

pg. 724 #3-42 x3

3. each tick mark is 30° 120° is mark after 90° . At 120° y looks < 1 , about 0.9

9. each tick mark is $\frac{\pi}{4}$ radians. 4 radians is between $\frac{5\pi}{4}$ & $\frac{3\pi}{2}$. y looks about -0.7

15. 2 cycles from $0 - 2\pi$
amplitude: $\frac{1}{2}(3 - (-3)) = 3$
period: π

18. graph paper

24. graph paper

30. period = π period = $\frac{2\pi}{b}$ amp = 2.5

$$\pi = \frac{2\pi}{b}$$

$$b\pi = 2\pi$$

$$b = 2$$

$$y = 2.5 \sin 2\theta$$

a b
↓ ↓

36. b is number of cycles. $y = \sin \pi \theta$

$b = \pi$ π cycles between 0 & 2π

a is amplitude. This time it's (invisible) 1.

$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{\pi} = 2$$

substitute

42. $y = 1.5 \sin 2\theta$ period = $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

substitute

$$\left. \begin{aligned} y &= 3 \sin \frac{\pi}{2} \theta \\ \frac{2\pi}{\pi/2} &= \frac{2}{\frac{1}{2}} = 4 \end{aligned} \right\}$$

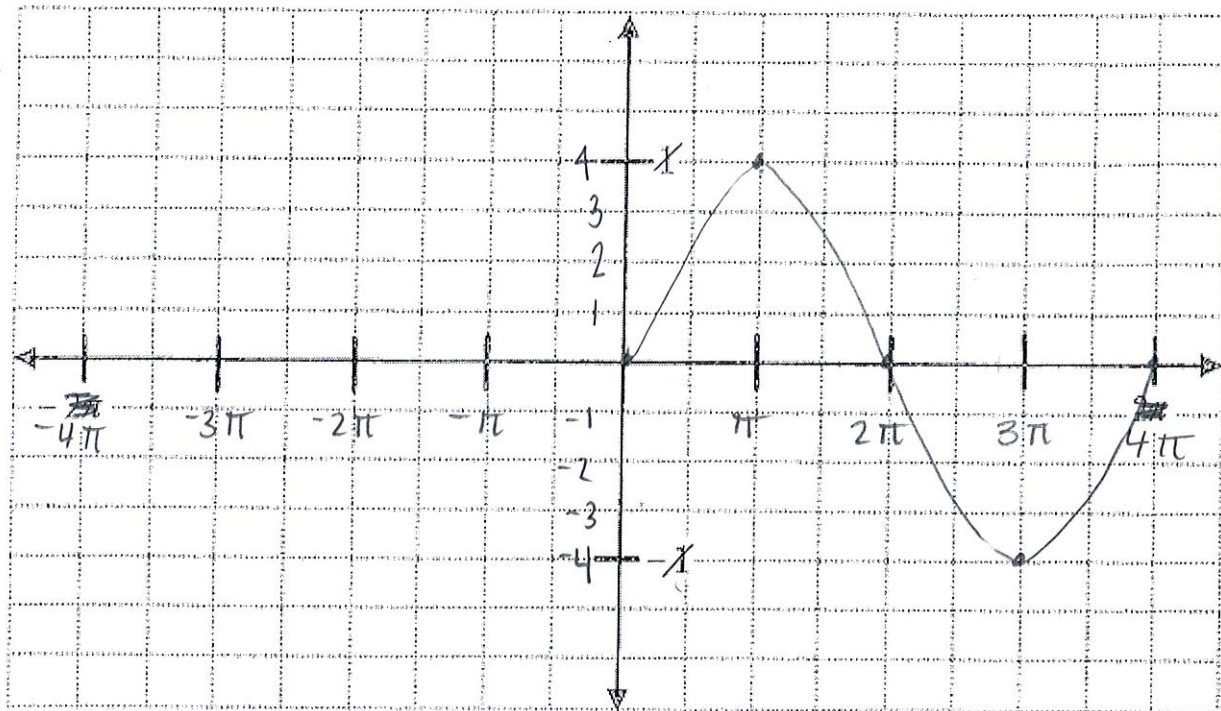
$$y = 4 \sin \frac{1}{2} \theta$$

$$\frac{2\pi}{b} = 4\pi$$

$$\frac{2\pi}{\cancel{4\pi}} = \frac{4\pi}{\cancel{4\pi}} b$$

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

18.

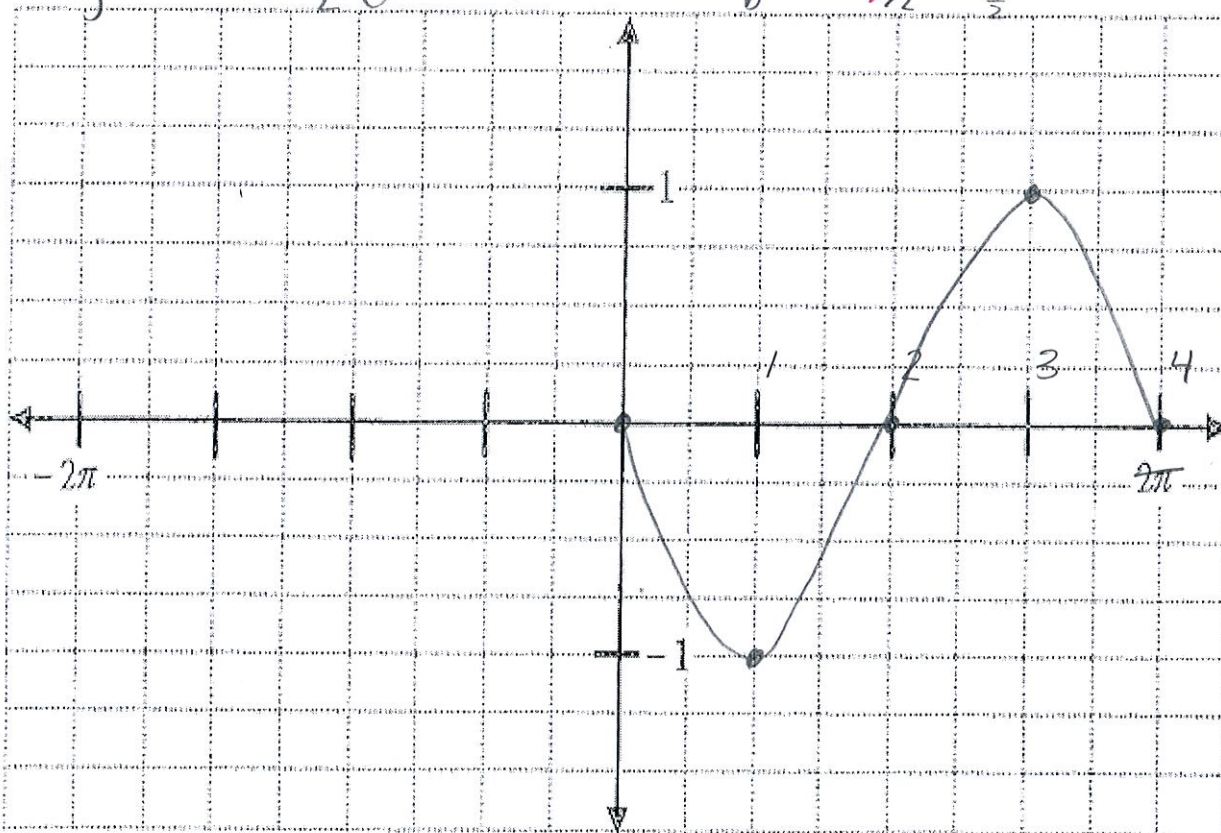


24.

$$y = -\sin \frac{\pi}{2} \theta$$

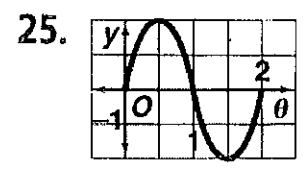
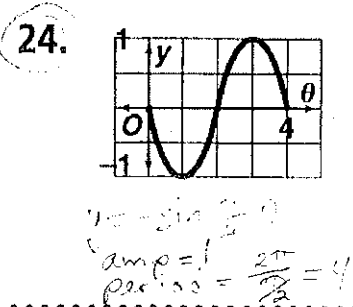
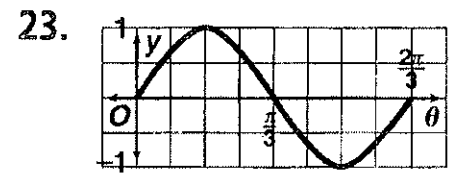
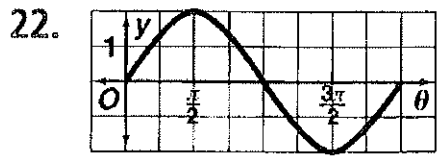
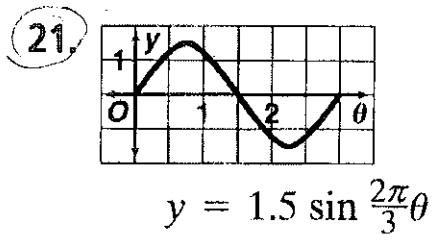
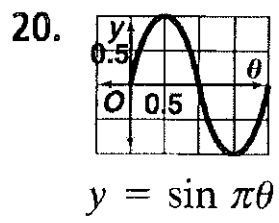
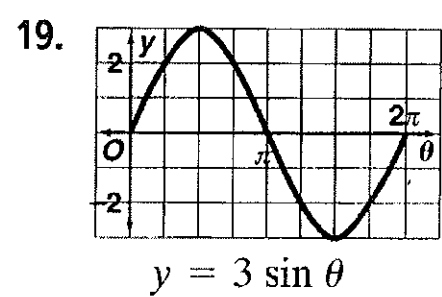
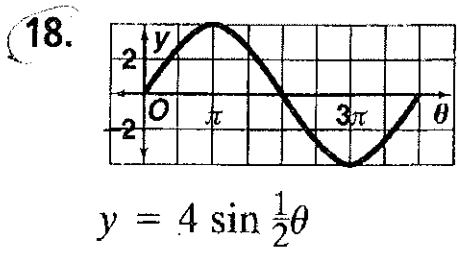
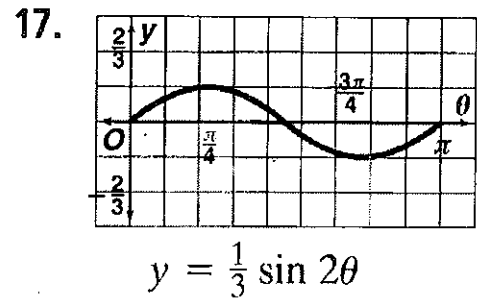
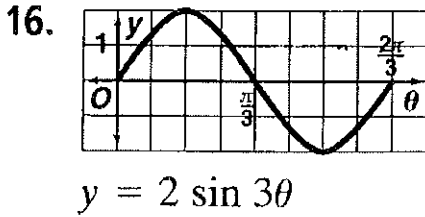
$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{\pi/2} = \frac{2}{1/2} = 4$$

amp = 1
flip = yes
period = 4
each = 1



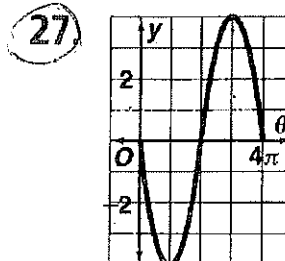
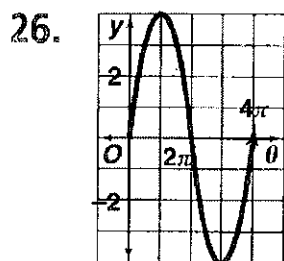
Answers for Lesson 13-4, pp. 724–727 Exercises

1. $\frac{1}{2}$ 2. ≈ 0.7 3. ≈ 0.9 120° $\frac{\sqrt{3}}{2} \approx 0.8660$
 4. 0 5. ≈ -0.9 6. ≈ -0.9 330° $-\frac{\sqrt{3}}{2} \approx -0.8660$
 7. 1 8. ≈ 0.1 9. ≈ -0.8 4 Calc in radians -0.7568
 10. ≈ -1 11. -1 12. ≈ -0.7 $\frac{2\pi}{7} - \frac{\sqrt{2}}{2} \approx -0.7071$
 13. 3; 2, $\frac{2\pi}{3}$ 14. $\frac{1}{2}$; 1, 4π 15. 2; 3, π
Express amp. in radians



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Answers for Lesson 13-4, pp. 724–727 Exercises (cont.)



$y = -4 \sin \theta$
 $2\pi \cdot 2 = 4\pi$
 $4\pi \cdot 0.5 = 2\pi = 4\pi$

28. $2\pi; y = 2 \sin \theta$

29. $2\pi; y = -3 \sin \theta$

30. $\pi; y = \frac{5}{2} \sin 2\theta$

31. $\frac{\pi}{3}; y = \frac{1}{2} \sin 6\theta$

32. $\pi; y = -\sin 2\theta$

33. $4; y = 3 \sin \frac{\pi}{2}\theta$

34. 1; 1, 2π

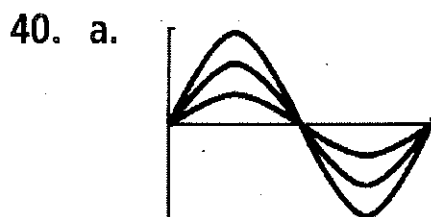
35. 5; 1, $\frac{2\pi}{5}$

36. $\pi; 1, 2$

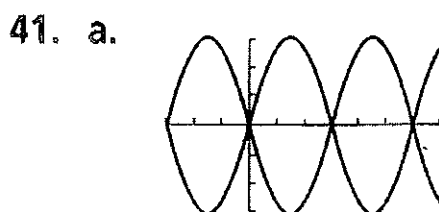
37. 1; 3, 2π

38. 1; 5, 2π

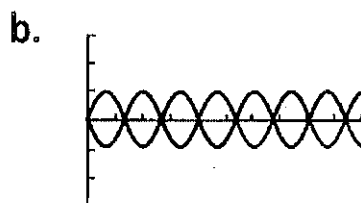
39. $2\pi; 5, 1$



b. As a increases, the amplitude of the graph increases.



They are reflections of each other in the x -axis.



They are reflections of each other in the x -axis.

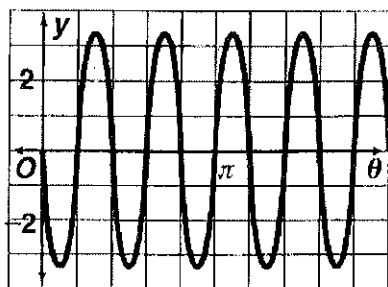
c. When either a or b is replaced by its opposite, the graph is a reflection of the original graph in the x -axis.

42. a. π
b. 4

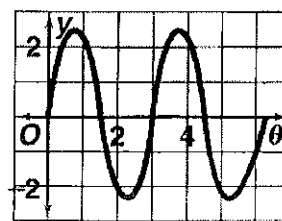
43. a. $\frac{1}{440}$
b. 0.001
c. 880π

44. • $|a|$ is the amplitude of the function.
• b is the number of cycles in the interval 0° to 360° .
• $\frac{360^\circ}{b}$ is the period of the function. The properties relating to number of cycles and period are affected.

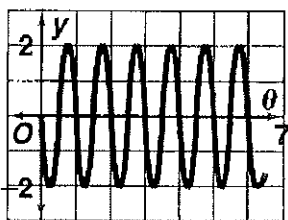
45. $\frac{2\pi}{5}, 3.5$



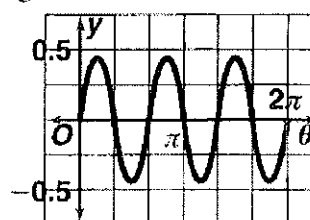
46. $\pi, \frac{5}{2}$



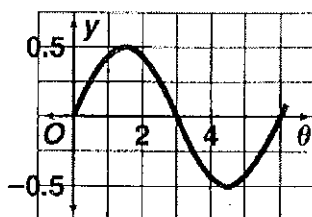
47. 1, 2



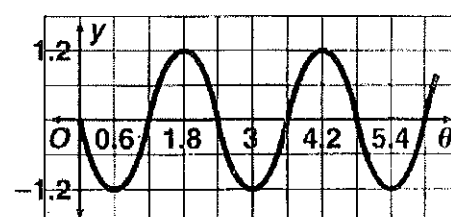
48. $\frac{2\pi}{3}, 0.4$



49. 6, 0.5



50. $\frac{12}{5}, 1.2$



51. Check students' work.