Name:_____ Date:_____

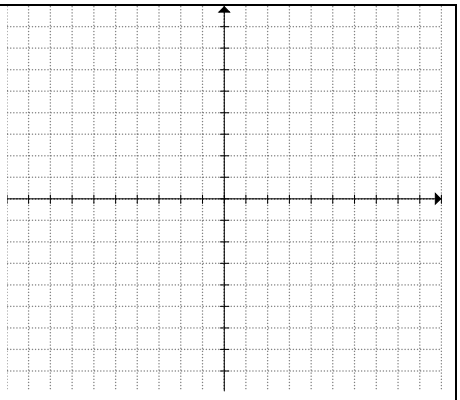
Math 10/11 Enriched: Section 5.4 Solving Systems with Absolute Values

1. Solve the following equations and indicate any extraneous roots:

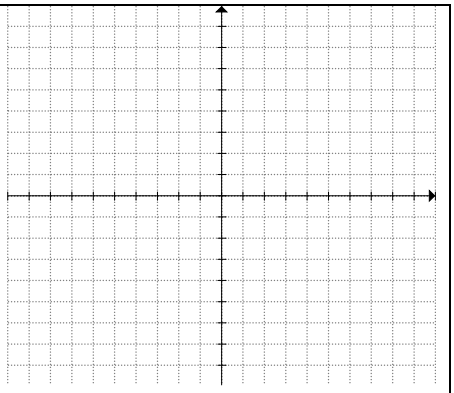
a) $\lvert 2x+1\rvert = 3-x$	b) $\lvert 3x+14\rvert = x+2$
c) $\lvert 10x+x^2\rvert = 24$	d) $\lvert x+3\rvert + \lvert 5-x\rvert = 16$
e) $\lvert 2x-1\rvert + \lvert 2x-5\rvert - 4 = 0$	f) $\lvert x+3\rvert + \lvert x-6\rvert = 16$

g) $\lvert 2x+1\rvert+\lvert 4-3x\rvert=18$	h) $\lvert 3x-1\rvert+\lvert 3x-5\rvert=-4$
i) $\lvert 2x+3\rvert+\lvert 4-3x\rvert=15$	j) $\lvert 2x+3\rvert+\lvert 3x-8\rvert=15$

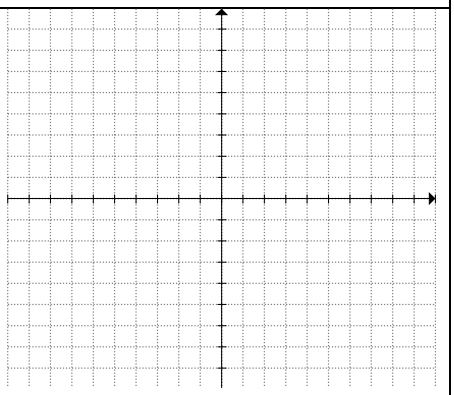
2. Solve the following equations algebraically for "x". Then use the grid of the left to graph the two sides of the equations as Y1 and Y2 with a graphing calculator. Solve for "x" graphically by finding the points of intersections. Indicate all the extranneous roots

a) $\lvert 2x+5\rvert=5$	

b) $|2x+1| = 3x$

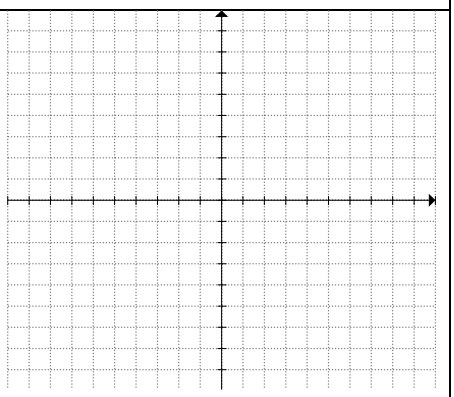


c) $|4x+10| = x+1$



b) $|2x+1| = 3x^2$

c) $|4x+10| = 2x^2+1$



3. Find the product of all real numbers "x" that satisfy the following equation: $\left|x^2-9x+20\right|=\left|16-x^2\right|$

4. What is the smallest value of "x" such that $\left|5x-1\right|=\left|3x+2\right|$? Express your answer as a common fraction

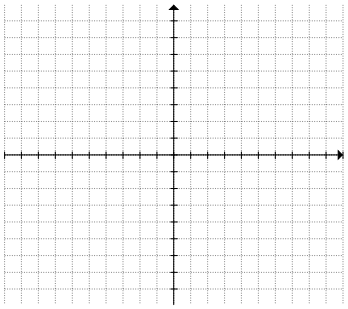
5. How many integers satisfy the following: $\left|x\right|+1\geq 3 \quad and \quad \left|x-1\right|<3$?

6. What are all real numbers "x" for which $\left|\left(5-\left|x\right|\right)\right|<14$?

7. What are both values of "x" which satisfy $x^2+5\left|x\right|-6=0$

8. What are all the real values of 'x' which satisfy: $x + |x| = 0$

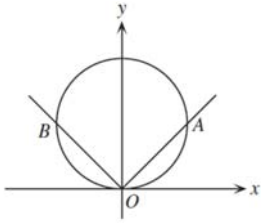
9. On the grid provided, sketch the system: $y = x^2 - 4$ and $y = |2x|$. Find all the intersection points:



b. Determine all value(s) of "k" for which $y = x^2 - 4$ and $y = 2|x| + k$ do not intersect.

c. State the value(s) of "k" for which $y = x^2 - 4$ and $y = 2|x| + k$ intersect in exactly two points.

10. A circle with its center on the y-axis intersects the graph of $y = |x|$ at the origin and exactly two other points "A" and "B" as shown in the diagram below. Prove that the ratio of the area of triangle ABO to the area of the circle is always $1 : \pi$



11. What is the value of $b > 0$ for which the region bounded by both equations has an area of 72? $y = 0$ and $y = -|2x| + b$?

12. Challenge: Postive integers "a", "b", and "c" are chosen so that $a < b < c$, and the system of equation: $2x + y = 2003$ and $y = |x - a| + |x - b| + |x - c|$ has exactly one solution. What is the minimum value of "c"?

Amc 2003 #24

13. The graph of the three equations are given in the coordinate plane. How mnay ordered pairs of integers (x,y) satisfy all three equations? List all the coordinate pairs: CNML 1985 4-4

$y - |y| = 0$; $x - 3 + |x - 3| = 0$ and $y - x + |y - x| = 0$