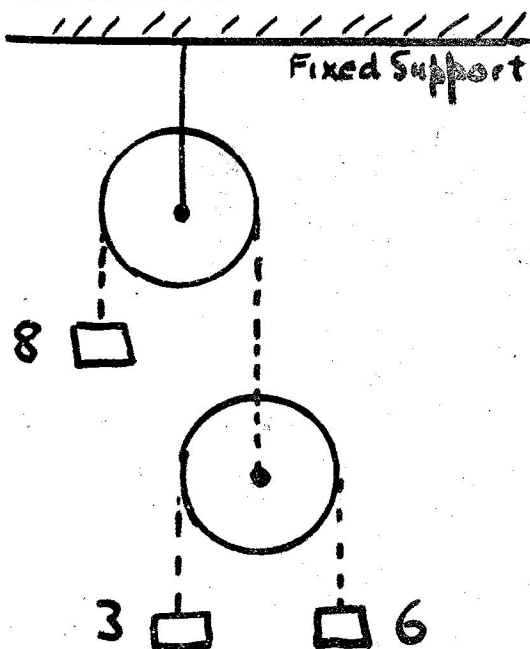


QUIZ ON QUALITATIVE PHYSICS

NAME \_\_\_\_\_

A Pulley Problem



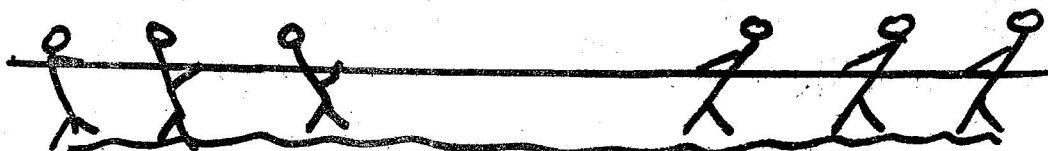
Light frictionless pulleys.  
Light inextensible strings.

Question 1.

The system is released from rest.  
Does the 8 kg. weight then move up or down or remain stationary?

The Tug-o-War

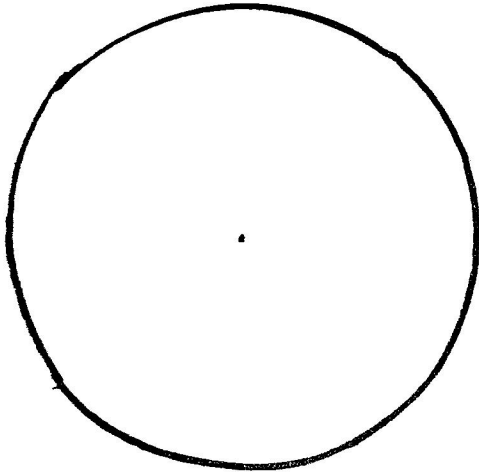
Two tug-of-war teams are perfectly matched. In competition they are supplied with a length of Blue-Line Rope.



At full loading, the rope snaps. One team returns home and practices against a sturdy brick wall using a new length of similar rope.

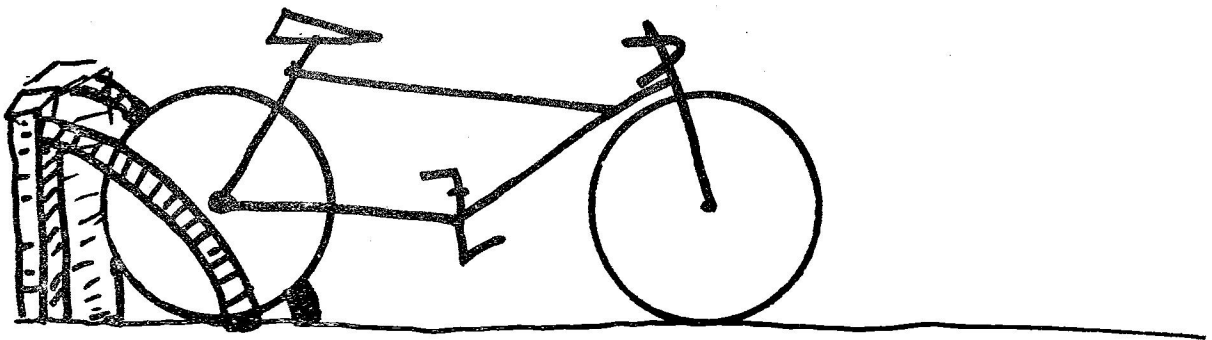


Can the team, by itself, snap this rope?

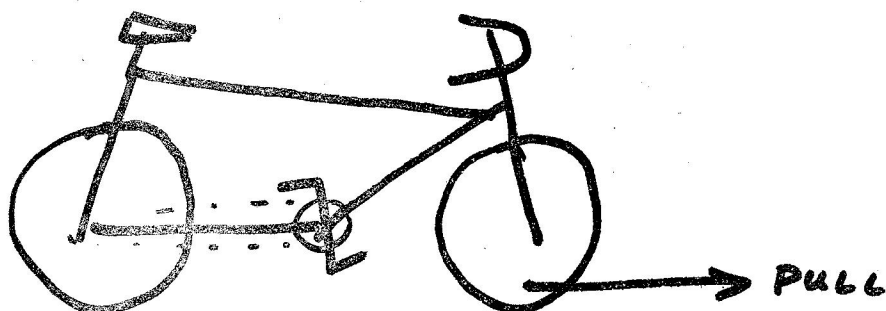


This is the rim of a bicycle wheel. Draw in the hub and spokes.

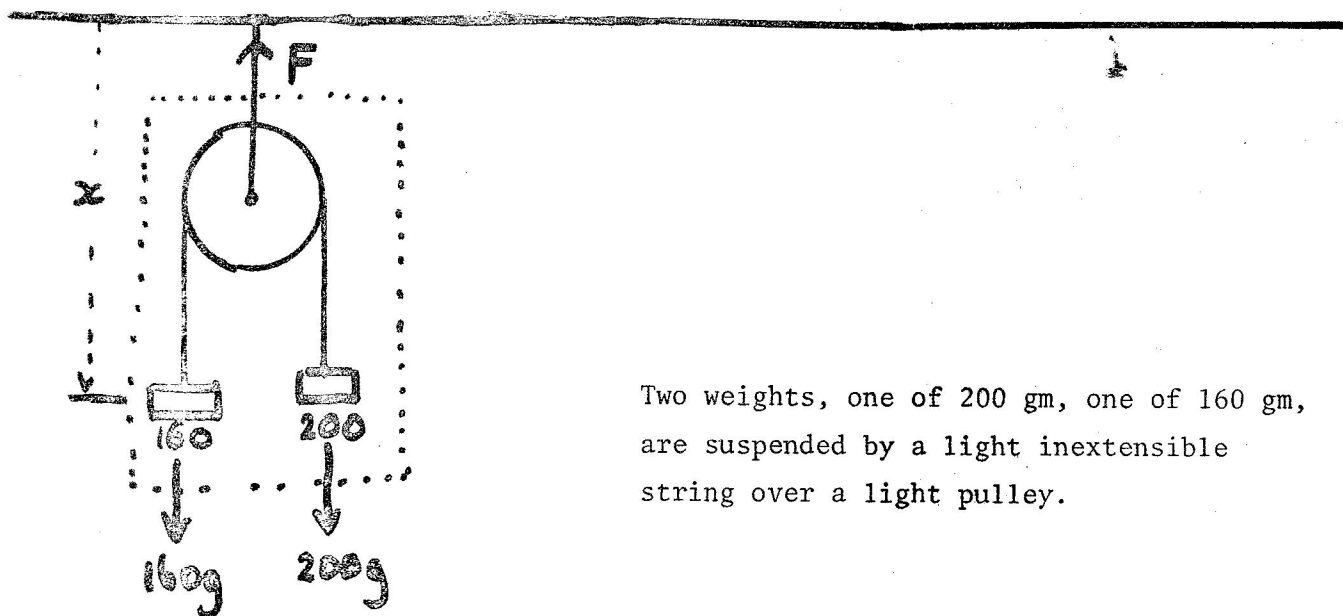
Suppose this wheel was fitted as the front wheel of a bicycle, which is upright, and which is kept from falling sideways by the arms of a bike stand.



A mischievous girl (sex chosen in deference to Women's Lib) comes along, and stealthily and carefully, one-by-one, removes the spokes. Suggest - with reasons - the strategy she should use so that the partly-spoked wheel continues to support to bike as long as possible. Mark the order of spokes she should remove - as 1 first, 2 second ... and 9 LAST. (The bike collapses when spoke(s) 9 is/are removed.)

The Bicycle Tug

A cord is attached to a point on the spokes of the front wheel of a bicycle, and the cord pulled. Which way does the bike move at first? (Assume someone stops the bike falling sideways.)



Two weights, one of 200 gm, one of 160 gm, are suspended by a light inextensible string over a light pulley.

Suppose the strain on the pulley support is  $F$ . Then the total mass acted on is 360. Total gravitational force downwards is 360 g. Hence, applying Newton's Law to the system, one has

$$360 \ddot{x} = 360 \text{ g} - F.$$

Now this formula yields the wrong answer for the downwards acceleration. What is wrong?

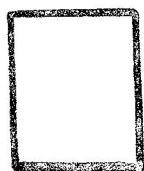
Could this approach be patched up - debugged? How?

### The Big Wheel

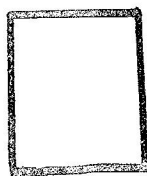
A wheel of one mile radius rolls past a window of normal dimensions near ground level. Sketch the view of the rim of the wheel as it passed by the window.

WHEEL ROLLS from LEFT to RIGHT.

→ THAT WAY →



View A



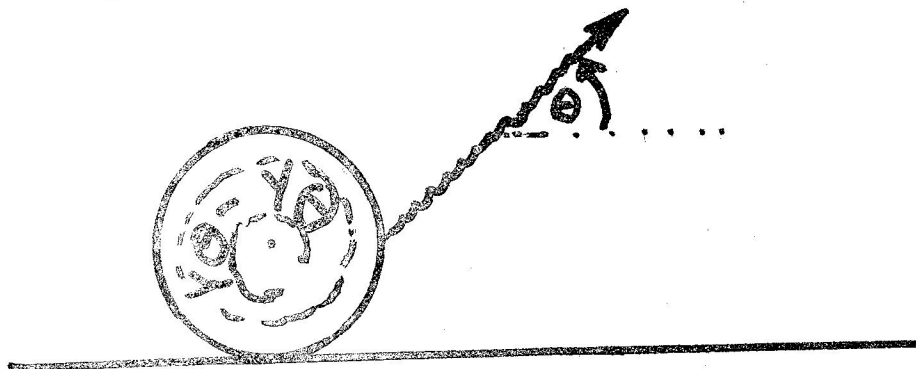
View B



View C

- A: Rim of wheel is first visible - about  $\frac{1}{4}$  of window blocked.  
 B: Wheel first blocks about  $\frac{1}{2}$  of window.  
 C: Wheel is receding - about  $\frac{1}{4}$  of window blocked.

### Yo-Yo



Which way does the YO-YO roll for various  $\theta$ ? e.g.  $\theta = 0^\circ$ ,  
 $\theta = 45^\circ$ ,  $\theta = 90^\circ$ ,  $\theta = 180^\circ$ . Indicate the direction of rolling  
 by an arrow.