Answers for Lesson 8-4, pp. 441–443 Exercises

1. $\frac{7}{25}; \frac{24}{25}$ **2.** $\frac{4\sqrt{2}}{9}; \frac{7}{9}$ **3.** $\frac{1}{2}; \frac{\sqrt{3}}{2}$

4. 11.5 **5.** 8.3 **6.** 17.9

7. 17.0 **8.** 4.3 **9.** 106.5

10. 1085 ft **11.** 21 **12.** 51

13. 46 **14.** 59 **15.** 24

16. 66 **17.** about 17 ft 8 in.

18. $\sin X \div \cos X = \frac{\text{opp.}}{\text{hyp.}} \div \frac{\text{adj.}}{\text{hyp.}} = \frac{\text{opp.}}{\text{adj.}} = \tan X$

19. $\cos X \cdot \tan X = \frac{\text{adj.}}{\text{hyp.}} \cdot \frac{\text{opp.}}{\text{adj.}} = \frac{\text{opp.}}{\text{hyp.}} = \sin X$

20. $\sin X \div \tan X = \frac{\text{opp.}}{\text{hyp.}} \div \frac{\text{opp.}}{\text{adj.}} = \frac{\text{adj.}}{\text{hyp.}} = \cos X$

21. No; the $\triangle$s are $\sim$ and the sine ratio for 35° is constant.

22. $w = 3; x \approx 41$

23. $w \approx 37; x \approx 7.5$

24. $w \approx 68.3; x \approx 151.6$

25. a. They are equal; yes; the sine and cosine of complementary $\angle$s are $=$.

b. $\angle B; \angle A$

c. Answers may vary. Sample: cosine of $\angle A$ = sine of the compl. of $\angle A$.

26. a. $\frac{\sqrt{2}}{2}$

b. $\frac{\sqrt{2}}{2}$

c. $\frac{\sqrt{2}}{2}$

d. $\frac{\sqrt{2}}{2}$

e. They are equal.

27. Yes; use any trig. function and the known measures to find one other side. Use the Pythagorean Thm. to find the 3rd side. Subtract the acute $\angle$ measure from 90 to get the other $\angle$ measure.

28. a. $\frac{\sqrt{3}}{2}$

b. $\frac{1}{2}$

c. $\frac{1}{2}$

d. $\frac{\sqrt{3}}{2}$

e. $\cos 30^\circ = \sqrt{3} \sin 30^\circ$

f. $\sin 60^\circ = \sqrt{3} \cos 60^\circ$

29. Answers may vary. Samples are given.

a. Since $\sin A = \frac{\text{opp.}}{\text{hyp.}}$, if $\sin A \geq 1$, then opp. $\geq$ hyp., which is impossible.

b. Since $\cos A = \frac{\text{adj.}}{\text{hyp.}}$, if $\cos A \geq 1$, then adj. $\geq$ hyp., which is impossible.

30. a. 0.99985

b–d. Answers may vary. Samples are given.

b. 1

c. $\sin X = 1$ for $X = 89.9$; no

d. For $\measuredangle$s that approach 90, the opp. side gets close to the hyp. in length, so $\frac{\text{opp.}}{\text{hyp.}}$ approaches 1.

31. $(\sin A)^2 + (\cos A)^2 = \left(\frac{a}{c}\right)^2 + \left(\frac{b}{c}\right)^2 = \frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{a^2 + b^2}{c^2} = \frac{c^2}{c^2} = 1$

32. $(\sin B)^2 + (\cos B)^2 = \left(\frac{b}{c}\right)^2 + \left(\frac{a}{c}\right)^2 = \frac{b^2}{c^2} + \frac{a^2}{c^2} = \frac{b^2 + a^2}{c^2} = \frac{c^2}{c^2} = 1$

33. $\frac{1}{(\cos A)^2} - (\tan A)^2 = \left(1 \div \frac{b^2}{c^2}\right) - \frac{a^2}{b^2} = \frac{c^2}{b^2} - \frac{a^2}{b^2} = \frac{c^2 - a^2}{b^2} = \frac{b^2}{b^2} = 1$

34. $\frac{1}{(\sin A)^2} - \frac{1}{(\tan A)^2} = \frac{1}{\left(\frac{a}{c}\right)^2} - \frac{1}{\left(\frac{a}{b}\right)^2} = \frac{c^2}{a^2} - \frac{b^2}{a^2} = \frac{c^2 - b^2}{a^2} = \frac{a^2}{a^2} = 1$

35. $(\tan A)^2 - (\sin A)^2 = \left(\frac{a}{b}\right)^2 - \left(\frac{a}{c}\right)^2 = \frac{a^2}{b^2} - \frac{a^2}{c^2} = \frac{a^2c^2}{b^2c^2} - \frac{a^2b^2}{b^2c^2} = \frac{a^2c^2 - a^2b^2}{b^2c^2} = \frac{a^2(c^2 - b^2)}{b^2c^2} = \frac{a^2 \cdot a^2}{b^2c^2} = \left(\frac{a}{b}\right)^2\left(\frac{a}{c}\right)^2 = (\tan A)^2(\sin A)^2$

36. **a.** about 1.5 AU

b. about 5.2 AU