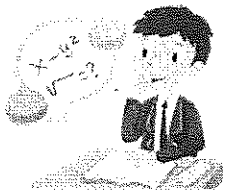
Advanced Algebra 1 Summer Packet



- This summer packet must be completed **BEFORE** the first day of school. This is prerequisite material needed to be successful in the Advanced Algebra 1 course.
- Your Advanced Algebra 1 teacher will ask you to show all completed work.
- You will take a **part calculator and part non-calculator** test on the material in class. Your performance on this assessment will be used as a helpful tool to ensure you have been placed correctly at this level.

In order to prepare yourself for the non-calculator part of the test, it will be important that you use your calculator as little as possible. Do not expect to complete this packet in one sitting. It is recommended that you work on 10 to 15 problems at a time. Plan to take your time when working on these problems and carefully read through each question, underline key points and information when working on word problems, and show all steps when solving equations or simplifying expressions. Unless the problem involves decimal values, express your answers as simplified fractions. When working out problems, be sure to be neat and organized. Showing work is an important requirement in Algebra I. It will demonstrate to your teacher that you fully understand the concepts learned as well as serve as a guide to help you when studying for a test.

Parents and Students: To show you have read and understand the instructions above, please sign below and return with the completed packet on the first day of school. Thank you and have a great summer!

Student Name: _____

Student Signature _____

Parent Signature: _____

Good Luck!

Show All Work – Express Answers as Simplified Fractions Unless Otherwise Indicated. Box Your Answer.

NON-CALCULATOR PROBLEMS. SHOW ALL STEPS

1. Mark paid \$145 for a game console. He bought several games at \$26 each. Mark spent a total of \$275. How many games did Mark buy?

$145 + 26x = 275$
$-145 \quad -145$
$\frac{26x}{26} = \frac{130}{26}$

$x = 5$ games

2. A plumber charges \$60 for a house call, plus \$75 for each hour of work.

   a. Write an equation that shows how the total cost of the plumber's work y depends on the number of hours x the plumber works.

$y = 60 + 75x$

   b. If the plumber charged \$435 how many hours did he work?

$435 = 60 + 75x$
$-60 \quad -60$
$\frac{375}{75} = \frac{75x}{75}$
$5 = x$

5 Hours

Evaluate the Expressions Below

3. $|-50| - |4 \cdot -2|$

$50 - |-8|$
$50 - 8$
42

4. $-1 \cdot |-8| - \left|4 - \frac{1}{2}\right|$

$-1 \cdot 8 - |3\frac{1}{2}|$
$-8 - 3\frac{1}{2}$
$-11\frac{1}{2}$ or $-\frac{23}{2}$

5. $\left|\frac{14 - a^2}{b+4}\right|$ when a = – 3 and b = – 5

$\left|\frac{14-(-3)^2}{(-5)+4}\right| = \left|\frac{14-9}{-1}\right| = \left|\frac{5}{-1}\right|$
$= |-5| = 5$

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

$\frac{3(3)^2+2}{(-1)^3} = \frac{3 \cdot 9 + 2}{-1} = \frac{27+2}{-1}$
$= \frac{29}{-1}$
-29

7. $50-6+15\div5$

$44 + 3$

47

8. $|x \cdot y - x| + |y - x|$

when x = 4 and y = – 3

$|4\cdot(-3)-4| + |-3-4|$

$= |-12-4| + |-7|$

$= |-16| + |-7|$

$= 16 + 7$

$= 23$

9. $(455 - 450)^2$

$(5)^2$

$= 25$

10. $\frac{3^2}{3^4} + (9+3)^0$

$\frac{1}{3^2} + (12)^0$

$= \frac{1}{9} + 1$

$= 1\frac{1}{9}$ or $\frac{10}{9}$

11. $\frac{2}{2}\cdot\frac{4}{3} - \frac{1}{2}\cdot\frac{3}{3}$

$\frac{8}{6} - \frac{3}{6}$

$= \frac{5}{6}$

12. $4\frac{5}{7} + 3\frac{1}{2} =$

Way 1

$4\frac{5\cdot2}{7\cdot2} + 3\frac{1\cdot7}{2\cdot7}$

$4\frac{10}{14} + 3\frac{7}{14}$

$= 7\frac{17}{14}$

$= 7 + 1\frac{3}{14} = 8\frac{3}{14}$ or

Way 2

$\frac{2}{2}\cdot\frac{33}{7} + \frac{7}{2}\cdot\frac{7}{7}$

$\frac{66}{14} + \frac{49}{14}$

$= \frac{115}{14}$

13. $-2\frac{2}{3}\cdot4\frac{1}{10} =$

$-\frac{8}{3}\cdot\frac{41}{10}$ (4 and 5)

$\frac{-164}{15} = -10\frac{14}{15}$

14. $\frac{1}{2}\div\frac{5}{4} =$

$\frac{1}{2}\cdot\frac{4}{5}$ (2)

$= \frac{-2}{5}$

For #15 – 26, solve for the variable.

15. $-5 = \frac{a}{3} + 6$

$-6 \quad -6$

$-11 = \frac{a}{3} \cdot 3$

$-33 = a$

16. $\frac{p+5}{3} = 6$ (3)

$p + 5 = 18$

$-5 \quad -5$

$p = 13$

17. $4x - 5 + 2x + 9 = 28$

$6x + 4 = 28$

$-4 \quad -4$

$\frac{6x}{6} = \frac{24}{6}$

$x = 4$

18. $\frac{0x}{0} = \frac{-3}{0}$

Can't divide by 0

NO solution

19. $\frac{8x}{8} = \frac{0}{8}$

$x = 0$

20. $-9(x + 5) + 6 = -12$

$-9x - 45 + 6 = -12$

$-9x - 39 = -12$

$+39 \quad +39$

$\frac{-9x}{-9} = \frac{27}{-9}$

$x = -3$

21. $\frac{9}{11} - \frac{3x}{11} = \frac{3}{11}$ (11)

$9 - 3x = 3$

$-9 \quad -9$

$-3x = -6$

$\frac{-3x}{-3} = \frac{-6}{-3}$

$\boxed{x = 2}$

22. $\frac{4x}{4} + \frac{x}{2} - \frac{6}{2} = \frac{12}{8}$ (8)

$\frac{32x}{4} + \frac{8x}{2} - \frac{48}{2} = \frac{96}{8}$

$8x + 4x - 24 = 12$

$12x - 24 = 12$

$+24 \quad +24$

$\frac{12x}{12} = \frac{36}{12}$

$\boxed{x = 3}$

23. $12 - 2w = 18w - 26$

$+2w \quad +2w$

$12 = 20w - 26$

$+26 \quad +26$

$\frac{38}{20} = \frac{20w}{20}$

$\boxed{\frac{19}{10} \text{ or } 1\frac{9}{10} = w}$

24. $3(x - 4) = -2(4 - x)$

$3x - 12 = -8 + 2x$

$-2x \quad -2x$

$x - 12 = -8$

$+12 \quad +12$

$\boxed{x = 4}$

25. $3f - 4 - 5f = f + 4 + f$

$-2f - 4 = 2f + 4$

$+2f \quad +2f$

$-4 = 4f + 4$

$-4 \quad -4$

$\frac{-8}{4} = \frac{4f}{4}$

$\boxed{-2 = f}$

26. $5k - 4 - k = 3k - 6 + 2k$

$4k - 4 = 5k - 6$

$-4k \quad -4k$

$-4 = k - 6$

$+6 \quad +6$

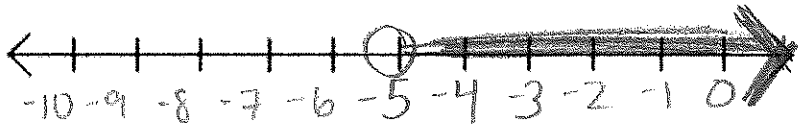
$\boxed{2 = k}$

27. Solve and graph the solution on a number line.

a. $-2x < 10$

$\frac{-2x}{-2} < \frac{10}{-2}$

$x > -5$



b. $\frac{x}{4} + 22 \leq 38$

$-22 \quad -22$

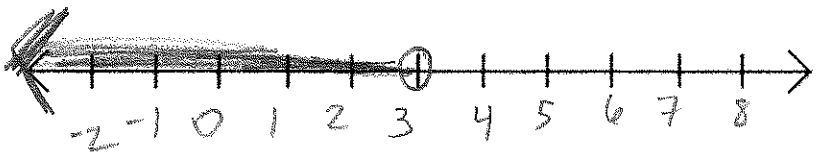
$(4)\frac{x}{4} \leq 16\,(4)$

$x \leq 64$

c. $14 > k + 11$

$-11 \quad -11$

$3 > k$



For #28-35, simplify completely.

28. $\frac{-5a+3}{4} + \frac{-2a}{4}$

$\frac{-5a+3+-2a}{4}$

$\boxed{\frac{-7a+3}{4}}$

29. $-3(-2y+3)$

$+6y-9$

$\boxed{6y-9}$

30. $-7(4x+3)-2(4-x)$

$-28x-21-8+2x$

$\boxed{-26x-29}$

31. $-4y-(5-y)$

$-4y-5+y$

$\boxed{-3y-5}$

32. $(7x^2-5x+2)+6(3x-2x^2-4)$

$7x^2-5x+2+18x-12x^2-24$

$\boxed{-5x^2+13x-22}$

33. $(a^3-5a+b-2)-(3a^3+5a-b+2)$

$a^3-5a+b-2-3a^3-5a+b-2$

$\boxed{-2a^3-10a+2b-4}$

34. $5(2a^2-5a)+3(2a-7)$

$10a^2-25a+6a-21$

$\boxed{10a^2-19a-21}$

35. $(3x+4)\frac{9}{2}+\frac{7}{2}(x+2)$

$\frac{27}{2}x+\frac{36}{2}+\frac{7x}{2}+\frac{14}{2}$

$\frac{27}{2}x+18+\frac{7x}{2}+7$

$\frac{34x}{2}+25$

$\boxed{17x+25}$

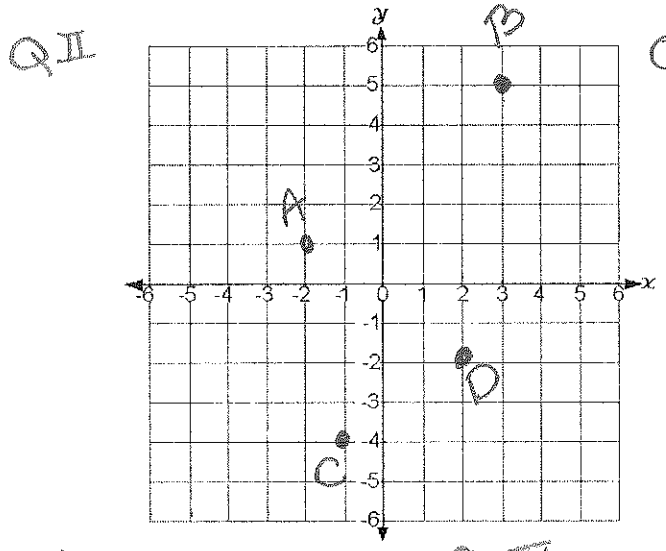
36. Graph the following points on a coordinate plane. Label the 4 quadrants.

$A=(-2,1)$

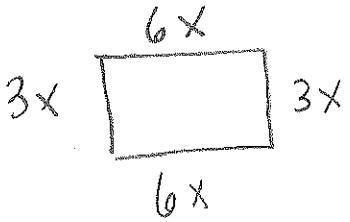
$B=(3,5)$

$C=(-1,-4)$

$D=(2,-2)$



37. Write a simplified expression for the **perimeter** of a rectangle with length 3x and width 6x.



$3x + 3x + 6x + 6x$

$6x + 12x$

$\boxed{18x}$

38. Write a simplified expression for the **area** of the given rectangle in question #37.

$3x \cdot 6x = \boxed{18x^2}$

39. Is $-(-11)^4$ a positive or negative number? Explain why.

It is Negative By order of operations you must first do $(-11)^4$. This is positive because a Negative × Neg × Neg × Neg is positive Then when you apply the outer negative to the positive # it becomes Negative.

40. Determine if the ordered pair (5, 2) is a solution of $2x + 3y = 16$

x, y

$2(5) + 3(2) = 16$

$10 + 6 = 16$

$16 = 16$ ✓

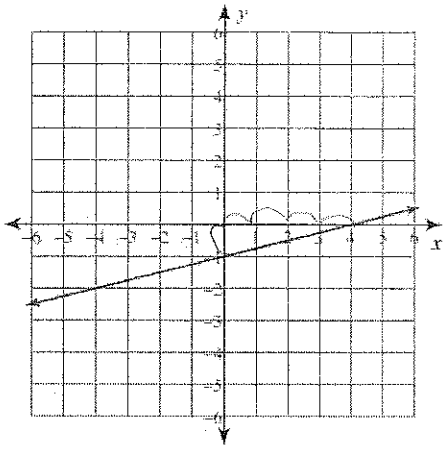
yes, it is a solution

41. Find the slope of the line that passes through (5, -1) and (-7, -4)

$x_1\ y_1 \quad x_2\ y_2$

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - -1}{-7 - 5} = \frac{-4 + 1}{-12} = \frac{-3}{-12} = \boxed{\frac{1}{4}}$$

For #42 use the graph below



a. What is the slope of the line? $\frac{1}{4}$

$\frac{\text{rise}}{\text{run}}$

b. What is the y-intercept of the line? -1

c. What is the x-intercept of the line? 4

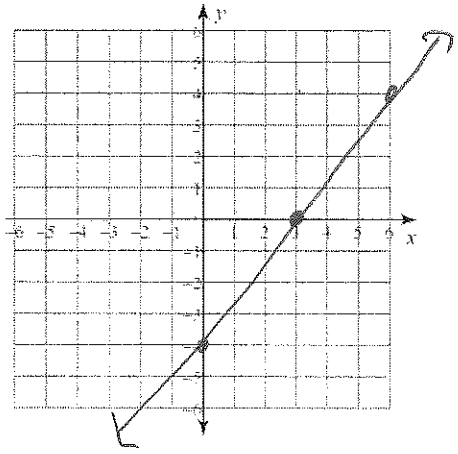
d. Write the equation of this line in slope-intercept form

$y = \frac{1}{4}x - 1$

For 43-44 graph the lines below using the coordinate planes provided

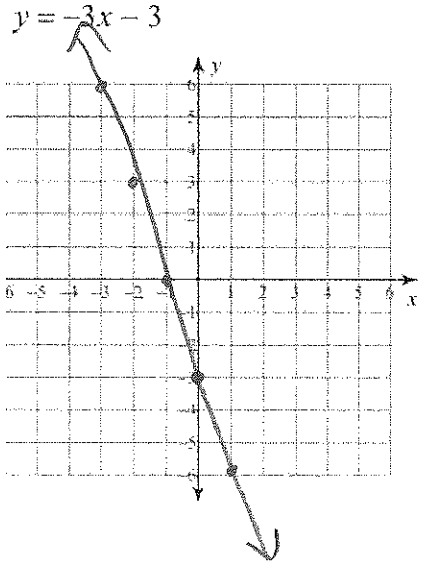
43.

$y = \frac{4}{3}x - 4$



44.

$y = -3x - 3$



45. Write a function rule for the data in the table. Find the initial amount and rate of change.

Days, x	4	7	9	11
Blooms on Plant, y	20	29	35	41

+3 +2 +2

+9 +6 +6

x	3	2	1	0
y	17	14	11	8

Function Rule: $y = 3x + 8$ Initial Amount: 8 Blooms

Rate of Change: 3

Rate of change $= \frac{9}{3} = \frac{6}{2} = 3$

For every 1 day the plant gains 3 blooms.

Work backwards to get initial amount

46. A cell phone company offers two texting plans to its customers. The monthly cost, y dollars, of Plan A is $y = 0.10x + 5$, where x is the number of texts. The cost of Plan B is shown in the table below.

Number of texts, x	100	200	300	400	500
Cost, y	20	25	30	35	40

Plan A $y = 0.1(100) + 5$

$y = 10 + 5$

$= 15$ → cheaper at 100 texts

a. Which plan is cheaper for under 200 texts? Plan A

b. The graph of plan A does not pass through the origin. What does this indicate?

Even if you send no text messages plan A still costs $5.

Write each expression using a single exponent

47. $3^{-9} \cdot 3^{12}$

3^{-9+12}

3^3

48. $(x^2)^3$

$x^{2 \cdot 3}$

x^6

Write each expression using a single, positive exponent

49. $\frac{x^8}{x^3} = x^{8-3} = x^5$

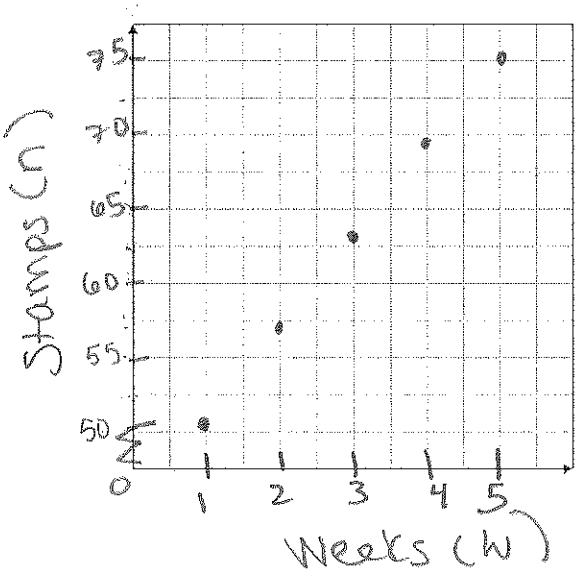
50. $x^{-4} = \frac{1}{x^4}$

51. Mike collects stamps. He currently has 45 stamps and would like to add 6 stamps per week to his collections.

A. Write an **equation** that represents the number of stamps n that Mike will have after w weeks. $n = 6w + 45$

B. Graph the ordered pairs (w, n) for weeks 1 through 5. Fill out the table.

w	n
1	51
2	57
3	63
4	69
5	75



52. Solve the system of equations below algebraically:

$y = -x + 5$

$x + 2y = 2$

Use Substitution

$x + 2(-x + 5) = 2$

$x - 2x + 10 = 2$

$-x + 10 = 2$

$-10 \quad -10$

$-1x = -8$

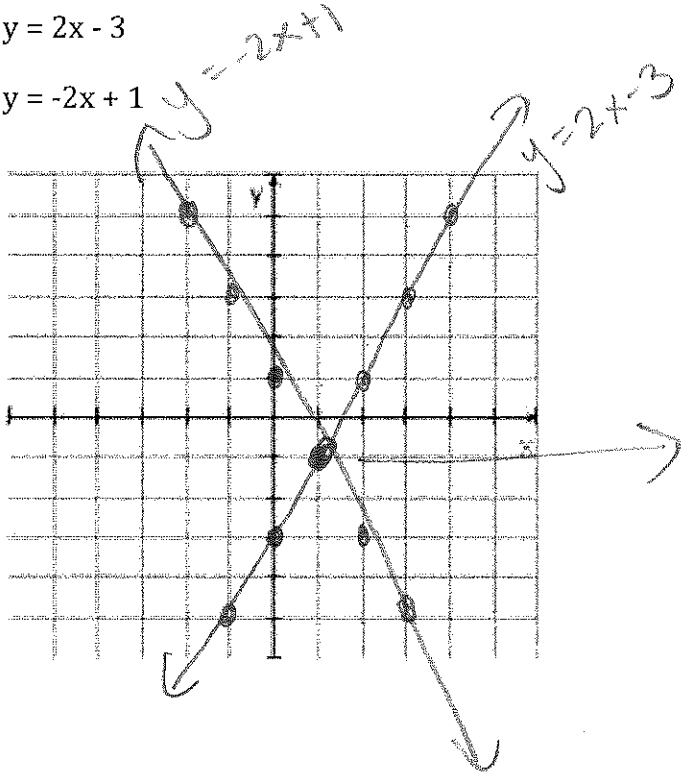
$\div -1 \quad \div -1$

$x = 8$

53. Solve the system of equations below graphically:

$y = 2x - 3$

$y = -2x + 1$



Solution
(1, -1)