Ch 5 HW Assignment: Answers & HW Hints (Pt. 1)

Part 1: Basic Forces and Newton's 2^{nd} Law

Pg. 108 #1-4, 6-10

Answers

1a. 1.88N

b. 0.68N

c. (1.88i + 0.68j)N

2a. 0m/s^2

b. 4j m/s^2

c. 3i m/s^2

3. 2.99m/s^2

4. (-34i - 12j)N

6. (-2i + 6j)N

7a. (0.86i - 0.16j)m/s^2

b. 0.87m/s^2

c. -10.5^o

8. 240.8N

9. +9m/s^2

10. -7.98i N

Ch 5 #4

Think about horizontal and vertical components separately, and begin by finding net force. Then find the extra component needed to reach the net force, both horizontally and vertically.

Ch 5 #8

This one's probably the weirdest one on this first assignment. Realize that everything is balanced since it's an equilibrium situation, and then start by thinking horizontally. There are only two horizontal force components, so they must be exactly equal, and you can use this fact to find the angle of F_C. Then think vertically, with the two upward components balancing the one downward force to find F_B.

Ch 5 HW Assignment: Answers & HW Hints (Pt. 2)

Part 2: Particular Forces, Connected Objects, & Inclines

Pg. 108-113 #13, 15, 18, 19, 21, 23, 24, 29, 31-33, 37, 41-43, 51, 54, 55, 59, 60ab, 65, 66 (#63 E.C.)

Answers

13a-c. 107.8N

15d. 1kg

c. 4kg

b. 1kg

a. 4kg

18a. (284.7i + 704.7j)N

b. (284.7i – 115.3j)N

c. 307.17N

d&f. -22.2°

e. 3.67m/s^2

19a. 41.65N

b. 72.14N

c. 4.9m/s^2

21a. 11.66N

b. -59.04°

23a. 0.0222m/s^2

b. 8.29E^{7}m

c. 1920m/s

24. 309N

29. 1.54mm

31a. 46.7°

b. 28.0°

More Answers

32a. 565.8N

b. 1131.6N

33a. 0.619m/s^2

b. 0.13m/s^2

c. 2.6m

37a. 0.00222N

b. 0.00368N

41a. 31,261N

b. 24,339N

42a. 7.295kg

b. 89N

43a. 1.35m/s^2

b. 4.06m/s

51a. 0.97m/s^2

b. 11.64N

c. 34.92N

54a. 36.75N

b. 0.191m

55a. 3.59m/s^2

b. 17.39N

59a. 0.735m/s^2

b. Downward, since…

c. 20.85N

And A Few More Answers

60a. 465.5N

b. 527.25N

65. 81.7N

66a. 3.1N

b. 14.7N

Extra Credit:

63a. 0.653m/s^2

b. 0.896m/s^2

c. 3.5s

Ch 5 #13

Don't make it more difficult than it needs to be. Every case involves the one salami in equilibrium, so every case must use the spring to pull hard enough to keep the salami suspended, so in every case the spring simply reads the weight of the one salami.

Ch 5 #15

As implied by the way the answers are expressed, this one is easier if you start from the bottom and work your way up. Think of just the forces acting on one object at a time, using each previous tension to help find each new mass.

Ch 5 #29

This one is actually fairly similar to a projectile situation, where you can treat the horizontal and vertical motions independently, and where its horizontal motion is constant but its vertical motion is accelerating.

Ch 5 #31

Start by figuring out the magnitude of the acceleration "at the moment the net force on the particle has a magnitude of 35N." Also start by calculating a function for the acceleration in terms of time, since you've been given v(t). Then you should be able to use your function and acceleration magnitude to find the time that we're interested in. (t=1.416s)

Once you've done all of that, actually doing part A and B is pretty easy, with finding the components of each vector, and using them to determine angle.

Ch 5 #32

This is an equilibrium situation, since the block's at a constant speed. You can either think of it with rotated axes (at which point you need to consider components of F and F_g), or with 'regular' axes (at which point you need to consider components of F_N). Either way, you'll be setting two x-components equal and also setting two y-components equal.

Ch 5 #33

Part A and B should be easy enough if you think about Newton's 3rd law for a moment. But part C is a little rougher. Realize that both object's motions could be described with the kinematic equation $x=v_ot+½at^2$, but that you don't know x or t for either one. Well, to deal with that problem, realize that they'll both move for the same amount of time, so times can be set equal to one another. And also use the fact that $x_{sled}=15-x_{girl}$.

Ch 5 #37

Do a quick sketch of all forces acting on the ball, and then use simple equilibrium ideas. One component of tension balances the gravity, and the other balances the breeze's force. Easy!

Ch 5 #51, 54, 55, 59

These all involve connected objects, so follow the thinking we used on our examples in class.

Ch 5 #52

Omit this one!

Ch 5 #60

If you do a free-body diagram as the problem suggests, you should see that the rope really pulls upward on the man twice. (Once is obvious, and the other is a reaction force on his hands. When his hands pulls down on the rope, the rope pulls up on his hands.)

Ch 5 #65

I’m not sure why this is rated as a “3-Dot Difficulty” kind of problem, because it should really be pretty easy. The only thing that could make it hard is if you don’t realize that you should start by finding the acceleration of the whole system, even though you weren’t asked for this.

Ch 5 #66

For part B, think about the fact that the cord will become slack if m_1 accelerates faster than m_2. This means that you need to find how fast m_2 would accelerate if the cord was slack. Then see how large F has to be in order to make m_1 accelerate this fast.