

1)) What is a solution statement for the inequality

$$5 - 2(x + 4) \geq 2x + 3 ?$$

$$5 - 2x - 8 \geq 2x + 3$$

$$\begin{array}{r} -2x - 3 \geq 2x + 3 \\ -2x \quad \quad \quad -2x \\ \hline \end{array}$$

$$\begin{array}{r} -4x - 3 \geq 3 \\ \quad \quad \quad +3 \quad \quad \quad +3 \\ \hline \end{array}$$

$$\begin{array}{r} -4x \geq 6 \\ -4 \quad \quad \quad -4 \\ \hline \end{array}$$

$$x \leq -\frac{3}{2}$$

2) $(3a^3b^2)^3(4a^4b)^2$ is equivalent to:

$$3^3 a^9 b^6 \cdot 4^2 a^8 b^2$$

$$27 \cdot 16 a^{17} b^8$$

$$432 a^{17} b^8$$

3) For nonzero x and y, what expressions is equivalent to

$$\frac{6x^{-2}y^2}{-2x^{-5}y^{-1}}$$

$$\frac{6x^5y^2y^1}{-2x^2} = \frac{6x^5y^3}{-2x^2}$$

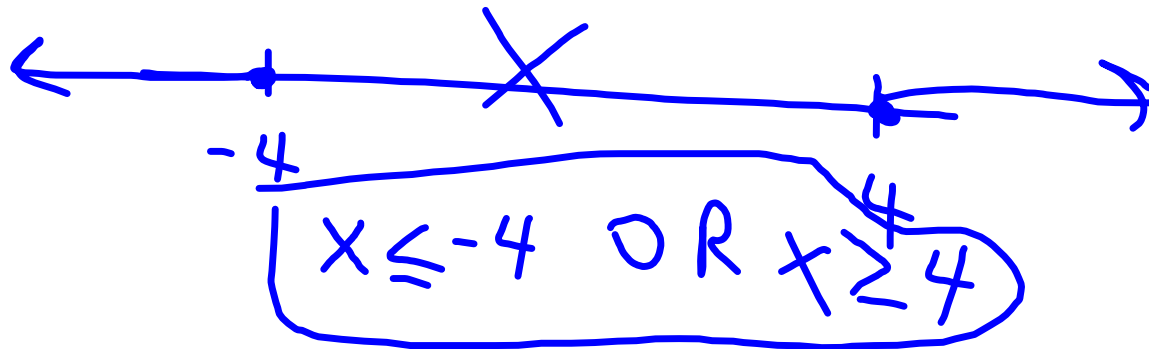
$$\boxed{-3x^3y^3}$$

4) The solution set to the following quadratic inequality $16 - x^2 \leq 0$ is

$$\frac{-16 \quad -16}{-1} \left[-x^2 \leq -16 \right]$$

$$\sqrt{x^2} \geq \sqrt{16}$$

$$x \geq \pm 4$$



5) If the number of real solution to the following equations is one then the value of b must be

$$2x^2 + bx + 18 = 0 \quad ?$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow = 0$$

$$a = 2$$

$$b = b$$

$$c = 18$$

$$b^2 - 4(2)(18) = 0$$

$$b^2 - 144 = 0$$

$$\begin{array}{r} b^2 - 144 = 0 \\ + 144 \quad + 144 \\ \hline \end{array}$$

$$\sqrt{b^2} = \sqrt{144}$$

$$b = \pm 12$$

6) How many real solutions are there to the equation $x^2 - 5x + 10 = 0$?

Discriminant $\rightarrow b^2 - 4ac$

$> 0 \rightarrow 2 \text{ Real}$

$= 0 \rightarrow 1 \text{ Real}$

$< 0 \rightarrow 0 \text{ Real}$

$$a = 1$$

$$b = -5$$

$$c = 10$$

$$(-5)^2 - 4(1)(10)$$

$$25 - 40 = -15$$

0 Real

7) What is the sum of the solutions to $3x^2 - 12x - 15 = 0$?

$$\frac{3x^2 - 12x - 15}{3} = \frac{0}{3}$$

$$x^2 - 4x - 5 = 0$$

$$(x - 5)(x + 1) = 0$$

$$x = 5, -1$$

4

8) What is the solution to the following system of equations?

$$4[x - 2y = -3]$$

$$-4x + 12y = 52$$

$$\begin{array}{r} 4x - 8y = -12 \\ -4x + 12y = 52 \\ \hline \end{array}$$

$$x - 2(10) = -3$$

$$\begin{array}{r} x - 20 = -3 \\ + 20 \quad + 20 \\ \hline \end{array}$$

$$\frac{4y}{4} = \frac{40}{4}$$

$$y = 10$$

$$\begin{array}{l} x = 17 \\ y = 10 \end{array}$$

$$(17, 10)$$

9) If $f(x) = x^3 + 4x^2 - 2x - 7$ then what is $f(-5)$?

$$f(-5) = (-5)^3 + 4(-5)^2 - 2(-5) - 7$$

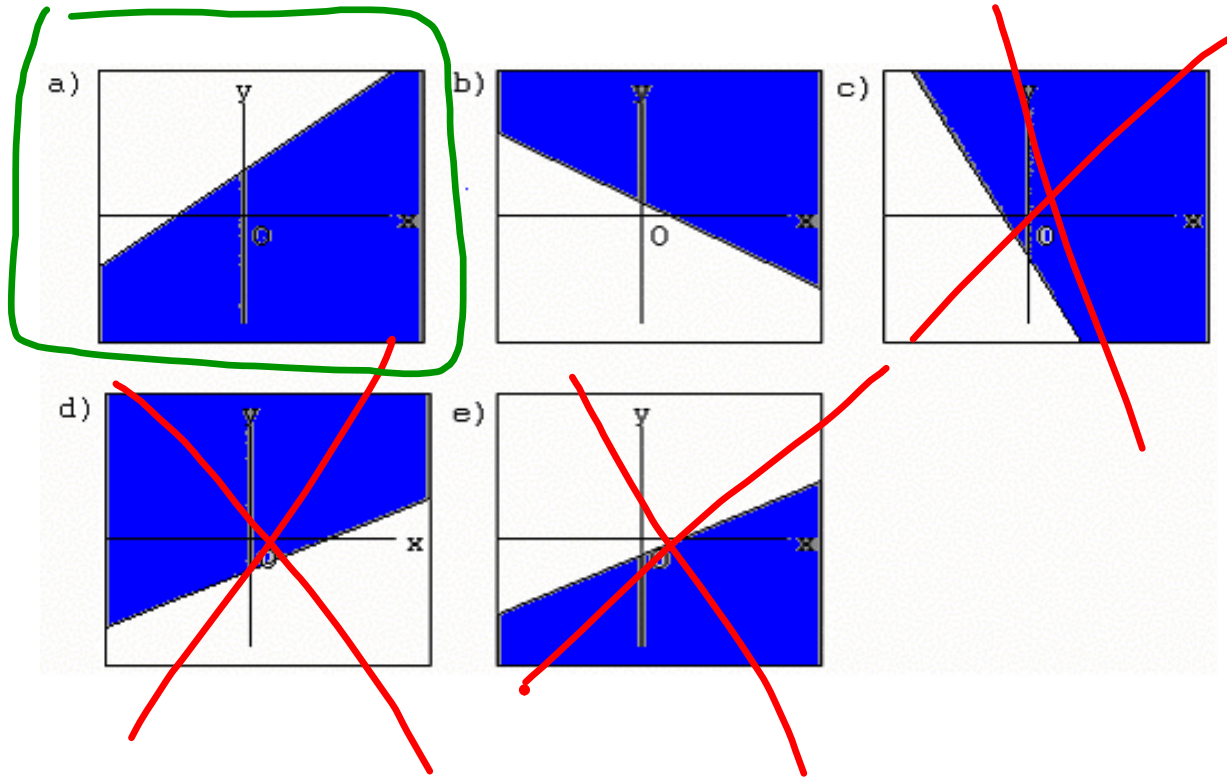
$$= -125 + 100 + 10 - 7$$

$$= \boxed{-22}$$

10) If $f(x) = 3x + 2$ and $g(x) = -2x^2 + 5$ then $f(g(x)) = ?$

$$\begin{aligned} f(g(x)) &= 3(-2x^2 + 5) + 2 \\ &= -6x^2 + 15 + 2 \\ &= -6x^2 + 17 \end{aligned}$$

11) Which graph best represents the graph of $y \leq x + 1$



12) factor $16x^2 - 36y^4$?

$$(4x + 6y^2)(4x - 6y^2)$$

13) What is the product of the complex numbers

$$(7+6i)(7-6i) \quad ?$$

$$49 - 36i^2$$

$$i^2 = -1$$

$$49 - 36(-1)$$

$$49 + 36$$

$$85$$

14) Given the following set of ordered pairs
(5,5)(3,3)(1,0)(6,-6) What is the domain, range, and relation?

Domain : 1, 3, 5, 6

Rang : -6, 0, 3, 5

Relation \rightarrow is a function

15) For all $x > 0$ simplify $\frac{2x^2 + 11x + 12}{x^2 - x - 20}$

$$\frac{(2x+3)(\cancel{x+4})}{(\cancel{x+4})(x-5)}$$

$$\boxed{\frac{2x+3}{x-5}}$$

16) If the denominator is not zero, then $\frac{7x^2 - 7y^2}{-x - y}$ simplifies to.

$$\frac{7(x^2 - y^2)}{-(x + y)}$$

$$\frac{7(\cancel{x + y})(x - y)}{-(\cancel{x + y})}$$

$$\begin{array}{c} -7(x - y) \\ \text{or} \\ -7x + 7y \end{array}$$

17) If the denominator is not zero then, $\frac{x^2-4}{2x} \div \frac{x-2}{8}$
simplifies to

$$\frac{x^2-4}{2x} \cdot \frac{8}{x-2}$$

$$\frac{(x+2)(\cancel{x-2})}{\cancel{2}x} \cdot \frac{\cancel{8}4}{\cancel{x-2}}$$

$$\frac{4(x+2)}{x} = \frac{4x+8}{x}$$
$$4 + \frac{8}{x}$$

18) If $\frac{3}{u-1} = \frac{9}{u+3}$ then $u = ?$

$$\begin{array}{r} 9u - 9 = 3u + 9 \\ -3u \quad -3u \\ \hline \end{array}$$

$$\begin{array}{r} 6u - 9 = 9 \\ +9 \quad +9 \\ \hline \end{array}$$

$$\begin{array}{r} 6u = 18 \\ \underline{6} \quad \underline{6} \\ \hline \end{array}$$

$$\boxed{u = 3}$$

19) If $x + \frac{2}{3} = \frac{1}{10}$ then $x = ?$

$$30 \left[\frac{x}{1} + \frac{2}{3} = \frac{1}{10} \right]$$

$$30x + 20 = 3$$

$$\underline{-20 \quad -20}$$

$$\frac{30x}{30} = \frac{-17}{30}$$

$$x = -\frac{17}{30}$$

20) If x and y are real numbers and $\sqrt{4\left(\frac{y^2}{x}\right)} = 1$ then what must be true?

possible Answers

$$x \neq 0$$

$$x \geq 0$$

$$\frac{y^2}{x} = \frac{1}{4}$$

...

21) When asked her age , the history teacher said, “If you cube my age, then subtract 120 times my age, the result is 178353.” How old is she?

$$x^3 - 120x = 178353$$

$$x = 57$$

22) Simplifying $\frac{2a}{\sqrt{2a-b}}$ you would get?

$$\frac{2a}{\sqrt{2a-b}} \cdot \frac{\sqrt{2a-b}}{\sqrt{2a-b}} = \frac{2a\sqrt{2a-b}}{2a-b}$$

23) The domain for $f(x) = \sqrt{3x+8}$ is

$$3x + 8 \geq 0$$

$$\frac{3x}{3} \geq \frac{-8}{3}$$

$$x \geq -\frac{8}{3}$$

24) The sum of $\frac{2}{3y} + \frac{5}{4(2y-6)}$ in simplest form is

$$\frac{8y-24}{8y-24} \cdot \frac{2}{3y} + \frac{5}{8y-24} \cdot \frac{3y}{3y}$$

$$\frac{16y-48}{24y^2-72y} + \frac{15y}{24y^2-72y}$$

$$\frac{16y-48+15y}{24y(y-3)}$$

$$\frac{31y-48}{24y(y-3)}$$

25) If $x = 6$, then $\frac{1}{\frac{5}{x} + \frac{2}{3}} = ?$

$$\frac{1}{\frac{5}{6} + \frac{4}{6}} = \frac{1}{\frac{9}{6}}$$

$$\frac{1}{1} \cdot \frac{6}{9} = \frac{6}{9} = \boxed{\frac{2}{3}}$$

26) In the equation $y = \frac{9}{13+x}$, x represents a

positive number. As x gets larger without bound, the value of y does what?

y approaches zero

27) In the equation $y = \frac{2x^2}{3+x^2}$, x represents a

positive number. As x gets larger without bound, the value of y does what?

y approaches 2

28) y varies directly as the square of x. If y = 63 when x = 9. Find y when x = 5?

$$y = kx^2$$

$$63 = k9^2$$

$$\frac{63}{81} = \frac{81k}{81}$$

$$\frac{7}{9} = k$$

$$y = \frac{7}{9}x^2$$

$$y = \frac{7}{9} \cdot \frac{5^2}{1}$$

$$y = \frac{7}{9} \cdot \frac{25}{1}$$

$$y = \frac{175}{9}$$

29) The list of all possible rational roots to the equation $f(x) = 3x^2 - 8x + 5$ is

$$\pm \frac{1}{1}, \pm \frac{1}{3}$$

$$\pm \frac{5}{1}, \pm \frac{5}{3}$$

30) Use synthetic divisions to compute a root to the equation $f(x) = x^3 - 5x^2 + 15x - 14$

31) Use synthetic division to find the quotient you get when dividing $x^3 - 6x^2 + 5x + 12$ by $x - 3$

$$\begin{array}{r|rrrr} 3 & 1 & -6 & 5 & 12 \\ & & 3 & -9 & -12 \\ \hline & 1 & -3 & -4 & 0 \end{array}$$

$x^2 - 3x - 4$

32) What is the result you get when you rationalize

$$\frac{1}{\sqrt{6}-4} \cdot \frac{\sqrt{6}+4}{\sqrt{6}+4} = \frac{\sqrt{6}+4}{6-16}$$

$$\frac{\sqrt{6}+4}{-10} = \frac{-\sqrt{6}-4}{10}$$

33) The solution(s) to the equation $\sqrt{3}(x+4) = \sqrt{x^2-16}$ is (are)

$$(\sqrt{3}(x+4))^2 = (\sqrt{x^2-16})^2$$

$$3(x+4)^2 = x^2 - 16$$

$$3(x^2 + 8x + 16) = x^2 - 16$$

$$\begin{array}{r} 3x^2 + 24x + 48 = x^2 - 16 \\ -x^2 \qquad \qquad +16 \quad -x^2 +16 \\ \hline \end{array}$$

$$\frac{2x^2}{2} + \frac{24x}{2} + \frac{64}{2} = \frac{0}{2}$$

$$x^2 + 12x + 32 = 0$$

$$(x+8)(x+4) = 0$$

$$x = \cancel{-8}, \textcircled{-4}$$

34) Using the quadratic formula the solutions to the equation $x^2+4x+5=0$ are

$$\begin{aligned} a &= 1 \\ b &= 4 \\ c &= 5 \end{aligned}$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(5)}}{2(1)}$$

$$= \frac{-4 \pm \sqrt{16 - 20}}{2}$$

$$= \frac{-4 \pm \sqrt{-4}}{2}$$

$$= \frac{-4 \pm 2i}{2}$$

$$x = -2 \pm i$$

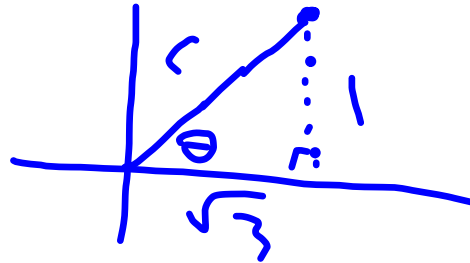
35) Expressing $\sqrt{50a^4} + 3a^2\sqrt{8}$ in simplest form would result in the answer. Assume a to be a positive number

$$\sqrt{25} \sqrt{2} \sqrt{a^2 \cdot a^2} + 3a^2 \sqrt{4} \sqrt{2}$$

$$5a^2\sqrt{2} + 6a^2\sqrt{2}$$

$$\boxed{11a^2\sqrt{2}}$$

36) Find the angle θ whose terminal side passes through the point $(\sqrt{3}, 1)$



$$\sin \theta = \frac{1}{2}$$
$$\theta = 30^\circ$$

$$\tan \theta = \frac{1}{\sqrt{3}}$$

$$\theta = 30^\circ$$

$$1^2 + (\sqrt{3})^2 = r^2$$

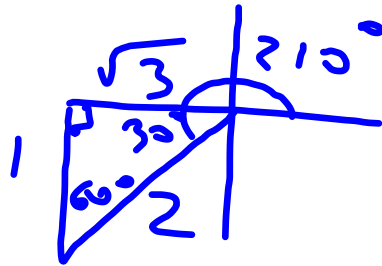
$$1 + 3 = r^2$$

$$\sqrt{4} = \sqrt{r^2}$$

$$2 = r$$

37) Find the ratio for the $\cot 210^\circ$

$$\sin 30^\circ = \frac{1}{2}$$



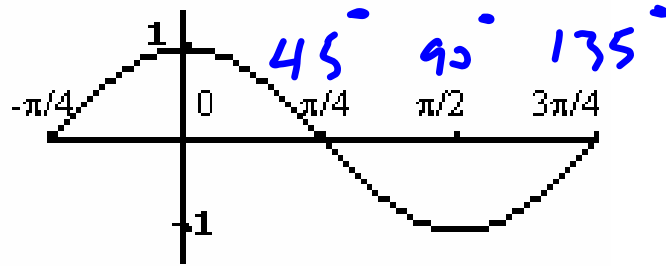
$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\cot 210^\circ = \sqrt{3}$$

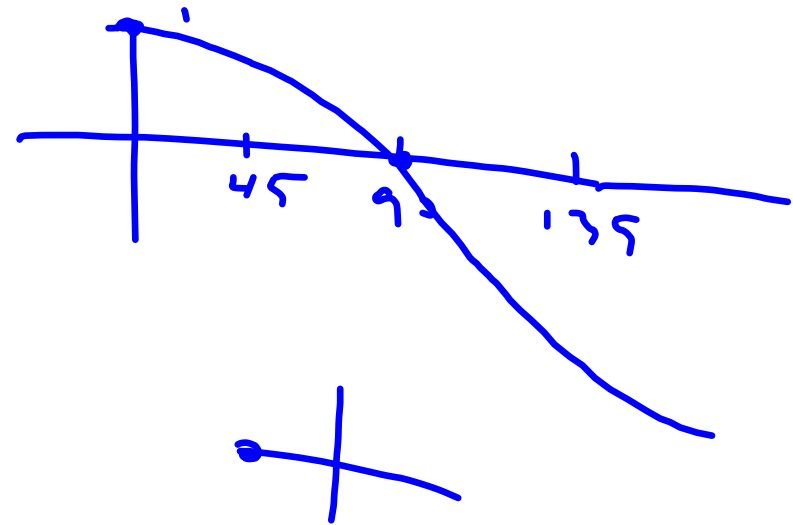
38) Use the fundamental trigonometric identities to find an equivalent trigonometric value for $-1 - \tan^2 x$

$$\begin{aligned} & -1 - \frac{\sin^2 x}{\cos^2 x} \\ & \quad \downarrow \\ & -\frac{\cos^2 x}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x} = \frac{-\cos^2 x - \sin^2 x}{\cos^2 x} \\ & \frac{-(\cos^2 x + \sin^2 x)}{\cos^2 x} = \boxed{-\frac{1}{\cos^2 x} = -\sec^2 x} \end{aligned}$$

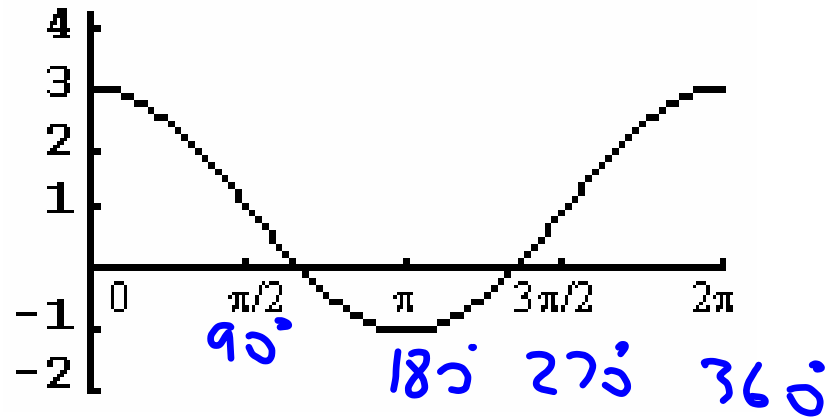
39) What is the equation of the graph below



$$\cos 2\theta$$

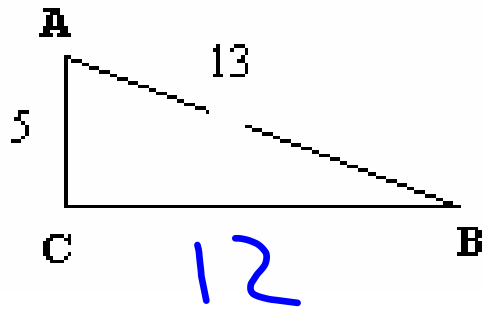


40) What is the equation of the graph below



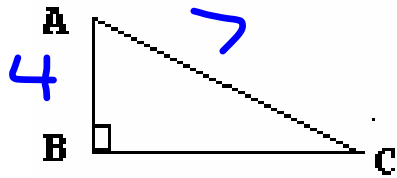
$$2 \cos \theta + 1$$

41) In the right triangle below, what is the $\sin A$.



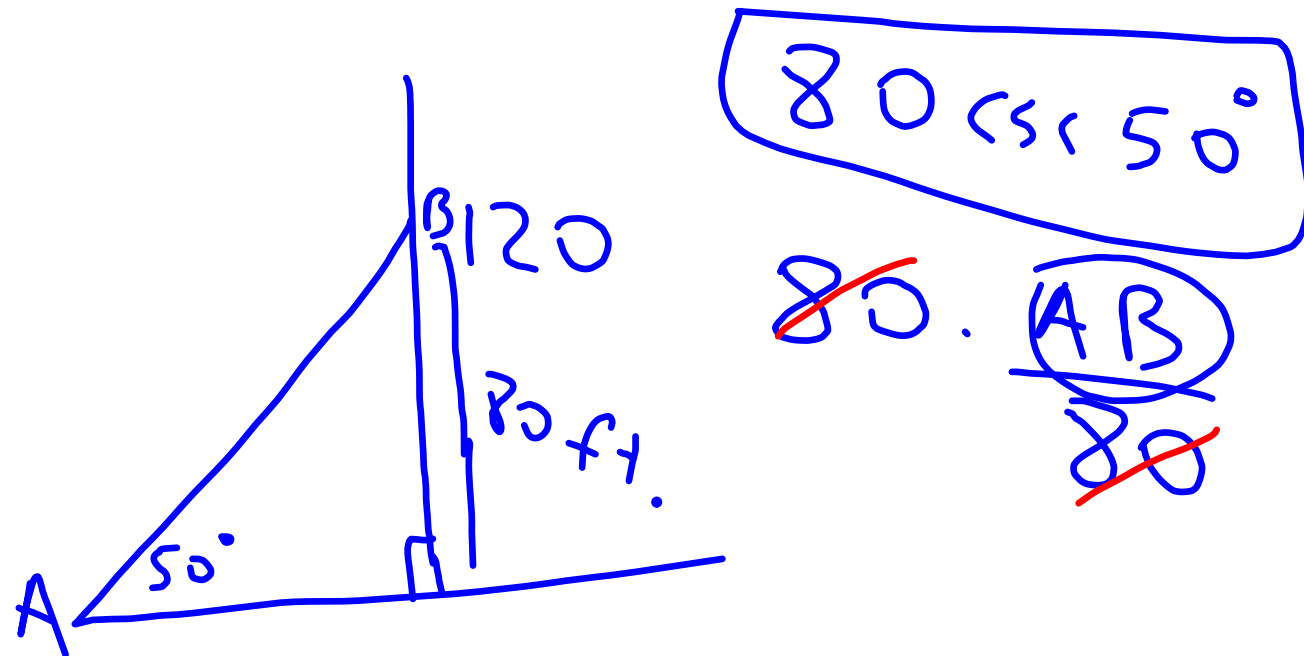
$$\sin A = \frac{12}{13}$$

42) In the right triangle below, if $\angle C$ is such that the $\sin C = \frac{4}{7}$, $\cos C = \frac{\sqrt{33}}{7}$, and $\tan C = \frac{4}{\sqrt{33}}$, then how many inches long is AB ?

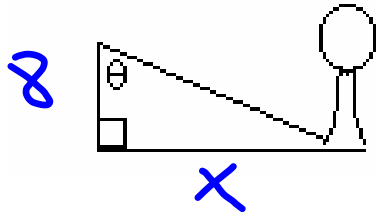


$$\overline{AB} = 4$$

43) A TV station is putting up a new transmitter tower which is 120 feet tall. A support wire will be attached to the ground at point A and to the tower at point B which is 80 feet up. The angle between the ground and the wire is 50° . The wire must be at least as long as \overline{AB} . Which of the following expresses the length of \overline{AB} in feet?

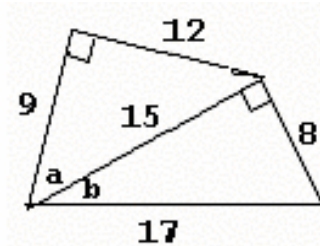


44) Joe Bob peaks over the top of a fence post at a tree. The post is 8 feet high. If he is looking down at angle of θ degrees as shown below, what is the distance from the bottom of the post to the tree?



$$8 \left[\tan \theta = \frac{x}{8} \right]$$
$$8 \tan \theta = x$$

45) The two triangles in the figure below share a common side. What is the $\cos(a+b)$?



$$\sin a = \frac{12}{15} \quad \sin b = \frac{8}{17}$$

$$\cos a = \frac{9}{15} \quad \cos b = \frac{15}{17}$$

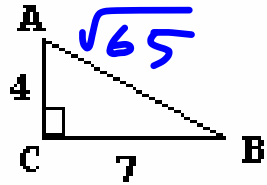
$$\cos(a+b) = \cos a \cos b - \sin a \sin b$$

$$\frac{9}{15} \cdot \frac{15}{17} - \frac{12}{15} \cdot \frac{8}{17}$$

$$\frac{135}{255} - \frac{96}{255} = \frac{39}{255}$$

$$= \frac{13}{85}$$

46) For the right triangle $\triangle ABC$, shown below, which of the following expressions has the smallest value?



a) ~~$\tan A$~~
 ~~$\frac{7}{4}$~~

b) $\tan B$
 $\frac{4}{7}$

c) ~~$\sin A$~~
 ~~$\frac{7}{\sqrt{65}}$~~

d) $\sin B$
 $\frac{4}{\sqrt{65}}$

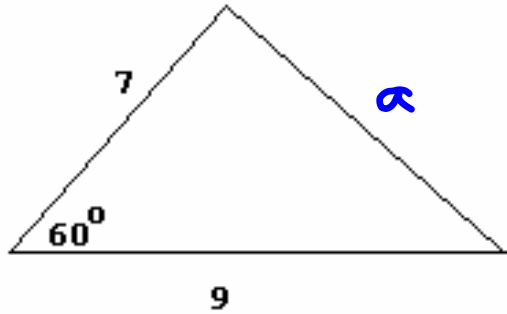
e) ~~$\sin^2 A + \cos^2 A$~~
 1

47) If the $\sin x = \frac{1}{2}$ and the $\cos x = \frac{-\sqrt{3}}{2}$, then the $\cot x = ?$

$$\cot x = \frac{\cos x}{\sin x} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}}$$

$$\frac{-\sqrt{3}}{2} \cdot \frac{2}{1} = \boxed{-\sqrt{3}}$$

48) In the triangle below one of the sides is missing. Find the length, in inches of that side?



$$a^2 = 7^2 + 9^2 - 2(7)(9)\cos 60^\circ$$

$$a^2 = 49 + 81 - 126\left(\frac{1}{2}\right)$$

$$a^2 = 130 - 63$$

$$\sqrt{a^2} = \sqrt{67}$$

$$a = \sqrt{67}$$

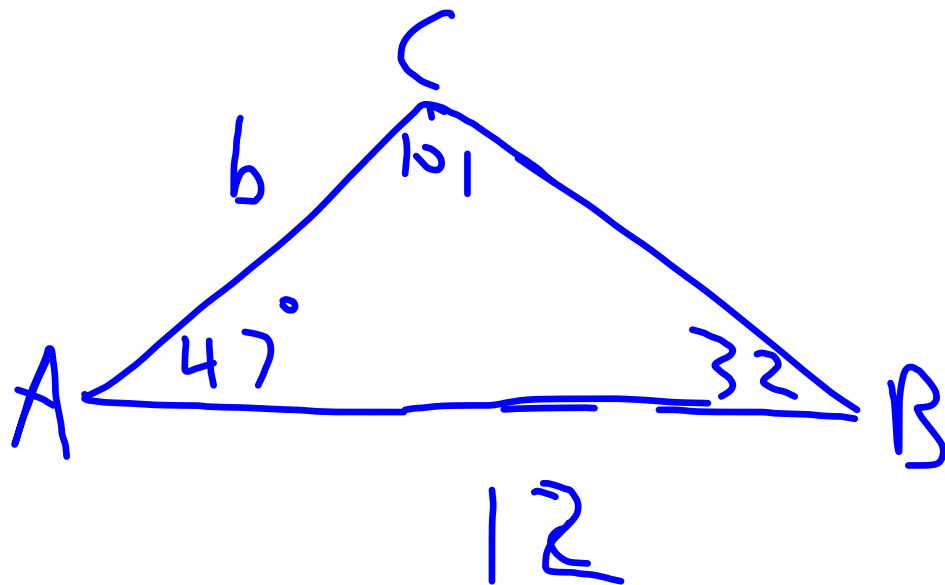
49) what is the value of $(\cot^2 x)(\sec^2 x)$

$$\frac{\cancel{\cos^2 x}}{\sin^2 x} \cdot \frac{1}{\cancel{\cos^2 x}}$$

$$\frac{1}{\sin^2 x} = \csc^2 x$$

50) Two lookout towers are located about 12 miles apart, at the same elevation. A fire is sighted at angles of 47° and 32° from the line straight between the towers. What is the approximate distance in miles, between the fire and tower A

$$\frac{\sin 32}{b} = \frac{\sin 101}{12}$$



$$\frac{b \sin 101}{\sin 101} = 12 \frac{\sin 32}{\sin 101}$$

$$b = \frac{12 \sin 32}{\sin 101}$$