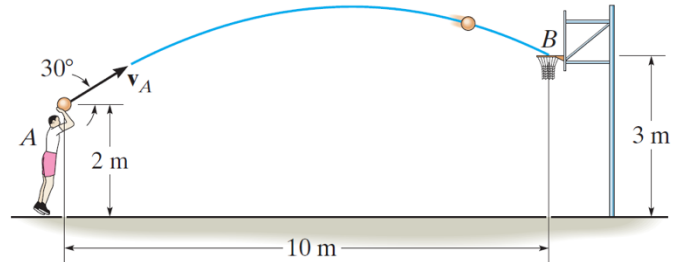


Instructions:

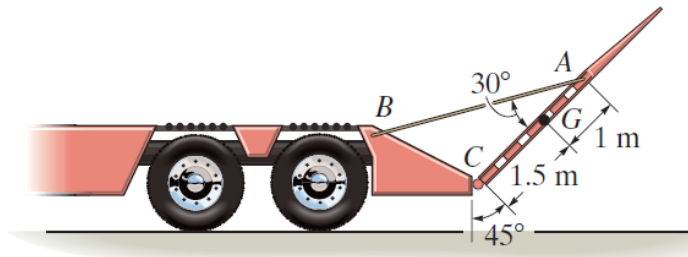
- Read the questions carefully. Detail all steps of your solution and include free-body diagrams. Writing only the equations and their solutions is not enough for full points.
- Make sure your answers include units.

Exercise 1 (20%)

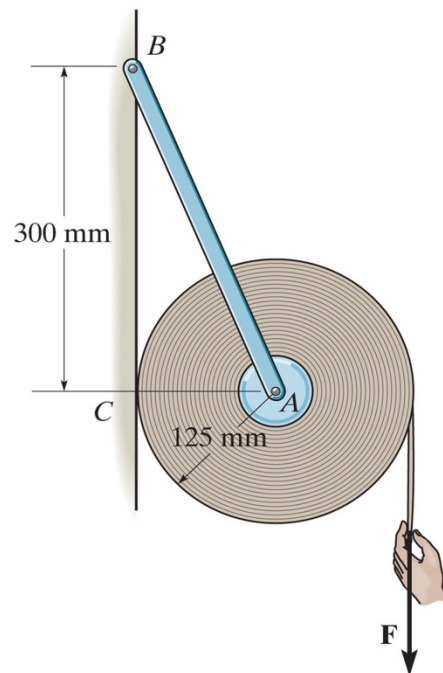
Neglecting the size of the ball, determine the magnitude v_A of the basketball's initial velocity and its velocity when it passes through the basket.

**Exercise 2 (20%)**

The drop gate at the end of the trailer has a mass of 1250 kg and its centre of mass is at G . If it is supported by the cable AB and hinge C , determine the tension in the cable when the truck begins to accelerate at 5 m/s^2 . Also, what are the horizontal and vertical components of reaction at the hinge C .

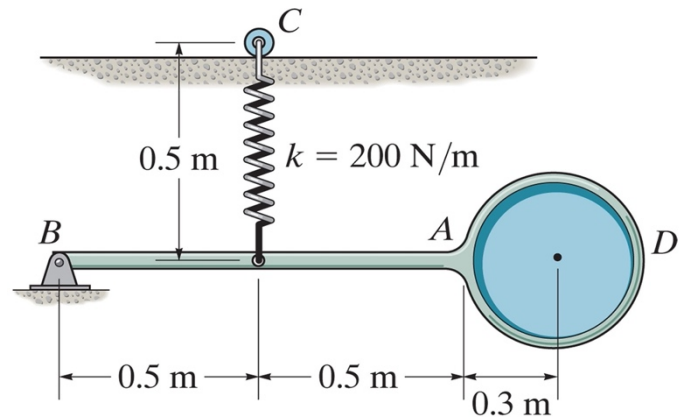
**Exercise 3 (20%)**

The 20-kg roll of paper has a radius of gyration $k_A = 90 \text{ mm}$ about an axis passing through point A . It is pin supported at both ends by two brackets AB . If the roll rests against a wall for which the coefficient of kinetic friction is $\mu_k = 0.2$ and a vertical force $F = 30 \text{ N}$ is applied to the end of the paper, determine the angular acceleration of the roll as the paper unrolls.



Exercise 4 (20%)

The pendulum consists of a 6-kg slender rod fixed to a 15-kg disk. If the spring has an unstretched length of 0.2 m, determine the angular velocity of the pendulum when it is released from rest and rotates clockwise 90° from the position shown. The roller at C allows the spring to always remain vertical.

**Exercise 5 (20%)**

If the flywheel is rotating with an angular velocity $\omega_A = 6 \text{ rad/s}$, determine the angular velocity of rod BC at the instant shown.

