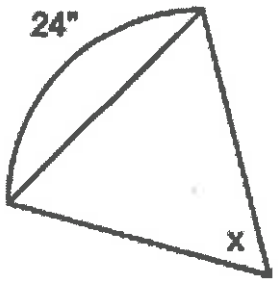
PreCalc BC Trig Review **Name:** Steve

1. The area of the sector is 360 square inches and the length of the arc is 24". (*The sector is the WHOLE pie wedge, right?)*



a) **(No Calculator)** Find the radius.

$\frac{1}{2} r s = 360$

$\frac{1}{2}(r)24 = 360$ $r = 30$ in

b) **(No Calculator)** Find the measure of the central angle *x* in radians.

$\theta r = s$

$\theta(30) = 24$

$\theta = 4/5$

c) Find the length of the chord.

$\text{chord} = 2(30)\sin\frac{\theta}{2}$

$= 2(30)\sin\left(\frac{2}{5}\right) = 23.4$ in

2. Use your calculator to evaluate each of the following over [0, 2π). Be sure to find TWO values for each:

a) $\cos^{-1}(-0.32)$

1.8965
4.3867

b) $\csc^{-1}(-3.14)$

$\sin^{-1}\left(\frac{-1}{3.14}\right)$

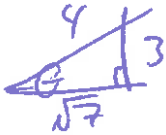
3.4657
5.9591

c) $\cot^{-1}(7)$

$\tan^{-1}\left(\frac{1}{7}\right)$

.1419
3.2835

3. **(No Calculator)** Given: $\sin\theta = \frac{3}{4}$ (*assume* $0 \le \theta < \frac{\pi}{2}$), find each of these:



a) $\cos\theta$

$\cos\theta = \frac{\sqrt{7}}{4}$

b) $\sin\left(\theta - \frac{\pi}{4}\right)$

$\sin\theta\cos\frac{\pi}{4} - \sin\frac{\pi}{4}\cos\theta$

$\left(\frac{3}{4}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{7}}{4}\right)$

$= \frac{3-\sqrt{7}}{4\sqrt{2}}$

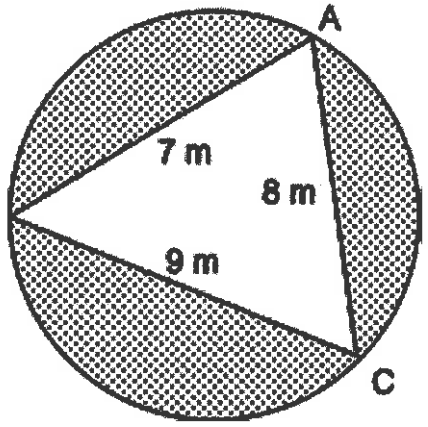
c) $\tan\left(\theta + \frac{2\pi}{3}\right)$

$\frac{\tan\theta + \tan\frac{2\pi}{3}}{1 - \tan\theta \cdot \tan\frac{2\pi}{3}}$

$\frac{\frac{3}{\sqrt{7}} + \frac{-\sqrt{3}}{1}}{1 - \frac{3}{\sqrt{7}}\cdot(-\sqrt{3})}$

$= \frac{3\sqrt{7} - \sqrt{21}}{\sqrt{7} + 3\sqrt{3}}$

4. Find the area of the shaded region below to the nearest tenth.



(A) $\cos B = \frac{7^2+9^2-8^2}{2 \cdot 7 \cdot 9}$

$\cos B = \frac{11}{21}$

$\angle B = 1.019479$

(B) $\text{diam} = \frac{8}{\sin B}$

$= 9.3915$

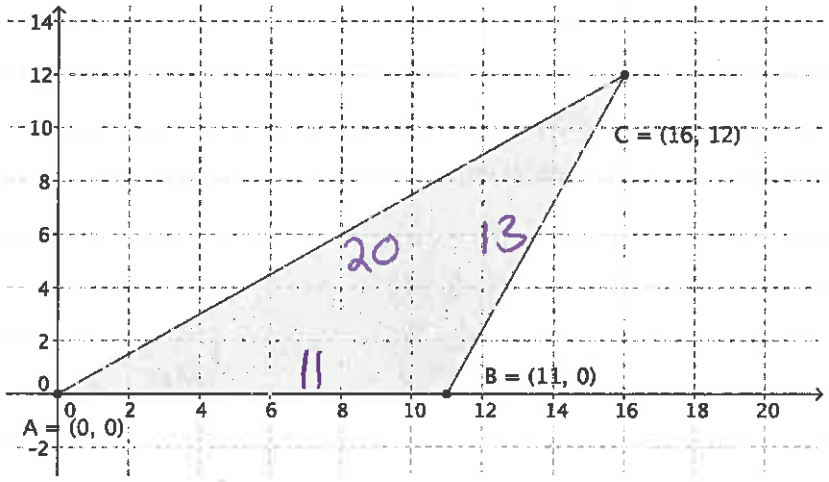
(C) $\bigcirc - \triangle$

$= \pi\left(\frac{\text{diam}}{2}\right)^2 - \frac{1}{2}(7)(9)\sin(B)$

$= 69.2721 - 26.8328$

$= 42.4\ m^2$

5. **(No Calculator)** Given Δ ABC as shown below, find *exact values* for …



a) area of ΔABC *(take advantage of the coordinate system)*

$\text{Area} = \frac{1}{2}(6)(4) = \frac{1}{2}(11)(12) = 66$

b) sin(C) *(Use the sine area formula)*

$\frac{1}{2}ab\sin\theta = 66$

$\left(\frac{1}{2}\right)(13)(20)\sin\theta = 66$

$\sin\theta = \frac{33}{65}$

c) cos(B) *(Use LOC)*

$\cos\theta = \frac{11^2+13^2-20^2}{2 \cdot 11 \cdot 13} = \frac{-5}{13}$

6. **(No Calculator)** Find the exact value of $\cos\left(\frac{\pi}{12}\right)$ *(In simplified radical form – think of 2 angles you could subtract).*

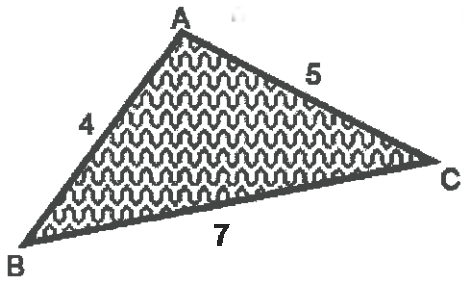
$$\frac{\pi}{12} = \frac{4\pi}{12} - \frac{3\pi}{12}$$

$$\cos\left(\frac{\pi}{12}\right) = \cos\left(\frac{4\pi}{12} - \frac{3\pi}{12}\right) = \cos\left(\frac{\pi}{3} - \frac{\pi}{4}\right)$$

$$= \cos\frac{\pi}{3}\cdot\cos\frac{\pi}{4} + \sin\frac{\pi}{3}\cdot\sin\frac{\pi}{4}$$

$$= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right) = \frac{1+\sqrt{3}}{2\sqrt{2}}$$

7. **(No Calculator)** Find sin(A) in simplified radical form *(Use law of cosine)*



$$\cos A = \frac{4^2+5^2-7^2}{2\cdot 4\cdot 5}$$

$$= \frac{-1}{5}$$

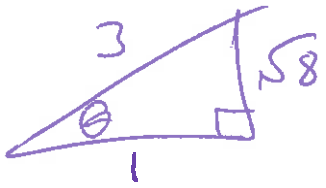
$$\sin A = \sqrt{1-\cos^2 A}$$

$$= \sqrt{1-\left(\frac{-1}{5}\right)^2}$$

$$= \sqrt{\frac{24}{25}}$$

$$= \frac{2\sqrt{6}}{5}$$

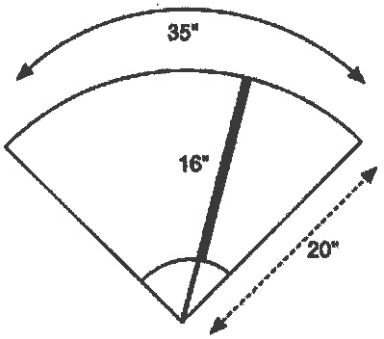
8. **(No Calculator)** Find the value of $\csc\theta$ if $\cos\theta = \frac{1}{3}$, $\tan\theta < 0$, and $0 \le \theta < 2\pi$



cos +, tan − → IV → csc −

$\csc\theta = -\frac{3}{\sqrt{8}} = -\frac{3\sqrt{2}}{4}$

9. A windshield wiper on a car is 20 inches long and has a blade 16 inches long. If the wiper sweeps through an arc measuring 35 inches, how large an area does the wiper clean? (*Note, the bottom 4 inches of the sector are not cleaned by the blade).*



(A) $s = r\theta$

$\frac{s}{r} = \theta$

$\frac{35}{20} = \theta$

$\frac{7}{4} = \theta$

(B) $\triangledown - \triangledown = \square$

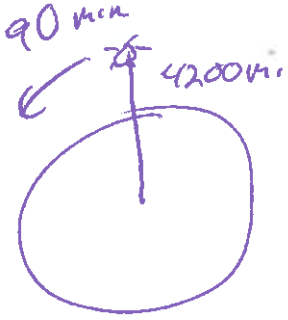
$\frac{1}{2}(20)^2\left(\frac{7}{4}\right) - \frac{1}{2}(4)^2\left(\frac{7}{4}\right)$

$= \frac{7}{8}(20^2 - 4^2)$

$= \frac{7}{8}(384)$

$= 336\ in^2$

10. A satellite orbits the earth at a height of 4200 miles relative to the center of the earth and travels around the earth in 90 minutes. Find the angular and linear velocity of the satellite in radians and miles per hour.



$\omega = \frac{2\pi}{90\ min} = \frac{2\pi}{1.5} = \frac{4}{3}\pi\ rad/hr$

$v = \omega r = \left(\frac{4}{3}\pi\right)(4200) = 17{,}593\ mph$