

Full Name: _____



Preparing for Precalculus

Summer Review Problems

A review of select skills from Algebra II

Instructions:

- Start the review packet a few weeks before the beginning of the school year. It is divided into four sections so you can pace yourself.
- An answer key is provided, and checking your answers is an essential part of your mathematical success. You should persist in working each problem in this review guide until it is correct.
- Expect a quiz on this material in the first week or two of school – this will ensure you are prepared for precalculus, are in the appropriate level course, and will allow us to address any gaps in critical concepts so you can master them.
- Students expecting to work at the honors level should have minimal difficulty completing this packet without assistance.

Review of Algebra

Section A – Simplifying Expressions

Directions – Simplify the given expression, or perform the indicated operation (and simplify, if possible.) Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

1. $7 + 2[3(x + 1) - 2(3x - 1)]$

2. $\frac{30x^3y^4}{6x^9y^{-4}}$

3. $4\sqrt{50} - 3\sqrt{18}$

4. $\frac{3}{5 + \sqrt{2}}$

5. $\sqrt[3]{16x^4}$

6. $\frac{2x^2 + 4x - 6}{3x^2 - 9x + 6}$

$$7. (2x - 5)(x^2 - 4x + 3)$$

$$8. \frac{2x + 8}{x - 3} \div \frac{x^2 + 5x + 4}{x^2 - 9}$$

$$9. \sqrt[3]{-\frac{1}{216}}$$

$$10. \frac{1 - \frac{x}{x+2}}{1 + \frac{1}{x}}$$

$$11. 125^{2/3} + 16^{3/2}$$

$$12. x\sqrt{75} - \sqrt{27x^2}$$

Review of Algebra

Section B - Error Analysis

Directions: Find the error in the left-hand column and highlight it. Then, use the right-hand column to do the problem correctly. Finally, check your answers using the key in the back. If your answer does not match the key, revise your work until it does.

Error	Correction
<p>1. Simplify. $(2x + y)^2 - (x - 3y)^2$</p> $4x^2 + y^2 - x^2 + 9y^2$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $3x^2 + 10y^2$ </div>	
<p>2. Simplify: More than one error $\frac{3x^2 - 3}{x + 1}$</p> $= \frac{-3(x-1)}{(x+1)}$ $= \frac{-3x-3}{1}$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $-3x-3$ </div>	
<p>3. Let $f(x) = 2x^2$ and $g(x) = x^3 - 1$ Find $g(f(x))$ Both a and b contain an error.</p> <p>a) $g(f(x)) = (2x^2)^3 - 1$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $2x^6 - 1$ </div></p> <p>b) $g(f(x)) = (2x^2)^3 - 1$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $6x^6 - 1$ </div></p>	

Error

Correction

4. Solve by taking the square root of both sides.

$$x^2 + 9 = 25$$

More than one error

$$\sqrt{x^2 + 9} = \sqrt{25}$$

$$x + 3 = 5$$

$$x = 2$$

5. Simplify.

$$\frac{4x^{-1}}{2x^2}$$

$$\frac{1}{4x} \cdot \frac{1}{2x^2}$$

$$= \frac{1}{8x^3}$$

6. Simplify:

$$\frac{\left(\frac{1}{x+3} + \frac{1}{3}\right) 3(x+3)}{x \cdot 3(x+3)}$$

$$= \frac{3 + \cancel{(x+3)}}{3x \cancel{(x+3)}}$$

$$= \frac{3}{3x} = \frac{1}{x}$$

Review of Algebra

Section C – Factoring

Directions – factor each polynomial according to its type. Box each answer. Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

Greatest Common Factor

Your first step in any type of factoring is to look for a GCF to factor out

1. $4x^2 - 8x$

2. $6x^4 - 18x^3 + 12x^2$

3. $x(2x + 1) + 4(2x + 1)$

4. $2x^4 + 12x^3 - 4x^2 - 24x$

Factoring Trinomials of the form $ax^2 + bx + c$

1) GCF? 2) Guess and check OR master product OR quadratic formula

5. $6x^2 - 6x - 12$

6. $2x^2 + 5x - 3$

7. $3x^2 + 9x - 30$

8. $15x^2 - 19x + 6$

More Trinomial Factoring

9. $9x^4 - 18x^3 + 27x^2$

10. $6x^4 - 18x^3 + 12x^2$

11. $9x^2 - 12xy + 4y^2$

12. $4x^4 + 4x^2y + y^2$

Difference of Squares $a^2 - b^2 = (a + b)(a - b)$

13. $4x^2 - 81$

14. $25x^3 - 9x$

Sum of cubes
 $(a^3 + b^3) = (a + b)(a^2 - ab + b^2)$

Difference of cubes
 $(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

15. $y^3 + 8$

16. $125t^3 - 27$

17. $x^2 - 10x + 25 - 36y^2$

18. $(x + y)^4 - 100(x + y)^2$

19. $(y + 1)^3 + 8$

20. Find all possible values of b so that the following trinomial can be factored
 $x^2 + bx - 24$

Review of Algebra

Section D – Solving Equations

Directions – solve each equation, following the prompt when given.

1. $5 + \frac{x-2}{3} = \frac{x+3}{8}$

2. $\frac{3a}{5} - \frac{a-3}{2} = \frac{a+2}{3}$

3. By factoring:
 $2x^2 - 12 = -5x$

4. By using the quadratic formula:
 $4t^2 - 2t = 7$

5. By any method:
 $2x^2 - 3x + 10 = 0$

6. By any method:
 $-3x^2 + 12x = 12$

$$7. \sqrt{x + 10} = x - 2$$

$$8. \sqrt{20 - 8z} = z$$

$$9. 3|2t - 1| = 21$$

$$10. -4|b + 5| - 17 = 11$$

$$11. \frac{3}{x + 4} - 7 = -\frac{4}{x + 4}$$

$$12. \frac{4}{x + 5} + \frac{2}{x - 5} = \frac{32}{x^2 - 25}$$

Answer Key:
Section A – Simplifying Expressions

1. $-6x + 17$

2. $\frac{5y^8}{x^6}$

3. $11\sqrt{2}$

4. $\frac{15 - 3\sqrt{2}}{23}$

5. $2x^3\sqrt{2x^4}$

6. $\frac{2x + 6}{3x - 6}$

7. $2x^3 - 13x^2 + 26x - 15$

8. $\frac{2x + 6}{x + 1}$

9. $-\frac{1}{6}$

10. $\frac{2x}{x^2 + 3x + 2}$

11. 89

12. $2x\sqrt{3}$

Section B – Error Analysis

1. $3x^2 + 10xy - 8y^2$

4. $x = \pm 4$

2. $3x - 3$

5. $\frac{2}{x^3}$

3. $8x^6 - 1$

6. $\frac{x + 6}{3x^2 + 9x}$

Need help? Khan Academy is a great resource for review. Students expecting to work at the honors level should have minimal difficulty completing this packet without assistance.
<https://www.khanacademy.org/math/algebra2>

Topics Section A: Polynomial arithmetic, rational exponents and radicals, rational expressions

Topics Section B: Polynomial arithmetic, rational expressions, composition of functions, quadratic equations, equivalent forms of exponential expressions

Section C – Factoring

- | | |
|---|--|
| 1. $4x(x - 2)$ | 2. $6x^2(x - 2)(x - 1)$ |
| 3. $(2x + 1)(x + 4)$ | 4. $2x(x^2 - 2)(x + 6)$ |
| 5. $6(x - 2)(x + 1)$ | 6. $(2x - 1)(x + 3)$ |
| 7. $3(x + 5)(x - 2)$ | 8. $(3x - 2)(5x - 3)$ |
| 9. $9x^2(x^2 - 2x + 3)$
The inner trinomial is prime | 10. $6x^2(x - 2)(x - 1)$ |
| 11. $(3x - 2y)^2$ | 12. $(2x^2 + y)^2$ |
| 13. $(2x + 9)(2x - 9)$ | 14. $x(5x + 3)(5x - 3)$ |
| 15. $(y + 2)(y^2 - 2y + 4)$ | 16. $(5t - 3)(25t^2 + 15t + 9)$ |
| 17. $(x - 5 + 6y)(x - 5 - 6y)$ | 18. $(x + y)^2(x + y + 10)(x + y - 10)$ |
| 19. $(y + 3)(y^2 + 3)$ | 20. $b = \{\pm 2, \pm 5, \pm 10, \pm 23\}$ |

Section D – Solving Equations

- | | |
|--|---|
| 1. $x = -19$ | 2. $a = \frac{25}{7}$ |
| 3. $x = -4, x = \frac{3}{2}$ | 4. $t = \frac{1 \pm \sqrt{29}}{4}$ |
| 5. $x = \frac{3 \pm i\sqrt{71}}{4}$ | 6. $x = 2$, multiplicity 2 |
| 7. $x = 6$
-1 is an extraneous solution | 8. $z = 2$
-10 is an extraneous solution |
| 9. $t = \{4, -3\}$ | 10. No solution |
| 11. $x = -3$ | 12. $x = 7$ |

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Topics Section C: Polynomial factorization

Topics Section D: Rational equations, square root equations, extraneous solutions