Name: _____

Dear Pre-Calculus Students:

Summer is here and so is your summer packet!

It is important that you review some essential algebraic concepts before starting the pre-calculus course. This packet is designed to help you with that review.

Complete these problems, **<u>showing all of your work</u>** to support your answers. If necessary, you can use loose-leaf paper to show the work to support your answers. Write your final answer in the spaces provided in this packet. During the first couple of days of class, your packet and all supporting work will be collected and evaluated. We will take some time during the first couple days of class to go over any questions you have about the pre-requisite skills. You will then be tested on the work from the summer packet. It is always great to start a course with a good grade, so invest some time and energy during this vacation to prepare for an exciting semester of pre-calculus.


If you need a refresher on how to solve certain types of problems, look for "key words" next to the to help you do an online search for help on various topics.

You will need a graphing calculator in order to successfully complete this course. We recommend a TI-83 or TI-84. Please make sure you bring your calculator with you for the first day of class. We begin work right away!
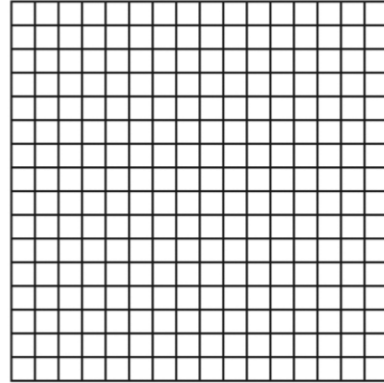
Have an enjoyable, relaxing summer. We're looking forward to seeing you during the next school year. If you have any questions, please contact the math department.

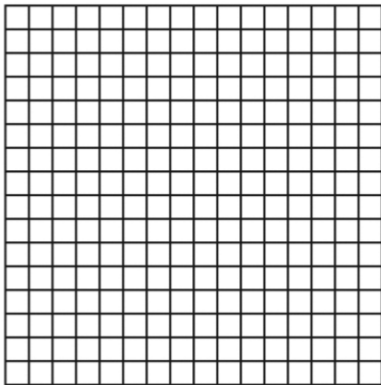Graph the following: **Key words:** *Graphing lines; Graphing quadratic equations; Graphing inequalities*
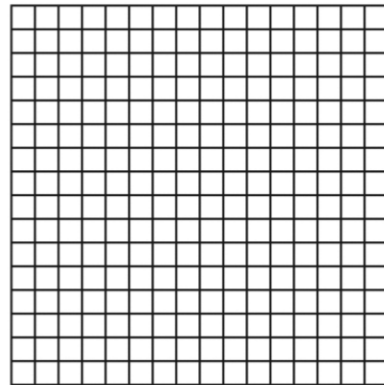
1. $3x + 4y = 12$
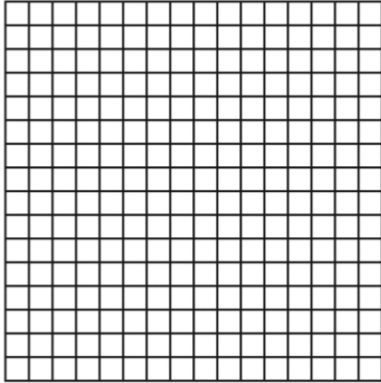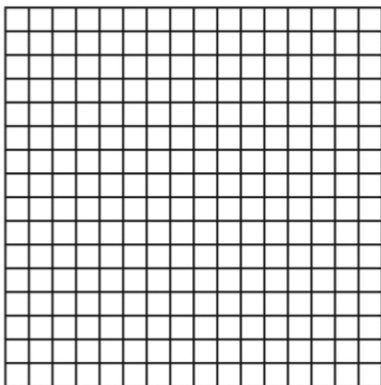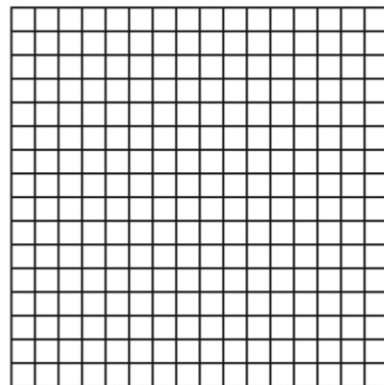
2. $x = -2$ *and* $y = 4$

3. $6x + 12y \leq -24$

4. $y = x^2 - 4x + 5$

5. $y = -2x^2 + 12x - 15$

6. $y = 3x^2 + 2$

7. Are the following lines parallel, perpendicular or neither. Explain why.

$$2x - 4y = 16 \qquad and \qquad 6x + 3y = -4$$

_____

8. Write an equation for the line that passes through the points (-3, 3) and (2, -7):

_____

Key words: *Distance and midpoint formulas*

9. Find the distance between the two points. Then find the midpoint of the line segment joining the two points.
(-4, -2) and (1, -5)

Distance: _____

Midpoint: _____

Working with Fractions

Adding Fractions:

a) $\frac{5}{2} + \frac{2}{3} =$

b) $\frac{23}{2} + \frac{9}{4} =$

c) $\frac{9}{3} + \frac{5}{12} =$

Subtracting Fractions:

d) $\frac{7}{4} - \frac{8}{5} =$

e) $\frac{9}{3} - \frac{5}{4} =$

f) $\frac{7}{20} - \frac{5}{4} =$

Multiplying Fractions:

g) $\frac{5}{2} * \frac{12}{13} =$

h) $\frac{36}{5} * \frac{15}{2} =$

i) $\frac{7}{20} * \frac{5}{4} =$

Dividing Fractions:

j) $\frac{15}{9} \div \frac{5}{6} =$

k) $\frac{27}{4} \div \frac{9}{16} =$

l) $\frac{10}{20} \div \frac{81}{6} =$

🔍 **Key words:** *Simplifying exponent expressions; Laws of exponents*

Simplify the following using the laws of exponents.

10. _____ $\left(6x^3y^4\right)^{-2}$

11. _____ $\dfrac{4x^4y^7}{8x^5y^3}$

12. _____ $\left(\dfrac{3c^3d^4}{5}\right)^3$

13. _____ $\dfrac{12x^{-3}y^{-5}}{3x^{-6}y^4}$

14. _____ $5^5 \cdot 5^0 \cdot 5^{-3}$

15. _____ $\dfrac{x^{10}}{3y^4} \cdot \dfrac{9x^2y^2}{x^4y^3}$

🔍 **Key words:** *Simplifying radical expressions.*

Simplify the following radical expressions.

16. _____ $\sqrt[3]{-125}$

17. _____ $\sqrt[4]{81x^6y^8}$

18. _____ $\sqrt[3]{\dfrac{8x^6y^{12}}{9z^4}}$

19. _____ $\sqrt[3]{9xy^6} \cdot \sqrt[3]{6x^{10}}$

20. _____ $\dfrac{\sqrt[3]{x} \cdot \sqrt{x^3}}{\sqrt{16x^{12}}}$

21. _____ $\dfrac{2+\sqrt{5}}{3-\sqrt{7}}$

Simplify the following polynomial expressions. **SHOW ALL YOUR WORK (NO WORK _ NO CREDIT).**

22. _____ $\left(2x^2+6x+3\right)+\left(3x^2+4x-4\right)$

23. _____ $\left(6x^3-7x^4+10x\right)-\left(4x^3-6x^2+2x-3\right)$

24. _____ $\left(2x+7\right)\left(x-5\right)$

25. _____ $\left(2x-3\right)^2$

26. _____ $\left(4x+3\right)\left(x^2-2x+5\right)$

27. _____ $\left(5x-3\right)\left(x+1\right)\left(x+6\right)$

Key words: *Factoring polynomials; factoring binomials; factoring quadratic expressions*

Factor the following completely.

28. _____ $3x^2+11x-4$

29. _____ x^2-49

30. _____ x^2-81

31. _____ $x^3+5x^2+8x+40$

32. _____ $3x^5+6x^3-45x$

Simplify the following rational expressions. **SHOW ALL YOUR WORK (NO WORK _ NO CREDIT).**

33. _____ $\dfrac{x^3+3x^2}{2x} \cdot \dfrac{5x^3}{x^2+5x+6}$

34. _____ $\dfrac{x^2+2x-35}{x^2-7x+12} \div \dfrac{x^2-13x+40}{3x^2-12x}$

35. _____ $\dfrac{2x+1}{x^2-4} + \dfrac{5}{x-2}$

36. _____ $\dfrac{8x-1}{x^2+x-6} - \dfrac{4}{x-2}$

Key words: *Solving equations rational equations; solving quadratic equations*

Solve the following equations and inequalities. **SHOW ALL YOUR WORK (NO WORK – NO CREDIT).**

37. _____ $\dfrac{2}{x+2} + \dfrac{x}{x-2}$

38. _____ $2x^2 - 5x = 7$

39. _____ $3y^2 + 2y = 5 - 4y$

40. _____ $-4(x+2)^2 = -20$

41. _____ $-6 \le 3x + 2 \le 11$ **Key words:** *Solving inequalities*

42. _____ $\left|\dfrac{1}{4}x + 5\right| = 21$ **Key words:** *Solving absolute value equations*

Key words: *Solving radical equations* **SHOW ALL YOUR WORK (NO WORK – NO CREDIT).**

43. _____ $\sqrt{11x+3} = 2x$

44. _____ $2(x+1)^{\frac{2}{3}} = 6$

45. _____ $\sqrt{5x+1} = x - 4$

Problem Solving:

46. You pay $38.50 for a sweater that is marked 30% off the regular price. What is the regular price of the sweater? How much did you save by buying it on sale?

47. An automobile rental agency charges $60 per day with unlimited mileage. A second agency charges $45 per day plus $.25 per mile after the first 100 miles. For a one-day rental, after how many miles will the first agency be less expensive?

48. The height in feet of a bottle rocket is given by $h(t) = 160t - 16t^2$ where t is the time in seconds. How long will it take for the rocket to return to the ground? What is the height after 2 seconds? When does the rocket reach maximum height?

49. A candy factory needs a box that has a volume of 30 cubic inches. The width should be 2 inches less that the height and the length should be 5 inches greater than the height. What should the dimensions of the box be?

50. A clothing store is having a sale in which you can take $50 off the cost of any coat in the store. The store also offers 10% off your entire purchase if you open a charge account. You decide to open a charge account and buy a coat. Find the sale price of a $175 coat when $50 is subtracted before the 10% discount is applied. Why doesn't the store apply the 10% discount before subtracting $50?