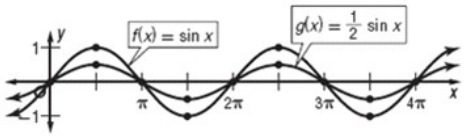
4-4 Graphing Sine and Cosine Functions

Describe how the graphs of $f(x)$ and $g(x)$ are related. Then find the amplitude of $g(x)$, and sketch two periods of both functions on the same coordinate axes.

1. $f(x) = \sin x$; $g(x) = \frac{1}{2}\sin x$

ANSWER:

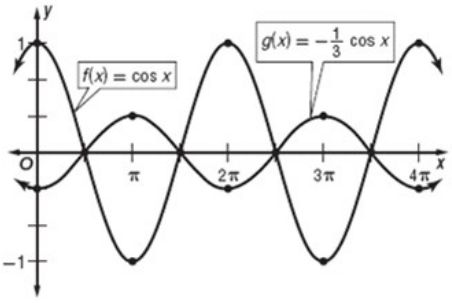
The graph of $g(x)$ is the graph of $f(x)$ compressed vertically. The amplitude of $g(x)$ is $\frac{1}{2}$.



2. $f(x) = \cos x; g(x) = -\frac{1}{3}\cos x$

ANSWER:

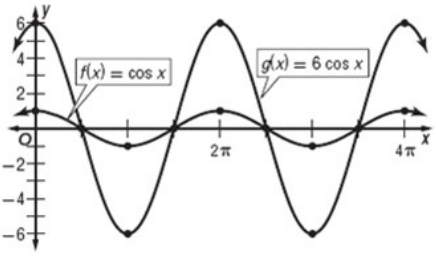
The graph of $g(x)$ is the graph of $f(x)$ compressed vertically and then reflected in the x-axis. The amplitude of $g(x)$ is $\frac{1}{3}$.



3. $f(x) = \cos x$; $g(x) = 6\cos x$

ANSWER:

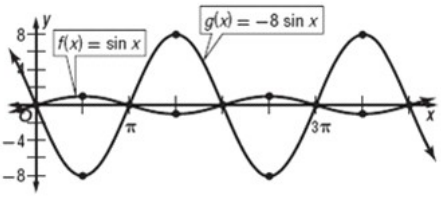
The graph of $g(x)$ is the graph of $f(x)$ expanded vertically. The amplitude of $g(x)$ is 6.



4. $f(x) = \sin x$; $g(x) = -8\sin x$

ANSWER:

The graph of $g(x)$ is the graph of $f(x)$ expanded vertically and then reflected in the x-axis. The amplitude of $g(x)$ is 8.

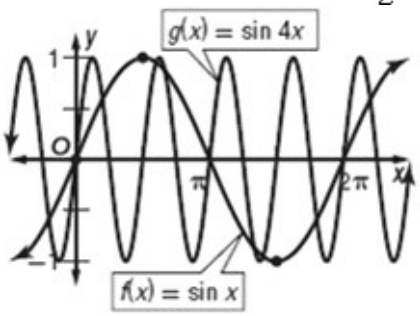


Describe how the graphs of $f(x)$ and $g(x)$ are related. Then find the period of $g(x)$, and sketch at least one period of both functions on the same coordinate axes.

5. $f(x) = \sin x$; $g(x) = \sin 4x$

ANSWER:

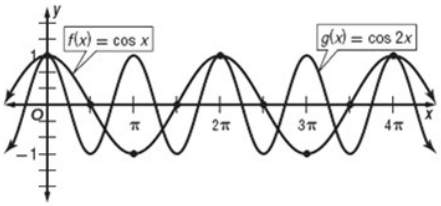
The graph of $g(x)$ is the graph of $f(x)$ compressed horizontally. The period of $g(x)$ is $\frac{\pi}{2}$.



6. $f(x) = \cos x$; $g(x) = \cos 2x$

ANSWER:

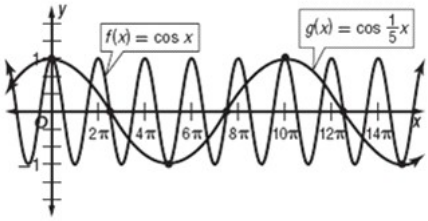
The graph of $g(x)$ is the graph of $f(x)$ compressed horizontally. The period of $g(x)$ is π.



7. $f(x) = \cos x$; $g(x) = \cos \frac{1}{5}x$

ANSWER:

The graph of $g(x)$ is the graph of $f(x)$ expanded horizontally. The period of $g(x)$ is 10π.



8. $f(x) = \sin x$; $g(x) = \sin \frac{1}{4}x$

ANSWER:

The graph of $g(x)$ is the graph of $f(x)$ expanded horizontally. The period of $g(x)$ is 8π.