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

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

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

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

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

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. $\dfrac{1}{27x^6y^3}$
4. $\dfrac{x^2}{5y^4}$
5. $\dfrac{y^3}{x^2}$
6. $-\dfrac{y^{12}}{4x^4}$
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. $\dfrac{3\sqrt{2}}{4}$
17. $\dfrac{2\sqrt{3}}{15}$
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. $1 \pm \dfrac{\sqrt{6}}{2}$
8. $-\dfrac{1}{2} \pm \dfrac{\sqrt{5}i}{2}$
9. $\pm\sqrt{2+\sqrt{2}}, \pm\sqrt{2-\sqrt{2}}$
10. $\dfrac{7}{18} \pm \dfrac{\sqrt{13}}{18}$
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. $\dfrac{\sqrt{34}}{2}, \left(\dfrac{7}{4}, -\dfrac{11}{4}\right)$
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. $x=-6,-2$, no y-ints