

## INTERMEDIATE ALGEBRA REVIEW

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The Mathematics Department at Onondaga Community College recommends that students who have taken Intermediate Algebra or Course III review this material prior to taking the Placement Exam.

1.  $|7 - 2x| = 11$
2.  $|3x - 4| > 2$  (graph)
3.  $-5 \leq 3x - 2 \leq 4$  (graph)
4.  $\frac{7x - 5}{2} + 7 = 4x$
5.  $A = -4h(x + 5)$  (For  $x$ )
6. Factor:  $36x^3 + 12x^2 - 48x$
7. Factor:  $a^4 - b^4$
8. Factor:  $x^3 + 64$
9. Divide:  $(3x^2 + 7x + 7)$  by  $(3x + 1)$
10. Solve:  $3x^2 - 4x - 3 = 0$
11. Simplify:  $\frac{4x - 48}{x^2 - 144}$
12. 
$$\frac{\frac{x + 5}{3x^2}}{\frac{x^2 - 25}{6x^3}}$$
13.  $\frac{2x}{x + 2} + \frac{5}{x - 5}$
14. 
$$\left( \frac{x^2 - 9}{2x + 2} \right) \cdot \left( \frac{x^2 + 2x + 1}{(x - 3) \cdot (x + 1)} \right)$$

15.  $\sqrt{2x+1} + 1 = 4$

16.  $(4\sqrt{5} - 2) \cdot (2\sqrt{5} + 4)$

17.  $\sqrt{125} + 2\sqrt{20} - 4\sqrt{45}$

18.  $\left(\sqrt{14x^3y}\right) \cdot \left(\sqrt{7x^3y^3}\right)$

19.  $\sqrt{\frac{375x^5}{5x}}$

20. Find the slope of the line  $7x + 3y = 21$

21. Find the slope of the line containing the points  $(-3, 5)$  and  $(6, -1)$ .

22. Find the equation of the line passing through  $(-6, 2)$  with a slope of  $-2$ .

23. Write the equation of the line through  $(2, 5)$  and perpendicular to  $y = 2x + 4$ .

24. Solve for  $x$ ,  $y$  and  $z$ .

$$2x - 3y + z = 1$$

$$x + 2y + z = -1$$

$$3x - y + 3z = 4$$

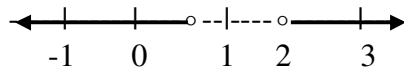
25. Graph  $y \geq 3x + 1$

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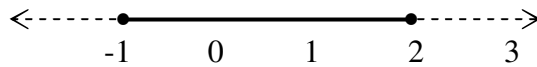
### ANSWERS TO THE PROBLEMS

1.  $|7 - 2x| = 11$   
 $7 - 2x = 11$                        $7 - 2x = -11$   
 $-2x = 4$                                $-2x = -18$   
 $x = -2$       or                       $x = 9$

2.  $|3x - 4| > 2$   
 $3x - 4 > 2$       or       $3x - 4 < -2$   
 $3x > 6$                        $3x < 2$   
 $x > 2$                                $x < \frac{2}{3}$



3.  $-5 \leq 3x - 2 \leq 4$   
 $-3 \leq 3x \leq 6$   
 $-1 \leq x \leq 2$



4.  $\frac{7x - 5}{2} + 7 = 4x$   
 $7x - 5 + 14 = 8x$   
 $9 = x$

$$5. \quad A = -4h(x + 5)$$

$$\frac{A}{-4h} = x + 5$$

$$-\frac{A}{4h} - 5 = x$$

$$6. \quad \begin{aligned} &36x^3 + 12x^2 - 48x \\ &12x(3x^2 + x - 4) \\ &12x(3x + 4)(x - 1) \end{aligned}$$

$$7. \quad \begin{aligned} &a^4 - b^4 \\ &(a^2 - b^2)(a^2 + b^2) \\ &(a - b)(a + b)(a^2 + b^2) \end{aligned}$$

$$8. \quad \begin{aligned} &x^3 + 64 \\ &(x + 4)(x^2 - 4x + 16) \end{aligned}$$

$$9. \quad \begin{array}{r} \phantom{3x+1} \overline{) 3x^2 + 7x + 7} \\ \underline{-3x^2 - x} \phantom{+ 7} \\ \phantom{3x+1} 6x + 7 \\ \underline{-6x - 2} \\ \phantom{3x+1} \phantom{6x+7} 5 \end{array} \quad \begin{array}{l} x + 2 \quad R = 5 \end{array}$$

$$10. \quad \begin{aligned} &3x^2 - 4x - 3 = 0 \\ &x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-3)}}{2(3)} \\ &x = \frac{4 \pm \sqrt{16 + 36}}{6} = \frac{4 \pm \sqrt{52}}{6} = \frac{4 \pm 2\sqrt{13}}{6} = \frac{2 \pm \sqrt{13}}{3} \end{aligned}$$

$$11. \quad \frac{4x - 48}{x^2 - 144} = \frac{4(x - 12)}{(x - 12)(x + 12)} = \frac{4}{x + 12}$$

$$12. \frac{\frac{x+5}{3x^2}}{\frac{x^2-25}{6x^3}} = \frac{x+5}{3x^2} \cdot \frac{6x^3}{x^2-25} = \frac{(x+5) \cdot (6x^3)}{(3x^2) \cdot (x+5) \cdot (x-5)} = \frac{2x}{x-5}$$

$$13. \frac{2x}{x+2} + \frac{5}{x-5} = \frac{2x^2 - 10x + 5x + 10}{(x+2)(x-5)} = \frac{2x^2 - 5x + 10}{(x+2)(x-5)}$$

$$14. \left( \frac{x^2-9}{2x+2} \right) \cdot \left( \frac{x^2+2x+1}{(x-3) \cdot (x+1)} \right) = \frac{(x-3) \cdot (x+3)}{2(x+1)} = \frac{(x+1) \cdot (x+1)}{(x-3) \cdot (x+1)} = \frac{x+3}{2}$$

$$15. \begin{aligned} \sqrt{2x+1} + 1 &= 4 \\ \sqrt{2x+1} &= 3 \\ 2x+1 &= 9 \\ x &= 4 \end{aligned}$$

$$16. \frac{4\sqrt{5}-2}{2\sqrt{5}+4} \cdot \frac{8 \cdot 5 - 4\sqrt{5}}{+16\sqrt{5}-8} = \frac{40+12\sqrt{5}-8}{32+12\sqrt{5}}$$

$$17. \sqrt{125} + 2\sqrt{20} - 4\sqrt{45} = \sqrt{5 \cdot 25} + 2\sqrt{5 \cdot 4} - 4\sqrt{5 \cdot 9} = 5\sqrt{5} + 4\sqrt{5} - 12\sqrt{5} = -3\sqrt{5}$$

$$18. \left( \sqrt{14x^3y} \right) \cdot \left( \sqrt{7x^3y^3} \right) = \sqrt{98x^6y^4} = 7x^3y^2\sqrt{2}$$

$$19. \sqrt{\frac{375x^5}{5x}} = \sqrt{75x^4} = 5x^2\sqrt{3}$$

$$\begin{aligned}
 20. \quad & 7x + 3y = 21 \\
 & \frac{3y}{3} = \frac{-7x}{3} + \frac{21}{3} \\
 & y = -\frac{7x}{3} + 7 \\
 & m = -\frac{7}{3}
 \end{aligned}$$

$$21. \quad m = \frac{-1-5}{6-(-3)} = \frac{-6}{9} = -\frac{2}{3}$$

$$\begin{aligned}
 22. \quad & y - y_1 = m(x - x_1) \\
 & y - 2 = -2(x + 6) \\
 & y - 2 = -2x - 12 \\
 & y = -2x - 10
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & y = 2x + 4 \quad m = 2 \quad \text{perpendicular } m = -\frac{1}{2} \\
 & y - y_1 = m(x - x_1) \\
 & y - 5 = -\frac{1}{2}(x - 2) \\
 & y - 5 = -\frac{1}{2}x + 1 \\
 & y = -\frac{1}{2}x + 6
 \end{aligned}$$

$$\begin{array}{lll}
 24. \quad 2x - 3y + z = 1 & -2x + 3y - z = -1 & -3x - 6y - 3z = 3 \\
 \quad \quad x + 2y + z = -1 & \quad \quad \underline{x + 2y + z = -1} & \quad \quad \underline{3x - y + 3z = 4} \\
 \quad \quad 3x - y + 3z = 4 & \quad \quad -x + 5y = -2 & \quad \quad -7y = 7 \\
 & & \quad \quad y = -1 \\
 \\
 \quad \quad -x + 5(-1) = -2 & \quad \quad x + 2y + z = -1 & \\
 \quad \quad -x = 3 & \quad \quad -3 + 2(-1) + z = -1 & \\
 \quad \quad x = -3 & \quad \quad -5 + z = -1 & \\
 & \quad \quad z = 4 & \\
 \\
 \quad \quad (-3, -1, 4) & & 
 \end{array}$$

25.  $y \geq 3x + 1$

