Name___Key___

Graph the following. Make note of the amplitude, reflection, period, interval, start, end, and increments. Label everything!

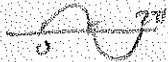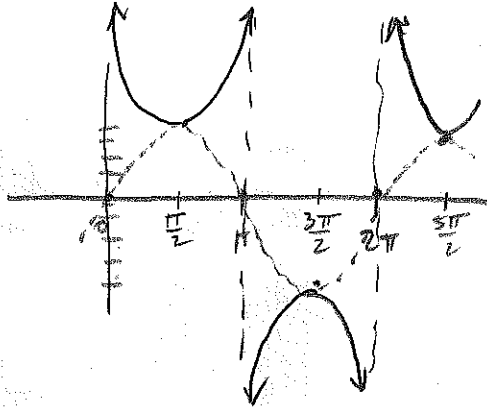**1.** $y = 4\csc\theta$ → $4\sin\theta$

A/refl.:__4__/__no__

P:__2π__

PS:__O__

Start:__O__

End:__2π__

zeros

Int.:__$0, \pi, 2\pi$__

VS:__O__

2. $y = 2\sin(3x)$

A/refl.:__2__/__no__

P:__$\frac{2\pi}{3}$__

PS:__O__

Start:__O__

End:__$\frac{2\pi}{3}$__

zeros

Int.:__$0, \frac{\pi}{3}, \frac{2\pi}{3}$__

VS:__O__
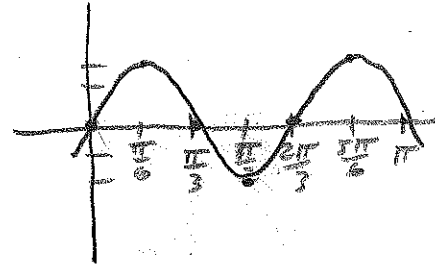
$0 \le 3x \le 2\pi$

$0 \le x \le \frac{2\pi}{3}$

3. $y = 4\cos(\theta + \frac{\pi}{6})$

A/refl.:__4__/__no__

P:__2π__

PS:__$\frac{-\pi}{6}$__

Start:__$\frac{-\pi}{6}$__

End:__$\frac{11\pi}{6}$__

maximin

Int.:__$\frac{-\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}$__

VS:__O__

$0 \le \theta + \frac{\pi}{6} \le 2\pi$

$\frac{-\pi}{6} \le \theta \le 2\pi - \frac{\pi}{6}$

4. $y = 5\sec(\frac{2}{3}x + \frac{\pi}{3})$ → $5\cos(\frac{2}{3}x + \frac{\pi}{3})$

A/refl.:__5__/__no__

P:__3π__

PS:__$\frac{-\pi}{2}$__

Start:__$\frac{-\pi}{2}$__

End:__$\frac{5\pi}{2}$__

Int.:__$\frac{-\pi}{2}, \frac{\pi}{4}, \pi$__

VS:__O__

$0 \le \frac{2}{3}x + \frac{\pi}{3} \le 2\pi$

$\frac{-\pi}{3} \le \frac{2}{3}x \le 2\pi - \frac{\pi}{3}$

$\frac{-\pi}{2} \le x \le 3\pi - \frac{\pi}{2}$

5. $y = \frac{2}{3}\sin(x + \frac{\pi}{6}) + \frac{1}{3}$
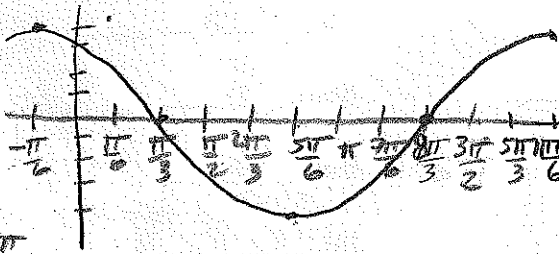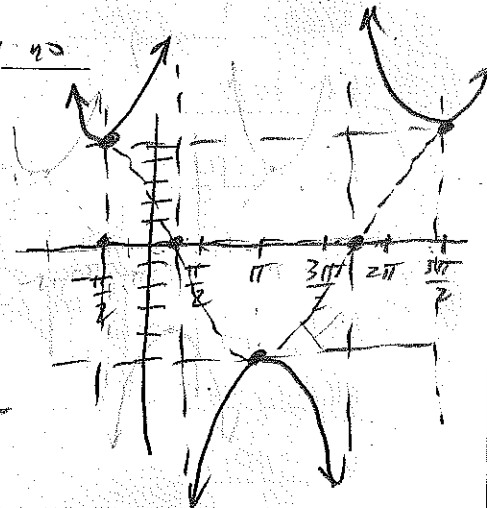
A/refl.: $\frac{2}{3}$ / no

P: 2π

PS: $-\frac{\pi}{6}$

Start: $-\frac{\pi}{6}$
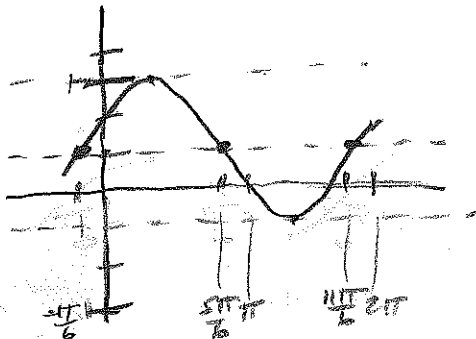
End: $\frac{11\pi}{6}$

max/min
Int.: $-\frac{\pi}{6}, \frac{5\pi}{6}, \frac{11\pi}{6}$

VS: $\frac{1}{3}$

$0 \leq x + \frac{\pi}{6} \leq 2\pi$

$-\frac{\pi}{6} \leq x \leq 2\pi - \frac{\pi}{6}$

6. $y = \cos(2x - \frac{\pi}{2}) + 6$

A/refl.: 1 / no

P: π

PS: $+\frac{\pi}{4}$

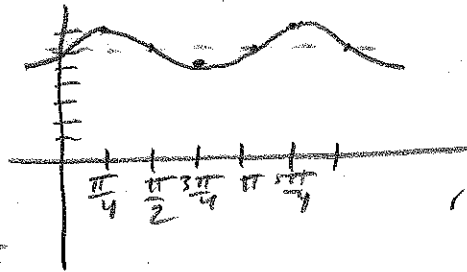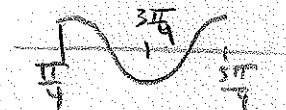Start: $\frac{\pi}{4}$

End: $\frac{5\pi}{4}$

max/min
Int.: $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}$

VS: 6

$0 \leq 2x - \frac{\pi}{2} \leq 2\pi$

$\frac{\pi}{2} \leq 2x \leq 2\pi + \frac{\pi}{2}$

$\frac{\pi}{4} \leq x \leq \pi + \frac{\pi}{4}$

7. $y = -\sin(\frac{1}{5}x - \pi)$

A/refl.: 1 / yes

P: 10π

PS: $+5\pi$
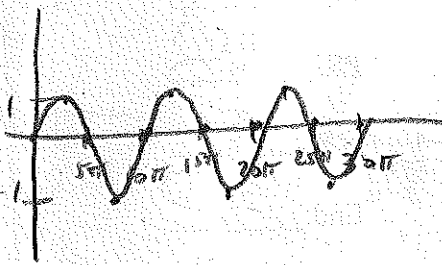
Start: 5π

End: 15π

7eros.
Int.: $5\pi, 10\pi, 15\pi$

VS: no

$0 \leq \frac{1}{5}x - \pi \leq 2\pi$

$\pi \leq \frac{1}{5}x \leq 2\pi + \pi$

$5\pi \leq x \leq 10\pi + 5\pi$

8. $f(x) = \cos(3x - \frac{5\pi}{6}) - \frac{1}{2}$

A/refl.: 1 / no

P: $\frac{2\pi}{3}$

PS: $+\frac{5\pi}{18}$

Start: $\frac{5\pi}{18}$

End: $\frac{17\pi}{18}$

max/min
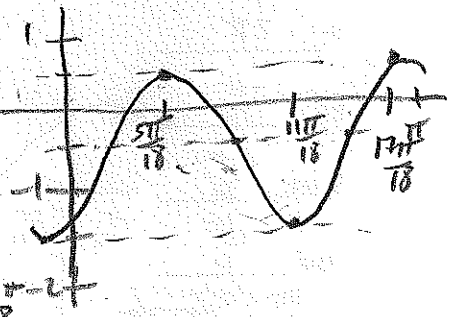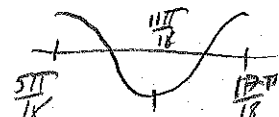Int.: $\frac{5\pi}{18}, \frac{11\pi}{18}, \frac{17\pi}{18}$

VS: $-\frac{1}{2}$

$0 \leq 3x - \frac{5\pi}{6} \leq 2\pi$

$\frac{5\pi}{6} \leq 3x \leq 2\pi + \frac{5\pi}{6}$

$\frac{5\pi}{18} \leq x \leq \frac{2\pi}{3} + \frac{5\pi}{18}$

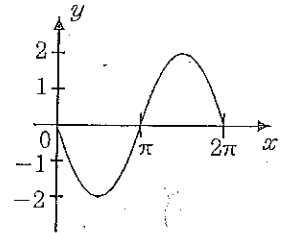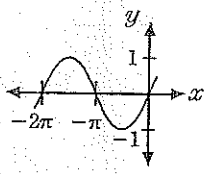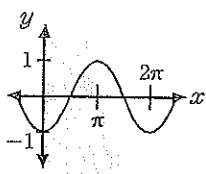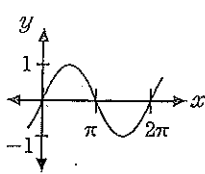$\frac{12\pi}{18} + \frac{5\pi}{18} = \frac{17\pi}{18}$

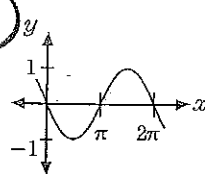Name ___**Key**___   Date _____

1. Which is an equation of the graph shown?

   a) $y = \sin 2x$ b) $y = -\sin 2x$ (c) $y = -2\sin x$ d) $y = 2\sin x$
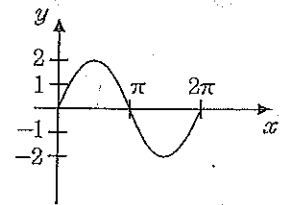
2. Which is the graph of the equation $y = -\sin x$?

   a)   b)   c)   (d)

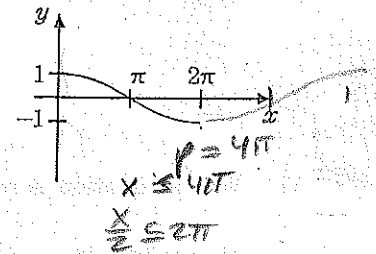3. Which is an equation of the graph shown below?

   a) $y = \sin 2x$ b) $y = 2\cos x$ c) $y = \cos 2x$ (d) $y = 2\sin x$

4. Which is an equation of the graph shown below?

   (a) $y = \cos \frac{1}{2}x$ b) $y = \cos 2x$ c) $y = \sin \frac{1}{2}x$ d) $y = \sin 2x$

   $y = 1\cos\left(\frac{x}{2}\right)$

   $p = 4\pi$

   $x \leq 4\pi$

   $\frac{x}{2} \leq 2\pi$

5. Which equation represents the graph below?

   a) $y = 2\sin 2x$ b) $y = \frac{1}{2}\sin x$ (c) $y = 2\sin \frac{1}{2}x$ d) $y = 2\cos 2x$

   $2\sin\frac{x}{2}$

   $p = 4\pi$

   $x \leq 4\pi$

   $\frac{x}{2} \leq 2\pi$

6. Which graph represents the equation $y = \cos\frac{1}{2}x$?

   a)   (b)   c)   d)

   $\frac{1}{2}x \leq 2\pi$

   $x \leq 4\pi \leftarrow period$

7. Which equation is represented by the graph below?

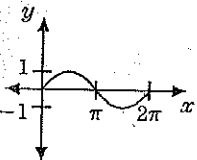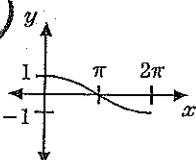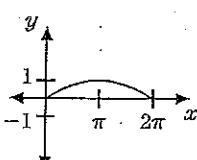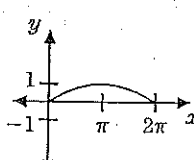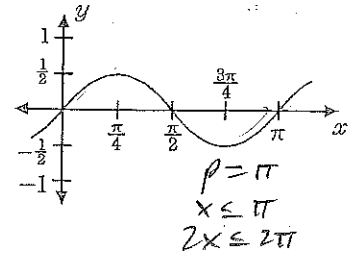a) $y = 2\sin\frac{1}{2}x$ b) $y = \frac{1}{2}\sin\frac{1}{2}x$ (c) $y = \frac{1}{2}\sin 2x$ d) $y = -\frac{1}{2}\cos 2x$

$\frac{1}{2}\sin 2x$

$P = \pi$
$x \leq \pi$
$2x \leq 2\pi$

8. Which equation is represented by the graph in the accompanying diagram?

a) $y = 3\sin x$ b) $y = 3\sin\frac{1}{2}x$ c) $y = -3\sin x$ (d) $y = -3\sin\frac{1}{2}x$

$-3\sin\frac{x}{2}$

$P = 4\pi$
$x \leq 4\pi$
$\frac{x}{2} \leq 2\pi$

9. Which equation is represented by the accompanying graph?

(a) $y = -2\sin\frac{1}{2}x$ b) $y = -\frac{1}{2}\sin 2x$ c) $y = \frac{1}{2}\sin 2x$ d) $y = 2\sin\frac{1}{2}x$

$-2\sin\frac{x}{2}$

$P = 4\pi$
$x \leq 4\pi$
$\frac{x}{2} \leq 2\pi$
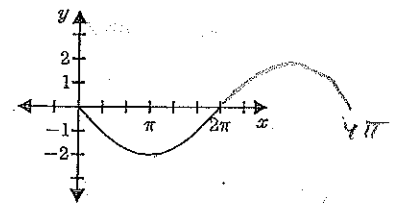
10. Which equation is represented in the accompanying graph?

a) $y = 2\cos 2x$ b) $y = \frac{1}{2}\cos 2x$ (c) $y = 2\cos\frac{1}{2}x$ d) $y = \frac{1}{2}\cos\frac{1}{2}x$

$2\cos\frac{x}{2}$

$P = 4\pi$
$\frac{x}{2} \leq 2\pi$

11. Which equation is represented in the accompanying graph?

a) $y = 2\sin 2x$ b) $y = \frac{1}{2}\sin\frac{1}{2}x$ c) $y = 2\sin\frac{1}{2}x$ (d) $y = \frac{1}{2}\sin 2x$
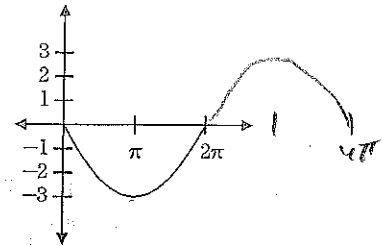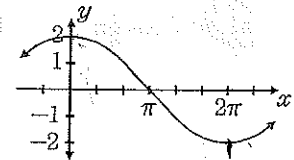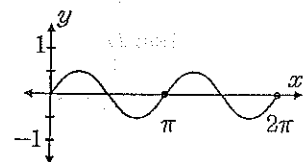
$\frac{1}{2}\sin 2x$

$P = \pi$
$x \leq \pi$
$2x \leq 2\pi$

NAME___*Key*___ DATE_____

4.5 — SINE CURVE EQUATION

Match the sine curve equations on the right to their characteristics on the left. Place the letter of the matching equation on the blank before its characteristics.

		Amplitude	Period	Displacement		Sine curve equations y =
_e_	1.	1	2π	$\frac{\pi}{4}$ units left	a.	$\sin\left(\frac{2}{5}x+\frac{\pi}{10}\right)$
_j_	2.	2	π	$\frac{\pi}{2}$ units right	b.	$1.5\sin\left(4x-\frac{2\pi}{3}\right)$
_b_	3.	1.5	$\frac{\pi}{2}$	$\frac{\pi}{6}$ units right	c.	$2\sin\left(2x-\frac{\pi}{3}\right)$
_i_	4.	1.5	2π	$\frac{\pi}{6}$ units left	d.	$\sin(3x+3\pi)$
_d_	5.	1	$\frac{2\pi}{3}$	π units left	e.	$\sin\left(x+\frac{\pi}{4}\right)$
_o_	6.	2	4π	$\frac{\pi}{3}$ units right	f.	$1.5\sin\left(\frac{1}{5}x-\frac{\pi}{5}\right)$
_K_	7.	1	$\frac{3\pi}{4}$	$\frac{\pi}{2}$ units right	g.	$\sin\left(\frac{2}{3}x+\frac{\pi}{3}\right)$
_a_	8.	1	5π	$\frac{\pi}{4}$ units left	h.	$1.5\sin(2x-2\pi)$
_h_	9.	1.5	π	π units right	i.	$1.5\sin\left(x+\frac{\pi}{6}\right)$
_m_	10.	2	$\frac{\pi}{2}$	$\frac{2\pi}{3}$ units left	j.	$2\sin(2x-\pi)$
_g_	11.	1	3π	$\frac{\pi}{2}$ units left	k.	$\sin\left(\frac{8}{3}x-\frac{4\pi}{3}\right)$
_C_	12.	2	π	$\frac{\pi}{6}$ units right	l.	$\sin\left(3x-\frac{\pi}{2}\right)$
_q_	13.	1.5	4π	2π units left	m.	$2\sin\left(4x+\frac{8\pi}{3}\right)$
_f_	14.	1.5	10π	π units right	n.	$2\sin\left(2x-\frac{\pi}{2}\right)$
					o.	$2\sin\left(\frac{1}{2}x-\frac{\pi}{6}\right)$
					p.	$1.5\sin\left(x-\frac{\pi}{6}\right)$
					q.	$1.5\sin\left(\frac{1}{2}x+\pi\right)$

Handwritten work:

2. $x \le 2\pi + \frac{\pi}{4}$
$x - \frac{\pi}{4} \le 2\pi$

3. $x \le \pi + \frac{\pi}{2}$
$x - \frac{\pi}{2} \le \pi \Rightarrow 2x - \pi$

4. $x \le \frac{\pi}{6} + \frac{\pi}{6}$
$x - \frac{\pi}{6} \le \frac{\pi}{6} \Rightarrow 4x - \frac{2\pi}{3}$

5. $x \le 2\pi - \frac{\pi}{6}$
$x + \frac{\pi}{6} \le 2\pi$

6. $x \le \frac{2\pi}{3} - \pi$
$x + \pi \le \frac{2\pi}{3} \Rightarrow 3x + 3\pi$

7. $x \le 4\pi + \frac{\pi}{3}$
$x - \frac{\pi}{3} \le 4\pi \Rightarrow \frac{x}{2} - \frac{\pi}{6}$

8. $x \le \frac{3\pi}{4} + \frac{\pi}{2}$
$x - \frac{\pi}{2} \le \frac{3\pi}{4} \Rightarrow \frac{8}{3}x - \frac{4\pi}{3}$

9. $x \le 5\pi - \frac{\pi}{4}$
$x + \frac{\pi}{4} \le 5\pi \Rightarrow \frac{2}{3}x + \frac{\pi}{10}$

10. $x \le \pi + \pi$
$x - \pi \le \pi \Rightarrow 2x - 2\pi \le 2x$

11. $x \le \frac{\pi}{2} - \frac{2\pi}{3}$
$x + \frac{2\pi}{3} \le \frac{\pi}{2} \Rightarrow 4x + \frac{8\pi}{3}$

12. $x \le 3\pi - \frac{\pi}{2}$
$x + \frac{\pi}{2} \le 3\pi \Rightarrow \frac{2}{3}x + \frac{\pi}{3}$

13. $x \le \pi + \frac{\pi}{3}$
$x - \frac{\pi}{3} \le \pi \Rightarrow 2x - \frac{\pi}{3}$

14. $x \le 4\pi - 2\pi$
$x + 2\pi \le 4\pi \Rightarrow \frac{x}{2} + \pi$

$x \le 10\pi + \pi$
$x - \pi \le 10\pi$
$\frac{x}{5} - \frac{\pi}{5} \le 2\pi$

Name_____

Graph the following. Make note of the amplitude, reflection, period, interval, start, end, and increments. Label everything!

1. $y = 4\csc\theta$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

2. $y = 2\sin(3x)$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

3. $y = 4\cos(\theta + \frac{\pi}{6})$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

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

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

5. $y = \dfrac{2}{3}\sin(x + \dfrac{\pi}{6}) + \dfrac{1}{3}$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

6. $y = \cos(2x - \dfrac{\pi}{2}) + 6$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

7. $y = -\sin(\dfrac{1}{5}x - \pi)$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

VS:_____

8. $f(x) = \cos(3x - \dfrac{5\pi}{6}) - \dfrac{1}{2}$

A/refl.:_____/_____

P:_____

PS:_____

Start:_____

End:_____

Int.:_____

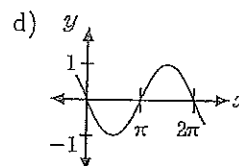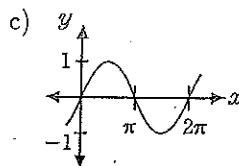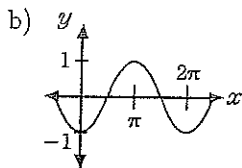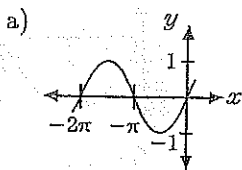VS:_____

1. Which is an equation of the graph shown?

   a) $y = \sin 2x$ b) $y = -\sin 2x$ c) $y = -2\sin x$ d) $y = 2\sin x$

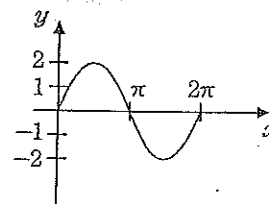2. Which is the graph of the equation $y = -\sin x$?

   a)   b)   c)   d)
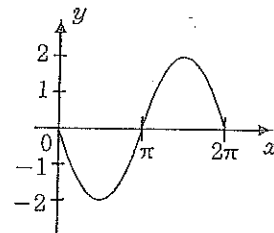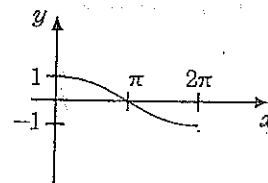

3. Which is an equation of the graph shown below?

   a) $y = \sin 2x$ b) $y = 2\cos x$ c) $y = \cos 2x$ d) $y = 2\sin x$
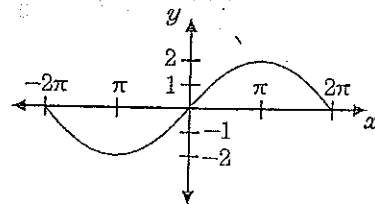

4. Which is an equation of the graph shown below?

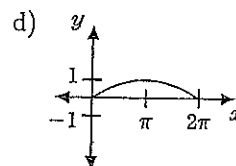   a) $y = \cos \frac{1}{2}x$ b) $y = \cos 2x$ c) $y = \sin \frac{1}{2}x$ d) $y = \sin 2x$
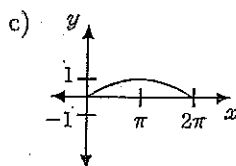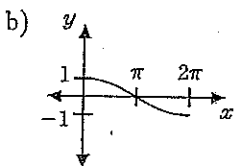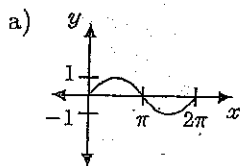

5. Which equation represents the graph below?

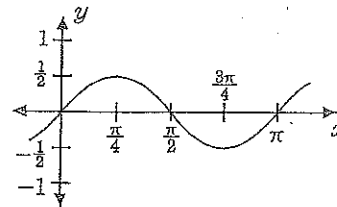   a) $y = 2\sin 2x$ b) $y = \frac{1}{2}\sin x$ c) $y = 2\sin \frac{1}{2}x$ d) $y = 2\cos 2x$

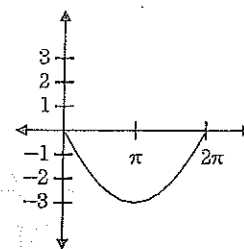6. Which graph represents the equation $y = \cos \frac{1}{2}x$?

   a)   b)   c)   d)

7. Which equation is represented by the graph below?

    a) $y = 2\sin\frac{1}{2}x$ b) $y = \frac{1}{2}\sin\frac{1}{2}x$ c) $y = \frac{1}{2}\sin 2x$ d) $y = -\frac{1}{2}\cos 2x$
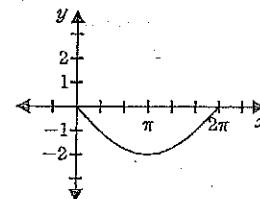
8. Which equation is represented by the graph in the accompanying diagram?

    a) $y = 3\sin x$ b) $y = 3\sin\frac{1}{2}x$ c) $y = -3\sin x$ d) $y = -3\sin\frac{1}{2}x$

9. Which equation is represented by the accompanying graph?

    a) $y = -2\sin\frac{1}{2}x$ b) $y = -\frac{1}{2}\sin 2x$ c) $y = \frac{1}{2}\sin 2x$ d) $y = 2\sin\frac{1}{2}x$

10. Which equation is represented in the accompanying graph?

    a) $y = 2\cos 2x$ b) $y = \frac{1}{2}\cos 2x$ c) $y = 2\cos\frac{1}{2}x$ d) $y = \frac{1}{2}\cos\frac{1}{2}x$

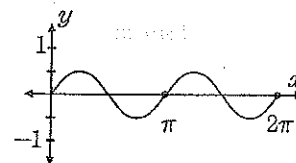11. Which equation is represented in the accompanying graph?

    a) $y = 2\sin 2x$ b) $y = \frac{1}{2}\sin\frac{1}{2}x$ c) $y = 2\sin\frac{1}{2}x$ d) $y = \frac{1}{2}\sin 2x$

4.5 — SINE CURVE EQUATION

Match the sine curve equations on the right to their characteristics on the left. Place the letter of the matching equation on the blank before its characteristics.

	Amplitude	Period	Displacement		Sine curve equations y =
_____ 1.	1	2π	$\frac{\pi}{4}$ units left	a.	$\sin\left(\frac{2}{5}x+\frac{\pi}{10}\right)$
_____ 2.	2	π	$\frac{\pi}{2}$ units right	b.	$1.5\sin\left(4x-\frac{2\pi}{3}\right)$
_____ 3.	1.5	$\frac{\pi}{2}$	$\frac{\pi}{6}$ units right	c.	$2\sin\left(2x-\frac{\pi}{3}\right)$
_____ 4.	1.5	2π	$\frac{\pi}{6}$ units left	d.	$\sin(3x+3\pi)$
_____ 5.	1	$\frac{2\pi}{3}$	π units left	e.	$\sin\left(x+\frac{\pi}{4}\right)$
_____ 6.	2	4π	$\frac{\pi}{3}$ units right	f.	$1.5\sin\left(\frac{1}{5}x-\frac{\pi}{5}\right)$
_____ 7.	1	$\frac{3\pi}{4}$	$\frac{\pi}{2}$ units right	g.	$\sin\left(\frac{2}{3}x+\frac{\pi}{3}\right)$
_____ 8.	1	5π	$\frac{\pi}{4}$ units left	h.	$1.5\sin(2x-2\pi)$
_____ 9.	1.5	π	π units right	i.	$1.5\sin\left(x+\frac{\pi}{6}\right)$
_____ 10.	2	$\frac{\pi}{2}$	$\frac{2\pi}{3}$ units left	j.	$2\sin(2x-\pi)$
_____ 11.	1	3π	$\frac{\pi}{2}$ units left	k.	$\sin\left(\frac{8}{3}x-\frac{4\pi}{3}\right)$
_____ 12.	2	π	$\frac{\pi}{6}$ units right	l.	$\sin\left(3x-\frac{\pi}{2}\right)$
_____ 13.	1.5	4π	2π units left	m.	$2\sin\left(4x+\frac{8\pi}{3}\right)$
_____ 14.	1.5	10π	π units right	n.	$2\sin\left(2x-\frac{\pi}{2}\right)$
				o.	$2\sin\left(\frac{1}{2}x-\frac{\pi}{6}\right)$
				p.	$1.5\sin\left(x-\frac{\pi}{6}\right)$
				q.	$1.5\sin\left(\frac{1}{2}x+\pi\right)$