Advanced Algebra 2 H Name KEY

Special Functions Review - Solve Absolute Value Equations and Inequalities

SOLVE AND CHECK!

1. $-2|m-3|+8=-24$

$-2|m-3|=-32$

$|m-3|=16$ ← Isolate!

$m-3=16$ $\quad m-3=-16$

$m=19$ $\quad m=-13$

$\{-13, 19\}$

2. $5|3x+7|=-65$

$|3x+7|=-13$ ← Isolate!

↑ Impossible

Abso. value is always positive → cannot equal -13.

3. $|2x+12|=7x-3$

$2x+12=7x-3$ | $2x+12=-(7x-3)$

$15=5x$ | $2x+12=-7x+3$

$3=x$ | $9x=-9$

$x=-1$

OMIT

$\{3\}$

4. $2|2x-7|+11=25$

$2|2x-7|=14$

$|2x-7|=7$ ← Isolate!

$2x-7=7$ $\quad 2x-7=-7$

$2x=14$ $\quad 2x=0$

$x=7$ $\quad x=0$

$\{0, 7\}$

5. $|7x-2|=x+4$

$7x-2=x+4$ $\quad 7x-2=-(x+4)$

$6x=6$ $\quad 7x-2=-x-4$

$x=1$ $\quad 8x=-2$

$x=-\frac{1}{4}$

ck $\left|-\frac{7}{4}-2\right|$ $\left|-1\frac{3}{4}-2\right|$ $3\frac{3}{4}$

$\{-\frac{1}{4}, 1\}$

6. $\frac{5}{8}|5m-4|=10$

$|5m-4|=16$ Isolate!

$5m-4=16$ $\quad 5m-4=-16$

$5m=20$ $\quad 5m=-12$

$m=4$ $\quad m=\frac{-12}{5}$

ck $\frac{5}{8}\left|5\left(-\frac{12}{5}\right)-4\right|$

$\frac{5}{8}|-16|$

$\frac{5}{8}(16)$

$10=10$

$\{-\frac{12}{5}, 4\}$

7. $\left|\frac{2y-7}{5}\right|=1$

$\frac{2y-7}{5}=1$ $\quad \frac{2y-7}{5}=-1$

$2y-7=5$ $\quad 2y-7=-5$

$2y=12$ $\quad 2y=2$

$y=6$ $\quad y=1$

$\{1, 6\}$

8. $\left|\frac{3x+1}{4}\right|=7$

$\frac{3x+1}{4}=7$ $\quad \frac{3x+1}{4}=-7$

$3x+1=28$ $\quad 3x+1=-28$

$x=9$ $\quad x=\frac{-29}{3}$

$\{-\frac{29}{3}, 9\}$

9. $3|x+6| = 9x-6$ Isolate!

$|x+6| = 3x-2$

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

$8 = 2x$ | $x+6 = -3x+2$

$4 = x$ | $4x = -4$

$x = -1$

$\{4\}$ | OMIT

10. $|x-4| = 3x$

$x-4 = 3x$ | $x-4 = -3x$

$-4 = 2x$ | $4x = 4$

$-2 = x$ | $x = 1$

extraneous | $\{1\}$

11. $5|3x-4| = x+1$ Isolate!

$|3x-4| = \frac{x+1}{5}$

$3x-4 = \frac{x+1}{5}$ | $3x-4 = -\left(\frac{x+1}{5}\right)$

$15x-20 = x+1$ | $15x-20 = -x-1$

$14x = 21$ | $16x = 19$

$x = \frac{3}{2}$ | $x = \frac{19}{16}$

Chk $5\left|\frac{9}{2}-4\right| \stackrel{?}{=} \frac{3}{2}+1$

$\frac{5}{2} \stackrel{\checkmark}{=} \frac{5}{2}$

$\left\{\frac{3}{2}, \frac{19}{16}\right\}$

12. $|2(3-5x)| = 21$

$2(3-5x) = 21$ | $2(3-5x) = -21$

$6-10x = 21$ | $6-10x = -21$

$-15 = 10x$ | $27 = 10x$

$-\frac{3}{2} = x$ | $x = \frac{27}{10}$

$\left\{-\frac{3}{2}, \frac{27}{10}\right\}$

Chk $x = -\frac{3}{2}$: $21 = 21$ ✓

$x = \frac{27}{10}$: $2(-10.5)$, $|-21| = 21$, $21 = 21$ ✓

13. $\left|\frac{x-3}{2}\right| + 2 < 6$ AND

$\left|\frac{x-3}{2}\right| < 4$

$-4 < \frac{x-3}{2} < 4$

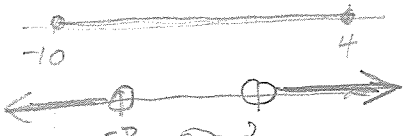
$-8 < x-3 < 8$

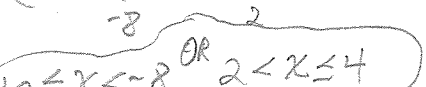
$-5 < x < 11$

14. $5 < |x+3| \le 7$ AND & OR

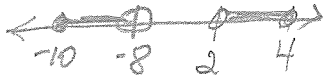
$-7 \le x+3 \le 7$ | $x+3 > 5$ or $x+3 < -5$

$-10 \le x \le 4$ | $x > 2$ or $x < -8$





$-10 \le x < -8$ OR $2 < x \le 4$



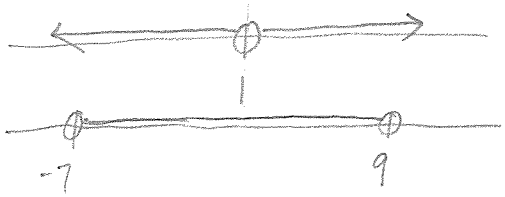
15. $0 < |1-x| < 8$

$|1-x| > 0$ OR | $|1-x| < 8$ AND

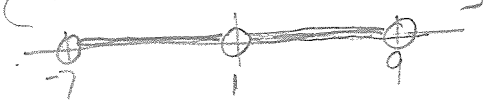
$1-x > 0$ or $1-x < 0$ | $-8 < 1-x < 8$

$-x > -1$ | $-x < -1$ | $-9 < -x < 7$

$x < 1$ or $x > 1$ | $9 > x > -7$



$\{-7 < x < 1$ or $1 < x < 9\}$



16. $|x+5| + 2 \le 3x$

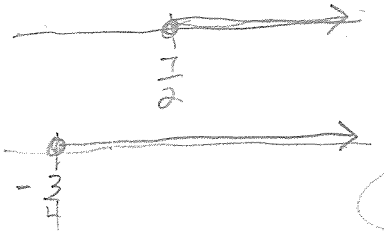
$|x+5| \le 3x-2$ AND

$x+5 \le 3x-2$ | $x+5 \ge -(3x-2)$

$7 \le 2x$ | $x+5 \ge -3x+2$

$x \ge \frac{7}{2}$ | $4x \ge -3$

$x \ge -\frac{3}{4}$



$x \ge \frac{7}{2}$