# Lesson 6.2: Solving Absolute Value Equations

Complete the *Practice* below. When you have completed all the questions for *Lesson 6.1 Practice – II* with your best work, mark your work by first comparing your answers to the solutions provided in *Appendix 2: Solutions*. Then, apply the rubric found at the beginning of the *Workbook*.

## Practice – IV

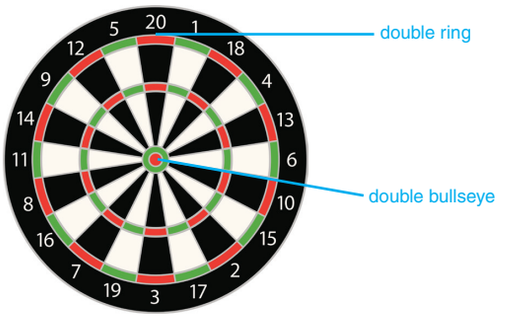
1. Solve the following equations algebraically.

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

b. $|-2x^2 - 6x + 2| = 6x^2 + 24x + 21$

2. Explain why two equations are usually solved when solving an absolute value equation algebraically.

3. The double ring on a dartboard is approximately $6\frac{1}{2}$ inches from the double bullseye.

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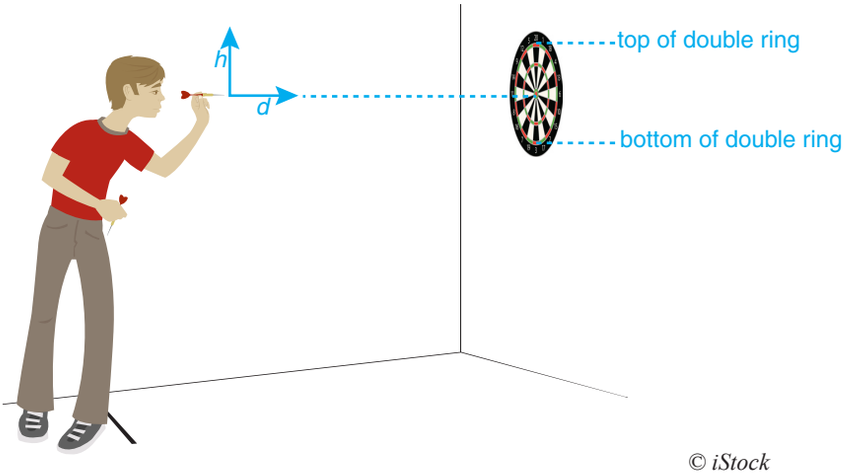
For a particular throw, the height of the dart, $h$, from the double bullseye, and its distance, $d$, away from the thrower's hand can be modelled by the function $h(d) = d - 0.13d^2$, where both $h$ and $d$ are measured in feet.

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a. Solve an absolute value equation to determine the distance(s) at which the dart is at the same height as the top or the bottom of the double ring.

b. If the dart board is 7 feet 9 inches away from the thrower, is each solution valid in this scenario?

4. Explain why the equation $|x^2 - 7x + 24| = -4$ has no solution.

5. Patrick attempted to solve the equation $|2x^2 - 4| = x^2 - 3$ as follows. Comment on Patrick's solution, and, if necessary, correct any errors.

Case 1:

$|2x^2 - 4| = x^2 - 3$

$2x^2 - 4 = x^2 - 3$

$x^2 = 1$

$x = \pm 1$

| Left Side | Right Side |
|---|---|
| $\|2(\pm 1)^2 - 4\|$ | $(\pm 1)^2 - 3$ |
| $2$ | $-2$ |
| LS $\neq$ RS | |

There are no real solutions to $|2x^2 - 4| = x^2 - 3$.

Case 2:

$|2x^2 - 4| = x^2 - 3$

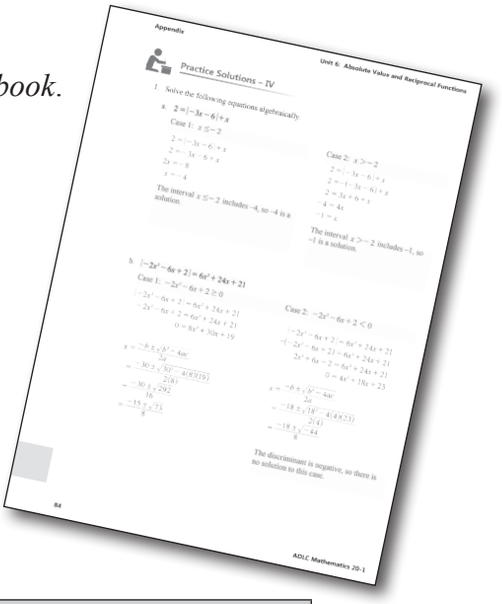
$2x^2 - 4 = -x^2 + 3$

$3x^2 = 7$

$x = \pm\sqrt{\frac{7}{3}}$

| Left Side | Right Side |
|---|---|
| $\left\|2\left(\pm\sqrt{\frac{7}{3}}\right)^2 - 4\right\|$ | $\left(\pm\sqrt{\frac{7}{3}}\right)^2 - 3$ |
| $\frac{2}{3}$ | $-\frac{2}{3}$ |
| LS $\neq$ RS | |

Mark your work for *Lesson 6.2 Practice – IV* using the solutions provided in *Appendix 2: Solutions*. Then, apply the rubric found at the beginning of the *Workbook*.


Appendix

Unit 6: Absolute Value and Reciprocal Functions

Practice Solutions – IV

1. Solve the following equations algebraically.

a. $2|-3x-6|+x$

Case 1: $x \le -2$

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

$2=-3x-6+x$

$2x=-8$

$x=-4$

The interval $x \le -2$ includes $-4$, so $-4$ is a solution.

Case 2: $x \ge -2$

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

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

$2=3x+6+x$

$-4=4x$

$-1=x$

The interval $x \ge -2$ includes $-1$, so $-1$ is a solution.

b. $|-2x^2-6x+2|=6x^2+24x+21$

Case 1: $-2x^2-6x+2 \ge 0$

$-2x^2-6x+2=6x^2+24x+21$

$-2x^2-6x+2-6x^2-24x-21=0$

$0=8x^2+30x+19$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$=\frac{-30\pm\sqrt{30^2-4(8)(19)}}{2(8)}$

$=\frac{-30\pm\sqrt{292}}{16}$

$=\frac{-15\pm\sqrt{73}}{8}$

Case 2: $-2x^2-6x+2<0$

$-(-2x^2-6x+2)=6x^2+24x+21$

$-(-2x^2-6x+2)-6x^2-24x-21=0$

$2x^2+6x-2-6x^2-24x-21=0$

$0=-4x^2-18x-23$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$=\frac{18\pm\sqrt{18^2-4(4)(23)}}{2(-4)}$

$=\frac{18\pm\sqrt{-44}}{-8}$

The discriminant is negative, so there is no solution to this case.

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My self-assessed mark on *Lesson 6.2 Practice – IV* is _____.

Transfer your self-assessed mark to the front cover of the *Workbook*.

Reflect on your understanding of the concepts addressed in the *Practice* exercises in the table provided.

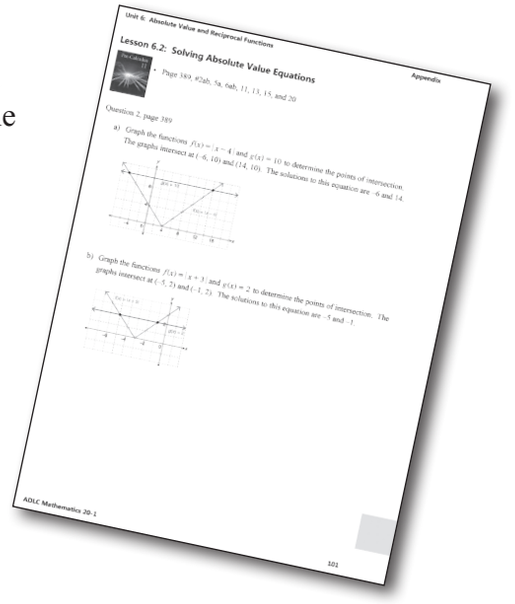
| Question Number | Got it! | Almost there… | Need to retry or ask for help. | Similar questions from *Pre-Calculus 11* |
|---|---|---|---|---|
| **1** | | | | p.389 #5a, 6ab |
| **2** | | | | p.490 #13 |
| **3** | | | | p.490 #11 |
| **4** | | | | |
| **5** | | | | p.390 #15 |

You may proceed to *Explore Your Understanding Assignment* on the next page of this *Workbook*.

**Note:** Before you complete *Explore Your Understanding*, you may review your skills and get more practice by completing the following problems in *Pre-Calculus 11*.

- Page 389, #2ab, 5a, 6ab, 11, 13, 15, and 20

Check your work in *Enhance Your Understanding*.


Unit 6: Absolute Value and Reciprocal Functions

Lesson 6.2: Solving Absolute Value Equations

Appendix

- Page 389, #2ab, 5a, 6ab, 11, 13, 15, and 20

Question 2, page 389

a) Graph the functions $f(x)=|x-4|$ and $g(x)=10$ to determine the points of intersection. The graphs intersect at $(-6, 10)$ and $(14, 10)$. The solutions to this equation are $-6$ and 14.

b) Graph the functions $f(x)=|x+1|$ and $g(x)=2$ to determine the points of intersection. The graphs intersect at $(-5, 2)$ and $(-1, 2)$. The solutions to this equation are $-5$ and $-1$.

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