

# Graphing Sine and Cosine Functions Worksheet

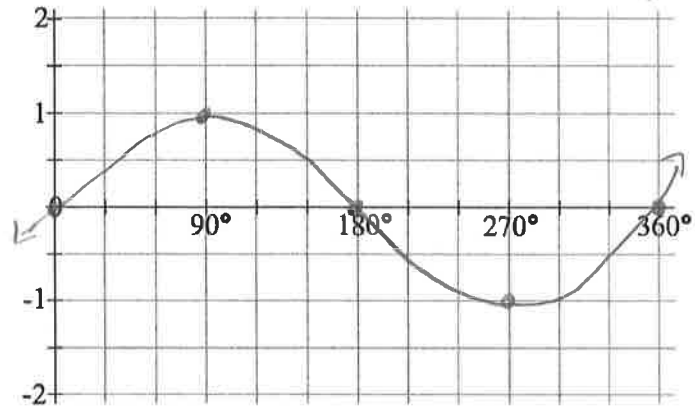
MCR3U

Jensen

SOLUTIONS

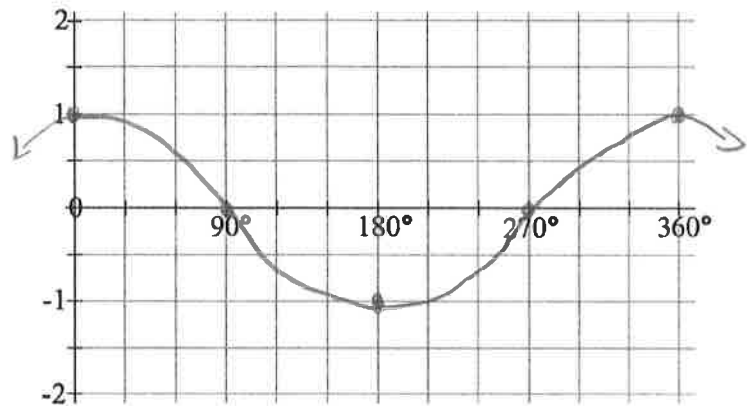
1) Graph the function  $y = \sin x$  using key points between  $0^\circ$  and  $360^\circ$ .

$x$	$y$
0	0
90	1
180	0
270	-1
360	0



2) Graph the function  $y = \cos x$  using key points between  $0^\circ$  and  $360^\circ$ .

$x$	$y$
0	1
90	0
180	-1
270	0
360	1



3) Determine the phase shift and the vertical shift of  $y = \sin x$ .

a)  $y = \sin(x - 50^\circ) + 3$

right  $50^\circ$

up 3

b)  $y = 2 \sin(x + 45^\circ) - 1$

left  $45^\circ$

down 1

4) Determine the phase shift and the vertical shift of  $y = \cos x$ .

a)  $y = -9 \cos(x + 120^\circ) - 5$

left  $120^\circ$   
down 5

b)  $y = 12 \cos[5(x - 150^\circ)] + 7$

right  $150^\circ$   
up 7

5) Determine the amplitude, the period, phase shift, vertical shift, maximum and minimum for each of the following.

a)  $y = 5 \sin[4(x + 60^\circ)] - 2$

amplitude = 5

period =  $\frac{360}{4} = 90^\circ$

shift left  $60^\circ$

shift down 2

max =  $5 - 2 = 3$

min =  $-2 - 5 = -7$

b)  $y = 2 \cos[2(x + 150^\circ)] - 5$

amplitude = 2

period =  $\frac{360}{2} = 180^\circ$

shift left  $150^\circ$

shift down 5

max =  $2 - 5 = -3$

min =  $-5 - 2 = -7$

c)  $y = \frac{1}{2} \sin[\frac{1}{2}(x - 60^\circ)] + 1$

amplitude =  $\frac{1}{2}$

period =  $\frac{360}{0.5} = 720^\circ$

shift right  $60^\circ$

shift up 1

max =  $\frac{1}{2} + 1 = \frac{3}{2}$  or 1.5

min =  $1 - \frac{1}{2} = \frac{1}{2}$  or 0.5

d)  $y = 0.8 \cos[3.6(x - 40^\circ)] - 0.4$

amplitude = 0.8

period =  $\frac{360}{3.6} = 100^\circ$

shift right  $40^\circ$

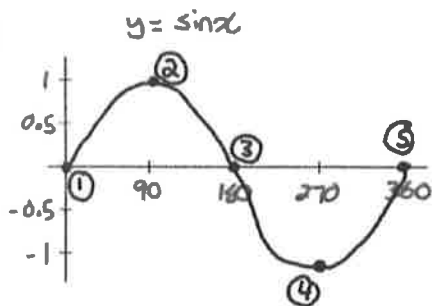
shift down 0.4

max =  $0.8 - 0.4 = 0.4$

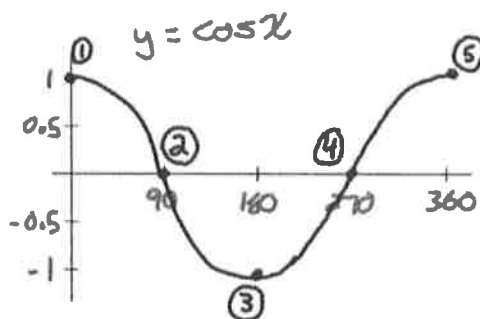
min =  $-0.4 - 0.8 = -1.2$

## Answers

1)



2)



3) a) phase shift: right  $50^\circ$   
vertical shift: up 3 units

b) phase shift: left  $45^\circ$   
vertical shift: down one unit

4) a) phase shift: left  $120^\circ$   
vertical shift: down 5 units

b) phase shift: right  $150^\circ$   
vertical shift: up 7 units

5) a) amplitude: 5                      period:  $90^\circ$                       phase shift: left  $60^\circ$   
vertical shift: down 2 units                      max: 3                      min: -7

b) amplitude: 2                      period:  $180^\circ$                       phase shift: left  $150^\circ$   
vertical shift: down 5 units                      max: -3                      min: -7

c) amplitude:  $\frac{1}{2}$                       period:  $720^\circ$                       phase shift: right  $60^\circ$   
vertical shift: up 1 unit                      max: 1.5                      min: 0.5

d) amplitude: 0.8                      period:  $100^\circ$                       phase shift: right  $40^\circ$   
vertical shift: down 0.4 units                      max: 0.4                      min: -1.2