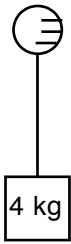


Force Problems III

Numbers 1 to 7 refer to the diagram below, which shows a hand holding up a 4 kg mass by a string.



1. Imagine you pull up on the mass with a force of 40 N. (We would call this force the tension in the string).
 - a. What is the weight of the mass?
 - b. So what is the net force on the mass?
 - c. So what is the acceleration of the mass?

2. If you pull up on the mass with a force of 60 N, what is the acceleration of the mass?

3. If you pull up on the mass with a force of 30 N, what is the acceleration of the mass?

4. If the mass is accelerating up, what has to be true about the tension in the string?

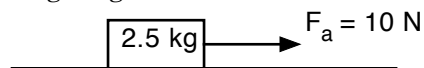
5. If the mass is accelerating down, what has to be true about the tension in the string?

6. If the mass has a constant speed, what has to be true about the tension in the string?

7. If the mass is accelerating up at 1.5 m/s^2 , what is the tension in the string?

Enough with strings, but now some problems with friction.

Numbers 8 to 11 refer to the following diagram:



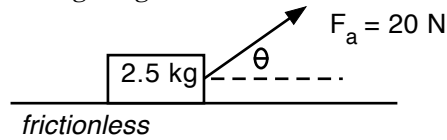
8. What is the force of friction if the acceleration of the block is 4 m/s^2 ?

9. What is the force of friction if the acceleration of the block is 0 m/s^2 ?

10. What is the force of friction if the acceleration of the block is 3 m/s^2 ?

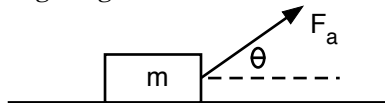
Force Problems III

Numbers 11 to 15 refer to the following diagram:



11. What is the acceleration of the block if the angle is 0° ?
12. What is the acceleration of the block if the angle is 20° ?
13. What is the acceleration of the block if the angle is 40° ?
14. What is the acceleration of the block if the angle is 60° ?
15. What is the acceleration of the block if the angle is 90° ? *Careful!*

Numbers 16 to 18 refer to the following diagram:



16. A 5 kg block is pulled with a force of 75 N at an angle of 30° . There is also 20 N of friction acting on the block. What is the acceleration of the block?
17. A 12 kg block is pulled with a force of 100 N at an angle of 45° . There is also 40 N of friction acting on the block. What is the acceleration of the block?
18. A 25 kg block is pulled with a force of 120 N at an angle of 30° . How much friction is there if the acceleration of the block is 3 m/s^2 ?

Answers:

- | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|-----------------------|
| 1.a) 40 N | b) 0 N | c) 0 m/s^2 | 2) 5 m/s^2 up | 3) 2.5 m/s^2 down | 4) Tension > weight |
| 5) Tension < weight | | 6) Tension = weight | | 7) 46 N | 8) 0 N |
| 10) 2.5 N | 11) 8 m/s^2 | 12) 7.52 m/s^2 | 13) 6.13 m/s^2 | 14) 4.00 m/s^2 | 15) 0 m/s^2 |
| 16) 8.99 m/s^2 | 17) 2.56 m/s^2 | 18) 28.9 N | | | |