Math Summer Enrichment Packet for Pre-Calculus CP and Honors 2021

Purpose: The purpose of our summer math enrichment program is to ensure that the skills, knowledge, and content mastered over the course of the year are retained over the summer. This will help students to be better prepared and ready to succeed in their next math course.

Grading: Completion of all the assigned pages/problems will be counted as your first test/project grade of the year. You will be graded upon completion of all the work.

What portions of the math packet do I need to complete?
On the chart below (a copy of this packet is also available on the SJP website), teachers have identified specific portions of the math packet for you to complete. You only need to complete the problems assigned for your course level – i.e. CP or Honors. Any unused portions of the packet will be used as a supplementary resource during the course of the upcoming school year. These problems are from the introductory chapter of the Pre-Calculus text you will purchase along with other sources, and knowledge of the content is critical for your success in the course.

Where do I complete the assignments?
All problems should be completed on lined paper. Neatness is important in math, so take your time and use a pencil. Show all of your work and clearly number all of the problems. Circle your answers.

Due Date: The assignment will be due to your teacher on the first day of class.

What if I struggle with the work?
Parents/guardians and students, please be aware that the math packet does not come with additional examples and/or instructions. Sections of this packet may be challenging for you at times. We suggest that if you run into difficulty with certain concepts and/or problems that you seek out advice from family and friends, previous math tutors, or utilize resources such as Khan Academy. The key is to give the assignment your best effort.

Have a great summer!
We look forward to working with all of you next year.

Best wishes,
Your Math Department

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Directions: On the chart below, you'll find a list of the problems you are expected to complete over the summer. Ideally, you should plan to spread your work out over the course of the summer, and complete 1 – 2 assignment parts per week. You'll also notice that students in CP and Honors level courses have differing requirements. Take careful note of which problems your math level is expected to complete.

Assignment Part	College Prep Problem Set	Honors Problem Set
1	1-2, 7-9	1-9
2	1-4, 9-12, 22-23, 26, 28, 33-34	1-47 odd
3	7-12, 19-22	1-6, 7-31 odd
4	1-13, 27-28	1-32
5	1-3, 7, 8-10	1-14
6	1-3	4-5
7	1-9	1-12

Have a great summer,
Your Math Department

Name: _____

Follow directions for all problems and show your work. You will need to do your work on separate paper. Please number each problem and circle your answers.

Part 1: Simplify using exponent rules. Assume that no variable equals zero. Write all exponents as positive.

1. $\frac{x^{-2}y}{x^4y^{-1}}$
2. $\frac{12m^8y^6}{-9my^4}$
3. $(4a^3c^2)^3(-3ac^4)^2$
4. $\left(\frac{5a^7}{2b^5c}\right)^3$
5. $\left(\frac{7m^{-1}n^3}{m^{-1}n^2}\right)^{-1}$
6. $\frac{(3x^{-2}y^3)(5xy^{-8})}{(x^3)^4y^{-2}}$
7. $(3b^3)(2b^4)$
8. $\frac{(2n^2)^4}{4n}$
9. $\left(\frac{1}{2a}\right)^{-3}$

Part 2: Follow each set of directions to complete problems with imaginary numbers.

For 1 – 32, simplify.

1. i^{-10}
2. $i^2 + i^8$
3. $i^3 + i^{20}$
4. i^{100}
5. i^{77}
6. $i^4 + i^{-12}$
7. $i^5 + i^9$
8. i^{18}
9. $(3 + 2i) + (-4 + 6i)$
10. $(7 - 4i) + (2 - 3i)$
11. $(0.5 + i) - (2 - i)$
12. $(-3 - i) - (4 - 5i)$
13. $(2 + 4.1i) - (-1 - 6.3i)$
14. $(2 + 3i) + (-6 + i)$
15. $(-2 + 4i) + (5 - 4i)$
16. $(5 + 7i) - (-5 + i)$
18. $(-2 - i)^2$
19. $(1 + 4i)^2$
20. $(5 + 2i)^2$
21. $(3 + i)^2$
22. $(2 + i)(4 + 3i)$
23. $(3 + 5i)(3 - 5i)$
24. $(5 + 3i)(2 + 6i)$
25. $(6 + 7i)(6 - 7i)$
26. $\frac{5+i}{6+i}$
27. $\frac{i}{1+2i}$
28. $\frac{5-i}{5+i}$
29. $\frac{3-2i}{-4-i}$
30. $\frac{1+2i}{2-3i}$
31. $\frac{3+4i}{1+5i}$
32. $\frac{2-\sqrt{2}i}{3+\sqrt{6}i}$

For 33 – 38, solve each equation.

33. $5x^2 + 5 = 0$ 34. $4x^2 + 64 = 0$ 35. $2x^2 + 12 = 0$

36. $6x^2 + 72 = 0$ 37. $8x^2 + 120 = 0$ 38. $3x^2 + 507 = 0$

For 39 – 44, find values of x and y to make each equation true.

39. $3x + 2iy = 6 + 10i$ 40. $5x + 3iy = 5 - 6i$

41. $x - iy = 3 + 4i$ 42. $-5x + 3iy = 10 - 9i$

43. $2x + 3iy = 12 + 12i$ 44. $4x - iy = 8 + 7i$

For 45 – 48, simplify.

45. $(2 - i)(3 + 2i)(1 - 4i)$ 46. $(-1 - 3i)(2 + 2i)(1 - 2i)$

47. $(2 + i)(1 + 2i)(3 - 4i)$ 48. $(-5 - i)(6i + 1)(7 - i)$

Part 3: Follow each set of directions to complete problems with quadratic functions.

For 1 – 6, find the axis of symmetry, y-intercept, and vertex of each function.

1. $y = x^2 + 3x + 2$ 2. $y = x^2 - 9x + 8$

3. $y = x^2 - 2x + 1$ 4. $y = x^2 - 6x - 16$

5. $y = 2x^2 - 8x - 5$ 6. $y = 3x^2 + 12x - 4$

For 7 – 32, solve each equation by factoring, completing the square, or the Quadratic Formula.

7. $x^2 - 10x + 21 = 0$ 8. $p^2 - 6p + 5 = 0$

9. $x^2 - 3x - 28 = 0$ 10. $4w^2 + 19w - 5 = 0$

11. $4r^2 - r = 5$ 12. $g^2 + 6g - 16 = 0$

13. $x^2 + 8x - 20 = 0$ 14. $2a^2 + 11a - 21 = 0$

15. $x^2 - 2x - 24 = 0$ 16. $p^2 - 3p - 88 = 0$

17. $t^2 - 3t - 7 = 0$

18. $3g^2 - 12g = -4$

19. $m^2 + 12m + 36 = 0$

20. $t^2 - 6t + 13 = 0$

21. $6m^2 + 7m - 3 = 0$

22. $c^2 - 5c + 9 = 0$

23. $4x^2 - 2x + 9 = 0$

24. $3p^2 + 4p = 8$

25. $x^2 + 5x - 6 = 0$

26. $a^2 - 13a + 40 = 0$

27. $x^2 - 11x + 24 = 0$

28. $q^2 - 12q + 36 = 0$

29. $-x^2 + 4x - 6 = 0$

30. $7x^2 + 3 = 0$

31. $x^2 - 4x + 7 = 0$

32. $2x^2 + 6x - 3 = 0$

Part 4: Simplify each of the following radical equations without a calculator.

1. $-\sqrt{169}$

2. $\sqrt{-100}$

3. $\sqrt[3]{\frac{216}{125}}$

4. $\sqrt[3]{-\frac{64}{343}}$

5. $\sqrt[4]{-81}$

6. $\sqrt[4]{625}$

7. $\sqrt[5]{243}$

8. $\sqrt[5]{-1024}$

9. $\sqrt[3]{-27x^9}$

10. $\sqrt[4]{16a^{20}}$

11. $\sqrt[8]{8y^{16}}$

12. $\sqrt[3]{54x^{17}}$

13. $\sqrt{20x^{16}}$

14. $\sqrt{121(z-2)^{14}}$

15. $\sqrt[4]{a^{12}b^9}$

16. $\sqrt[7]{-q^{13}r^{16}}$

17. $\frac{b^{\frac{5}{4}} \cdot b^{\frac{3}{4}}}{b^{\frac{1}{4}}}$

18. $(2x^{\frac{1}{4}}y^{\frac{1}{3}})(3x^{\frac{1}{4}}y^{\frac{2}{3}})$

19. $\sqrt[6]{640a^3}$

20. $\sqrt[6]{128b^4}$

21. $\frac{\sqrt[3]{16}}{\sqrt[5]{4}}$

22. $\frac{\sqrt[4]{27}}{\sqrt[3]{81}}$

23. $216^{\frac{1}{3}}$

24. $4096^{\frac{1}{4}}$

25. $49^{-\frac{1}{2}}$

26. $27^{-\frac{1}{3}}$

27. $\sqrt[3]{-250r^{11}t^6u^5}$

28. $\sqrt[3]{128a^9b^7c^4}$

29. $\sqrt[4]{96a^8b^6c^{20}}$

30. $\sqrt[6]{64x^7y^6z^{18}}$

31. $\sqrt[4]{a^2b^3c^4d^5}$

32. $\sqrt[5]{w^6x^8y^{10}z^{13}}$

Part 5: Solve each system of equations using the specified method.

Substitution

1. $5x - y = 16$
   $2x + 3y = 3$

2. $3x - 5y = -8$
   $x + 2y = 1$

3. $y = 6 - x$
   $x = 4.5 + y$

4. $x = 2y - 8$
   $2x - y = -7$

5. $4x - 5y = 6$
   $x + 3 = 2y$

6. $x - 3y = 6$
   $2x + 4y = -2$

7. Connor works at a movie rental store earning $8 per hour. He also walks dogs for $10 per hour on the weekends. Connor worked 13 hours this week and made $110. How many hours did he work at the movie rental store? How many hours did he walk dogs over the weekend?

Elimination

8. $7x + y = 9$
   $5x - y = 15$

9. $2x - 3y = 1$
   $4x - 5y = 7$

10. $-3x + 10y = 5$
    $2x + 7y = 24$

11. $2x + 3y = 3$
    $12x - 15y = -4$

12. $3x + 4y = -1$
    $6x - 2y = 3$

13. $5x - 6y = 10$
    $-2x + 3y = -7$

14. The Mountaineers Club held two camping trips during the summer. The club rented 5 tents and 1 cabin for the 30 members who went on the first trip. The club rented 4 tents and 2 cabins for the 36 members who were on the second trip. If the tents and cabins were filled to capacity on both trips, how many people can each tent and each cabin accommodate?

Part 6: Solve each linear equation for x.

1. $5x - 6 = 3x - 8$

2. $\frac{3}{4}x + \frac{5}{6} = 5x - \frac{125}{3}$

3. $2x - 4 = 10$

4. $\frac{6x-7}{4} + \frac{3x-5}{7} = \frac{5x+78}{28}$

5. $\frac{x-3.9}{2.2} = 1.2 - x$

Part 7: Use the functions $f(x) = 2x - 3$, $g(x) = x^2 - 4x + 11$, and $h(x) = \sqrt{x+2}$ to find the following.

1. $f(3)$

2. $g(-2)$

3. $f(3) - h(7)$

4. $f(x) * g(x)$

5. $g(-3) + h(10)$

6. $\frac{g(x)}{f(x)}$

7. $h(a^2)$

8. $g(2b)$

9. $f(5a) + g(a)$

10. $g(f(3))$

11. $h(f(x))$

12. $f(g(-2)$