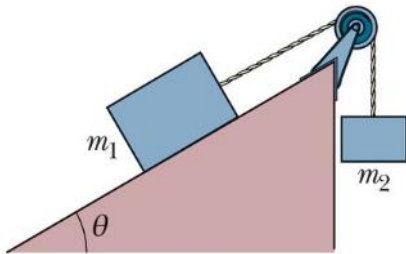


Practice Problems (1 pt each, except #9 and #23)
Use **g exactly equals 9.80 m/s^2** .

Total: 25 pts

1. You have a block of mass 5.0 kg. You drop it from a height of 2.00 meters. How long does it take to hit the ground?
2. You have a block of mass 5.0 kg. You drop it from a height of 2.00 meters. What was its velocity when it hit the ground?
3. You have a block of mass 5.0 kg. You drop it from a height of 2.00 meters. What was its velocity when it hit the ground in mph? (1 mi is equivalent to 1609 m)
4. You have a block of mass 5.0 kg. You toss it from a height of 2.00 meters with an initial velocity of $\mathbf{v} = 1.0 \text{ m/s } \mathbf{i} + 2.0 \text{ m/s } \mathbf{j}$. How long does it take to hit the ground?
5. You have a block of mass 5.0 kg. You toss it from a height of 2.00 meters with an initial velocity of $\mathbf{v} = 1.0 \text{ m/s } \mathbf{i} + 2.0 \text{ m/s } \mathbf{j}$. How far horizontally does it land?

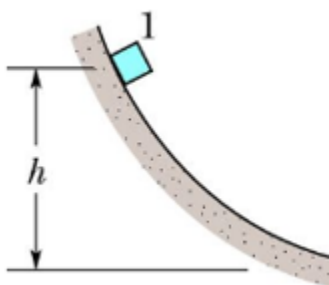
6. You have a block of mass 5.0 kg on a 30° ramp. What is the normal force on the block?
7. You have a block of mass 5.0 kg on a 30° ramp with $\mu=0.10$. What is the force of friction on the block?
8. You have a block of mass $m_1=5.0$ kg on a 30° ramp with $\mu=0.10$ tied to another $m_2=1.0$ kg block hanging from a pulley. Draw a free-body diagram of each block.



9. You have a block of mass $m_1=5.0$ kg on a 30° ramp with $\mu=0.10$ tied to another $m_2=1.0$ kg block hanging from a pulley. What is the tension in the rope? (2 pts)
10. You have a block of mass $m_1=5.0$ kg on a 30° ramp with $\mu=0.10$ tied to another $m_2=1.0$ kg block hanging from a pulley. The ramp is 2.00 meters high, how long would it take the block to go down the ramp?

11. You have a block of mass $m_1=5.0\text{ kg}$ on a 30° ramp with $\mu=0.10$ tied to another $m_2=1.0\text{ kg}$ block hanging from a pulley. The ramp is 2.00 meters high. How much work do the tension, gravity, friction, and normal force do on the block?

12. You have a block of mass 5.0 kg on at the top of a frictionless curved ramp 2.00 m high. What is the speed of the block at the bottom of the ramp?



13. You have a block of mass 5.0 kg on at the top of a frictionless curved ramp 2.00 m high. What was the work done by gravity?

14. You have a block of mass 5.0 kg on at the top of a frictionless curved ramp 2.00 m high. When would the block experience the largest drag force?

15. You have a block of mass 5.0 kg moving at 6.0 m/s collide with a block of mass 3.0 kg. They collide perfectly inelastically. What is their final speed?
16. You have a block of mass 5.0 kg moving at 6.0 m/s collide with a block of mass 5.0 kg. They collide perfectly elastically. What are their final speeds?
17. You have a solid BALL ($r=0.10$ m) of mass 5.0 kg on at the top of a 30° ramp 2.00 m high. [$I_{\text{ball}}=(2/5)MR^2$] What is the speed of the BALL at the bottom of the ramp?
18. You have a solid BALL ($r=0.10$ m) of mass 5.0 kg on at the top of a 30° ramp 2.00 m high. [$I_{\text{ball}}=(2/5)MR^2$] What is the angular velocity of the BALL at the bottom of the ramp?

19. You have a solid BALL ($r=0.10$ m) of mass 5.0 kg on at the top of a 30° ramp 2.00 m high.
[$I_{\text{ball}}=(2/5)MR^2$] What is the angular momentum of the BALL at the bottom of the ramp?

20. You have a solid BALL ($r=0.10$ m) of mass 5.0 kg on at the top of a 30° ramp 2.00 m high.
[$I_{\text{ball}}=(2/5)MR^2$] What is the period of the BALL's rotation at the bottom of the ramp?

21. You have a solid BALL of ($r=0.10$ m) mass 5.0 kg on at the top of a 30° ramp 2.00 m high.
[$I_{\text{ball}}=(2/5)MR^2$] What is the angular acceleration of the BALL on the ramp?

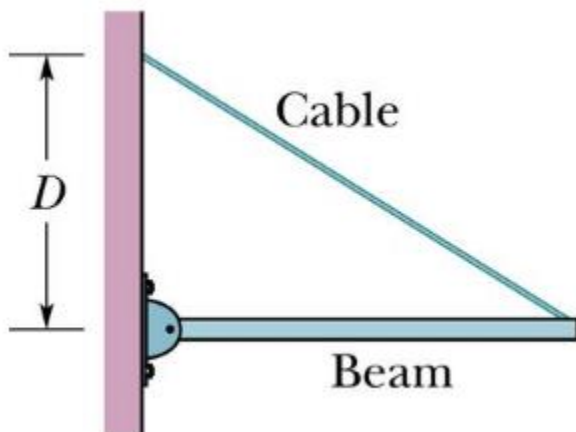
22. A rope is 10.0 meters long, 1.0cm in diameter. Under the 5×10^3 N tension it stretches 8.0mm. What is its Young's Modulus (give the answer in scientific notation)?

23

25. The figure below shows an exactly 5.0 m uniform bar of mass 50. kg supported by a massless rope and a hinge. The cable makes a 50° angle with the beam.

(2pts)

(a) Label the diagram below with the forces on the system



(a) What is the tension force from the rope on the bar in vector notation?

(b) What is the force from the hinge in vector notation?