

PreCalculus Summer Packet

Hi Rising 11th-graders. Here is a small Summer Packet for you. The first week of PreCalc in the Fall, we'll have a "Readiness Test" to see if you're ready for PreCalc. The 4 units on the next pages are to help you prepare for that test.

Try to work the problems from each unit. Get help from the internet or your Algebra 2 text if you need to. Write up neat and complete solutions to the problems and make a nice packet to hand in this Fall.

My way of rewarding your hard work is this: If you turn in an acceptable packet, then you get some bonus points to add to a quiz or test in the future. If you get an 85 on a test next February, you might use your points to change it into a 95. What could be more pleasant?

You are welcome to e-mail me questions. Answers are on the last page. Watch for typos, because I knocked them out pretty fast.

Unit 1: Exponents and Radicals

Simplify the following without a calculator. Leave no radicals in denominators.

1. $(-2^2)^3$

2. $-\left(\frac{2}{5}\right)^{-2}$

3. $(3x^2y)^{-3}$

4. $\frac{y^{-4}}{5x^{-2}}$

5. $\frac{x^{-1}y}{xy^{-2}}$

6. $\frac{3xy^9}{2y^{-2}} \cdot \frac{-7y}{42x^5}$

7. $8^{2/3}$

8. $4^{-1/2}$

9. $(\sqrt[4]{16})^2$

10. $\sqrt[3]{1000^2}$

11. $(\sqrt[3]{-27})^{-4}$

12. $-(25^{-3/2})$

13. $\sqrt{80}$

14. $\sqrt[4]{32}$

15. $\sqrt[3]{54x^3}$

16. $\frac{3}{\sqrt{8}}$

17. $\sqrt{\frac{4}{75}}$

18. $4\sqrt{3}\sqrt{21}$

Unit 2: Factoring.

Factor the following completely:

1. $3x^4 - 9x^2$

2. $49xy + 28x - 14y$

3. $18x^3y^5 - 12x^4y^2$

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

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

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

7. $3x^2 - 8x + 4$

8. $3x^2 + 17x + 10$

9. $10x^2 - 19x + 6$

10. $4x^2 - 20x + 25$

11. $49x^2 + 42xy + 9y^2$

12. $16x^4 - 81$

13. $x^3 - 8$

14. $125x^3 + y^3$

15. $64 - 27y^6$

Unit 3: Solving Equations

Find all solutions to the following equations.

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

2. $\frac{x}{2} + \frac{5x}{6} = \frac{2x}{3} + \frac{1}{12}$

3. $3(x-8) + 4x = 5x - (x+7)$

4. $x^2 + 5x + 6 = 0$

5. $8x^2 - 6x - 5 = 0$

6. $11x^2 - 14x - 16 = 0$

7. $2x^2 - 4x - 1 = 0$

8. $2x^2 + 2x + 3 = 0$

9. $x^4 - 4x^2 + 2 = 0$

10. $\sqrt{x} = 3x - 1$

11. $3\sqrt{2x} + 1 = 7$

12. $3x^{3/4} - 5 = 19$

13. $\frac{3}{2x} - \frac{9}{2} = 6x$

14. $\frac{2}{3x} + \frac{2}{3} = \frac{8}{x+6}$

15. $\frac{2}{x+1} + \frac{x}{x-1} = \frac{2}{x^2-1}$

Unit 4: Some Analytic Geometry

Find the distance AND the midpoint between the two points:

1. $(-2, 5); (6, -1)$

2. $\left(\frac{3}{2}, -\frac{1}{2}\right); \left(-\frac{3}{2}, \frac{7}{2}\right)$

3. $\left(\frac{5}{2}, -\frac{3}{2}\right); (1, -4)$

Find the *standard form* of the equation of the indicated line.

4. slope = $\frac{3}{4}$; y -int is $-\frac{2}{3}$

5. Parallel to $2x + 3y = 4$, through $(-3, 6)$

6. Perpendicular to $4x - 7y = 23$, through $\left(\frac{2}{3}, -\frac{4}{5}\right)$

Find all x - and y -intercepts of the following equations.

7. $y^2 = x + 9$

8. $9x^2 + 4y^2 = 36$

9. $\left(\frac{x+4}{2}\right)^2 + y^2 = 1$

Answers (may have typos)

Unit 1

1. -64

2. $-25/4$

3. $\frac{1}{27x^6y^3}$

4. $\frac{x^2}{5y^4}$

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

6. $-\frac{y^{12}}{4x^4}$

7. 4

8. $1/2$

9. 4

10. 100

11. $1/81$

12. $-1/125$

13. $4\sqrt{5}$

14. $2\sqrt[4]{2}$

15. $3x\sqrt[3]{2}$

16. $\frac{3\sqrt{2}}{4}$

17. $\frac{2\sqrt{3}}{15}$

18. $12\sqrt{7}$

Unit 2

1. $3x^2(x^2 - 3)$

2. $7(7xy + 4x - 2y)$

3. $6x^3y^2(3y^3 - 2x)$

4. $(x - 1)(x - 2)$

5. $(x - 1)(x + 6)$

6. $(2x - 1)(x + 3)$

7. $(3x - 2)(x - 2)$

8. $(x + 5)(3x + 2)$

9. $(5x - 2)(2x - 3)$

10. $(2x - 5)^2$

11. $(7x + 3y)^2$

12. $(2x - 3)(2x + 3)(4x^2 + 9)$

13. $(x - 2)(x^2 + 2x + 4)$

14. $(5x + y)(25x^2 - 5xy + y^2)$

15. $(4 - 3y^2)(16 + 12y^2 + 9y^4)$

Unit 3

1. $-3/11$

2. $1/8$

3. $17/3$

4. $-2, -3$

5. $-1/2, 5/4$

6. $2, -8/11$

7. $1 \pm \frac{\sqrt{6}}{2}$

8. $-\frac{1}{2} \pm \frac{\sqrt{5}i}{2}$

9. $\pm\sqrt{2 + \sqrt{2}}, \pm\sqrt{2 - \sqrt{2}}$

10. $\frac{7}{18} \pm \frac{\sqrt{13}}{18}$

11. 2

12. 16

13. $1/4, -1$

14. $2, 3$

15. $-1, 4$

Unit 4

1. $10, (2, 2)$

2. $5, (0, 3/2)$

3. $\frac{\sqrt{34}}{2}, \left(\frac{7}{4}, -\frac{11}{4}\right)$

4. $9x - 12y = 8$

5. $2x + 3y = 12$

6. $105x + 60y = 22$

7. $x = -9, y = \pm 3$

8. $x = \pm 2, y = \pm 3$

9. $x = -6, -2, \text{ no } y\text{-ints}$