Exam retake review

1.

$a = 8.7 \qquad b = \frac{2\pi}{365} \qquad d = 12$

$\Rightarrow$ amplitude: $|a| = \boxed{8.7 \, \frac{hrs}{day}}$

$\Rightarrow$ minimum # of days: $12 - |8.7| = \boxed{3.3 \text{ days}}$

$\Rightarrow$ Period: $\frac{2\pi}{b} \Rightarrow \frac{2\pi}{\frac{2\pi}{365}} = \boxed{365 \text{ days}}$

2.

Period: $p = \frac{2\pi}{b} \Rightarrow 2\pi = \frac{2\pi}{b} \Rightarrow b = 1$

P.S: $\frac{c}{b} = 0$ [No phase shift

a: must be 1 or -1, + goes down so -1

V.S: moved down 2, so -2

$\therefore \boxed{y = -\sin x - 2}$

3. i. The wheel turns at $\frac{1 \, rev}{min}$, which = 2π rad

$\omega = \frac{2\pi \, rad}{1 \, min} = \boxed{6.283 \, \frac{rad}{min}}$

ii. $v = r\omega \Rightarrow v = 35ft \, (2\pi) = 70\pi \, \frac{ft}{min} = \boxed{219.911 \, \frac{ft}{min}}$

Exam 2

4. $\sin\left(\frac{\pi}{3}+x\right)-\sin\left(\frac{\pi}{3}-x\right)=\sin x$

$$\Rightarrow \cancel{\sin\frac{\pi}{3}\cos x}+\cos\frac{\pi}{3}\sin x-\left[\cancel{\sin\frac{\pi}{3}\cos x}-\cos\frac{\pi}{3}\sin x\right]$$ sum + difference

$$\Rightarrow 2\cos\frac{\pi}{3}\sin x$$ Evaluate

$$\Rightarrow 2\cdot\frac{1}{2}\sin x=\boxed{\sin x}$$

5. $\cos x\cos 3x-\sin x\sin 3x=-1$

$$\Rightarrow \cos x\cos 3x-\sin x\sin 3x=\cos(x+3x)$$ Sum + difference

$$\therefore \cos 4x=-1$$

$$\therefore 4x=\pi+2\pi k,\ k\in\mathbb{Z}$$

$$x=\frac{\pi}{4}+\frac{\pi}{2}k,\ k\in\mathbb{Z}, \text{ so on } [0,2\pi),\ \boxed{\frac{\pi}{4},\ \frac{3\pi}{4},\ \frac{5\pi}{4},\ \frac{7\pi}{4}}$$

6. $\dfrac{2\cot^2 x-\csc^2 x}{1+\cot^2}=\cos 2x$

$$\Rightarrow \frac{2\cot^2 x-\csc^2 x}{\csc^2 x}$$ pythagorean

$$\Rightarrow \frac{2\cot^2 x}{\csc^2 x}-\frac{\csc^2 x}{\csc^2 x}$$

$$\Rightarrow \frac{2\cot^2 x}{\csc^2 x}-1$$

$$\Rightarrow \frac{\frac{2\cos^2 x}{\sin^2 x}}{\frac{1}{\sin^2 x}}-1$$ ← quotient rule

← reciprocal identity

$$\Rightarrow 2\cos^2 x-1$$ Algebra

$$\Rightarrow \boxed{\cos 2x}$$ Double-angle

Exam 3:

7.

$P(t) = 4264 - 1223\cos\left(\frac{2\pi}{5}t\right)$

$4800 = 4264 - 1223\cos\left(\frac{2\pi}{5}t\right)$

$\vdots$

$\cos\left(\frac{2\pi}{5}t\right) = -\frac{546}{1223}$ - let $u = \frac{2\pi}{5}t$

$\cos(u) = -\frac{546}{1223}$

$u = \cos^{-1}\left(-\frac{546}{1223}\right)$

$\frac{2\pi}{5}t = \pi - \cos\left(\frac{546}{1223}\right)$ + $\frac{2\pi}{5}t = \pi + \cos\left(\frac{546}{1223}\right)$

$t = \frac{5}{2\pi}\left(\pi - \cos\left(\frac{546}{1223}\right)\right)$ + $t = \frac{5}{2\pi}\left(\pi + \cos\left(\frac{546}{1223}\right)\right)$

$\boxed{t = .882}$ $\boxed{t = 3.38}$

Since this # is negative, the 2 answers must be in Q_2 + Q_3

8

$a = ?$

$b = 60$

$c = 71$

$A = ?$

$B = 33^\circ$

$C = ?$

Finding C_1: $\frac{\sin(C)}{71} = \frac{\sin(33^\circ)}{60}$

$\sin(C) = \frac{71\sin(33^\circ)}{60}$

$C = \sin^{-1}\left[\frac{71\sin(33^\circ)}{60}\right]$

$C = 40.13^\circ$

Finding C_2:

$180^\circ - 40.13^\circ = 139.87^\circ$

Solving for A + a

=> using C_1

$180^\circ - (40.13^\circ + 30^\circ) = A_1$

$A_1 = 106.87^\circ$

$\frac{a_1}{\sin(106^\circ)} = \frac{60}{\sin(33^\circ)}$

$a_1 = \frac{60\sin(106)}{\sin(33^\circ)}$

$a_1 = 105.42$

=> using C_2

$180 - (139.87 + 30^\circ) = A_2$

$A_2 = 7.13^\circ$

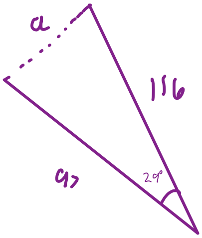
$\frac{a_2}{\sin(7.13^\circ)} = \frac{60}{\sin(33^\circ)}$

$a_2 = \frac{60\sin(7.13^\circ)}{\sin(33^\circ)}$

$a_2 = 13.67$

$\therefore$ $\boxed{C = 40.1^\circ,\ A = 106.9^\circ,\ a = 105.4 \text{ or } C = 139.9^\circ,\ A = 7.1^\circ,\ a = 13.7}$

9.



$a^2 = b^2 + c^2 - 2ac\cos(A)$

$a^2 = 97^2 + 116^2 - 2(97)(116)\cos(29)$

$a^2 = 3182.56$

$\boxed{a = 56.41}$