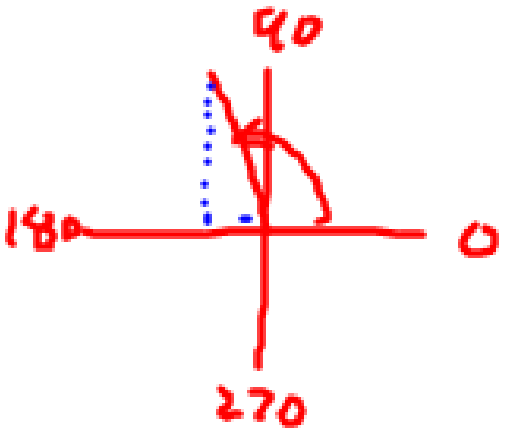
1. What is the reference angle for:

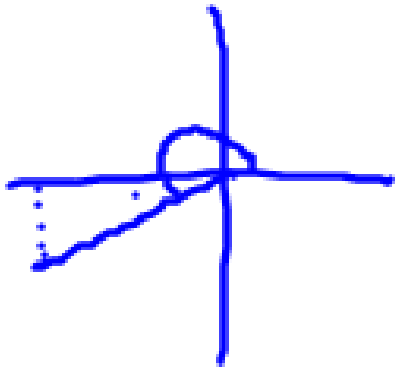
100° 80°

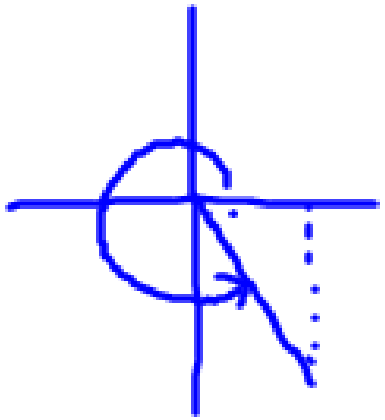
200° 20

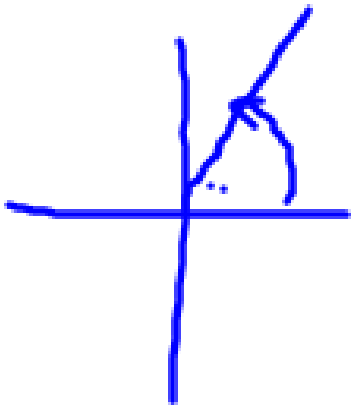
300° 60°

50° 50°





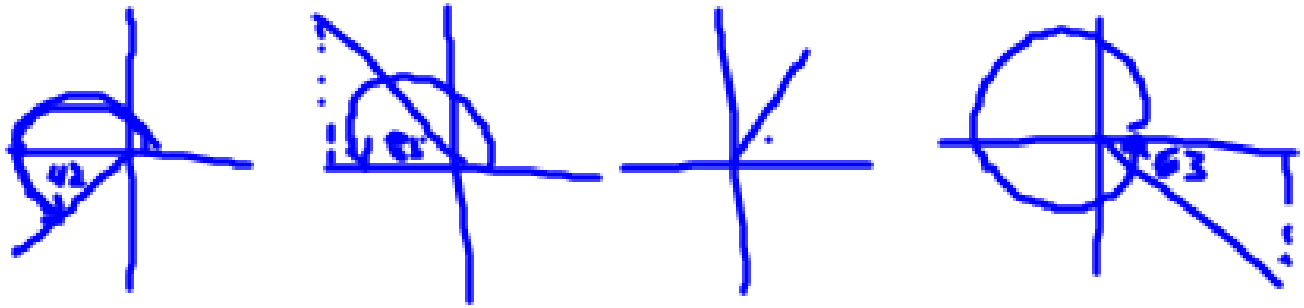




2.

Reference Angle	Quadrant	Angle in Standard Position
42°	III	222
85°	II	95
53°	I	53
63°	IV	297

II	I
III	IV



3. Solve $x = 4 + \sqrt{2x+7}$

$x - 4 = \sqrt{2x+7}$

$x^2 - 8x + 16 = 2x + 7$

$x^2 - 10x + 9 = 0$

$(x-9)(x-1) = 0$

$x = 9 \quad x = 1$

Check $x = 9$

$9 = 4 + \sqrt{25}$

$9 = 4 + 5$ ✓

Check $x = 1$

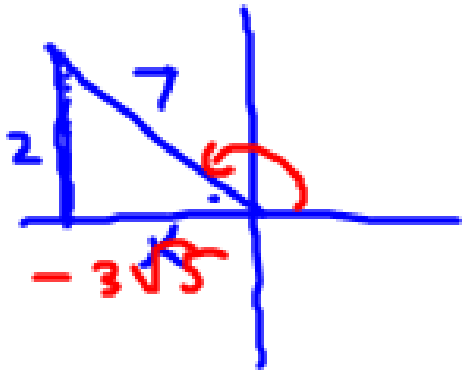
$1 = 4 + \sqrt{9}$

$1 = 4 + 3$

no.

$\boxed{x = 9}$

4. θ is in quadrant II and $\sin\theta = 2/7$
Find the exact values of $\cos\theta$ and $\tan\theta$. (and find θ)



$x^2 + 4 = 49$

$x^2 = 45$

$x = \pm\sqrt{45}$

But II $\therefore x = -\sqrt{45} = -3\sqrt{5}$

$\cos\theta = -\frac{3\sqrt{5}}{7}$ $\tan\theta = -\frac{2}{3\sqrt{5}}$

$= -\frac{2\sqrt{5}}{15}$

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

$\theta = 16.6°$

$163.4°$

5. State the restrictions for

a) $\sqrt[3]{-7x^2y^5}$

3 ✓ 5 ✓ 7 ✓

none

b) $\sqrt[4]{b^2c^3}$

2 ✓ 4 ✓ 6 ✓

no negatives

$c \geq 0$

$c > 0$

c) $\frac{1}{x+5}$

division by zero

$x \neq -5$

d) $\frac{1}{\sqrt{8-x}}$

$x \leq 8$

$x < 8$

6. Solve $\frac{1}{1-\sqrt{x}} + \frac{\sqrt{x}}{5} = 1$

$\frac{5}{1-\sqrt{x}} + \sqrt{x} = 5$

$5 + \sqrt{x}(1-\sqrt{x}) = 5(1-\sqrt{x})$

$5 + \sqrt{x} - x = 5 - 5\sqrt{x}$

$\Longrightarrow \quad 6\sqrt{x} = x$

$36x = x^2$

$0 = x^2 - 36x$

$0 = x(x-36)$

$x = 0 \quad x = 36$

Check $x=0$

$\frac{1}{1} + 0 = 1$

$1 = 1$ ✓

$x = 36$

$\frac{1}{1-6} + \frac{6}{5} = 1$

$-\frac{1}{5} + \frac{6}{5} = 1$

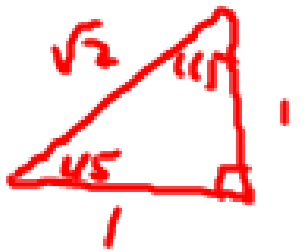
$1 = 1$ ✓

7. Find the exact value for $\cos 150°$, $\sin 300°$, $\tan 240°$

$\cos 150°$ → $30°$ → $-\frac{\sqrt{3}}{2}$

$\sin 300°$ → $60°$ → $-\frac{\sqrt{3}}{2}$

$\tan 240°$ → $60°$ → $\sqrt{3}$



S	A
T	C

8. Solve $2x + \sqrt{x^2+7} = 10$

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

$4x^2 - 40x + 100 = x^2 + 7$

$3x^2 - 40x + 93 = 0$

$(3x - 31)(x - 3) = 0$

$x = \frac{31}{3}$ $\boxed{x = 3}$

$\frac{94}{3} = 10$ $6 + \sqrt{16} = 10$

$6 + 4 = 10$

no. ✓

9. Write as an entire radical

$3x\sqrt{10x}$

$\sqrt{9x^2}\sqrt{10x}$

$\sqrt{90x^3}$

$2xy^2\sqrt{3x^2y}$

$\sqrt{4x^2y^4}\sqrt{3x^2y}$

$\sqrt{12x^4y^5}$

$3x\sqrt[3]{10x}$

$\sqrt[3]{27x^3}\ \sqrt[3]{10x}$

$\sqrt[3]{270x^4}$

10. Simplify $5\sqrt{50x^2y^5}$ $\sqrt[3]{a^3b^4c^5}$ $\sqrt{2000}$

$5\sqrt{25}\sqrt{x^2}\sqrt{y^4}\sqrt{2y}$ $\sqrt[3]{a^3}\sqrt[3]{b^3}\sqrt[3]{c^3}\sqrt[3]{bc^2}$

$25xy^2\sqrt{2y}$ $abc\sqrt[3]{bc^2}$

$\sqrt{2000} \longrightarrow \sqrt{400}\sqrt{5}$

$20\sqrt{5}$

$\sqrt{100}\sqrt{20}$

$10\sqrt{20}$

$10\sqrt{4}\sqrt{5}$

$10\cdot 2\sqrt{5}$ $20\sqrt{5}$

11. Rationalize

$\sqrt{\frac{2}{3}}$

$\frac{\sqrt{2}}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{\sqrt{6}}{3}$

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

$\frac{3}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$

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

$\frac{1-\sqrt{2}}{1-2} = \frac{1-\sqrt{2}}{-1}$ $-1+\sqrt{2}$

$\frac{5}{\sqrt{2}-\sqrt{3}}\left(\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}+\sqrt{3}}\right)$

$\frac{5\sqrt{2}+5\sqrt{3}}{2-3}$ $-5\sqrt{2}-5\sqrt{3}$

12. Expand and Simplify

$(3+\sqrt{6})^2$

$9+6+6\sqrt{6}$

$15+6\sqrt{6}$

$(2-\sqrt{10})^2$

$4+10-4\sqrt{10}$

$14-4\sqrt{10}$

$(\sqrt{3}+\sqrt{6})^2$

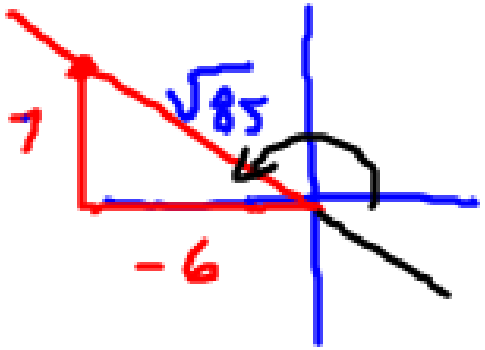
$3+6+2\sqrt{18}$

$9+2\sqrt{18}$

$9+2\sqrt{9}\sqrt{2}$

$9+6\sqrt{2}$

13. A terminal arm passes through the point $(-6, 7)$
Find exact values for $\sin\theta$, $\cos\theta$, $\tan\theta$ (and find θ)



$\sin\theta = \frac{7}{\sqrt{85}} = \frac{7\sqrt{85}}{85}$

$\cos\theta = \frac{-6}{\sqrt{85}} = \frac{-6\sqrt{85}}{85}$

$\tan\theta = -7/6$

$\sin^{-1}\left(\frac{7\sqrt{85}}{85}\right) = 49.4$

$\therefore 130.6°$

$\sin\theta = \sin(180 - \theta)$

$\Rightarrow \cos\theta = \cos(360 - \theta)$

$\tan^{-1}(7/6) = -49.4$

$\tan\theta = \tan\theta + 180$

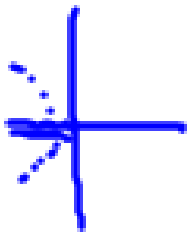
14. $\sin\theta = 0.95106$ find θ

$0 \le \theta < 360$

72° 108°

180 − θ

$\cos\theta = -0.52992$ find θ



122° 238°

360 − θ

$\tan\theta = 0.176327$ find θ

10° 190°

180 + θ

θ is in quad III

$\cos\theta = -0.358368$

find θ

111°

249°

15. Solve $\frac{\sqrt{3-x}}{1} = \frac{2+x}{\sqrt{2-x}}$

$$\sqrt{6-3x-2x+x^2} = 2+x$$

$$\sqrt{x^2-5x+6} = 2+x$$

$$x^2-5x+6 = x^2+4x+4$$

$$-9x = -2$$

$$\boxed{x = \frac{2}{9}}$$

Check

$\frac{20}{9} = \frac{20}{9}$ ✓

16. Solve $\sqrt{x+2}+1 = 2+\sqrt{3-x}$

$\sqrt{x+2} = 1+\sqrt{3-x}$

$x+2 = 1+3-x+2\sqrt{3-x}$

$2x-2 = 2\sqrt{3-x}$

$x-1 = \sqrt{3-x}$

$x^2-2x+1 = 3-x$

$x^2-x-2 = 0$

$(x-2)(x+1)=0$

$\boxed{x=2}$ $x=-1$

check 2

$\sqrt{4}+1 = 2+\sqrt{1}$

$2+1 = 2+1$

✓

check -1

$\sqrt{1}+1 = 2+\sqrt{4}$

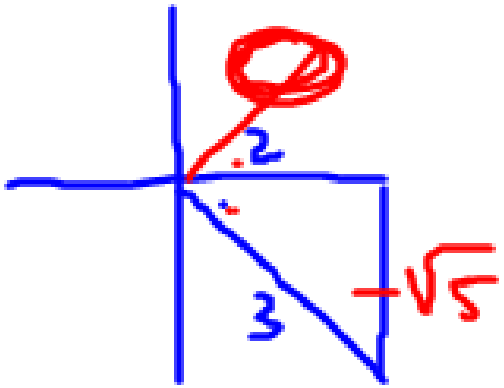
$1+1 = 2+2$

no.

17. A terminal arm in quad IV has $\cos\theta = \frac{2}{3}$

Find exact values of $\sin\theta$ and $\tan\theta$

Find θ to 1 decimal place.



$\cos^{-1}\left(\frac{2}{3}\right) = 48.2$

311.8°

$\sin\theta = -\frac{\sqrt{5}}{3}$

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