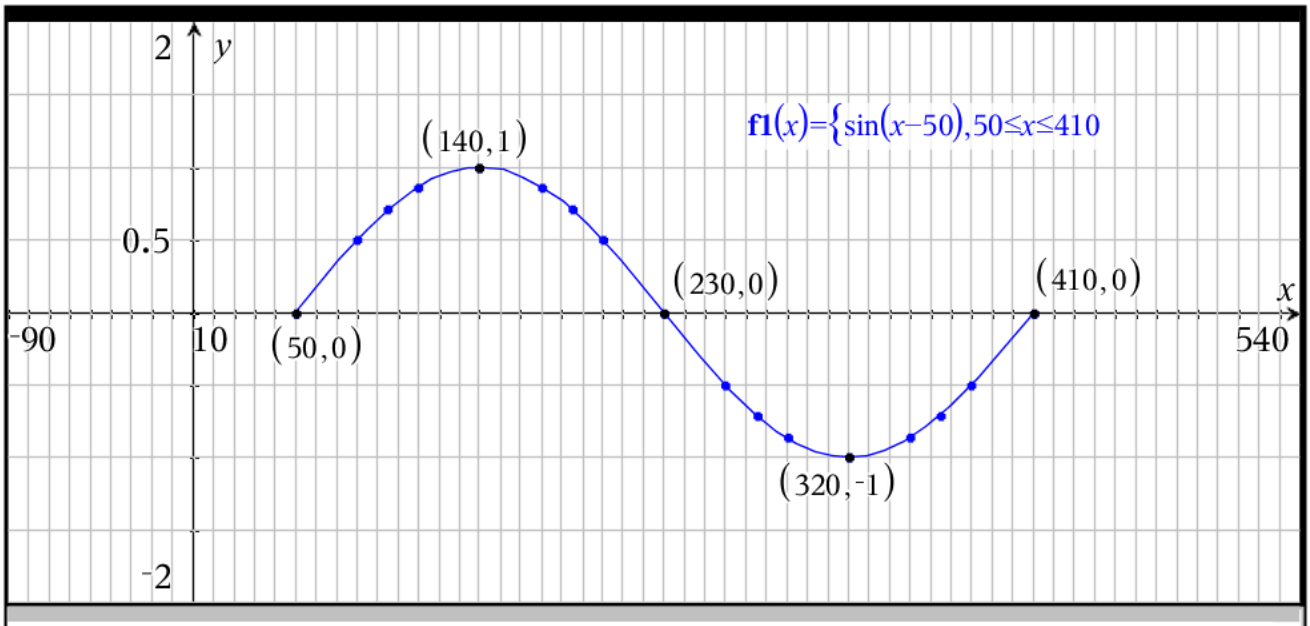
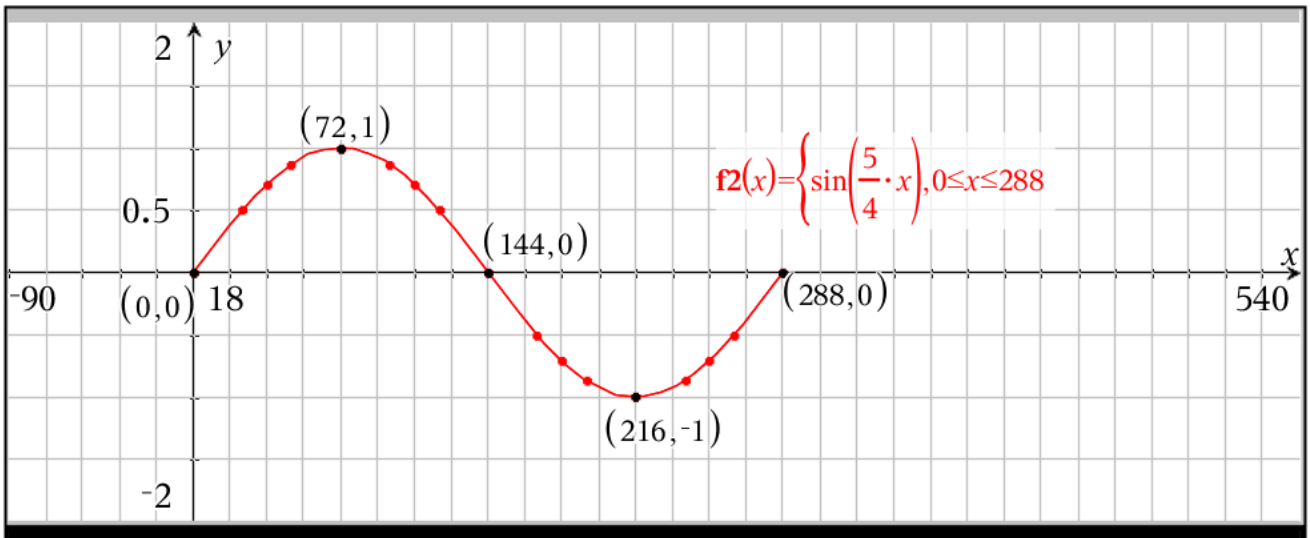


y = sin(x−50) ONE PERIOD [50,410) Length of ONE PERIOD $\frac{360}{1}$ ▸ 360

Range [−1,1]

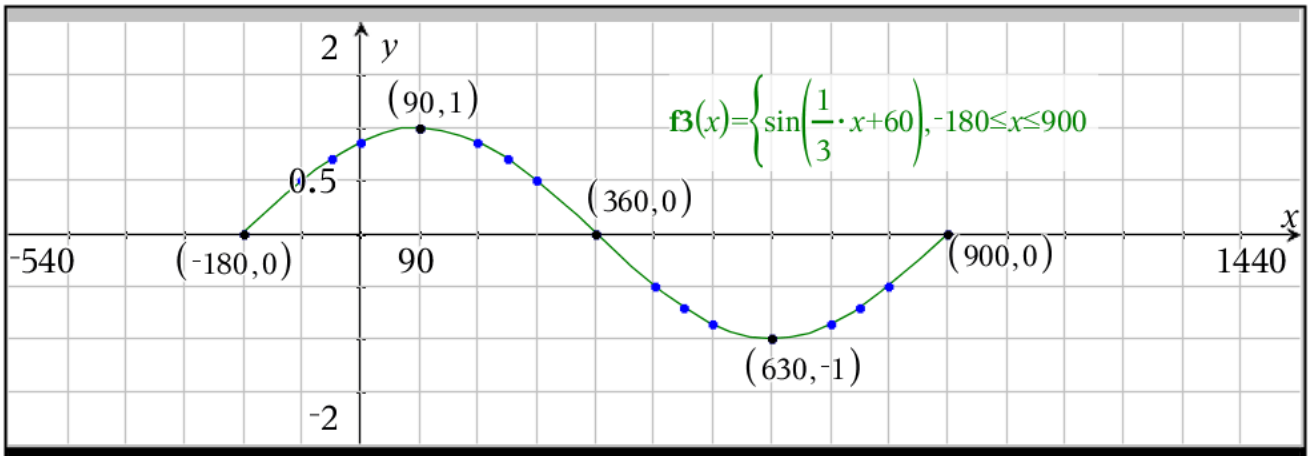
This is a horizontal shift right 50 degrees



y = $\sin\left(\frac{5}{4}x\right)$ ONE PERIOD [0,288) Length of ONE PERIOD $\frac{360}{\frac{5}{4}}$ = 288

Range [−1,1]

This is a horizontal compression by a factor of $\frac{4}{5}$

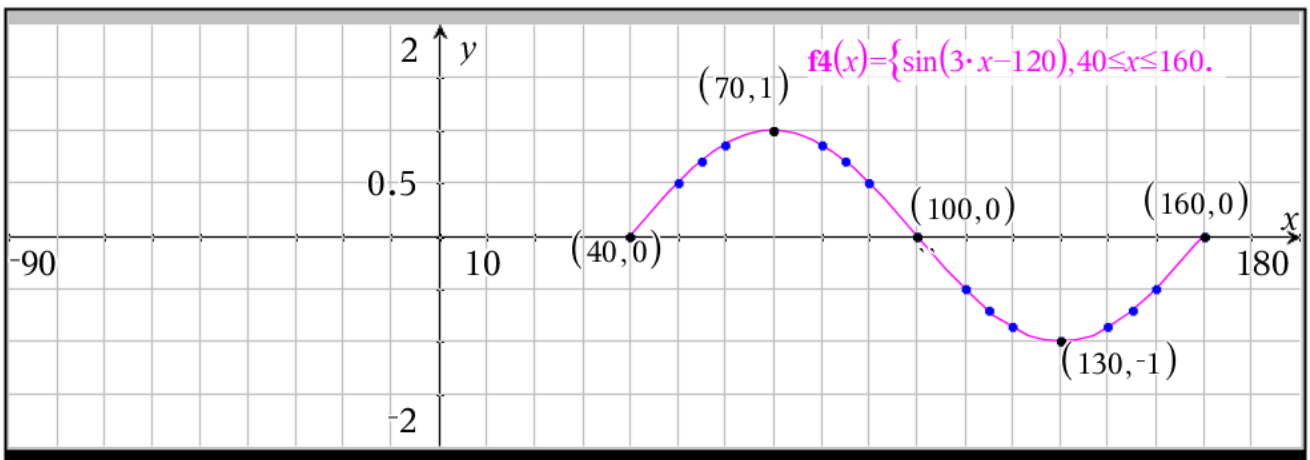


$y = \sin\left(\frac{1}{3}x+60\right) = \sin\left(\frac{1}{3}(x+180)\right)$ ONE PERIOD [−180,900)

Length of ONE PERIOD $\frac{360}{\frac{1}{3}} = 1080$ Range [−1,1]

This is a horizontal stretch by a factor of 3

This is a horizontal shift to the left 180 degrees



$y = \sin(3x-120) = \sin(3(x-40))$ ONE PERIOD [40,160)

Length of ONE PERIOD $\frac{360}{3} = 120$ Range [−1,1]

This is a horizontal compression by a factor of $\frac{1}{3}$

This is a horizontal shift to the right 40 degrees

	A special	B x_1	C sin_1	D x_2	E sin_2	F x_3	G sin_3	H x
=		=special+5	=sin(x_1−	=special*4	=sin(x_2*5	=special*3	=sin(1/3*x	=s
1	0	50	0	0	0	-180	0	
2	30	80	1/2	24	1/2	-90	1/2	
3	45	95	√(2)/2	36	√(2)/2	-45	√(2)/2	
4	60	110	√(3)/2	48	√(3)/2	0	√(3)/2	
5	90	140	1	72	1	90	1	
6	120	170	√(3)/2	96	√(3)/2	180	√(3)/2	
7	135	185	√(2)/2	108	√(2)/2	225	√(2)/2	
8	150	200	1/2	120	1/2	270	1/2	
9	180	230	0	144	0	360	0	
10	210	260	-1/2	168	-1/2	450	-1/2	
11	225	275	-√(2)/2	180	-√(2)/2	495	-√(2)/2	

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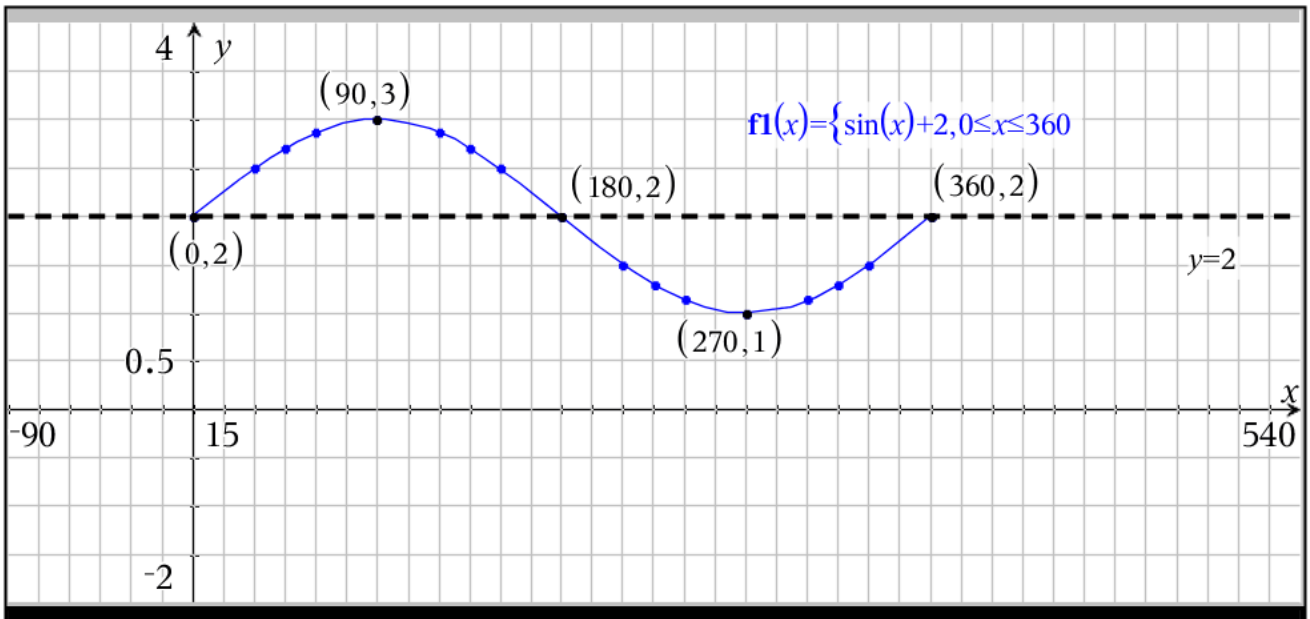
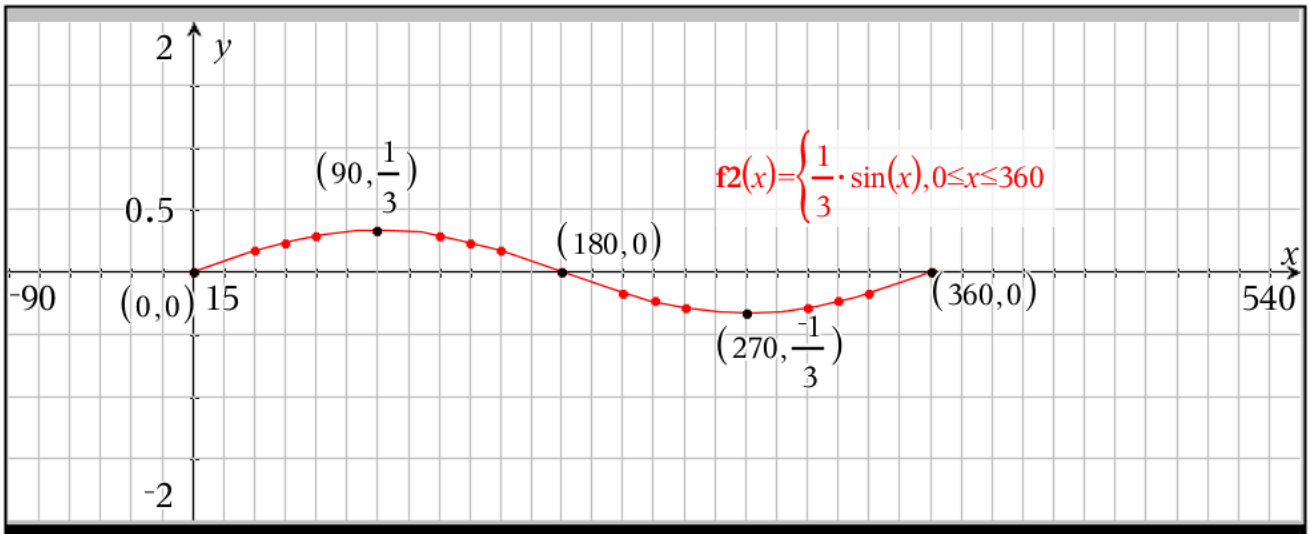


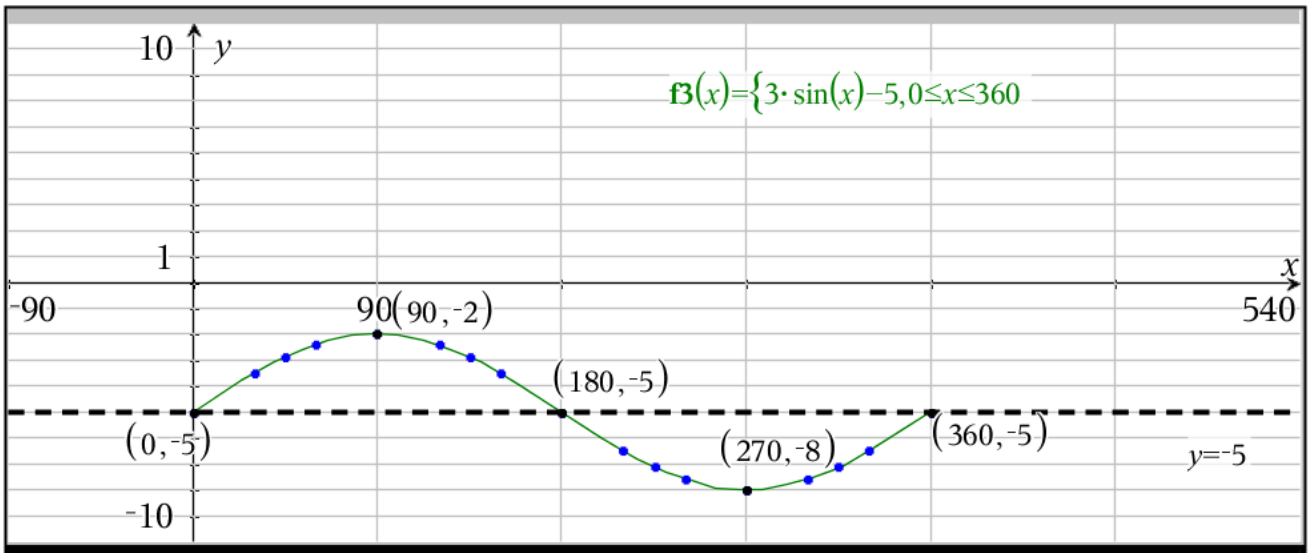
y = sin(x)+2 ONE PERIOD [0,360) Length of ONE PERIOD $\frac{360}{1} = 360$

Range [1,3] This is a vertical shift up 2 units This has a midline of y = 2



$y = \frac{1}{3}\sin(x)$ ONE PERIOD [0,360) Length of ONE PERIOD $\frac{360}{1} = 360$

Range $[\frac{-1}{3}, \frac{1}{3}]$ This is a vertical compression by a factor of $\frac{1}{3}$

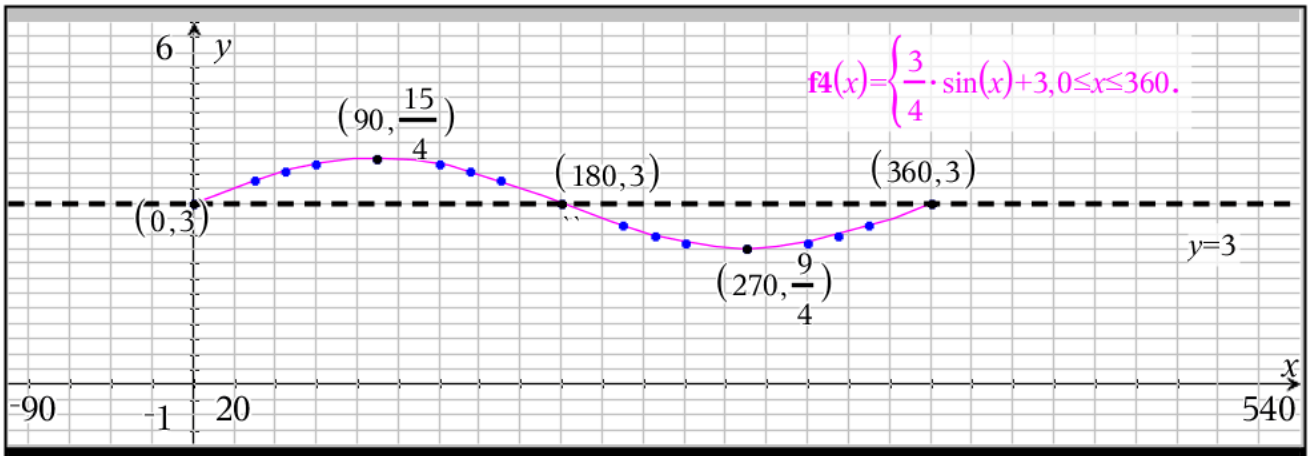


$y = 3\sin(x) - 5$ ONE PERIOD [−180,900) Length of ONE PERIOD $\frac{360}{1} = 360$

Range [−8,−2]

This is a vertical stretch by a factor of 3

This is a vertical shift down 5 units This graph has a midline of y = −5



$y=\frac{3}{4}\sin(x)+3$ ONE PERIOD [0,360) Length of ONE PERIOD $\frac{360}{1}=360$

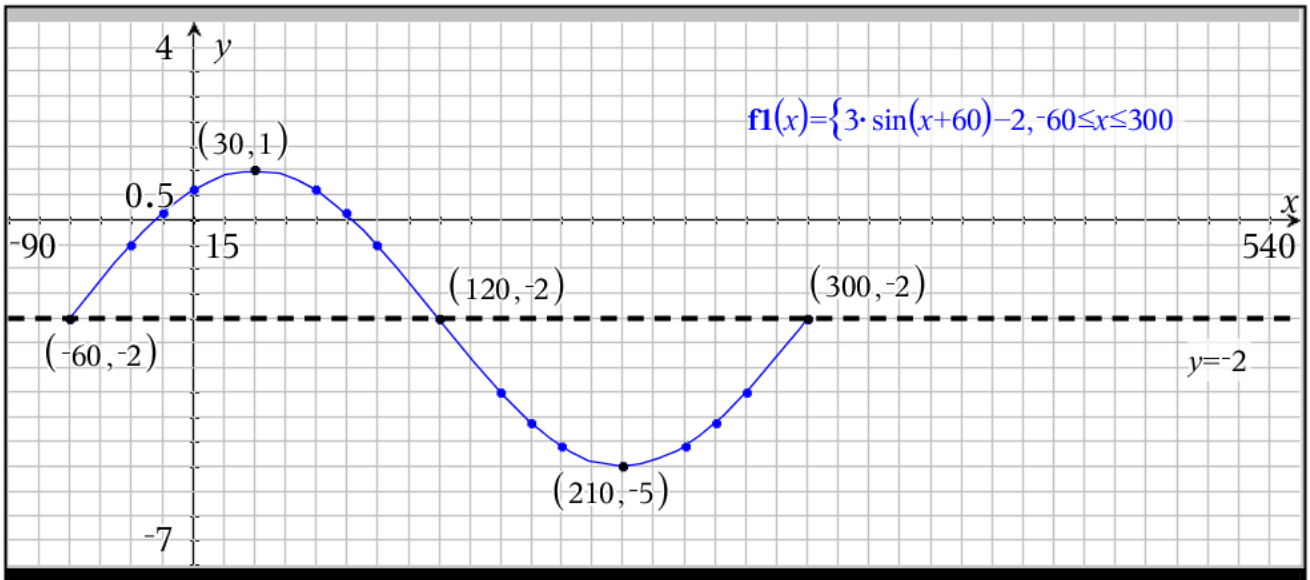
Range $[\frac{9}{4},\frac{15}{4}]=[2\frac{1}{4},3\frac{3}{4}]$ =[2.25, 3.75]

This is a vertical compression by a factor of $\frac{3}{4}$

This is a vertical shift up 3 units This graph has a midline of y = 3

	A special	B x_1	C sin_1	D x_2	E sin_2	F x_3	G sin_3	H x
=		=special	=sin(x_1)+	=special	=1/3*sin(x	=special	=3*sin(x_3	=s
1	0	0	2	0	0	0	-5	
2	30	30	5/2	30	1/6	30	-7/2	
3	45	45	√(2)/2+2	45	√(2)/6	45	3*√(2)/...	
4	60	60	√(3)/2+2	60	√(3)/6	60	3*√(3)/...	
5	90	90	3	90	1/3	90	-2	
6	120	120	√(3)/2+2	120	√(3)/6	120	3*√(3)/...	
7	135	135	√(2)/2+2	135	√(2)/6	135	3*√(2)/...	
8	150	150	5/2	150	1/6	150	-7/2	
9	180	180	2	180	0	180	-5	
10	210	210	3/2	210	-1/6	210	-13/2	
11	225	225	2−√(2)/2	225	-√(2)/6	225	-3*√(2)/...	

A1 0

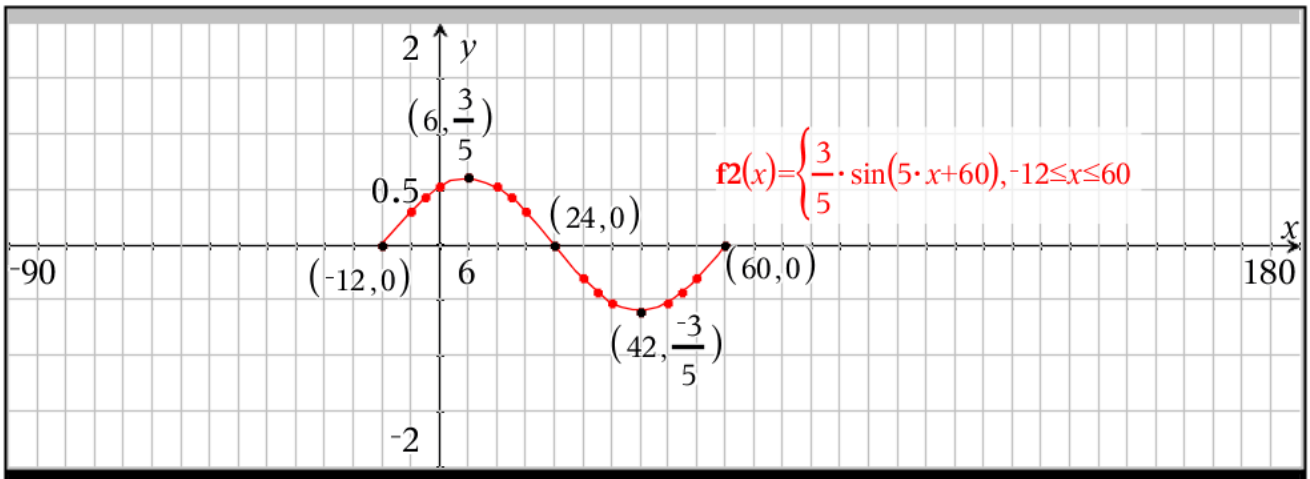


y = sin(x)+2 ONE PERIOD [0,360) Length of ONE PERIOD $\frac{360}{1} = 360$

Range [−5,1] This is a vertical shift down 2 units This has a midline of y = −2

This is horizontal shift 60 degrees to the left

This is a vertical stretch by a factor of 3

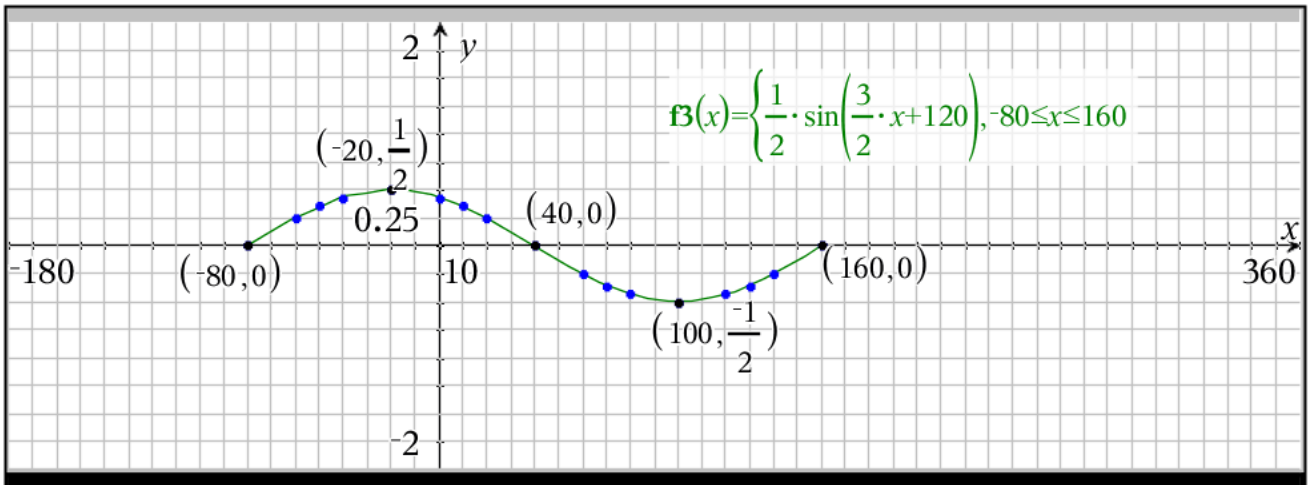


$y = \frac{3}{5}\sin(5x+60) = \frac{3}{5}\sin(5(x+12))$ ONE PERIOD [−12,60) Length of ONE PERIOD $\frac{360}{5} = 72$

Range $[\frac{-3}{5},\frac{3}{5}]$=[−0.6,0.6] This is a vertical compression by a factor of $\frac{3}{5}$

This is horizontal compression by a factor of $\frac{1}{5}$ This is a horizontal shift left 12 degrees

This has a midline y = 0

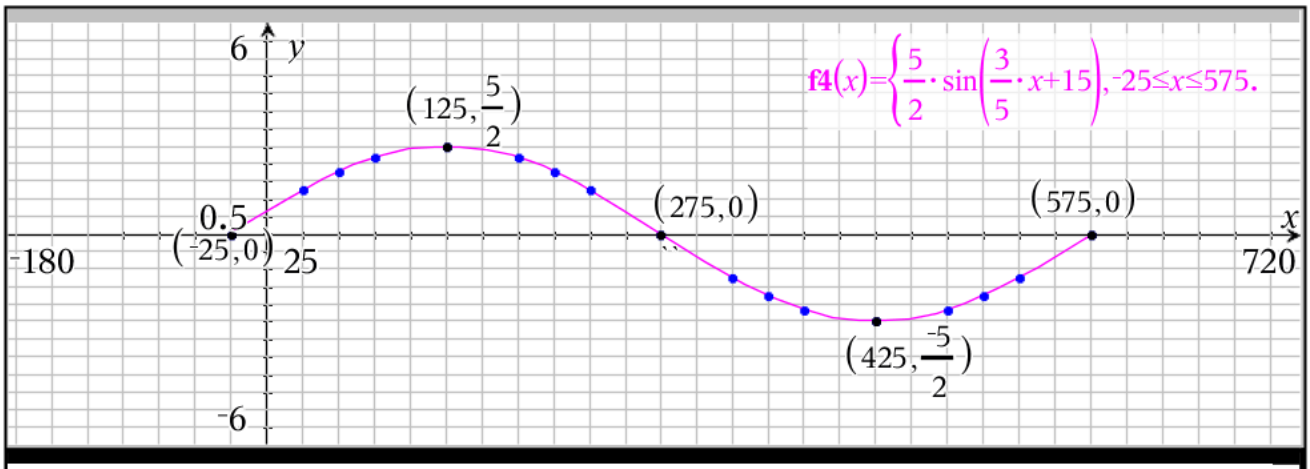


$y = \frac{1}{2}\sin\left(\frac{3}{2}x+120\right) = \frac{1}{2}\cdot\sin\left(\frac{3}{2}\cdot(x+80)\right)$ ONE PERIOD [−80,160) Length of ONE PERIOD $\frac{360}{\frac{3}{2}} = 240$

Range $[\frac{-1}{2},\frac{1}{2}]=[-0.5,0.5]$ This is a vertical compression by a factor of $\frac{1}{2}$

This is a horizontal compression by a factor of $\frac{2}{3}$

This is a horizontal shift left by 80 degrees This graph has a midline of y = 0



$y = \frac{5}{2}\sin\left(\frac{3}{5}x+15\right) = \frac{5}{2}\sin\left(\frac{3}{5}(x+25)\right)$ ONE PERIOD [−25,575) Length of ONE PERIOD $\frac{360}{\frac{3}{5}} = 600$

Range $[\frac{-5}{2},\frac{5}{2}]=[-2.5, 2.5]$ This is a vertical stretch by a factor of $\frac{5}{2}$

This is a horizontal shift left 25 degrees This is a horizontal stretch by a factor of $\frac{5}{3}$

This graph has a midline of y = 0

	A special	B x_1	C sin_1	D x_2	E sin_2	F x_3	G sin_3	H x
=		=special−(	=3*sin(x_1	=1/5*(spe(	=3/5*sin(5	=2/3*(spe(	=1/2*sin(3	=5
1	0	-60	-2	-12	0	-80	0	
2	30	-30	-1/2	-6	3/10	-60	1/4	
3	45	-15	3*√(2)/...	-3	3*√(2)/...	-50	√(2)/4	
4	60	0	3*√(3)/...	0	3*√(3)/...	-40	√(3)/4	
5	90	30	1	6	3/5	-20	1/2	
6	120	60	3*√(3)/...	12	3*√(3)/...	0	√(3)/4	
7	135	75	3*√(2)/...	15	3*√(2)/...	10	√(2)/4	
8	150	90	-1/2	18	3/10	20	1/4	
9	180	120	-2	24	0	40	0	
10	210	150	-7/2	30	-3/10	60	-1/4	
11	225	165	-3*√(2)/...	33	-3*√(2)/...	70	-√(2)/4	

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