Pre-calculus 20

Final Review

An arithmetic sequence begins with -5 and increases by 7 each time.

a) What is the 82nd term of the sequence?

$t_n = t_1 + (n-1)d$

$t_1 = -5$

$n = 82$

$d = 7$

$t_{82} = -5 + (82-1)(7)$

$t_{82} = -5 + 81(7)$

$t_{82} = 562$

b) What is the sum of the first 22 terms of this sequence?

$t_1 = -5$

$d = 7$

$n = 22$

$$S_n = \frac{n}{2}[2t_1 + (n-1)d]$$

$$S_n = \frac{22}{2}[2(-5) + (22-1)(7)]$$

$$S_{22} = 11(-10 + 147)$$

$$S_{22} = 11(137)$$

$$S_{22} = 1507$$

Find the 7th term of the sequence:

27, 18, 12, ...

$\frac{18}{27} = \frac{2}{3}$

$\frac{12}{18} = \frac{2}{3}$

$\therefore$ geometric

$r = \frac{2}{3}$

$t_1 = 27$

$n = 7$

$t_n = t_1 r^{n-1}$

$t_7 = 27\left(\frac{2}{3}\right)^{7-1}$

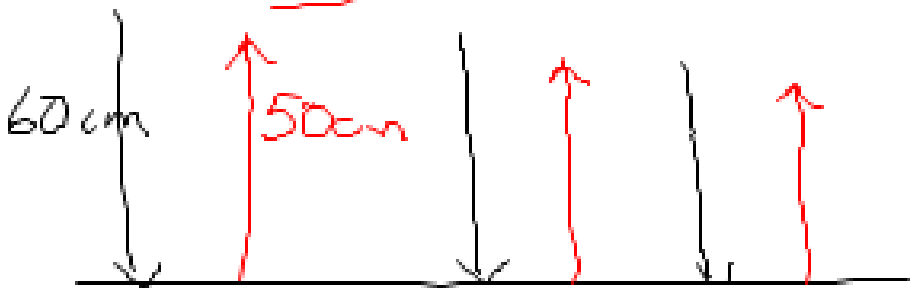
$t_7 = 27\left(\frac{2}{3}\right)^{6}$

$t_7 = \cancel{27}^{1}\left(\frac{64}{\cancel{729}_{27}}\right)$

$t_7 = \frac{64}{27}$

A ball is dropped from height of 60 cm. The ball bounces back up to a height that is 5/6 of the previous bounce.

a) How high does the ball bounce on its 4th bounce? (term)



$t_n = t_1 r^{n-1}$

$t_1 = 50$

$r = \frac{5}{6}$

$n = 4$

$t_4 = 50\left(\frac{125}{216}\right)$ (35, 50, 108)

$t_4 = \frac{3125}{108}$

$= 28.9$ cm

$t_4 = 50\left(\frac{5}{6}\right)^{4-1}$

$t_4 = 50\left(\frac{5}{6}\right)^3$

b) If the ball bounces indefinitely, how far will it travel altogether?

S_∞ for bounces + S_∞ for drops

$$S_\infty = \frac{t_1}{1-r}$$

$$\frac{50}{1-5/6} + \frac{60}{1-5/6}$$

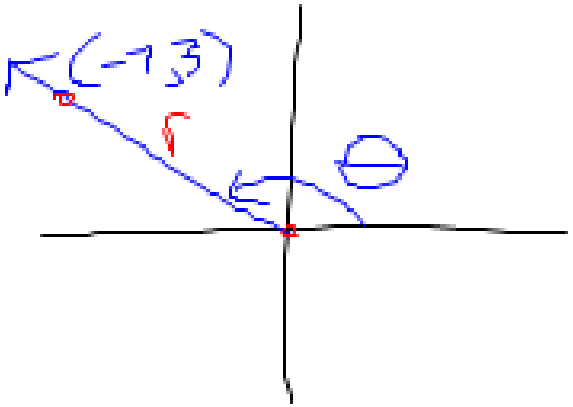
$$\frac{50}{1/6} + \frac{60}{1/6} = 50(6) + 60(6)$$

$$= 300 + 360 = \underline{660 \text{ cm}}$$

SYR CXR TYX

The point (-7, 3) lies on the terminal arm of an angle θ in standard position. Determine the exact values for the three primary trig ratios for angle θ.

sin cos tan



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

$r = \sqrt{(-7)^2 + 3^2}$

$r = \sqrt{49 + 9}$

$r = \sqrt{58}$

$x = -7$

$y = 3$

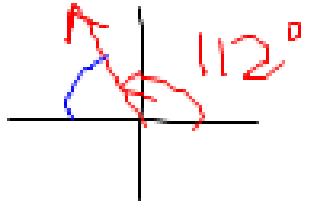
$r = \sqrt{58}$

$\sin\theta = \frac{3}{\sqrt{58}}$ $\cos\theta = \frac{-7}{\sqrt{58}}$

$\tan\theta = -\frac{3}{7}$

Calculate the reference angle for each of the following angles in standard position:

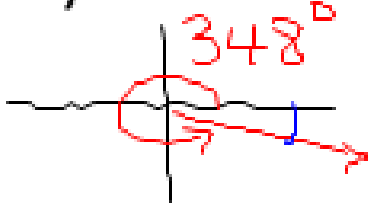
a) 112°



$180° - 112°$

$= 68°$

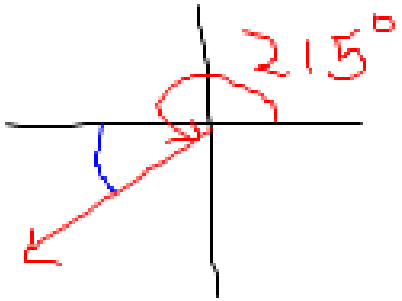
b) 348°



$360° - 348°$

$= 12°$

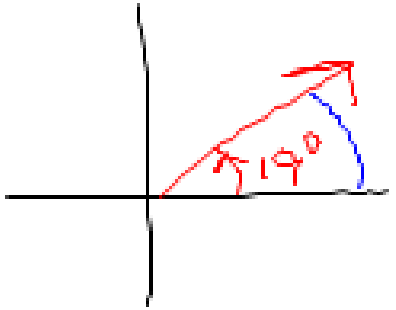
c) 215°



$215° - 180°$

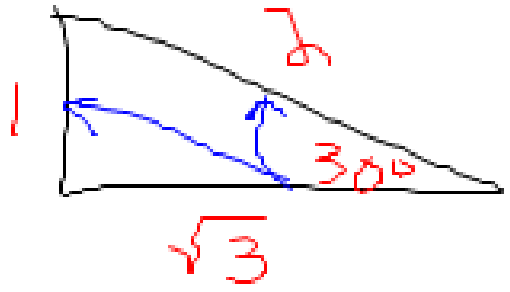
$= 35°$

d) 19°



$19°$

Calculate the exact value of $\sin 330°$



$\theta_R = 360° - 330° = 30°$

$\sin 30° = \frac{1}{2}$

$330° \Rightarrow$ Q4

S	A
T	C

sin is neg in Q4

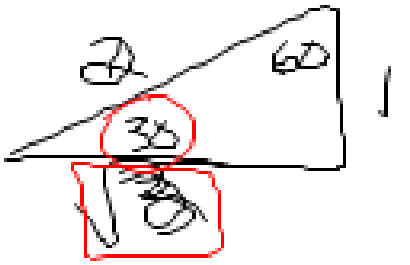
$\therefore \sin 330° = -\frac{1}{2}$

positive

If $\cos\theta = \frac{\sqrt{3}}{2}$, what are the two measures of $\angle\theta$?

adj

hyp



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S	A
T	C

$\theta_1 = 30^\circ$ (Q1)

$\theta_2 = 330^\circ$ (Q4)

$\therefore \theta_R = 30^\circ$

If $tan\theta = -2.4567$, what are the two measures of $\angle\theta$?

negative

$\theta_R = \tan^{-1}(2.4567) = 68^\circ$

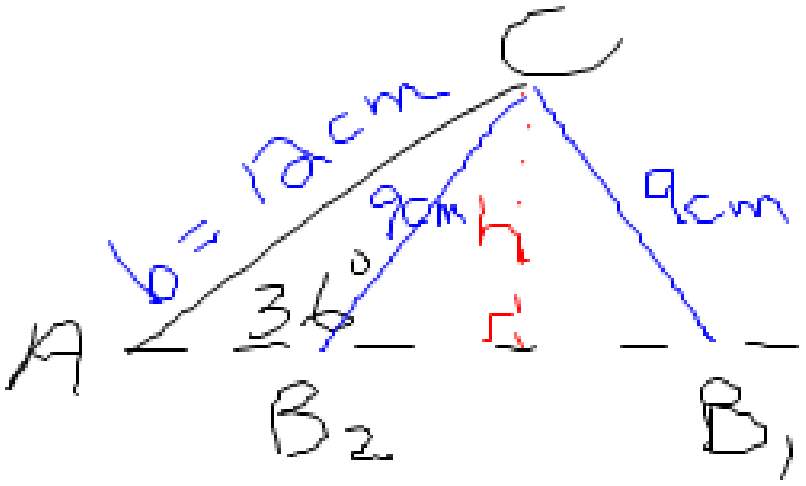
S	A
T	C

$\theta_1 = 112^\circ$ (Q2)

$\theta_2 = 292^\circ$ (Q4)

Solve the SSA ambiguous case:

$$\Delta ABC, \angle A = 36°, a = 9\ cm, b = 12\ cm$$



$a < b$

$h = 12\sin 36° = 7$

$a > h$

$\therefore$ 2 Δ's

$$\frac{\sin B_1}{12} = \frac{\sin 36°}{9}$$

$$\angle B_1 = \sin^{-1}\left(\frac{12\sin 36°}{9}\right)$$

$$\angle B_1 = 52°$$

$\angle B_2 = 180° - 52° = 128°$

$\angle C = 180^\circ - 36^\circ - 52^\circ$

$\angle C = 92^\circ$

$\frac{c}{\sin 92^\circ} = \frac{9}{\sin 36^\circ}$

$c = \frac{9 \sin 92^\circ}{\sin 36^\circ}$

$c = 15.3 \text{ cm}$

$\angle C = 180^\circ - 36^\circ - 128^\circ$

$\angle C = 16^\circ$

$\frac{c}{\sin 16^\circ} = \frac{9}{\sin 36^\circ}$

$c = \frac{9 \sin 16^\circ}{\sin 36^\circ}$

$c = 4.2 \text{ cm}$