Additional Problems: Periodic Functions

**Phase Shifts**

**Some problems include the solution. Please remove before sharing with students.**

1. What is the phase shift of the function $f\left(x\right)=\cos((x+\frac{π}{3}))$ ?
* $π$
* $\frac{π}{3}$
* $-\frac{π}{3}$
* $\frac{π}{2}$

\*\*Solution: $-\frac{π}{3}$

1. What is the phase shift of the function $f\left(x\right)=\sin((x-\frac{π}{4}))$ ?
* $π$
* $\frac{π}{4}$
* $-\frac{π}{3}$
* $\frac{π}{2}$

\*\*Solution: $\frac{π}{4}$

1. What is the phase shift of the function $f\left(x\right)=\tan((x+\frac{π}{6}))$ ?
* $π$
* $\frac{π}{6}$
* $-\frac{π}{6}$
* $\frac{π}{2}$

\*\*Solution: $-\frac{π}{6}$

1. What is the function that correctly represents the graph of the sine function below?



\*\*Solution: $f\left(x\right)=sin⁡(x+\frac{π}{2})$

1. What is the function that correctly represents the graph of the sine function below?



\*\*Solution: $f9x)=sin⁡(x+π)$

1. What is the function that correctly represents the graph of the sine function below?



\*\*Solution: $f\left(x\right)=sin⁡(x-\frac{π}{6})$

1. Describe how the graph of the function $f\left(x\right)=\cos((x+\frac{π}{4}))$ differs from the graph of $\cos(x)$.
* It shifts the graph of $\cos(x)$ up by $\frac{π}{4}$ units.
* It shifts the graph of $\cos(x)$ down by $\frac{π}{4}$ units.
* It shifts the graph of $\cos(x)$ to the right by $\frac{π}{4}$ units.
* It shifts the graph of $\cos(x)$ to the left by $\frac{π}{4}$ units.

\*\*Solution: It shifts the graph of $\cos(x)$ to the left by $\frac{π}{4}$ units.

1. Describe how the graph of the function $f\left(x\right)=\sin((x-\frac{π}{3}))$ differs from the graph of $\sin(x)$.
* It shifts the graph of $\sin(x)$ up by $\frac{π}{3}$ units.
* It shifts the graph of $\sin(x)$ down by $\frac{π}{3}$ units.
* It shifts the graph of $\sin(x)$ to the right by $\frac{π}{3}$ units.
* It shifts the graph of $\sin(x)$ to the left by $\frac{π}{3}$ units.

\*\*Solution: It shifts the graph of $\sin(x)$ to the right by $\frac{π}{3}$ units.

1. Describe how the graph of the function $f\left(x\right)=\tan((x+\frac{π}{6}))$ differs from the graph of $\tan(x)$.
* It shifts the graph of $\tan(x)$ up by $\frac{π}{6}$ units.
* It shifts the graph of $\tan(x)$ down by $\frac{π}{6}$ units.
* It shifts the graph of $\tan(x)$ to the right by $\frac{π}{6}$ units.
* It shifts the graph of $\tan(x)$ to the left by $\frac{π}{6}$ units.

\*\*Solution: It shifts the graph of $\tan(x)$ to the left by $\frac{π}{6}$ units.

1. Determine the equation of the sine function shown in the graph below.



\*\*Solution:$f\left(x\right)=sin⁡(x-\frac{2π}{3})$

1. Determine the equation of the sine function shown in the graph below.



\*\*Solution:$f\left(x\right)=sin⁡(x+\frac{π}{3})$

1. Determine the equation of the cosine function shown in the graph below.



\*\*Solution: $f\left(x\right)=cos⁡(x-π)$