

EXERCISES FOR ABS VAL EQ INEQ

Question 1 In Exercises ?? - ??, solve the equation.

Problem 1.1 $|x| = 6$

$$x = -6 \text{ or } x = 6$$

Problem 1.2 $|3t - 1| = 10$

$$t = -3 \text{ or } t = \frac{11}{3}$$

Problem 1.3 $|4 - w| = 7$

$$w = -3 \text{ or } w = 11$$

Problem 1.4 $4 - |y| = 3$

$$y = -1 \text{ or } y = 1$$

Problem 1.5 $2|5m + 1| - 3 = 0$

$$m = -\frac{1}{2} \text{ or } m = \frac{1}{10}$$

Problem 1.6 $|7x - 1| + 2 = 0$

No solution

Problem 1.7 $\frac{5 - |x|}{2} = 1$

$$x = -3 \text{ or } x = 3$$

Problem 1.8 $\frac{2}{3}|5 - 2w| - \frac{1}{2} = 5$

$$w = -\frac{13}{8} \text{ or } w = \frac{53}{8}$$

Problem 1.9 $|3t - \sqrt{2}| + 4 = 6$

$$t = \frac{\sqrt{2} \pm 2}{3}$$

Problem 1.10 $\frac{|2v + 1| - 3}{4} = \frac{1}{2} - |2v + 1|$

$$v = -1 \text{ or } v = 0$$

Problem 1.11 $|2x + 1| = \frac{|2x + 1| - 3}{2}$

No solution

Problem 1.12 $\frac{|3 - 2y| + 4}{2} = 2 - |3 - 2y|$

$$y = \frac{3}{2}$$

Problem 1.13 $|3t - 2| = |2t + 7|$

$$t = -1 \text{ or } t = 9$$

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Problem 1.14 $|3x + 1| = |4x|$

$$x = -\frac{1}{7} \text{ or } x = 1$$

Problem 1.15 $|1 - \sqrt{2}y| = |y + 1|$

$$y = 0 \text{ or } y = \frac{2}{\sqrt{2} - 1}$$

Problem 1.16 $|4 - x| - |x + 2| = 0$

$$x = 1$$

Problem 1.17 $|2 - 5z| = 5|z + 1|$

$$z = -\frac{3}{10}$$

Problem 1.18 $\sqrt{3}|w - 1| = 2|w + 1|$

$$w = \frac{\sqrt{3} \pm 2}{\sqrt{3} \mp 2}^1$$

Question 2 In Exercises ?? - ??, solve the inequality. Write your answer using interval notation.

Problem 2.1 $|3x - 5| \leq 4$

$$\left[\frac{1}{3}, 3\right]$$

Problem 2.2 $|7t + 2| > 10$

$$\left(-\infty, -\frac{12}{7}\right) \cup \left(\frac{8}{7}, \infty\right)$$

Problem 2.3 $|2w + 1| - 5 < 0$

$$(-3, 2)$$

Problem 2.4 $|2 - y| - 4 \geq -3$

$$(-\infty, 1] \cup [3, \infty)$$

Problem 2.5 $|3z + 5| + 2 < 1$

No solution

Problem 2.6 $2|7 - v| + 4 > 1$

$$(-\infty, \infty)$$

Problem 2.7 $3 - |x + \sqrt{5}| < -3$

$$(-\infty, -6 - \sqrt{5}) \cup (6 - \sqrt{5}, \infty)$$

¹That is, $w = \frac{\sqrt{3} + 2}{\sqrt{3} - 2}$ or $w = \frac{\sqrt{3} - 2}{\sqrt{3} + 2}$

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Problem 2.8 $|5t| \leq |t| + 3$

$$\left[-\frac{3}{4}, \frac{3}{4}\right]$$

Problem 2.9 $|w - 3| < |3 - w|$

No solution

Problem 2.10 $2 \leq |4 - y| < 7$

$$(-3, 2] \cup [6, 11)$$

Problem 2.11 $1 < |2w - 9| \leq 3$

$$[3, 4) \cup (5, 6]$$

Problem 2.12 $3 > 2|\sqrt{3} - x| > 1$

$$\left(\frac{2\sqrt{3}-3}{2}, \frac{2\sqrt{3}-1}{2}\right) \cup \left(\frac{2\sqrt{3}+1}{2}, \frac{2\sqrt{3}+3}{2}\right)$$

Problem 3 With help from your classmates, solve:

1. $|5 - |2x - 3|| = 4$

$$x = -3, \text{ or } x = 1, \text{ or } x = 2, \text{ or } x = 6$$

2. $|5 - |2x - 3|| < 4$

$$(-3, 1) \cup (2, 6)$$