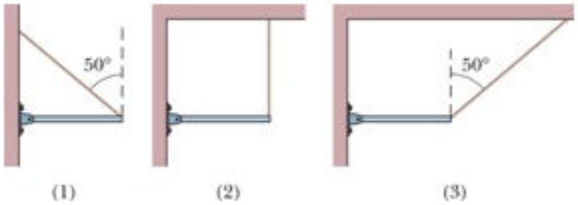
The figure shows three situations in which the same horizontal rod is supported by a hinge on a wall at one end and a cord at its other end.



In the following questions, you will need to rank the various situations. If multiple situations rank equally, use the same rank for each, then exclude the intermediate ranking (i.e. if objects A, B, and C must be ranked, and A and B must both be ranked first, the ranking would be A:1, B:1, C:3). If all situations rank equally, rank each as '1'.

Without written calculation, rank the situations according to the magnitudes of the force on the rod from the cord, greatest first.

Situation 1 1 ▼

Situation 2 3 ▼

Situation 3 1 ▼

Without written calculation, rank the situations according to the magnitudes of the vertical force on the rod from the hinge, greatest first..

Situation 1 1 ▼

Situation 2 1 ▼

Situation 3 1 ▼

Without written calculation, rank the situations according to the magnitudes of the horizontal force on the rod from the hinge, greatest first.

Situation 1 1 ▼

Situation 2 3 ▼

Situation 3 1 ▼

Question 2

The figure shows four overhead views of rotating uniform disks that are sliding across a frictionless floor. Three forces, of magnitude *F*, 2*F*, or 3*F*, act on each disk, either at the rim, at the center, or halfway between rim and center. The force vectors rotate along with the disks, and, in the "snapshots" of the figure, point left or right.
Which disks are in equilibrium? (Several choices may be correct.)

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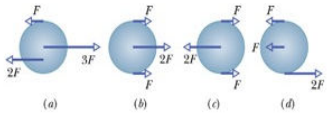
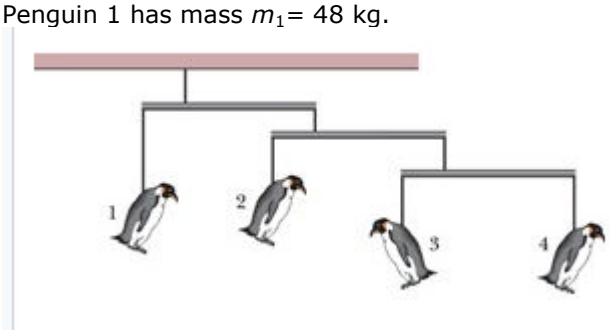


Which disks are in equilibrium? (Several choices may be correct.)

- [ ] b
- [x] c
- [x] a
- [ ] d

Question 3

The figure shows a mobile of toy penguins hanging from a ceiling. Each crossbar is horizontal, has negligible mass, and extends three times as far to the right of the wire supporting it as to the left. Penguin 1 has mass m_1= 48 kg.



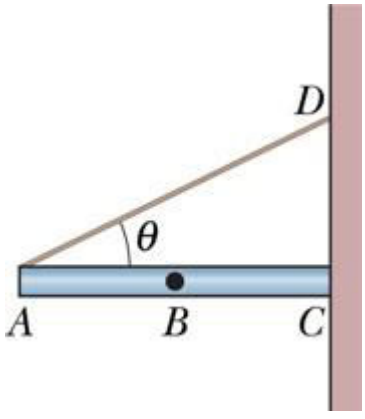
What is the mass of penguin 2?
12kg

What is the mass of penguin 3?
3kg

What is the mass of penguin 4?
1kg

Question 4

In the figure, a stationary 5 kg rod *AC* is held against a wall by a rope and friction between rod and wall. The uniform rod is 1 m long, and angle θ = 30°.



If you are to find the magnitude of the force on the rod from the rope with a single equation, at what labeled point should a rotational axis be placed?
Point C

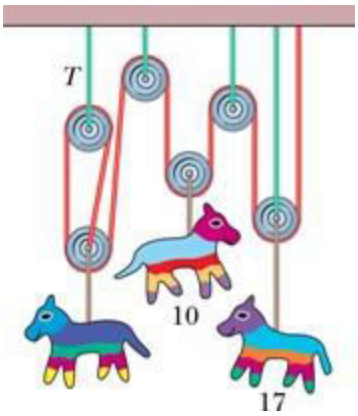
With that choice of axis and counterclockwise torques positive, what is the sign of the torque τ_w due to the rod's weight.
Positive

With that choice of axis and counterclockwise torques positive, what is the sign of the torque τ_r due to the pull on the rod by the rope?
Negative

Is the magnitude of τ_r greater than, less than, or equal to the magnitude of τ_w?
Equal to

Question 5

Three piñatas hang from the (stationary) assembly of massless pulleys and cords seen in the figure. One long cord runs from the ceiling at the right to the lower pulley at the left, looping halfway around all the pulleys. Several shorter cords suspend pulleys from the ceiling or piñatas from the pulleys. The weights (in newtons) of two piñatas are given.



What is the weight of the third piñata? (Hint: A cord that loops halfway around a pulley pulls on the pulley with a net force that is twice the tension in the cord.)
15N

What is the tension in the short cord labeled with T?
10N