

Sinusoidal Functions Worksheet

1a) $y = -3 \sin(2\theta - 60^\circ) - 1$

amplitude = $|-3| = 3$

$\Delta y = -3 \sin[2(\theta - 30^\circ)] - 1$

Period = $\frac{360^\circ}{|k|} = \frac{360^\circ}{|2|} = 180^\circ$

Phase = 30°

Vertical displacement = -1

Domain: $\{\theta \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid -4 \leq y \leq 2\}$

b) $y = 2 \cos(-3\theta - 135^\circ) + 5$

$y = 2 \cos[-3(\theta + 45^\circ)] + 5$

amplitude = $|2| = 2$

Period = $\frac{360^\circ}{|k|} = \frac{360^\circ}{|-3|} = 120^\circ$

Phase = -45°

Vertical displacement = 5

Domain: $\{\theta \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid 3 \leq y \leq 7\}$

2. See ^{graphs} at back of this solution set.

3. $y = a \cos[k(\theta - d)] + c$

$k = 1$

$d = 0$

$a = 1.5$

$c = -1$

$y = 1.5 \cos[1(\theta - 0)] - 1$

$y = 1.5 \cos \theta - 1$

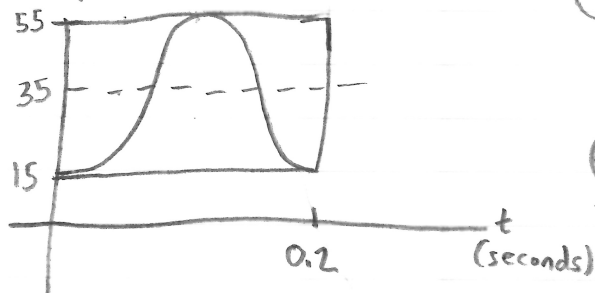
4. ① $H(\text{cm})$

Frequency = 5 Hz

$T = \frac{1}{f}$

$= \frac{1}{5}$

$= 0.2 \text{ s}$



③ $H = a \cos[k(t - d)] + c$
 $H = -20 \cos[1800t] + 35$

④

set $t = 2.7$

$H = -20 \cos[1800(2.7)] + 35$

$H = 55 \text{ m}$

② $k = \frac{360^\circ}{T}$

$d = 0$

$a = -20$

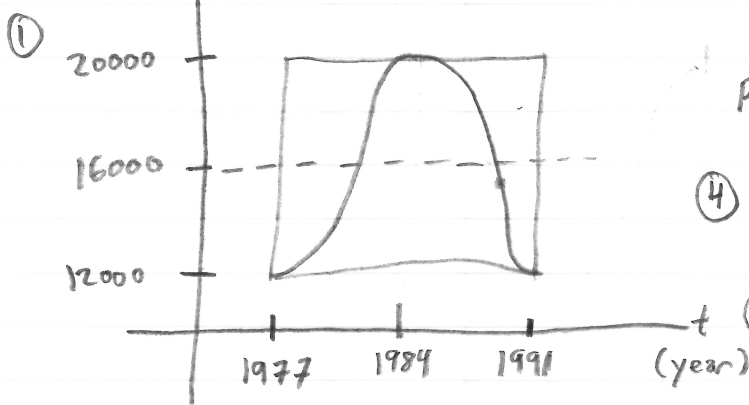
$k = \frac{360^\circ}{0.2}$

$c = 35$

$k = 1800$

"P"
Population

5.

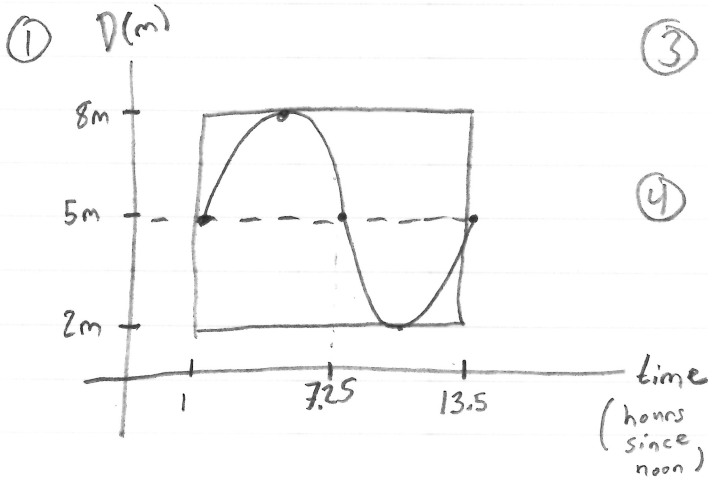


③ $P = a \cos [k(t-d)] + c$
 $P = -4000 \cos [25.7143(t-1977)] + 16000$

④ set $t = 1988$
 $P = -4000 \cos [25.7143(1988-1977)] + 16000$
 ≈ 15110 Jawas

② $k = \frac{360^\circ}{T}$ $d = 1977$
 $= \frac{360^\circ}{14}$ $a = -4000$
 ≈ 25.7143 $c = 16000$

6.



③ $D = a \sin [k(t-d)] + c$
 $D = 3 \sin [28.8(t-1)] + 5$

④ set $t = 6$
 $D = 3 \sin [28.8(6-1)] + 5$
 $\approx 6.7m$

② $k = \frac{360^\circ}{T}$ $d = 1$
 $= \frac{360^\circ}{12.5}$ $a = 3$
 $= 28.8$ $c = 5$

Sinusoidal Functions Worksheet

Practice:

1. For each sinusoidal function below, state the amplitude, period, phase, vertical displacement, domain and range without graphing:

a) $y = -3 \sin(2\theta - 60^\circ) - 1$

b) $y = 2 \cos(-3\theta - 135^\circ) + 5$

2. Graph the following sinusoidal functions. State the domain and range.

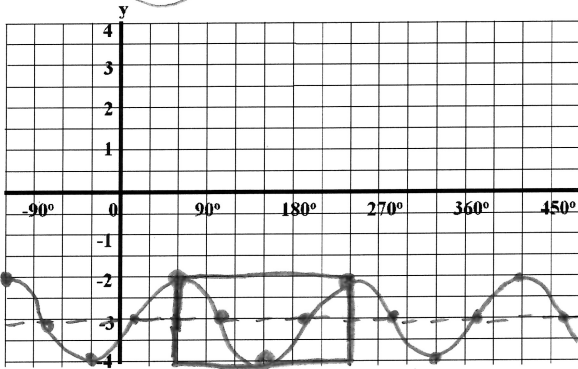
$y = 1 \cos[2(\theta - 60^\circ)] - 3$

a) $y = \cos(2\theta - 120^\circ) - 3$

b) $y = -3 \sin(\theta + 30^\circ) - 1$

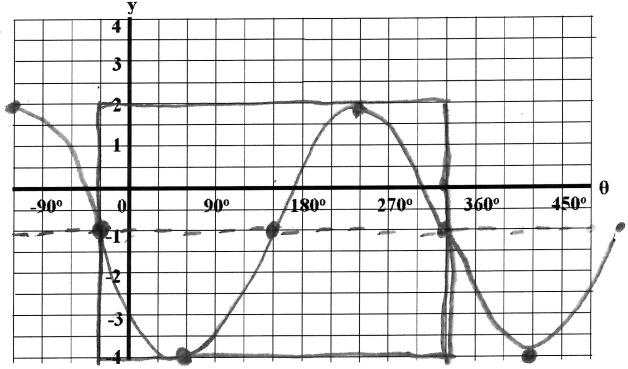


$K=2$
 $d=60^\circ$
 $a=1$
 $c=-3$
 $\text{amp} = |a| = 1$
 $T = \frac{360^\circ}{|K|} = \frac{360^\circ}{2} = 180^\circ$



Domain: $\{\theta \in \mathbb{R}\}$
 Range: $\{y \in \mathbb{R} \mid -4 \leq y \leq -2\}$

$k=1$
 $d=-30^\circ$
 $a=-3$
 $c=-1$
 $\text{amp} = |a| = |-3| = 3$
 $T = \frac{360^\circ}{|K|} = \frac{360^\circ}{1} = 360^\circ$



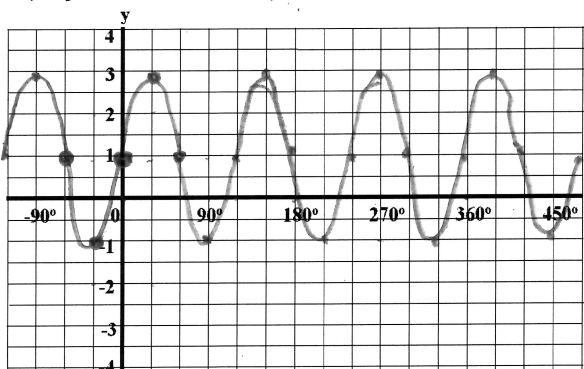
Domain: $\{\theta \in \mathbb{R}\}$
 Range: $\{y \in \mathbb{R} \mid -4 \leq y \leq 2\}$

c) $y = -2 \sin[3(\theta + 60^\circ)] + 1$

d) $y = 1.5 \sin[-1(\theta - 90^\circ)] - 1$

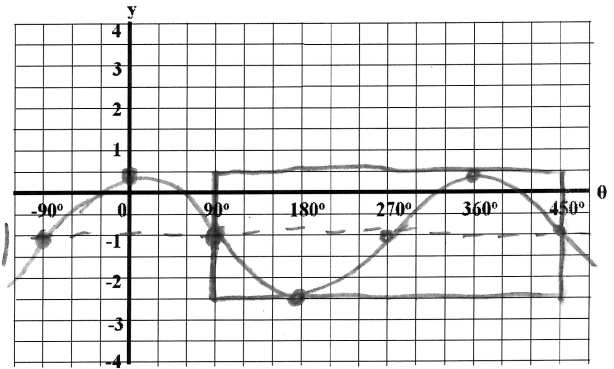


$K=3$
 $d=-60^\circ$
 $a=-2$
 $c=1$



Domain: $\{\theta \in \mathbb{R}\}$
 Range: $\{y \in \mathbb{R} \mid -1 \leq y \leq 3\}$

$K=-1$
 $d=90^\circ$
 $a=1.5$
 $c=-1$
 $\text{amp} = |a| = |1.5| = 1.5$
 $T = \frac{360^\circ}{|K|} = \frac{360^\circ}{1} = 360^\circ$



Domain: $\{\theta \in \mathbb{R}\}$
 Range: $\{y \in \mathbb{R} \mid -2.5 \leq y \leq 0.5\}$