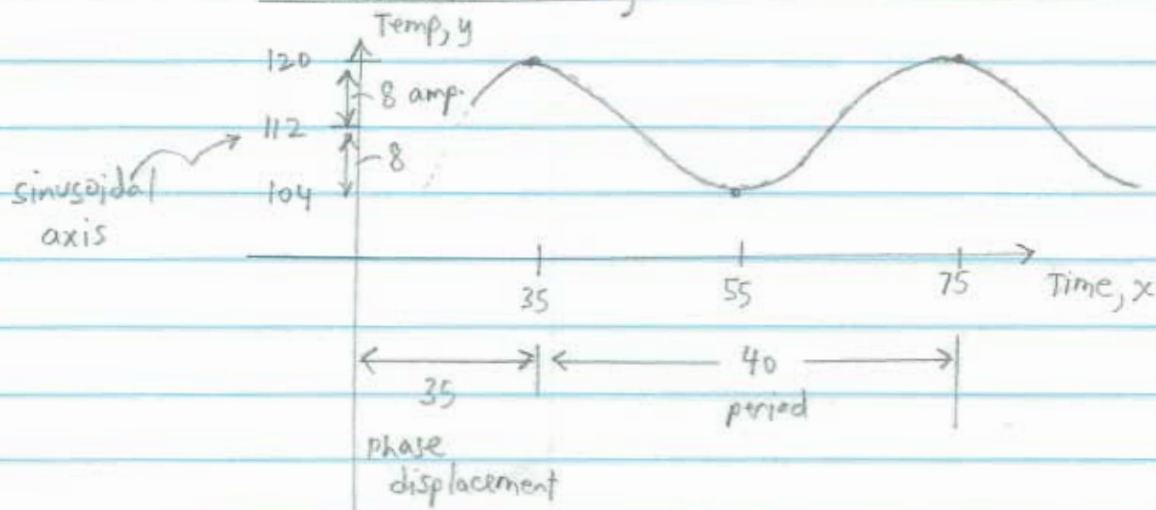


Accelerated Math 3
Apply Trig Functions

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1. Extraterrestrial Being



- (b) amplitude: $8 = A$
sinusoidal axis: $112 = C$
phase displ.: $35 = D$
period: $40 \Rightarrow B = \frac{2\pi}{40}$

$$y = 112 + 8 \cos \frac{\pi}{20} (x - 35)$$

(c) $y(x=0) = 112 + 8 \cos \frac{\pi}{20} (0 - 35)$
 $y(x=0) = 117.7^\circ \text{F}$

(d) $y = 114$; what are 1st 3 x's

$$114 = 112 + 8 \cos \frac{\pi}{20} (x - 35)$$
$$\frac{1}{4} = \cos \frac{\pi}{20} (x - 35)$$

$$\arccos\left(\frac{1}{4}\right) = \frac{\pi}{20}(x - 35)$$

$$x = \frac{20}{\pi} \arccos\left(\frac{1}{4}\right) + 35$$

Apply Trig Functions

(d) continued

$$x = \frac{20}{\pi} \left[\pm \cos\left(\frac{1}{4}\right) + 2\pi n \right] + 35$$

$$= \pm \frac{20}{\pi} \cos\left(\frac{1}{4}\right) + 40n + 35$$

$$= \pm 8.391 + 40n + 35$$

n	$-26.609 + 40n$	$43.391 + 40n$
0	26.609 #2	43.391 #3
-1	-13.391	3.391 #1
1	66.609	83.391

Accelerated Math 3
Apply Trig Functions

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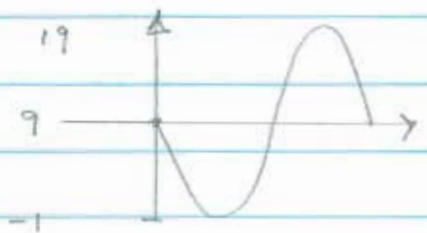
2. Tidal Wave Problem

Period = 15 min $\therefore B = \frac{2\pi}{15}$

Amplitude = 10 m $A = 10$

Sinusoidal axis = 9 m $C = 9$

No phase displacement $D = 0$



$$y = 9 - 10 \sin \frac{2\pi}{15} x$$

x	$y = 9 - 10 \sin \left(\frac{2\pi}{15} x \right)$
0	9
2	1.5686
4	-0.9452
6	3.1221
8	11.079
10	17.66
12	18.51
14	13.067
16	4.933

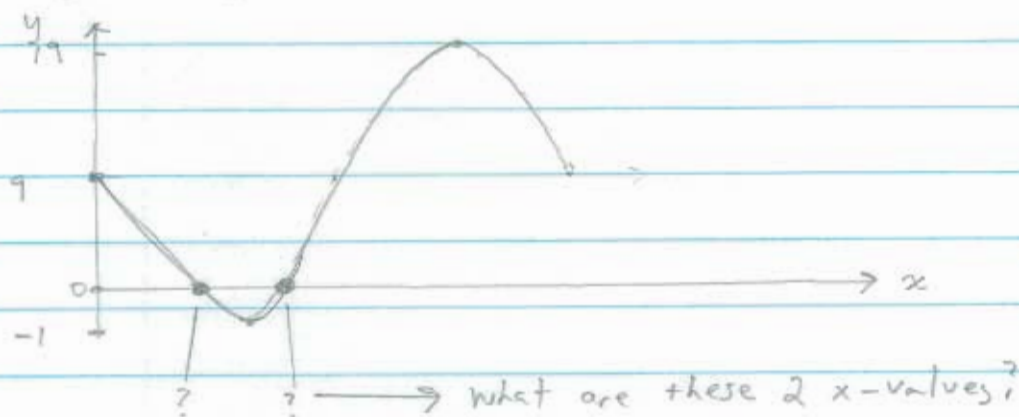
b) min depth = -1 m

This means there will be no water.

Accelerated Math 3
Apply Trig Functions

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- c) No water when depth (y) ≤ 0 .
Therefore, what values of time (x)
will give $y \leq 0$



$$0 = 9 - 10 \sin \frac{2\pi}{15} x$$
$$\arcsin\left(\frac{9}{10}\right) = \frac{2\pi}{15} x$$

$$x = \frac{15}{2\pi} \arcsin\left(\frac{9}{10}\right)$$

Formula for arcsin different from arccos

(see p. 171 of
textbook)

$$\arcsin x = \sin^{-1}(x) + 2\pi n \quad \text{or} \quad \arcsin x = [\pi - \sin^{-1}(x)] + 2\pi n$$

$$x = \frac{15}{2\pi} \sin^{-1}\left(\frac{9}{10}\right) + 15n$$

$$\text{or } x = \frac{15}{2\pi} \cdot \pi - \frac{15}{2\pi} \sin^{-1}\left(\frac{9}{10}\right) + 15n$$

$$x = \frac{15}{2} - \frac{15}{2\pi} \sin^{-1}\left(\frac{9}{10}\right) + 15n$$

$$x = 2.673 \quad (n=0)$$

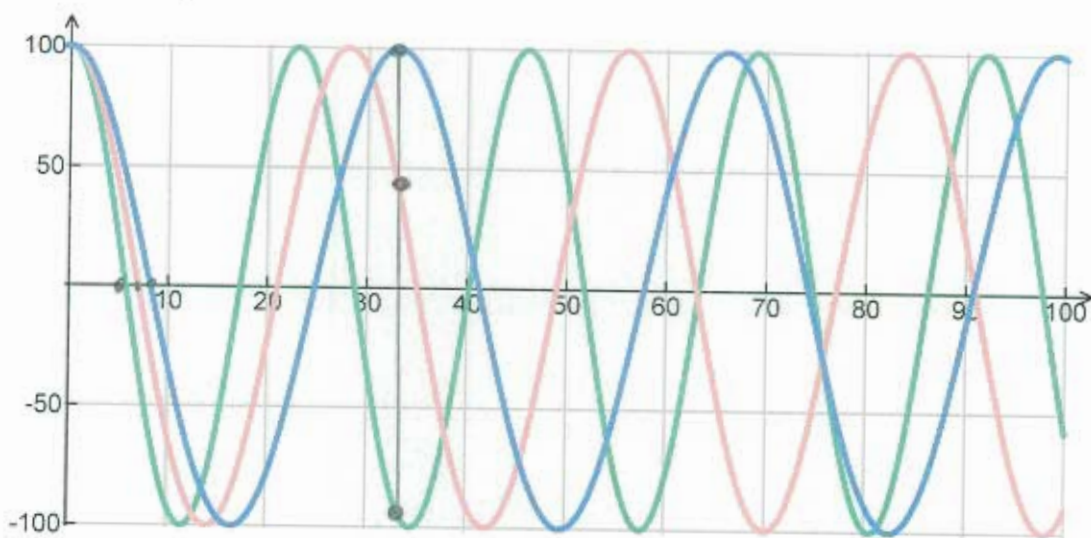
$$\text{or } x = 4.827 \quad (n=0)$$

Ans: $y \leq 0$ when $2.673 \leq x \leq 4.827$

Accelerated Math 3

Trig Applications

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3.

a)

$$y_1 = 100 \cos \frac{2\pi}{23} x \quad (\text{green})$$

$$y_2 = 100 \sin \frac{2\pi}{28} x \quad (\text{red})$$

$$y_3 = 100 \sin \frac{2\pi}{33} x \quad (\text{blue})$$

b) see graph above

c)

$$y_1(33) = -91.72$$

$$y_2(33) = 43.38$$

d) We could use arccos but notice that 1^{st} x intercept for $\cos(x)$ occurs at $\frac{1}{4}$ (period). Therefore,

$$x_1 = \frac{1}{4}(23) = 5.75 \text{ d}$$

$$x_2 = \frac{1}{4}(28) = 7.0 \text{ d}$$

$$x_3 = \frac{1}{4}(33) = 8.25 \text{ d}$$

e) Requires a little thought - need to consider period of each function - occurs at $x = 23 \cdot 28 \cdot 33 = 21,252 \text{ d}$ (58 years)

4. V.A. : $x=6$ $x-6=0 \Rightarrow x=6$
 H.A. : $y=1$ degree num. = deg. den.
 x-int: $x+6=0$
 $x=-6$
 $(-6,0)$
 y-int: $f(0) = \frac{0+6}{0-6} = -1 \Rightarrow (0,-1)$

5. $f(x) = \frac{2(x^2-2x-24)}{x(x-4)(x+4)} = \frac{2(x-6)(x+4)}{x(x-4)(x+4)}$

V.A. at $x=4$, $x=0$ $(x+4)$ factor
 H.A. $y=0$ cancels out.

x-int: $(6,0)$; undefined at $(-4,0)$
 y-int: none

6. V.A. at $x=-3$
 H.A. none
 x-int. $(x-4)(x-3)=0$ $x=4,3$ $(4,0)$ $(3,0)$
 y-int: $(0,4)$
 $h(0) = \frac{12}{3}$

Rational Expressions Review

$$7) \quad \frac{3x}{x^2-6x+5} + \frac{15}{x^2-14x+45}$$

$$= \frac{3x}{(x-5)(x-1)} + \frac{15}{(x-9)(x-5)}$$

$$\Rightarrow \frac{3x(x-9) + 15(x-1)}{(x-5)(x-1)(x-9)}$$

$$\Rightarrow \frac{3x^2 - 27x + 15x - 15}{(x-5)(x-1)(x-9)}$$

$$= \frac{3x^2 - 12x - 15}{(x-5)(x-1)(x-9)}$$

$$= \frac{3(x^2 - 4x - 5)}{(x-5)(x-1)(x-9)}$$

$$= \frac{3(x/5)(x+1)}{(x-5)(x-1)(x-9)}$$

$$= \boxed{\frac{3(x+1)}{(x-1)(x-9)}}$$

DO NOT MULTIPLY
ALL 4 FACTORS
IN DENOMINATOR
ONLY USE (x-5)
ONCE!