Pre Calculus
Review 4.1–4.3

Name: KEY

Non- Calculator

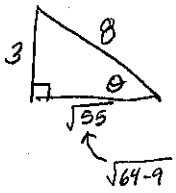
1. Convert $\frac{14\pi}{6}$ to degrees.

$\frac{14\pi}{6} \cdot \frac{180}{\pi} = \boxed{420^\circ}$

2. Convert 65° to radians.

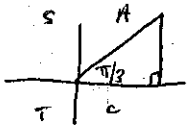
$65^\circ \cdot \frac{\pi}{180^\circ} = \boxed{\frac{13\pi}{36}}$

3. If $\csc\theta = \frac{8}{3}$, find $\tan\theta$.



$\boxed{\frac{3}{\sqrt{55}}}$

4. Find $\sec\left(\frac{\pi}{3}\right) = \boxed{2}$

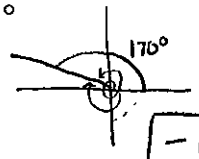


$\cos(\pi/3) = \frac{1}{2}$

$\pi/3 = 60^\circ$

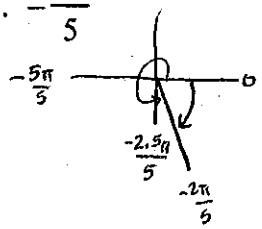
Sketch the angle. Find one positive angle and one negative angle that are coterminal with each angle.

5. 170°



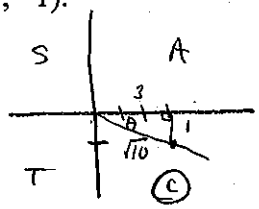
$\boxed{-190^\circ}$ or $\boxed{530^\circ}$

6. $-\frac{2\pi}{5}$



$\boxed{\frac{8\pi}{5}}$ or $\boxed{\frac{-12\pi}{5}}$

7. Find the values of the six trigonometric functions of an angle in standard position whose terminal side passes through (3, –1).



$\sin\theta = -\frac{1}{\sqrt{10}}$ $\quad \csc\theta = -\sqrt{10}$

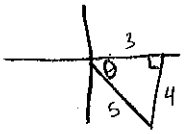
$\cos\theta = \frac{3}{\sqrt{10}}$ $\quad \sec\theta = \frac{\sqrt{10}}{3}$

$\tan\theta = -\frac{1}{3}$ $\quad \cot\theta = -3$

For each function, find the values of the remaining five trigonometric functions of θ with the given info.

8. $\cos\theta = \frac{3}{5}$; $\tan\theta < 0$

cosine positive
tangent negative
} QIV



$\sec\theta = \frac{5}{3}$

$\sin\theta = -\frac{4}{5}$

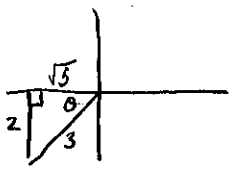
$\csc\theta = -\frac{5}{4}$

$\tan\theta = -\frac{4}{3}$

$\cot\theta = -\frac{3}{4}$

9. $\sin\theta = -\frac{2}{3}$; $\tan\theta > 0$

sine is negative
tangent is positive
} QIII



$\csc\theta = -\frac{3}{2}$

$\cos\theta = -\sqrt{5}/3$

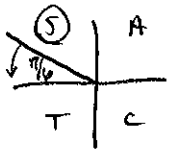
$\sec\theta = -3/\sqrt{5}$

$\tan\theta = \frac{2}{\sqrt{5}}$

$\cot\theta = \sqrt{5}/2$

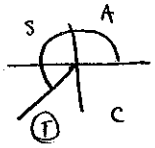
Find each exact value. Be sure to SHOW WORK!!

10. $\sin\left(\frac{5\pi}{6}\right) = \frac{1}{2}$



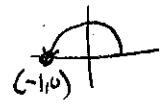
$\theta_{ref} = \pi/6$

11. $\cos\left(\frac{5\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ or $-\frac{1}{\sqrt{2}}$



$\theta_{ref} = \pi/4$

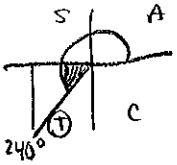
12. $\csc 180° = \frac{1}{\sin 180°}$



$\sin 180° = 0$

$\therefore$ csc 180° is undefined

13. $\csc 240° = \frac{-2}{\sqrt{3}}$

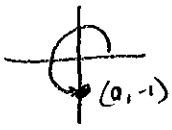


$\sin(240°) = -\frac{\sqrt{3}}{2}$

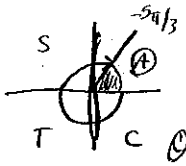
$\theta_{ref} = 60°$

14. $\tan\left(\frac{3\pi}{2}\right) = \frac{\sin(3\pi/2)}{\cos(3\pi/2)} = \frac{-1}{0}$

UNDEFINED

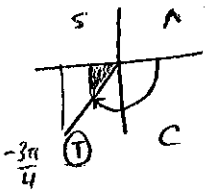


15. $\tan\left(-\frac{5\pi}{3}\right) = \sqrt{3}$



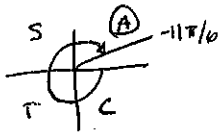
$\theta_{ref} = \pi/3$

16. $\tan\left(\frac{-3\pi}{4}\right) = 1$



$\theta_{ref} = \pi/4$

17. $\cos\left(-\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$



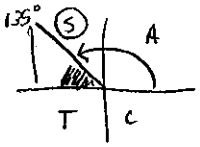
$\theta_{ref} = \pi/6$

18. $\cos\left(-\frac{7\pi}{2}\right) = 0$

19. $\cot(-90°) = \frac{0}{-1} = 0$

$\tan(-90°) = \frac{\sin(-90°)}{\cos(-90°)} = \frac{-1}{0}$

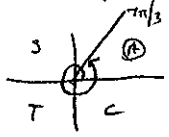
20. $\sec 135° = -\frac{2}{\sqrt{2}}$ or $-\sqrt{2}$



$\cos(135°) = -\frac{\sqrt{2}}{2}$

$\theta_{ref} = 45°$

21. $\sin\left(\frac{7\pi}{3}\right) = \frac{\sqrt{3}}{2}$



$\theta_{ref} = \pi/3$

Calculator Allowed

2nd APPS (Angle) for °, ', d ▶DMS

" is ALPHA +

22. Convert from DMS to decimal form: 38°23'36"

38.393°

23. Covert from decimal form to degrees: 59.354°.

59°21'14.4"

24. The radius of a car wheel is 15 inches. How many revolutions per minute is the wheel making when the care is traveling at 60 mph?

$$\frac{60\ \text{mi}}{\text{hr}} \cdot \frac{1\ \text{hr}}{60\ \text{min}} \cdot \frac{5280\ \text{ft}}{1\ \text{mi}} \cdot \frac{12\ \text{in}}{1\ \text{ft}} \cdot \frac{1\ \text{rev}}{2\pi \cdot 15\ \text{in}} = \frac{3801600}{1800\pi}\ \frac{\text{rev}}{\text{min}}$$

$\approx 672.270\ \frac{\text{rev}}{\text{min}}$

25. A bicyclist's wheel is traveling at 250 revolutions per minute. If the bicycle tire has a diameter of 29 inches, what is the bicyclist's speed in miles per hour?

$$\frac{250 \text{ rev}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{\pi \cdot 29 \text{ in}}{1 \text{ rev}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} = \frac{435000\pi \text{ mi}}{63360 \text{ hr}} \approx \boxed{21.569 \text{ mi/hr}}$$

26. Evaluate: $\sin 47°$ DEGREE MODE! $\approx \boxed{.731}$

27. Evaluate: $\csc\left(\frac{\pi}{10}\right) \Rightarrow 1/\sin(\pi/10) \approx \boxed{3.236}$ RADIAN MODE!

28. Given: $\theta = -145°$. Change to radian measure in terms of π.

$$-145° \cdot \frac{\pi}{180} \approx \boxed{\frac{-29\pi}{36}}$$

29. Given: $\theta = -1$ radian. Change to degree measure.

$$-1 \cdot \frac{180}{\pi} = -\frac{180}{\pi}° \approx \boxed{-57.296°}$$

Given the measurement of a central angle, find the measure of its intercepted arc in terms of π in a circle of diameter 30 inches. ★

↳ $r = 15$

$s = \theta \cdot r$ ← MUST BE IN RADIANS!

30. $\frac{\pi}{24}$

$s = \frac{\pi}{24} \cdot 15 = \boxed{\frac{5\pi}{8} \text{ inches}}$

31. $110° \cdot \frac{\pi}{180} = \frac{11\pi}{18}$ radians

$s = \frac{11\pi}{18} \cdot 15 = \boxed{\frac{55\pi}{6} \text{ inches}}$

32. The measure of an arc is 10 cm. Find the degree measure to the nearest tenth of the central angle it subtends in a circle of radius 16 cm.

$s = 10$ cm, $r = 16$ cm

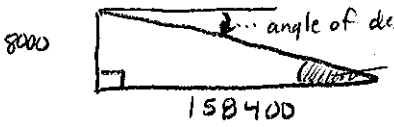
$s = \theta \cdot r$

$10 = \theta \cdot 16$

$.625 = \theta$ BUT... that's in Radians!

$.625 \cdot \frac{180°}{\pi} \approx \boxed{35.8°}$

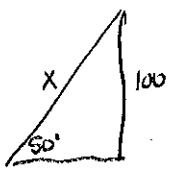
33. A plane is 8000 feet above the ground when it begins its final approach to a runway. If the ground distance to the end of the runway is 158400 feet, what is the angle of descent to the end of the runway?



$\tan\theta = \frac{8000}{158400}$ $\theta = \tan^{-1}\left(\frac{8000}{158400}\right)$

$\boxed{\theta \approx 2.891°}$ ← Degree mode!

34. A cable from the top of a 100 ft cell phone tower makes a 50° angle with the ground. How long is the cable?

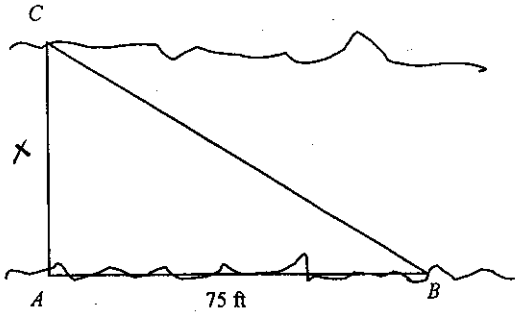


$\sin 50° = \frac{100}{x}$

$x = \frac{100}{\sin 50°} \approx \boxed{130.541 \text{ feet}}$

Degree mode

35. To measure the width of a river, a surveyor starts at point A on one bank and walks 75 feet down the river to point B. She then measures the angle ABC to be 21°37'15". Find the width of the river to the nearest foot.



$\tan(21°37'15") = \frac{x}{75}$

$75\tan(21°37'15") = x$

$\boxed{29.726 \text{ feet} \approx x}$