pg. 732 # 2-32 even

2. period - the mark is at π

0 to π is 1.5 cycles

$\frac{\pi}{3/2} = \frac{x}{1}$ use a proportion to figure out 1 cycle instead of 1.5 cycles

$\frac{2}{3} \cdot \frac{3}{2}x = \pi \cdot \frac{2}{3}$

$x = \frac{2\pi}{3}$

amplitude - the marks show one unit.

$\frac{1}{2}(1-(-1)) = \frac{1}{2}(2) = 1$

6. graph paper

10. $p = \frac{2\pi}{b}$ $y = 2\cos 2\theta$ (2 ← amplitude)

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

$b\pi = 2\pi$

$b = 2$

14. amp = 2 ← from graph

flip = no

period = 8

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

from graph → $8 = \frac{2\pi}{b}$

$\frac{8b}{8} = \frac{2\pi}{8}$

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

$y = 2\cos\frac{\pi}{4}\theta$

16. use GC. 0.52, 2.62, 3.67, 5.76

22. $y = 3\cos\theta$

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

amp = $a = 3$

range = $-3 \leq y \leq 3$

30. use GC 0.64, 2.50

6.

$y = -3\cos\theta$

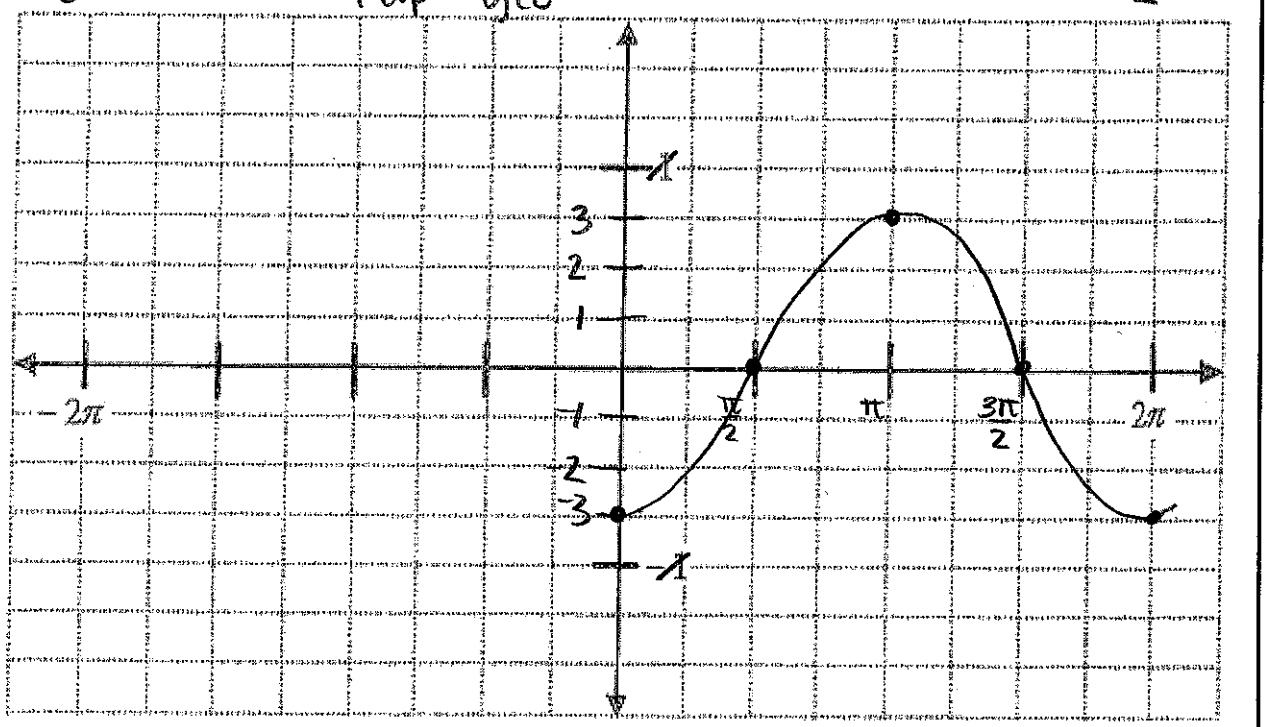
amp = 3

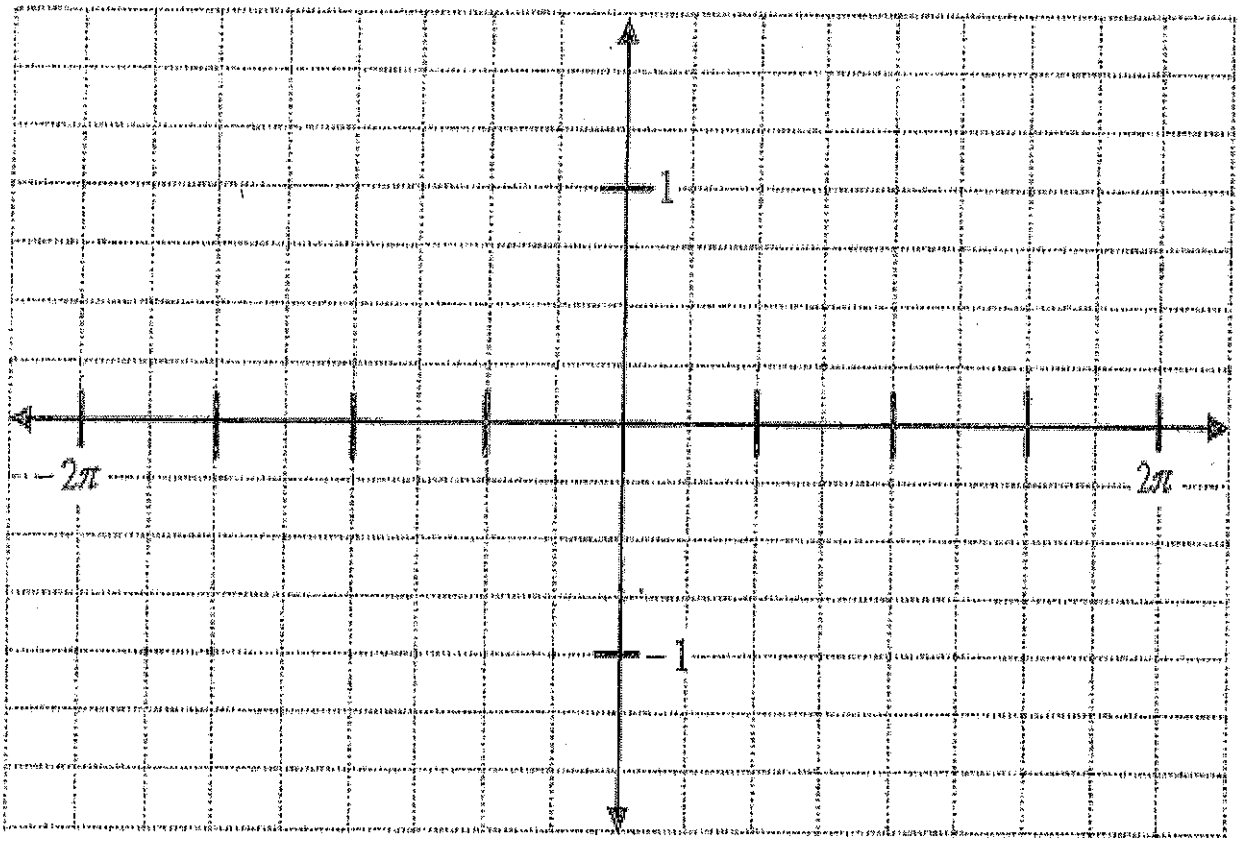
range $-3 \le y \le 3$

flip = yes

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

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





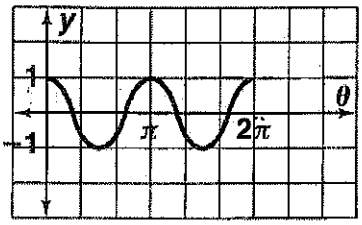
Answers for Lesson 13-5, pp. 732–734 Exercises

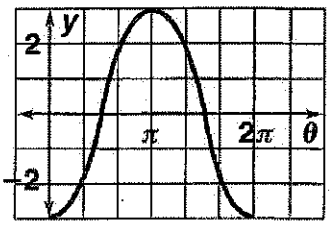
1. 2π, 3; max: 0, 2π; min: π; zeros: $\frac{\pi}{2}, \frac{3\pi}{2}$

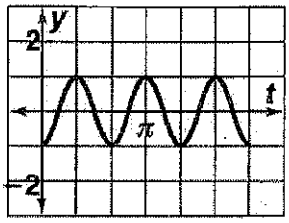
2. $\frac{2\pi}{3}$, 1; max: 0, $\frac{2\pi}{3}$, $\frac{4\pi}{3}$, 2π; min: $\frac{\pi}{3}$, π, $\frac{5\pi}{3}$; zeros: $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

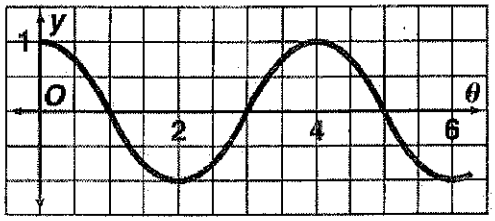
3. π, 1; max: 0, π, 2π; min: $\frac{\pi}{2}, \frac{3\pi}{2}$; zeros: $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

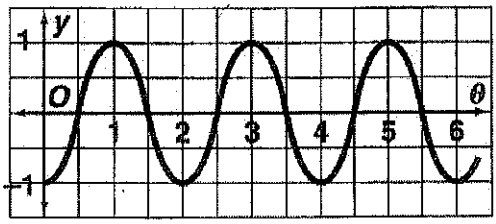
4. 2π, 2; max: π; min: 0, 2π; zeros: $\frac{\pi}{2}, \frac{3\pi}{2}$

5. 

6. 

7. 

8. 

9. 

10. $y = 2\cos 2\theta$

11. $y = \frac{\pi}{2}\cos\frac{2\pi}{3}\theta$

12. $y = \pi\cos\pi\theta$

13. $y = -3\cos 2\theta$

14. $y = 2\cos\frac{\pi}{4}\theta$

15. $y = 4\cos\frac{2\pi}{3}\theta$

16. 0.52, 2.62, 3.67, 5.76

17. 1.98, 4.30

18. 0.55, 1.45, 2.55, 3.45, 4.55, 5.45

19. 2.52

20. 0.00

21. 0.86, 5.14

22. $2\pi, -3 \leq y \leq 3, 3$

23. $\pi, -1 \leq y \leq 1, 1$

24. $4\pi, -2 \leq y \leq 2, 2$

25. $4\pi, -\frac{1}{3} \leq y \leq \frac{1}{3}, \frac{1}{3}$

26. $6\pi, -3 \leq y \leq 3, 3$

27. $\frac{2\pi}{3}, -\frac{1}{2} \leq y \leq \frac{1}{2}, \frac{1}{2}$

28. $\frac{4}{3}, -16 \leq y \leq 16, 16$

29. $2, -0.7 \leq y \leq 0.7, 0.7$

30. 0.64, 2.50

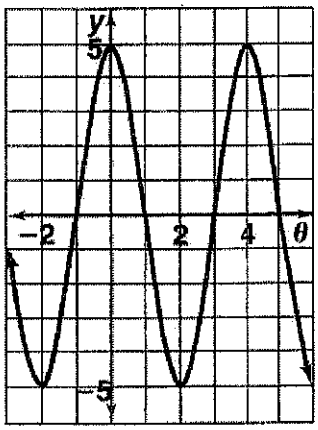
31. 1.83, 2.88, 4.97, 6.02

32. 0.50, 2.50, 4.50

33. **a.** 3.79, 5.64

b. 10.07, 11.92; these values are the sums of the values from part (a) and 2π.

34. **a.**



b. Answers may vary. Sample: 0 s, 4 s, 8 s, 12 s

c. 2 s; 2 s

35. **a.** 5.5 ft; 1.5 ft

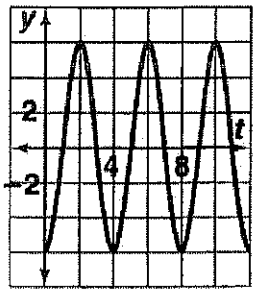
b. about 12 h 22 min

c. $y = 1.5 \cos \frac{2\pi t}{742}$

d. anytime except between 7:49 A.M. and 12:39 P.M.

36. a. 4 s; 6 ft

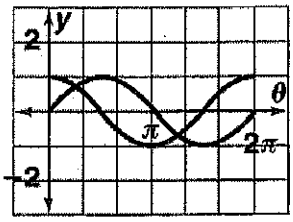
b. $y = -6 \cos \frac{\pi}{2}t$

c. 

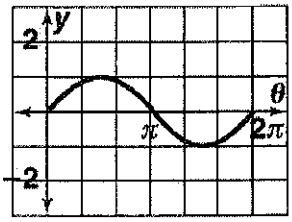
5

d. $-6 \cos \frac{\pi}{2}t = 3$

e. No; at 13.5 s you are right of the puddle and moving to the right.

37. a. 

shift of $\frac{\pi}{2}$ units to the right

b. 

They are the same.

c. To write a sine function as a cosine function, replace sin with cos and replace θ with $\theta - \frac{\pi}{2}$.

38. $y = \cos \frac{\pi}{12}x$ or $y = -\cos \frac{\pi}{12}x$

39. On the unit circle, the x-values of $-\theta$ are equal to the x-values of θ, so $\cos(-\theta) = \cos \theta$. $-\cos \theta$ is the opposite of $\cos \theta$, so these graphs are reflections of each other over the x-axis.