

Solving Absolute Value Inequalities

Name: _____ Date: _____ Score: _____ / 28

Q Quick Review

For absolute-value inequalities, there are two patterns to recognize. If $|E| < k$ with $k > 0$, then E is within distance k of 0: $-k < E < k$ (a single bounded interval). If $|E| > k$ with $k > 0$, then E is *farther than* k from 0: $E < -k$ or $E > k$ (two rays). The rule of thumb: **less-than goes with AND** (a single interval), and **greater-than goes with OR** (two rays). Use \leq and \geq for the inclusive versions, giving closed dots. Edge cases to watch for: $|E| < -3$ is impossible (no solution); $|E| > -3$ is always true (all reals); $|E| \geq 0$ is always true (any real); $|E| \leq 0$ forces $E = 0$ (single point). Always isolate the absolute value first — don't try to split before stripping coefficients and constants on the outside.

PRACTICE

Solve. Write your solution in interval notation or as a number line graph.

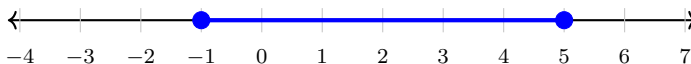
1. Solve $|x| < 5$ and graph the solution set. _____



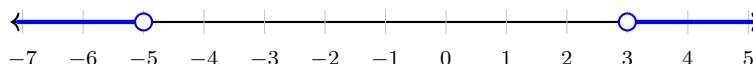
2. Solve $|x| \geq 4$ and graph the solution set. _____



3. Solve $|x - 2| \leq 3$ and graph the solution set. _____



4. Solve $|x + 1| > 4$ and graph the solution set. _____



5. Solve $|2x - 1| < 7$ and graph the solution set. _____



6. Solve $|3x| \geq 12$ and graph the solution set. _____



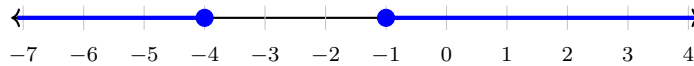
7. $|x| < -2$ _____

8. $|x - 4| > -1$ _____

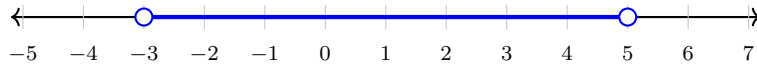
9. $|x + 3| \leq 0$ _____



10. Solve $|2x + 5| \geq 3$ and graph the solution set.

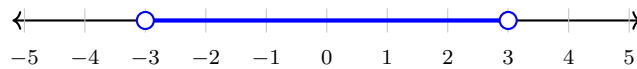


11. Solve $3|x - 1| < 12$ and graph the solution set.

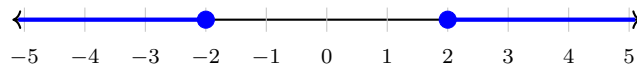


12. $|x - 5| - 2 \geq 0$

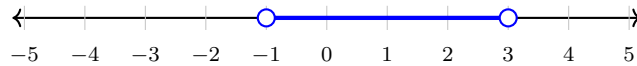
13. Graph $|x| < 3$ on the number line below.



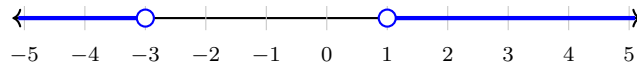
14. Graph $|x| \geq 2$ on the number line below.



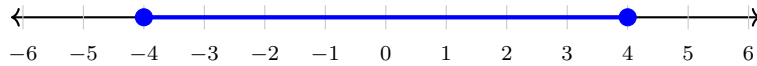
15. Graph $|x - 1| < 2$ on the number line below.



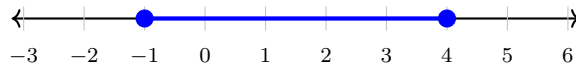
16. Graph $|x + 1| > 2$ on the number line below.



17. Solve $|x| + 2 \leq 6$ and graph the solution set.



18. Solve $|2x - 3| \leq 5$ and graph the solution set.



19. $|x - 6| > 2$

20. $|5 - 2x| \leq 7$



◆ Word Problems

21. A baker's bread loaves must weigh within 0.2 lb of 1.5 lb to pass quality control. Write the absolute value inequality for the acceptable weight w , and solve. _____
22. A factory's machine sets a length of 40 mm with a tolerance of 0.5 mm. Any part whose length L satisfies $|L - 40| > 0.5$ is rejected. Write the rejected interval. _____
23. The temperature in a refrigerator must satisfy $|T - 37| \leq 3$ (degrees Fahrenheit). What is the acceptable temperature range? _____
24. A speedometer reads accurately within 2 mph of the true speed. If the true speed is 60 mph, what is the range of possible meter readings r ? _____

Additional Practice

25. Solve $|x - 4| = 9$. _____
26. Solve $|2x + 1| < 7$. _____
27. Solve $|x + 3| \geq 5$. _____
28. Find the vertex of $y = |x - 2| - 3$. _____



Answer Keys

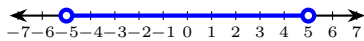
1. $-5 < x < 5$	13. $(-3, 3)$
2. $x \leq -4$ or $x \geq 4$	14. $(-\infty, -2] \cup [2, \infty)$
3. $-1 \leq x \leq 5$	15. $(-1, 3)$
4. $x < -5$ or $x > 3$	16. $(-\infty, -3) \cup (1, \infty)$
5. $-3 < x < 4$	17. $-4 \leq x \leq 4$
6. $x \leq -4$ or $x \geq 4$	18. $-1 \leq x \leq 4$
7. \emptyset	19. $x < 4$ or $x > 8$
8. \mathbb{R}	20. $-1 \leq x \leq 6$
9. $x = -3$	21. $ w - 1.5 \leq 0.2$; $1.3 \leq w \leq 1.7$
10. $x \leq -4$ or $x \geq -1$	22. $L < 39.5$ or $L > 40.5$
11. $-3 < x < 5$	23. $34 \leq T \leq 40$
12. $x \leq 3$ or $x \geq 7$	24. $58 \leq r \leq 62$
Additional Practice Answers	
25. $x = -5, 13$	27. $x \leq -8$ or $x \geq 2$
26. $-4 < x < 3$	28. $(2, -3)$

Additional Practice: Answers for all numbered items, including the added practice, are shown in the grid above.

Step-by-Step Explanations

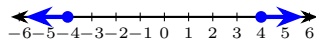
1. Within distance 5 of 0. Interval: $(-5, 5)$. Open dots at both ends; shade between.

Answer graph



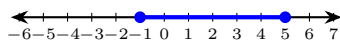
2. Farther than 4 from 0 (or exactly 4). Two rays: $(-\infty, -4] \cup [4, \infty)$. Closed dots at the endpoints.

Answer graph



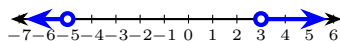
3. Unpack the AND: $-3 \leq x - 2 \leq 3$. Add 2: $-1 \leq x \leq 5$. Interval $[-1, 5]$, closed dots at both ends.

Answer graph



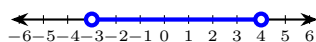
4. Start with the key idea: OR case: $x + 1 < -4$ or $x + 1 > 4$. So $x < -5$ or $x > 3$. Open dots, two rays heading out. That gives a quick check on the answer.

Answer graph



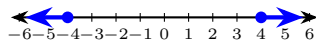
5. Unpack: $-7 < 2x - 1 < 7$. Add 1: $-6 < 2x < 8$. Divide by 2: $-3 < x < 4$. Open dots at both ends.

Answer graph



6. Keep the rule visible: $3x \leq -12$ or $3x \geq 12$, so $x \leq -4$ or $x \geq 4$. Closed dots at ± 4 , two rays. That gives a quick check on the answer.

Answer graph



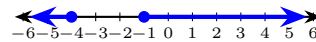
7. One steady path is: No real number's distance from 0 is negative. Empty. This is the part to check before moving on, because it keeps the answer tied to the original question.

8. Any absolute value is ≥ 0 , which is already greater than -1 . Every real x works.

9. A careful way to see it: Absolute value is ≥ 0 always, so $|x + 3| \leq 0$ forces $|x + 3| = 0$, i.e. $x = -3$. That gives a quick check on the answer.

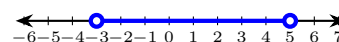
10. Keep the rule visible: $2x + 5 \leq -3 \Rightarrow x \leq -4$; $2x + 5 \geq 3 \Rightarrow 2x \geq -2 \Rightarrow x \geq -1$. Closed dots, two rays. That gives a quick check on the answer.

Answer graph



11. Divide by 3 first: $|x - 1| < 4$. Unpack: $-4 < x - 1 < 4$, so $-3 < x < 5$. Open dots at both ends.

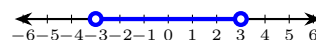
Answer graph



12. Start with the key idea: Add 2: $|x - 5| \geq 2$. Split: $x - 5 \leq -2 \Rightarrow x \leq 3$ or $x - 5 \geq 2 \Rightarrow x \geq 7$. This is the part to check before moving on, because it keeps the answer tied to the original question.

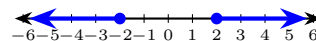
13. A careful way to see it: Open dots at -3 and 3 ; shade between. This is the part to check before moving on, because it keeps the answer tied to the original question.

Answer graph



14. Keep the rule visible: Closed dot at -2 heading left; closed dot at 2 heading right. That gives a quick check on the answer.

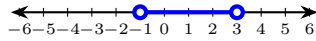
Answer graph



15. One steady path is: $|x - 1| < 2$ unpacks to $-2 < x - 1 < 2$, i.e. $-1 < x < 3$. Open dots both ends. That gives a quick check on the answer.

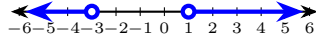
Answer graph





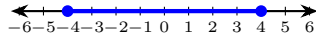
16. Start with the key idea: $x + 1 < -2 \Rightarrow x < -3$; $x + 1 > 2 \Rightarrow x > 1$. Open dots at -3 and 1 . This is the part to check before moving on, because it keeps the answer tied to the original question.

Answer graph



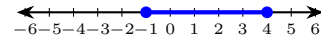
17. A careful way to see it: Subtract 2: $|x| \leq 4$. So $-4 \leq x \leq 4$. Closed dots, shade between. That gives a quick check on the answer.

Answer graph



18. Unpack: $-5 \leq 2x - 3 \leq 5$. Add 3: $-2 \leq 2x \leq 8$. Divide: $-1 \leq x \leq 4$. Closed dots at both ends.

Answer graph



19. Greater-than goes with OR (two rays). Split into $x - 6 < -2 \Rightarrow x < 4$ or $x - 6 > 2 \Rightarrow x > 8$. So x lands more than 2 units away from 6 in either direction.

20. Unpack: $-7 \leq 5 - 2x \leq 7$. Subtract 5: $-12 \leq -2x \leq 2$. Divide by -2 and flip both: $6 \geq x \geq -1$, i.e. $-1 \leq x \leq 6$.

21. Within 0.2 means the distance from 1.5 is at most 0.2: $|w - 1.5| \leq 0.2$. Unpack: $-0.2 \leq w - 1.5 \leq 0.2$, so $1.3 \leq w \leq 1.7$.

22. OR case: $L - 40 < -0.5 \Rightarrow L < 39.5$ or $L - 40 > 0.5 \Rightarrow L > 40.5$. Anything in those tails gets rejected.

23. One steady path is: $-3 \leq T - 37 \leq 3$, so $34 \leq T \leq 40$. The fridge runs between 34°F and 40°F . That gives a quick check on the answer.

24. Start with the key idea: $|r - 60| \leq 2$ means $-2 \leq r - 60 \leq 2$, so $58 \leq r \leq 62$. The reading is between 58 and 62 mph. That gives a quick check on the answer.



Build Algebra Confidence From Pre-Algebra Through Algebra II



The Complete Algebra Success Bundle

Pre-Algebra, Algebra I, and Algebra II in one clear path

Friendly lessons, focused practice, and full-review support for every stage.



Scan for the Bundle

6 Books
3 Courses
1 Path

Bundle Value: Six coordinated books help students review missing skills, learn new algebra topics, and practice until the steps feel natural.

Complete Course Path

- ✓ Starts with Pre-Algebra foundations
- ✓ Moves smoothly into Algebra I skills
- ✓ Extends learning through Algebra II topics
- ✓ Great for review, tutoring, and summer study

One bundle, one steady path.

Step-by-Step Lessons

- ✓ Plain-English explanations students can follow
- ✓ Worked examples that show every important step
- ✓ Common mistakes called out before they stick
- ✓ Skill-building practice after each lesson
- ✓ Helpful for independent study or class support

Less guessing. More understanding.

Practice That Sticks

- ✓ Matching practice workbooks for extra repetition
- ✓ Review sets to keep older skills fresh
- ✓ Answer explanations for checking thinking
- ✓ Strong support before tests and final exams
- ✓ Designed to build fluency and confidence

Practice today. Remember tomorrow.

STUDENT FAVORITE • Master Algebra II From the Ground Up



Algebra II for Beginners

Written by a top math teacher & aligned with national and state Algebra II courses. From polynomial functions to logarithms, trigonometry, and rational expressions — explained the easy way.

- ✓ **Complete coverage** of every Algebra II concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra Journey Today! →

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

PDF EDITION



Instant download • any device

PAPERBACK



Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra II for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. → EffortlessMath.com/product/algebra-ii-for-beginners