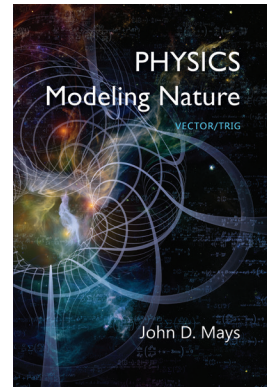


# Physics: Modeling Nature

## Errata

We always strive to make our textbooks as accurate as possible, but sadly, errors are a reality. We very much appreciate friends who report errata that are not included in this document!

Please send new errata to [info@novaescienceandmath.com](mailto:info@novaescienceandmath.com)



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## Physics: Modeling Nature 2e (2021)

There are no known errata.

## Physics: Modeling Nature (2015)

### Chapter 1 Text

- 26 Example 1.2. The result of the  $R_y$  calculation should be 1.69 units, and the angle for the resultant should be  $7.0^\circ$ .

### Chapter 1 Answers

19. magnitude = 278 km/hr  
22f.  $\theta = -131^\circ$   
25.  $\theta = 35.1^\circ$   
27.  $\theta_R = 140^\circ$

### Chapter 2 Problem correction

- p. 73, #39. The time given should be 1.00 s, not 2.6 s.

### Chapter 2 Answers

10.  $v = 0.625$  m/s (0.63 m/s with 2 sig digs)  
11b. 15 m/s  
12.  $v_f = 4.1$  m/s  
14.  $d = 4.000$  cm  
25.  $t = 0.474$  s (In the solutions manual, the second equation at the top of page 20 is incorrect, and should read  $d_F = d_K$ .)  
36.  $d_h = 23.4$  m  
45.  $\theta_p = 41.2^\circ$

### Chapter 3 Problem corrections

p. 111, #46.  $m_2 = 300.0$  g not kg.

p. 111, #48. The wind should be blowing from due southeast, not southwest.

### Chapter 3 Answers

17.  $a = -1.34$  m/s<sup>2</sup>,  $F = -9100$  N

24c.  $F_N = 41$  N

30c. The answer given is correct, but in the solutions manual the normal force used in the solution should be  $F_N = 41$  N.

34.  $d = 1.2$  m,  $T = 8.21$  N

35.  $d = 46$  m

37a.  $a = 1.7$  m/s<sup>2</sup>

37b.  $v_f = 1.4$  m/s

37c.  $d = 0.39$  m

39.  $a = 5.3$  m/s<sup>2</sup>,  $T_B = 26$  N

40.  $a = 1.2$  m/s<sup>2</sup>

44b.  $T_1 = 8.29$  N

44c.  $T_1 = 5.48$  N

46.  $m_{max} = 220$  g

48.  $2.0 \times 10^2$ ,  $102^\circ$ . The diagram in the Solutions manual shows the wind coming from due SE, but the problem statement says the wind is coming from due SW. Correcting the wind, the result is as shown above.

### Chapter 4 Answers

7d.  $|\mathbf{p} \times \mathbf{E}| = 1.20 \times 10^3$  m·N

9.  $\theta_3 = 139^\circ$  (2 sig digs)

11.  $\theta = 63^\circ$

17.  $F_4$ : 11 m·N;  $F_5$ : 3.5 m·N

18. For the 0.1450 N force on the left, torque = 0.3537 m·N; for the 0.1450 N force on the right, torque = 0.1282 m·N

28.  $\theta = +1.4^\circ$  (In the solutions manual, the numerator in the equation 4 lines from the end should have (-) not (+).)

### Chapter 5 Answers

18.  $F = 3.81 \times 10^{-13}$  N

22.  $F = 21.0 \text{ N}$  (3 sig digs)
27. a. and b.,  $W = 9600 \text{ J}$
33.  $W = 3400 \text{ J}$
36. The height should use the sine of the angle, giving  $v_f = 5.3 \text{ m/s}$
53.  $E = 4.03329 \text{ MeV}$
56.  $239.9^\circ$ ,  $42.9 \text{ min}$ . The  $157^\circ$  angle shown should be  $113.0^\circ$ . Calculating missing angles gives results precise to tenths, giving a heading precise to tenths (4 sig digs).
57.  $1.8 \text{ m/s}^2$ . In the final line of the solution, the  $\mu\text{g}$  term is precise to tenths. Addition rule then requires result to be precise to tenths.

### Chapter 6 Answers

- 1b.  $4.0 \times 10^5 \text{ kg}\cdot\text{m/s}$
- 1c.  $9.97 \times 10^{-20} \text{ kg}\cdot\text{m/s}$
17.  $\frac{\sqrt{5+2\sqrt{2}}}{4}v_0, -59.6^\circ$

### Chapter 7 Problem Correction

4. The question in the text should ask about the minute hand, not the hour hand.

### Chapter 7 Answers

8.  $2.07 \text{ rad/s}$
14.  $\alpha = 3.10 \text{ rad/s}^2, s = 218 \text{ m}$
15.  $\theta = 25 \text{ rev}$ . Corrected angle is already shown. Add to it  $\omega = 160 \text{ rad/s}$ .
21.  $t = 0.107 \text{ s}$
22. Typo in the units. Should be  $\text{kg}\cdot\text{m/s}^2$
25.  $v = 18.1 \text{ m/s}$
27.  $F_c = 9.60 \times 10^{-5} \text{ N}$

### Chapter 8 Answers

7.  $\tau = -0.000362 \text{ m}\cdot\text{N}$
10.  $\alpha = 8.542 \text{ rad/s}, \omega_f = 11.0 \text{ rad/s}, U_K = 70.1 \text{ J}$
11.  $t = 8.84 \text{ s}, \omega_f = 21.6 \text{ rpm}$
15.  $h = 0.0547 \text{ m}$
32. In line 5 of the solution, the  $-2R$  term should be  $+2R$ . This gives  $r = 3.83 \times 10^7 \text{ m}$  and  $R - r = 3.46 \times 10^8 \text{ m}$ . This means  $r$  is 90% of the distance from earth to the moon, and  $(R -$

$$r)/r = 9.03.$$

In the second part,  $F_{GS} / F_{GE} = 1.77$ .

### Chapter 9 Answers

45.  $v_0 = 509 \text{ m/s}$

46.  $v_c = 21 \text{ cm/s}$

47.  $P_{in} = 0.40 \text{ hp}$

### Chapter 10 Answers

1.  $159.692 \text{ g/mol}$

2.  $108 \text{ g}$

5. The correct atomic mass for iodine is  $126.9045 \text{ g/mol}$ , giving  $2.107298 \times 10^{-22} \text{ g/particle}$ .

15.  $V_2 = 355 \text{ cm}^3$

19.  $F_w = 0.0276 \text{ N}$

22.  $T = 295.2 \text{ K}$ . This gives for oxygen  $v_{rms} = 4.80 \times 10^2 \text{ m/s}$  and for nitrogen  $v_{rms} = 513 \text{ m/s}$ .

36.  $m_w = 10.4 \text{ g}$ , or with 2 sig figs,  $1.0 \times 10^1 \text{ g}$ .

40. Equilibrium temperature should be  $38.5^\circ \text{ C}$ .

44.  $P_{duct} = 100,200 \text{ Pa}$

### Chapter 11 Answers

9. Corrected solution:

$$P = 155 \text{ kPa} = 155,000 \text{ Pa}$$

$$V_0 = 5.00 \text{ L} = 0.00500 \text{ m}^3$$

$$V_f = 3.00 \text{ L}$$

$$PV = nRT = \text{const} = P \cdot V_0 = 155,000 \text{ Pa} \cdot 0.00500 \text{ m}^3 = 775 \text{ Pa} \cdot \text{m}^3 = 775 \text{ J}$$

$$W = nRT \ln \frac{V_f}{V_0} = PV \ln \frac{V_f}{V_0} = 775 \text{ J} \cdot \ln \frac{3}{5} = -396 \text{ J}$$

$$\Delta U = 0$$

$$Q = W = -396 \text{ J}$$

11. The problem statement should read: Determine the amount of work done by a system during a gas expansion from  $V_0 = 250 \text{ L}$  to  $V_f = 350 \text{ L}$  at constant temperature if  $525 \text{ J}$  of heat are added to the system during the process.

25. Since heat is being removed,  $Q$  is negative and  $\Delta S = -1.23 \text{ kJ/K}$ .

33.  $W = 1.20 \times 10^2 \text{ hp}$

### Chapter 12 Answers

11.  $75 \text{ J}$  (2 sig digs)

- 12. 8.31 cycles
- 13. 2.0 Hz
- 18.  $2.83 \times 10^7$  MHz
- 25.  $1.57 \times 10^8$  m/s
- 34b. 0.353 J

### Chapter 13 Answers

- 8.  $a = 52,900 \text{ m/s}^2$
- 11. In the solution and the diagram, replace  $\theta$  everywhere with  $\theta/2$ .
- 17.  $E = 2.9 \times 10^9 \text{ N/C}$ ,  $\theta = -11^\circ$
- 26.  $W = 1.8 \times 10^{-14} \text{ J}$
- 34.  $E = 60,200 \text{ N/C}$
- 57. 97%

### Chapter 14 Answers

- 9a.  $B = 0.0204 \text{ T}$  (0.020 T with 2 sig digs)
- 9b.  $\Phi_B = 9.0 \text{ mWb}$
- 10. The last line should read  $\Phi_B = B \cdot A \cos \theta$ , giving  $\Phi_B = 0.83 \mu\text{Wb}$
- 15. Units for  $q/m$  are C/kg.
- 18.  $\tau = 0.013 \text{ m} \cdot \text{N}$
- 20. The question should read: "Explain the concept of a magnetic moment."
- 25.  $B = 2.6 \times 10^{-5} \text{ T}$
- 36.  $v(t) = (\sqrt{2} \cdot 240 \text{ V}) \sin 100\pi t$
- 37.  $i(t) = (\sqrt{2} \cdot 1.3 \times 10^{-5} \text{ V}) \cos 2400\pi t$
- 51. The graph in part A should be inverted, and thus is the same as the graphs in parts b and c.
- 53. This represents a 75% reduction.