Chapter 4 Test Review

① $\frac{27\text{min}}{1} \cdot \frac{1\text{deg}}{60\text{min}} = .45° \Rightarrow \boxed{32.45°}$

② $\frac{42\text{min}}{1} \cdot \frac{1\text{deg}}{60\text{min}} = .7°$

$\frac{16\text{sec}}{1} \cdot \frac{1\text{min}}{60\text{sec}} = .2667\text{min} \cdot \frac{1\text{deg}}{60\text{min}} = .0044°$

$\boxed{54.7044°}$

③ $\frac{.41\text{deg}}{1} \cdot \frac{60\text{min}}{1\text{deg}} = 24.6\text{min}$

$\frac{.6\text{min}}{1} \cdot \frac{60\text{sec}}{1\text{min}} = 36\text{sec}$

$\boxed{197° 24' 36''}$

④ $\frac{.89\text{deg}}{1} \cdot \frac{60\text{min}}{1\text{deg}} = 50.4\text{min}$

$\frac{.4\text{min}}{1} \cdot \frac{60\text{sec}}{1\text{min}} = 24\text{sec}$

$\boxed{93° 50' 24''}$

⑤ $\frac{144}{1} \cdot \frac{\pi}{180} = \frac{144\pi}{180} = \boxed{\frac{4\pi}{5}}$

⑥ $\frac{57.82}{1} \cdot \frac{\pi}{180} = \frac{57.82\pi}{180} = \boxed{1.0091}$

⑦ $\frac{\pi}{5} \cdot \frac{180}{\pi} = \frac{180}{5} = \boxed{36°}$

⑧ $\frac{7\pi}{10} \cdot \frac{180}{\pi} = \frac{1260}{10} = \boxed{126°}$

⑨ $\frac{6}{1} \cdot \frac{180}{\pi} = \frac{1080}{\pi} = \boxed{343.77°}$

(10) $s=?,\ r=14,\ \theta=\frac{39\pi}{180}$ $\quad s=\theta r$

$\frac{39}{1}\cdot\frac{\pi}{180}=\frac{39\pi}{180}$ $\Rightarrow$ $s=\frac{39\pi}{180}\cdot\frac{14}{1}=\frac{546\pi}{180}=\boxed{\frac{91\pi}{30}\text{ ft}}\approx\boxed{9.53\text{ ft}}$

(11) $s=7.8,\ r=?,\ \theta=\frac{\pi}{4}$

$7.8=\frac{\pi}{4}\cdot r \Rightarrow \frac{7.8}{1}\cdot\frac{4}{\pi}=r \Rightarrow \boxed{\frac{31.2}{\pi}\text{ ft}}\approx\boxed{9.93\text{ ft}}$

(12) $s=2,\ r=3,\ \theta=?$

$2=\theta(3)$

$\boxed{\theta=2/3}\approx\boxed{0.67}$

(13) $360\div60=6^\circ$ for each min

$19\times6=114^\circ$

$r=9,\ \theta=\frac{114\pi}{180},\ s=?$ $\Rightarrow$

$\frac{114}{1}\cdot\frac{\pi}{180}=\frac{114\pi}{180}$

$s=\frac{114\pi}{180}\cdot\frac{9}{1}=\frac{1026\pi}{180}\approx\boxed{17.9\text{ inches}}$

(14) $\sin\theta=\frac{y}{r}=\frac{6}{7}$

$y=6,\ r=7,\ x=?$

$x=\sqrt{13}$

$r=\sqrt{x^2+y^2}$

$7=\sqrt{x^2+(6)^2}$

$49=x^2+36$

$13=x^2$

$x=\sqrt{13}$

$\Rightarrow \cos\theta=\frac{x}{r}=\boxed{\frac{\sqrt{13}}{7}}$

(15) $\cos\theta=\frac{x}{r}=\frac{2}{3}$

$x=2,\ y=?,\ r=3$

$y=\sqrt{5}$

$3=\sqrt{(2)^2+y^2}$

$9=4+y^2$

$5=y^2$

$y=\sqrt{5}$

$\Rightarrow \sec\theta=\frac{r}{x}=\boxed{\frac{3}{2}}$

(16) $\cos\theta=\frac{x}{r}=\frac{3}{4}$

$x=3,\ r=4,\ y=\sqrt{7}$

$4=\sqrt{(3)^2+y^2}$

$16=9+y^2$

$7=y^2$

$y=\sqrt{7}$

$\Rightarrow \tan\theta=\frac{y}{x}=\boxed{\frac{\sqrt{7}}{3}}$

(17) $\tan\theta = \frac{y}{x} = \frac{1}{5}$ $\quad r = \sqrt{(5)^2+(1)^2}$ $\quad r = \sqrt{26}$ $\Rightarrow \csc\theta = \frac{r}{y} = \frac{\sqrt{26}}{1} = \boxed{\sqrt{26}}$

$x=5,\ y=1,\ r=\sqrt{26}$

(18) Coord for $\frac{\pi}{3}$: $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

$\tan\frac{\pi}{3} = \frac{y}{x} = \frac{\sqrt{3}}{2} \div \frac{1}{2} \Rightarrow \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \boxed{\sqrt{3}}$

(19) Coord for $\frac{\pi}{4}$: $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

$\cot\frac{\pi}{4} = \frac{x}{y} = \frac{\sqrt{2}}{2} \div \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2} \cdot \frac{2}{\sqrt{2}} = \boxed{1}$

(20) Find coterminal: $-\frac{17\pi}{6} + \frac{2\pi}{1} = -\frac{17\pi}{6} + \frac{12\pi}{6} = -\frac{5\pi}{6} + \frac{12\pi}{6} = \frac{7\pi}{6}$

Coord for $\frac{7\pi}{6}$: $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

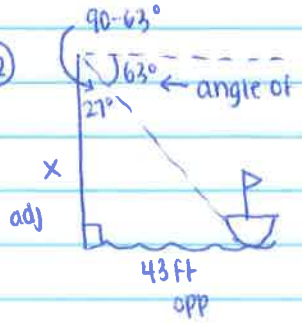
$\tan\left(\frac{7\pi}{6}\right) = \frac{y}{x} = -\frac{1}{2} \div -\frac{\sqrt{3}}{2} = -\frac{1}{2} \cdot -\frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$

(21) Find coterminal: $\frac{\pi}{2}$

Coord for $\frac{\pi}{2}$: $(0,1)$

$\cot\left(\frac{\pi}{2}\right) = \frac{x}{y} = \frac{0}{1} = \boxed{0}$

(22)

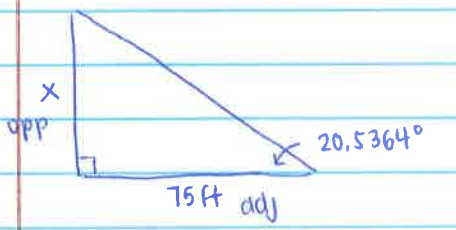


$\frac{\tan 27^\circ}{1} = \frac{43}{x} \Rightarrow \frac{43}{\tan 27^\circ} = \frac{x \cdot \tan 27^\circ}{\tan 27^\circ}$

$x = \frac{43}{\tan 27^\circ} = \boxed{84.4 \text{ ft}}$

(23) $\frac{32 \text{ min}}{1} \cdot \frac{1 \text{ deg}}{60 \text{ min}} = .5333°$ → $20.5364°$

$\frac{11 \text{ sec}}{1} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{.1833 \text{ min}}{1} \cdot \frac{1 \text{ deg}}{60 \text{ min}} = .0031°$



$\frac{\tan(20.5364)}{1} = \frac{X}{75} \Rightarrow X = 75 \cdot \tan(20.5364)$

$X = 28.1$

The river is about 28 ft wide

(24) $-269 + 360 = \boxed{91°}$

$-269 - 360 = \boxed{-629°}$

(25) $\frac{9\pi}{5} + \frac{2\pi}{1} = \frac{9\pi}{5} + \frac{10\pi}{5} = \boxed{\frac{19\pi}{5}}$

$\frac{9\pi}{5} - \frac{2\pi}{1} = \frac{9\pi}{5} - \frac{10\pi}{5} = \boxed{\frac{-\pi}{5}}$

(26) $\frac{-19\pi}{5} + \frac{2\pi}{1} = \frac{-19\pi}{5} + \frac{10\pi}{5} = \frac{-9\pi}{5} + \frac{10\pi}{5} = \boxed{\frac{\pi}{5}}$

$\frac{-19\pi}{5} - \frac{2\pi}{1} = \frac{-19\pi}{5} - \frac{10\pi}{5} = \boxed{\frac{-29\pi}{5}}$

(27) $x = 9,\ y = 12,\ r = ?$

$r = \sqrt{9^2 + 12^2}$

$r = \sqrt{225}$

$r = 15$

$\Rightarrow \sin\theta = \frac{y}{r} = \boxed{\frac{12}{15}}$

(28) Coterminal: $\frac{-2\pi}{3} + \frac{2\pi}{1} = \frac{-2\pi}{3} + \frac{6\pi}{3} = \frac{4\pi}{3}$

Coord for $\frac{4\pi}{3}$: $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

$\tan\left(\frac{4\pi}{3}\right) = \frac{y}{x} = \frac{-\sqrt{3}}{2} \div \frac{-1}{2} = \frac{-\sqrt{3}}{\cancel{2}} \div \frac{\cancel{2}}{1} = \boxed{\sqrt{3}}$

(29) coord of $\frac{4\pi}{3}$: $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

$\sin\left(\frac{4\pi}{3}\right) = -\frac{\sqrt{3}}{2}$ so $\csc\left(\frac{4\pi}{3}\right) = -\frac{2}{\sqrt{3}} = \boxed{-\frac{2\sqrt{3}}{3}}$

(30) $\tan(1080°)$: Find coterminal: $360°$ ⇒ coord of $360°$ $(1,0)$

$\tan(360°) = \frac{y}{x} = \frac{0}{1} = \boxed{0}$

(31) sin −, tan + ⇒ Quad III

$\sin\theta = \frac{y}{r} = \frac{-7}{10}$

$x = -\sqrt{51}$ $y = -7$ $r = 10$

$10 = \sqrt{x^2 + (-7)^2}$

$10 = \sqrt{x^2 + 49}$

$100 = x^2 + 49$

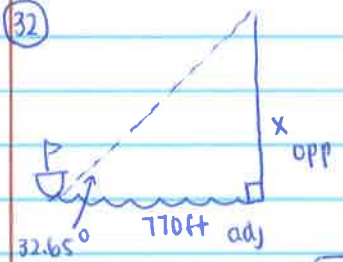
$51 = x^2$

$x = \sqrt{51}$

↑ neg. in Quad III

⇒ $\sec\theta = \frac{r}{x} = \frac{10}{-\sqrt{51}} = \boxed{-\frac{10\sqrt{51}}{51}}$

(32)



$\frac{39\text{min}}{1} \cdot \frac{1\text{deg}}{60\text{min}} = .65° \Rightarrow 32.65°$

$\frac{\tan(32.65)}{1} = \frac{x}{770} \Rightarrow x = 770\tan(32.65)$

$x = 493.4$

The cliff is 493 ft high

(33) comp: $\frac{\pi}{2} - \frac{9\pi}{13} = \frac{13\pi}{26} - \frac{18\pi}{26} = -\frac{5\pi}{26}$ ← no comp

supp: $\frac{\pi}{1} - \frac{9\pi}{13} = \frac{13\pi}{13} - \frac{9\pi}{13} = \boxed{\frac{4\pi}{13}}$

(34) Find coterminal: $\frac{-3\pi}{4} + \frac{2\pi}{1} = \frac{-3\pi}{4} + \frac{8\pi}{4} = \frac{5\pi}{4}$

The angle $\frac{5\pi}{4}$ is in **Quad III**

Reference: $\frac{5\pi}{4} - \frac{\pi}{1} = \frac{5\pi}{4} - \frac{4\pi}{4} = \boxed{\frac{\pi}{4}}$

(35) $S = 1100$, $r = 6400$, $\theta = ?$

$1100 = \theta(6400)$

$.171875 = \theta$

$\frac{.17185}{1} \cdot \frac{180}{\pi} = 9.8477°$

32° 58' N: 32.9667°

$\frac{58 \text{ min}}{1} \cdot \frac{1 \text{ deg}}{60 \text{ min}} = .9667$

θ = Big lat angle − small lat angle

$9.8477 = \text{Big lat} - 32.9667$

$+32.9667 \qquad +32.9667$

42.8144° = Big latitude