TRIGONOMETRY I REVIEW SOLUTIONS

1. Convert to radians:

    a) $105° = \dfrac{7\pi}{12}$ b) $400° = \dfrac{20\pi}{9}$ c) $40° = \dfrac{2\pi}{9}$ d) $10° = \dfrac{\pi}{18}$

2. Convert to degrees:

    a) $\dfrac{13\pi}{12} = 195°$ b) $0.800 = 45.84°$ c) $-7.500 = -429.72°$ d) $\dfrac{7\pi}{5} = 252°$

3. Determine the reference angle for:

    a) $\dfrac{7\pi}{5}$, $\dfrac{2\pi}{5}$ b) $-1.000,\quad 1.000$

4. Find 2 coterminal angles for each of the above (in question 3)

    a) $\dfrac{-13\pi}{5}, \dfrac{-3\pi}{5}, \dfrac{17\pi}{5}, \dfrac{27\pi}{5}$ b) $-13.566, -7.283, 5.283, 11.566$

5. A fan at high speed is turning at 220 rpm. Convert this speed to radians per second.
    $\dfrac{220\ rev.}{1\ min} \times \dfrac{2\pi\ radians}{1\ rev.} \times \dfrac{1\ min}{60\ s} \approx 23.04$ radians per second

6. The earth has a radius of 6.38×10^6 m, and completes one full rotation about its axis every 24 hours.

    a) Determine your angular speed. b) How far will you travel in one minute?
    $\dfrac{2\pi r}{24h} = \dfrac{2\pi(6.38E6)}{24}\dfrac{m}{h} \approx 1\ 670\ 280$ metres per hour $\quad 27838$ metres

7. Find the diameter of a pizza from which a slice with central angle of 1.50 radians and area of
    170 cm^2 is taken
    $$A = \dfrac{r^2\theta}{2} = \dfrac{r^2(1.50)}{2} = 170$$
    $r^2 = \dfrac{170(2)}{1.50}, \quad r \approx 15.06$ cm, $d \approx 30.11$ cm

8.

$\sin\theta = -\dfrac{8}{\sqrt{73}}$	$\csc\theta = -\dfrac{\sqrt{73}}{8}$
$\cos\theta = \dfrac{3}{\sqrt{73}}$	$\sec\theta = \dfrac{\sqrt{73}}{3}$
$\tan\theta = -\dfrac{8}{3}$	$\cot\theta = -\dfrac{3}{8}$
$\theta\ (0 < \theta < 2\pi)\quad 5.071$	

9. If $\csc\theta = -\dfrac{5}{4}$, and θ lies in quadrant III, determine $\cos\theta$. $\quad\quad \sin\theta = -\dfrac{4}{5}, \therefore \cos\theta = -\dfrac{3}{5}$

10. Complete the table with exact trig ratios:

(12 marks)	$\dfrac{2\pi}{3}$	$\dfrac{5\pi}{4}$	$\dfrac{3\pi}{2}$	$\dfrac{5\pi}{3}$
$\sin\theta$	$\dfrac{\sqrt{3}}{2}$	$-\dfrac{1}{\sqrt{2}}$	-1	$-\dfrac{\sqrt{3}}{2}$
$\cos\theta$	$-\dfrac{1}{2}$	$-\dfrac{1}{\sqrt{2}}$	0	$\dfrac{1}{2}$
$\tan\theta$	$-\sqrt{3}$	1	und	$-\sqrt{3}$
$\csc\theta$	$\dfrac{2}{\sqrt{3}}$	$-\sqrt{2}$	-1	$\dfrac{2}{\sqrt{3}}$
$\sec\theta$	-2	$-\sqrt{2}$	und	2
$\cot\theta$	$-\dfrac{1}{\sqrt{3}}$	1	0	$-\dfrac{1}{\sqrt{3}}$

11. a) $\sin\theta = -\dfrac{1}{\sqrt{2}}\qquad \theta = \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$ b) $\cot\theta = \sqrt{3}\qquad \theta = \dfrac{\pi}{6}, \dfrac{7\pi}{6}$

 c) $\sec\theta = -2\qquad \theta = \dfrac{2\pi}{3}, \dfrac{4\pi}{3}$ d) $\sin\theta = 0.600\qquad \theta = 0.644, 2.498$

 e) $\tan\theta = 2.5\qquad \theta = 1.190, 4.332$ f) $\cos\theta = 0.825\quad \theta = 0.601, 5.683$

 g) $\csc\theta = -\dfrac{2}{\sqrt{3}}\qquad \theta = \dfrac{4\pi}{3}, \dfrac{5\pi}{3}$ h) $\csc\theta = 0\qquad$ no solution

 i) $\cos\theta = -1\qquad \theta = \pi$ j) $\sec^2\theta = 2\qquad \theta = \dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$

12.

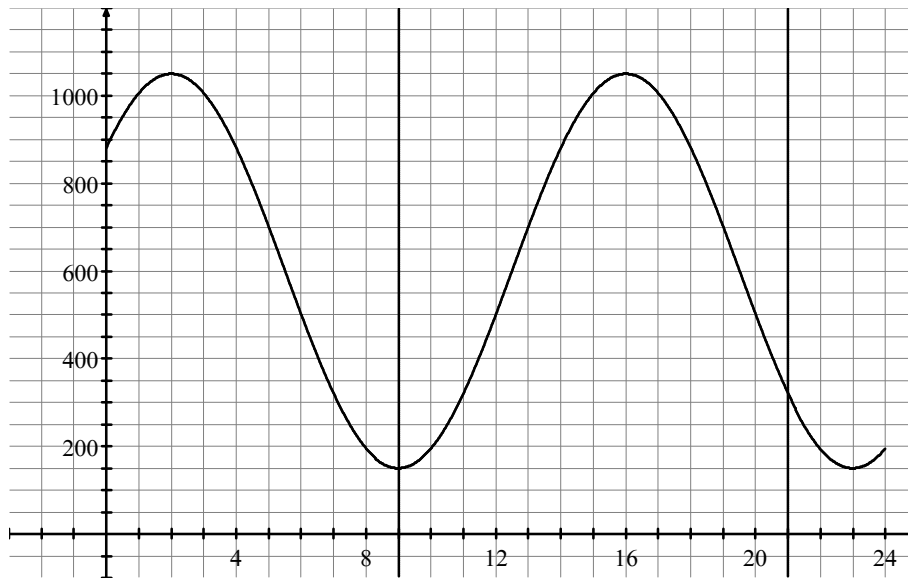|	Amplitude	Period	Phase shift	Vertical displacement
a) $y = -3\sin\left(2x + \dfrac{\pi}{3}\right) - 5$	3	π	$-\dfrac{\pi}{6}$	-5
b) $y = \sin\left(0.75\left(\theta - \dfrac{\pi}{4}\right)\right)$	1	$\dfrac{8\pi}{3}$	$\dfrac{\pi}{4}$	none
c) $y = -20\cos\left(\dfrac{2\pi}{120}(t+7)\right) + 10$	20	120	-7	$+10$
d) $y = 2\tan 2x$	----	$\dfrac{\pi}{2}$	----	none

13. $y = -6\cos\left(\dfrac{\pi}{18}(x-3)\right) + 1$

14. $y = 2\cos\left(\dfrac{2}{5}\left(x - \dfrac{\pi}{12}\right)\right) - 8$

15. $y = 5\cos\left(\dfrac{3}{4}\left(x - \dfrac{\pi}{3}\right)\right) + 3$ $y = -5\sin\left(\dfrac{3}{4}(x - \pi)\right) + 3$

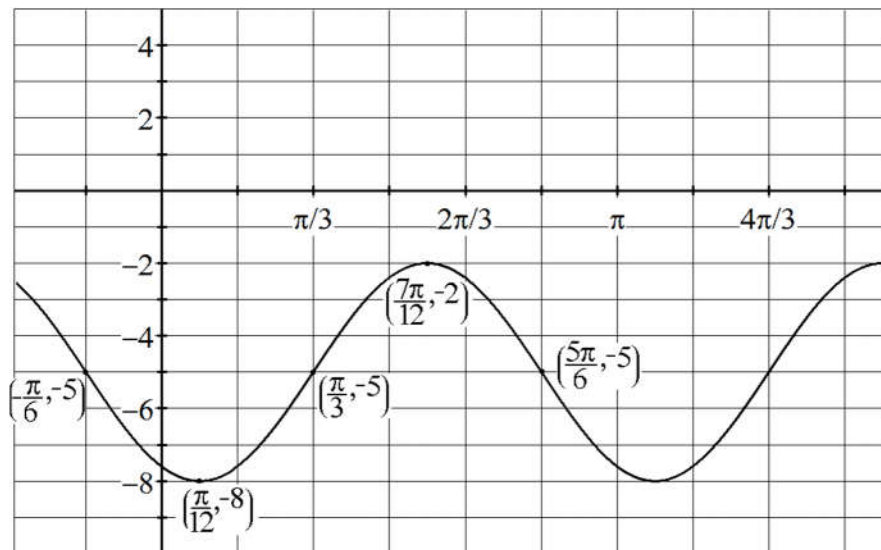16. $y = 3\cos\left(\dfrac{\pi}{2}(x+1)\right) + 1$; $y = 3\sin\left(\dfrac{\pi}{2}(x-2)\right) + 1$

17.a)

b) $P(t) = -450\cos\left[\dfrac{\pi(t-9)}{7}\right] + 600$
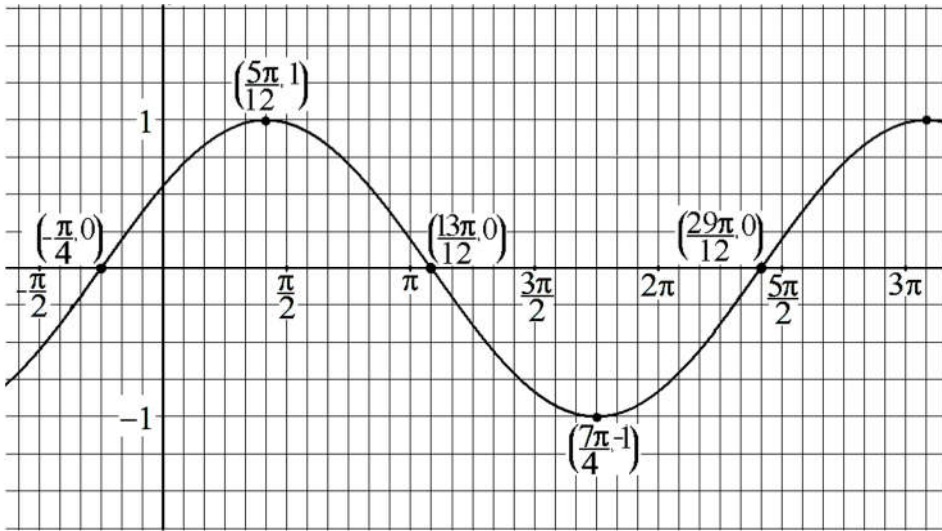
c)   12:30 pm
d)   500
e)   13.526 to 18.474, which is from 1:32 pm to 6:28 pm, a time of 4:57
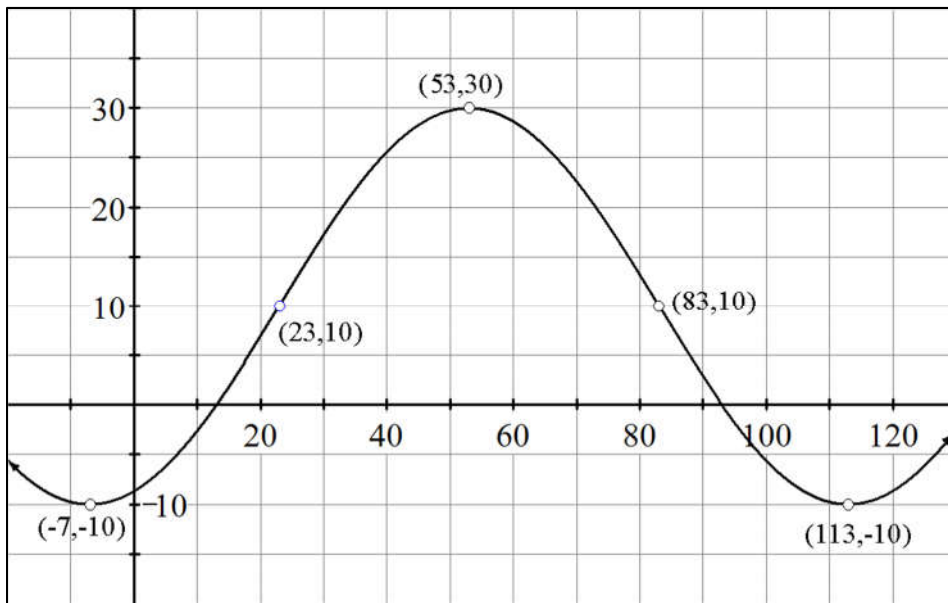
18a)

b)

c)

d)