

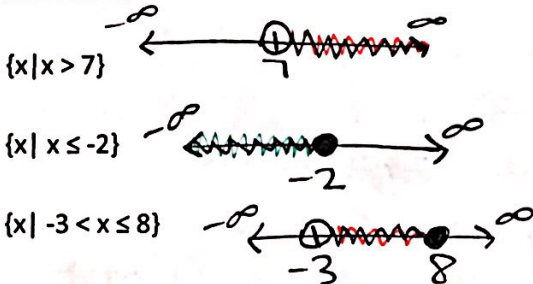
Day 2 Notes – Interval Notation, Trig, Factoring, and Solving

I. INTERVAL NOTATION

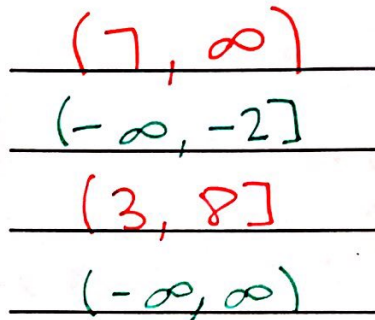
Interval Notation is a more "grown-up" and convenient way to write inequalities (as opposed to set-builder notation).

In interval notation, always list the smallest number first, then the largest.
Enclose the numbers with () if "not equal to" and [] if "equal to".

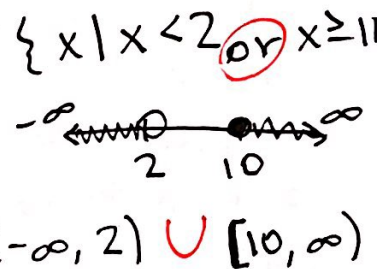
OLD WAY:



NEW WAY:



One More:

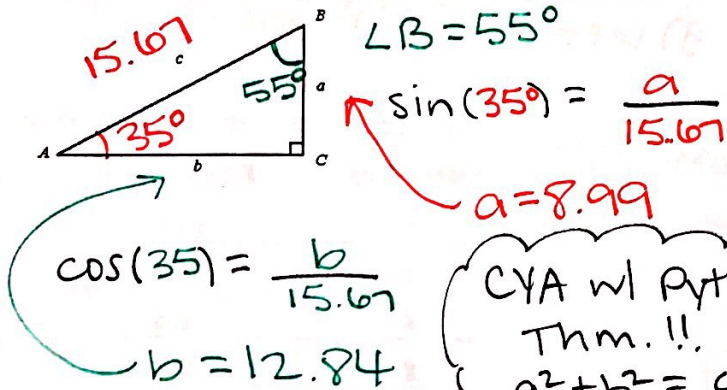


{x | x = R} "All Real Numbers"

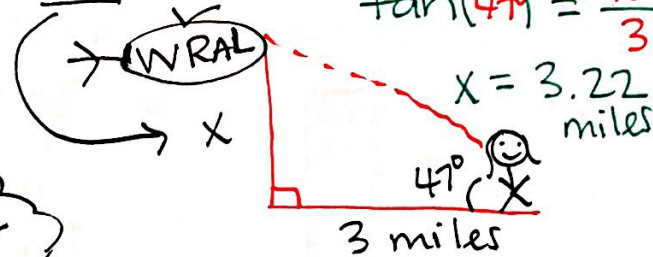
II. SOH-CAH-TOA

"Find all L's and side lengths"

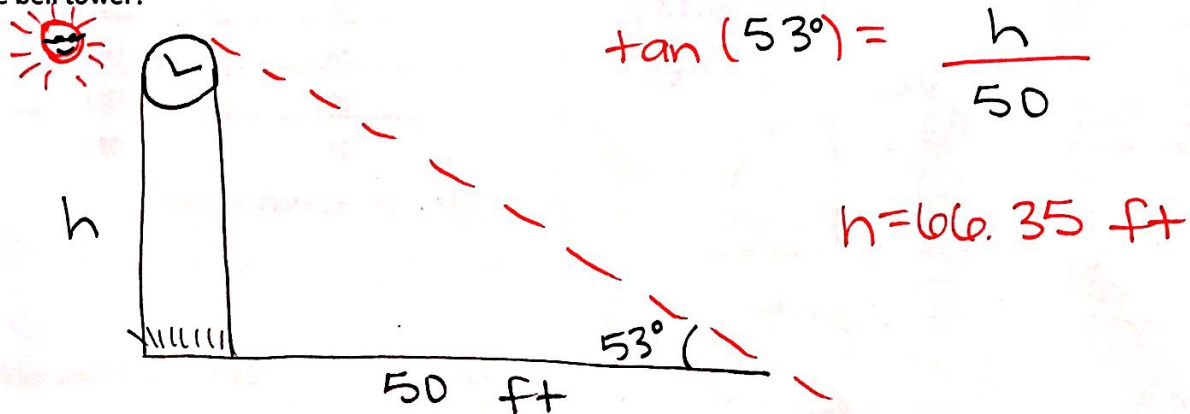
1. Solve the triangle ABC, given that $A = 35^\circ$ and $c = 15.67$.



2. While on a walk, Josette sees the WRAL traffic helicopter flying over the beltline located 3 miles away from her. If the angle of elevation from Josette to the helicopter is 47° , find the altitude of the helicopter.



3. You decide that you NEED to know the height of NC State's bell tower, so you go outside on a sunny day and measure the shadow of the bell tower to be 50 feet long and the angle of elevation to the sun is 53° . What is the height of the bell tower?



FACTORING:

Headphones

4. $x^2 + 5x + 6$

$(x+2)(x+3)$

GCF, then H.P.

5. $3x^2 - 18x + 24$

$3(x^2 - 6x + 8)$
 $3(x-2)(x-4)$

Try H.P.

6. $2x^2 + 5x - 1$

prime!

Bottom's Up!

7. $3x^2 + 2x - 16$

$(x - \frac{6}{3})(x + \frac{8}{3})$
 $(x-2)(3x+8)$

Diff. of sq.

8. $x^2 - 25$

$(x+5)(x-5)$

diff. of sq.

9. $x^4 - 16$

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

GCF

10. $4x^3 + 100x^2$

$4x^2(x+25)$

GCF, then D. of S.

11. $16x^2y - 36y$

$4y(4x^2 - 9)$
 $4y(2x+3)(2x-3)$

Synth. Div. (Use Rat. Roots Thm)

12. $x^6 - 1$

POSS. Roots: $\pm \frac{p}{q}$

Try $x=1$: $\rightarrow \pm 1$

$$\begin{array}{r|rrrrrrr} -1 & 1 & 0 & 0 & 0 & 0 & 0 & -1 \\ & \downarrow & -1 & 1 & -1 & 1 & -1 & 1 \\ \hline & 1 & -1 & 1 & -1 & 1 & -1 & 0 \end{array}$$

 $= x^5 - x^4 + x^3 - x^2 + x - 1$

Diff. of Cubes

13. $x^3 - 64$

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

Try $x=-1$:

$$\begin{array}{r|rrrrrr} 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ & \downarrow & 1 & 0 & 1 & 0 & 1 \\ \hline & 1 & 0 & x^2 & 0 & x & 1 & 0 \end{array}$$

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

Grouping

14. $x^3 + 2x^2 - 3x - 6$

$(x^3 - 3x) + (2x^2 - 6)$
 $x(x^2 - 3) + 2(x^2 - 3)$
 $= (x^2 - 3)(x + 2)$

common group
GCF group

IV. SOLVING:

Bottom's Up!

Solve by factoring:

15. $6x^2 + 7x + 2 = 0$

$(x + \frac{3}{6})(x + \frac{4}{6}) = 0$

$(x + \frac{1}{2})(x + \frac{2}{3}) = 0$

$x + \frac{1}{2} = 0$ $x + \frac{2}{3} = 0$

$x = -\frac{1}{2}$ $x = -\frac{2}{3}$

Solve by Quadratic Formula

16. $x^2 + 2x - 1 = 0$

$x^2 + 2x - 1 = 0$

$$\frac{-2 \pm \sqrt{4 - 4(1)(-1)}}{2}$$

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

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

$$= -1 \pm \sqrt{2}$$

Solve for the exact answer by completing the square:

17. $x^2 + 8x - 2 = 0$

$x^2 + 8x + \frac{16}{4} = 2 + \frac{16}{4}$

$(x+4) \pm \sqrt{18}$

$x+4 = \pm 3\sqrt{2}$

$x = -4 \pm 3\sqrt{2}$

Solve using synthetic division:

18. $x^3 - x^2 - x - 2 = 0$

Rat. Roots Thm:

$\pm \frac{p}{q} \rightarrow \pm 1, \pm 2$

Try $x=-1$:

$$\begin{array}{r|rrrr} -1 & 1 & -1 & -1 & -2 \\ & \downarrow & 1 & 0 & -1 \\ \hline & 1 & 0 & -1 & -3 \end{array}$$

Try $x=1$:

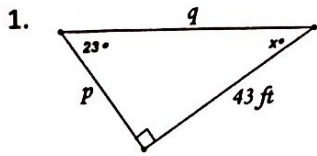
$$\begin{array}{r|rrrr} 1 & 1 & -1 & -1 & -2 \\ & \downarrow & 1 & 0 & -1 \\ \hline & 1 & -2 & -1 & -3 \end{array}$$

Try $x=-2$:

$$\begin{array}{r|rrrr} -2 & 1 & -1 & -1 & -2 \\ & \downarrow & 2 & 2 & 2 \\ \hline & 1 & 2 & 1 & 0 \end{array}$$

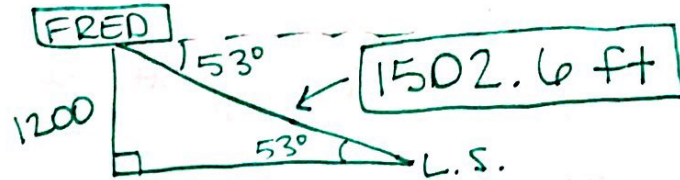
Day 2 Homework

For #1, find all the sides and angles.

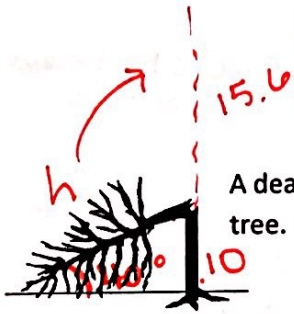


$$\begin{aligned} \angle x &= 67^\circ \\ p &= 101.3 \\ q &= 110.1 \end{aligned}$$

2. While flying an airplane, Fred sees a landing strip ahead of him at an angle of depression of 53° . If his altitude is 1200 ft, how far is the airplane from the landing strip?



3. A dead tree is struck by lightning causing it to fall over at a point 10 feet up from the base of the tree. If the fallen treetop forms a 40° with the ground, about how tall was the tree originally?



$$10 + 15.6 = 25.6 \text{ ft}$$

Factor the following completely:

4. $144x^2 - 16$

$$16(3x+1)(3x-1)$$

5. $x^3 + x^2 + 4x + 4$

$$(x+1)(x^2+4)$$

6. $8x^3 + 27$

$$(2x+3)(4x^2-6x+9)$$

Solve by factoring:

7. $2x^3 + 13x^2 - 45x = 0$

$$\begin{aligned} x &= 0 \\ x &= -9 \\ x &= 5/2 \end{aligned}$$

Solve by Quadratic Formula:

8. $-5x^2 - 19x = 11.5$

$$x = \frac{19 \pm \sqrt{131}}{-10}$$

Solve by completing the square:

9. $x^2 + 10x - 19 = 0$

$$x = -5 \pm 2\sqrt{11}$$

Solve by using synthetic division:

10. $x^3 + 3x^2 - 16x - 6 = 0$

$$\begin{aligned} x &= 3 \\ x &= -3 \pm \sqrt{7} \end{aligned}$$

Express in interval notation:

11. $\{x | x > 9\}$

$$(9, \infty)$$

12. $\{x | -2 \leq x \leq 21\}$

$$[-2, 21]$$

13. $\{x | x < 6\}$

$$(-\infty, 6)$$