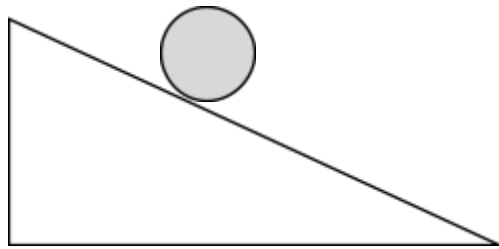


3. If a pipe and a solid cylinder with the same mass were rolled down an incline with a height of 30. cm, which one would reach the bottom of the ramp first? Ramp Length 122 cm

a) Explain why you choose your answer. Explain without using an equation and explain it again by referring to an equation. **(5 pts)**

4. With a ruler: Draw a **free-body diagram** that shows the forces on the cylinder as it moves down the ramp. **(5 pts)**



a) Which forces and components of forces on your diagram are causing the **cylinder** to accelerate? **(5 pts)**

b) Which force(s) are not causing the **cylinder** to accelerate? **(5 pts)**

c) Determine the acceleration of the cylinder down the ramp in terms of one or more of the following variables. M , R , θ , g . **(5 pts)**

5. Find the acceleration of a **pipe** in terms of one or more of the following variables. M , R , θ , g . **(5 pts)**

6. If a pipe and a solid cylinder with the same mass were rolled down an incline with a height of 30. cm, which one would reach the bottom of the ramp first? Ramp Length 122 cm. How much more time would it take for the slower object to reach the bottom of the ramp?

Calculation _____ **(10 pts)** How much more time? _____

Pipe	Cylinder

7. Find the final linear velocity of the faster and slower object. **(5 pts)**

Faster

Slower

8. If you placed the faster object on the top of the ramp, where would you place the slower one so that each object would reach the bottom of the ramp at the same time? **(5 pts)**