

Section 2.7

Translation of Trigonometric Functions

Translation of Quadratic Functions

$$y = a(x - h)^2 + k$$

a: Stretch or Shrink/Reflection

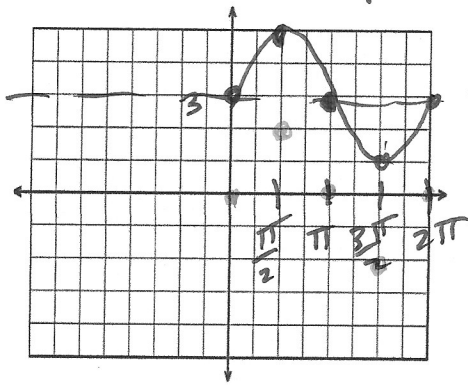
h: horizontal shift

k: vertical shift

In Exercises 33 to 50, graph each function using translations.

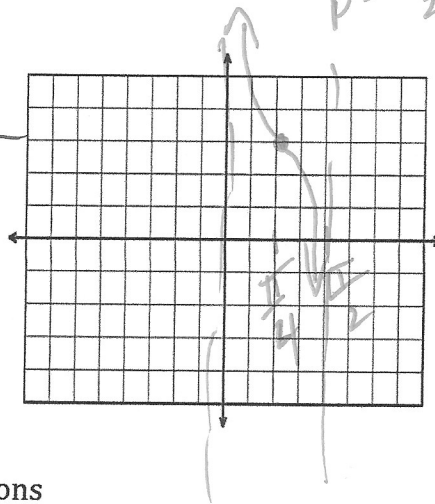
36. $y = 2 \sin x + 3$

$a = 2$
 $P = 2\pi$



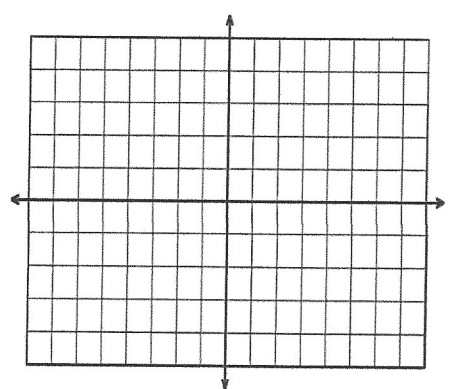
46. $y = \cot 2x + 3$

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



45. $y = \tan \frac{x}{2} - 4$

Homework



Translation of Trigonometric Functions

$$y = a \sin(bx + c)$$

$$y = a \cos(bx + c) \quad \text{with } b > 0,$$

Amplitude = a

Period: $\frac{2\pi}{b}$

Phase shift: $\frac{c}{b}$

In Exercises 1 to 8, find the amplitude, phase shift, and period for the graph of each function.

Homework

2. $y = -3 \sin(x + \pi)$

$a = 3$
 $P = 2\pi$
p.s. π left

6. $y = \frac{3}{2} \sin(\frac{x}{4} - \frac{3\pi}{4})$

$a = \frac{3}{2}$
 $P = 8\pi$
p.s. $\frac{3\pi}{4} = \frac{3\pi}{4}$ right

5. $y = -4 \sin(\frac{2x}{3} + \frac{\pi}{6})$

In Exercises 9 to 16, find the phase shift, and period for the graph of each function.

10. $y = \frac{1}{2} \tan(\frac{x}{2} - \pi)$ p.s. $\frac{2\pi}{1/2} = 4\pi$

p.s. $\frac{\pi}{1/2} = 2\pi$ right

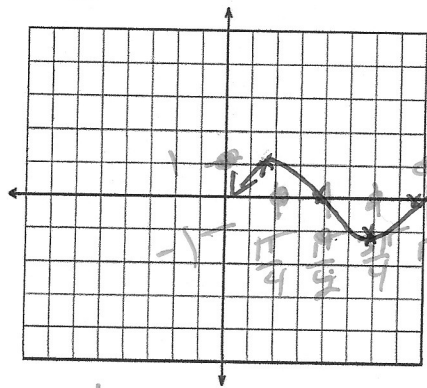
14. $y = 3 \sec(\frac{x}{4} - \frac{\pi}{2})$

p.s. $\frac{2\pi}{1/4} = 8\pi$

p.s. $\frac{\pi}{1/4} = 4\pi$ right

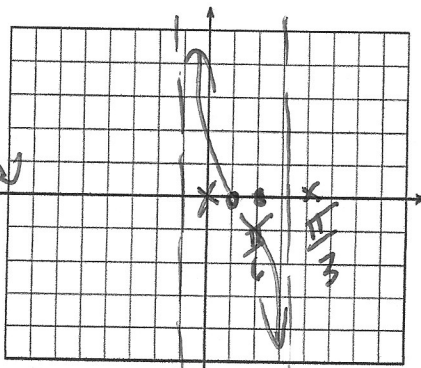
In Exercises 17 to 32, graph one full period of each function:

20. $y = \cos\left(2x - \frac{\pi}{3}\right)$



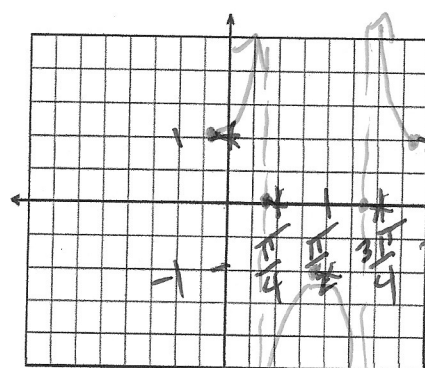
$a: 1$
 $p: \pi$ p.s. $\frac{\pi}{6}$ right

24. $y = \frac{3}{2} \cot\left(3x + \frac{\pi}{4}\right)$



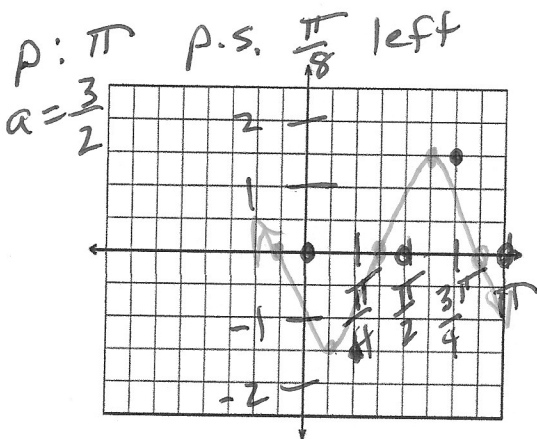
$\frac{\pi}{4} + \frac{1}{3}$ $p = \frac{\pi}{3}$
 p.s. $\frac{\pi}{12}$ left

28. $y = \sec\left(2x + \frac{\pi}{6}\right)$



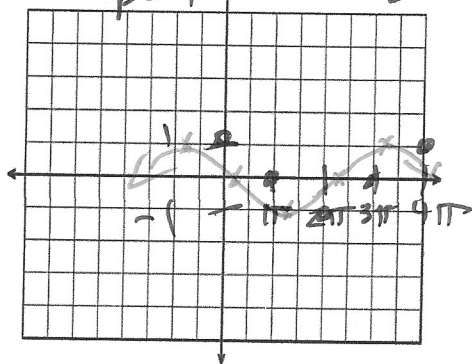
$a = 1$
 $p = \pi$
 p.s. $\frac{\pi}{12}$ left

30. $y = -\frac{3}{2} \sin\left(2x + \frac{\pi}{4}\right)$



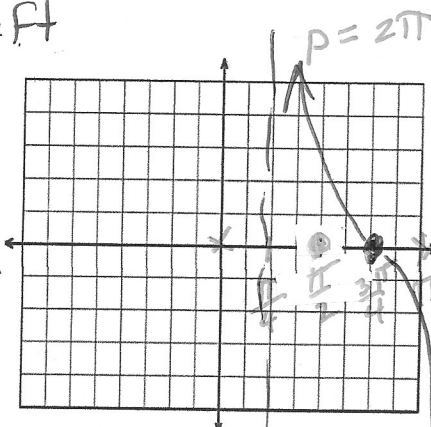
$p: \pi$ p.s. $\frac{\pi}{8}$ left
 $a = \frac{3}{2}$

19. $y = \cos\left(\frac{x}{2} + \frac{\pi}{3}\right)$



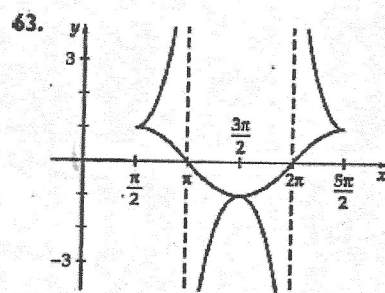
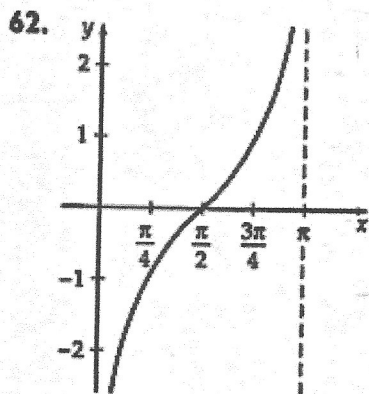
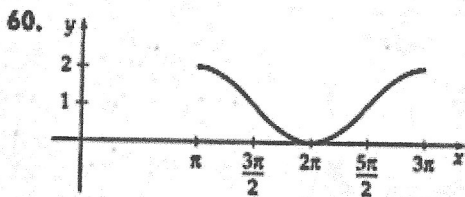
$a = 1$
 $p = 4\pi$ p.s. $\frac{2\pi}{3}$ left

23. $y = 2 \cot\left(\frac{x}{2} - \frac{\pi}{8}\right)$



$p = 2\pi$
 p.s. $\frac{\pi}{4}$ right

In Exercises 59 to 64, find an equation of each blue graph.



$y = \cos(x - \pi) + 1$
 $y = -\cot x$

$y = \sec\left(x - \frac{\pi}{2}\right)$