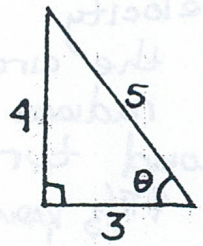
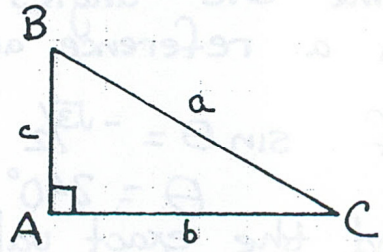
MATH ANALYSIS
STANDARD #6

NAME KEY
DATE

1. $\sin\theta = 4/5$
$\cos\theta = 3/5$
$\tan\theta = 4/3$



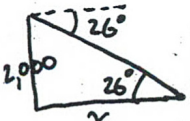
2. $m\angle C = 32°$ $\quad \cos 32° = \frac{b}{27}$
$\overline{BC} = 27$ ft
$b = \underline{22.897}$



3. $m\angle B = 71°$ $\quad \tan 71° = \frac{80}{c}$
$b = 80''$
$c = \underline{27.546}$ $\quad c = \frac{80}{\tan 71°}$

4. $b = 8$, $c = 7$, $m\angle B = \underline{48.8°}$ $\quad \tan B = 8/7$

5. A pilot in a plane at an altitude of 22,000 feet observes that the angle of depression to a nearby airport is 26°. How many miles is the airport from the point on the ground directly below the plane? (Draw a picture)

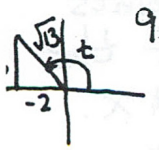


$x = 8.54$ miles

6. $\frac{9\pi}{5}$ radians = ? 324 degrees

7. $220° = \frac{220\pi}{180} = \frac{11\pi}{9}$ radians

8. Solve $3 + 2\sin\theta = 4$ over the domain $0° \le \theta < 360°$
$2\sin\theta = 1$ $\quad \theta = \sin^{-1}(1/2)$
$\sin\theta = 1/2$ $\quad \theta = 30°$ or $150°$



9. If the terminal side of an angle of t radians in standard position passes through the point $(-2,3)$, then $\cos t =$? and t in radians. $\cos t = -2/\sqrt{13}$ $\quad t = 2.15$ radians

10. Give the exact value of each:

a. $\cos(3\pi/4) = -\sqrt{2}/2$ $\quad$ b. $\sin(-7\pi/4) = \sin \pi/4 = \sqrt{2}/2$ $\quad$ c. $\sec 390° = \frac{1}{\cos 390} = \frac{1}{\cos 30} = 2/\sqrt{3}$

11. Give the exact value for:

$\cos\frac{3\pi}{4}\sin\frac{5\pi}{6} - \sin\frac{3\pi}{4}\cos\frac{5\pi}{6}$ $\quad \frac{-\sqrt{2}}{2}\cdot\frac{1}{2} - \frac{\sqrt{2}}{2}\cdot\frac{-\sqrt{3}}{2} \Rightarrow \frac{-\sqrt{2}+\sqrt{6}}{2}$

12. A merry-go-round makes 8 revolutions per minute.
16π a. How many radians per minute is this?
b. At a point 12 feet from the center, find the
$\frac{2\cdot\pi\cdot 12\cdot 8}{60}$ linear velocity in feet per second. You will need
(10.05) to know the circumference and $v = d/t$.

13. How many radians does the second hand move over a 40 second turn? How many degrees?
$4\pi/3$ RADIANS 240°

14. Name the angles in the 2nd, 3rd, & 4th quadrants with a reference angle of 30°. $30^\circ, 150^\circ, 210^\circ, 330^\circ$

15. If $\sin\theta = -\sqrt{3}/2$ and $180^\circ \le \theta \le 270^\circ$, then $\cos\theta = ?$ $-1/2$
$\theta = 240^\circ$

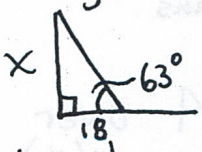
16. Find the exact value of $\cos(120^\circ)\cos 180^\circ + \sin(120^\circ)\sin 180^\circ$
$(-1/2)(-1) + (\sqrt{3}/2)(0)$
$1/2$

17. Simplify: $\dfrac{\sin^2 t - \cos^2 t \cdot \sin^2 t}{\sin^2 t}$ into $\sin^2 t$

18. Show that $\dfrac{\sin t}{\tan t}$ can be transformed into $\cos t$.

19. If $\tan\theta = \frac{4}{5}$ and $180^\circ \le \theta \le 270^\circ$, then $\cos\theta = \dfrac{?}{-5/\sqrt{41}}$
(-5, -4)

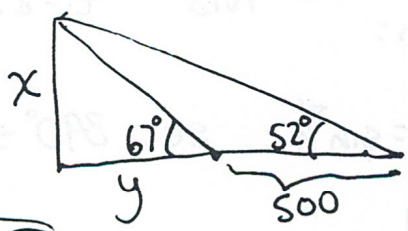
20. A guy wire stretches from the top of an antenna tower to a point on level ground 18 feet from the base of the tower. The angle between the wire and the ground is 63°. How high is the tower?



$\tan 63^\circ = \frac{x}{18}$
35.3 ft

Bonus

Two points on level ground are 500 meters apart. The angles of elevation from these points to the top of a nearby hill are 52° and 67°, respectively. The two points and the ground level point directly below the top of the hill lie on a straight line. How high is the hill? Find x.



$\tan 67^\circ = \frac{x}{y}$ $\quad \tan 52^\circ = \frac{x}{y+500}$

$x = y\cdot\tan 67^\circ$ $\quad x = \tan 52^\circ (y+500)$

$y\cdot\tan 67^\circ = \tan 52^\circ (y+500)$

$y = 594.8$

$\tan 67 = \frac{x}{594.8}$ ← (1401)