

# Accelerated Geometry B/Algebra II Summer Assignment 2018

## Welcome!

This packet includes a sampling of problems that students entering Accelerated Geometry B/Algebra II should be able to answer.

Accelerated Geometry B/Algebra 2 is the second in a sequence of mathematics courses designed to ensure that students are prepared to take higher-level mathematics courses during their high school career, including Advanced Placement Calculus AB, Advanced Placement Calculus BC, and Advanced Placement Statistics.

This is a fast-paced and rigorous college-preparatory math course that includes substantial work with the skills and concepts presented in each lesson. The course emphasizes more complex applications and challenging exercises than students might be exposed to in the traditional high school Geometry courses. You will be required to think, to apply what you know in new and different situations, and to use problem-solving skills. The course is one in which the concepts from the beginning lessons build upon one another and are essential to the mastery of the material that will be encountered later in the semester. In order to be successful, you must have strong foundational math skills and be consistent with your homework and study habits. It is our hope that you will not only learn the major concepts of this course but that you will also become more independent in your learning and study habits, skills that you will need to be successful in future honors-level and AP courses. It is your responsibility to be the best student you can be!

Because of the pace of our curriculum, there may not be too much time to be spent in class reviewing skills that were presented in the pre-requisite courses. This packet represents a brief review of some of those topics that will be an important foundation for this course. Work all of the problems neatly on separate paper, numbering your work. You must show work for each problem, not just an answer. Your final answer for each problem should be recorded on the answer sheet.

These review problems represent your first graded assignment for this course. Your work will be graded for completeness and accuracy. It is extremely important for all students to review the concepts contained in this packet and to be prepared for an assessment of prerequisite skills to take place within the first week of school.

Please let me know if you have any questions at [sduzyol@fultonscienceacademy.org](mailto:sduzyol@fultonscienceacademy.org)

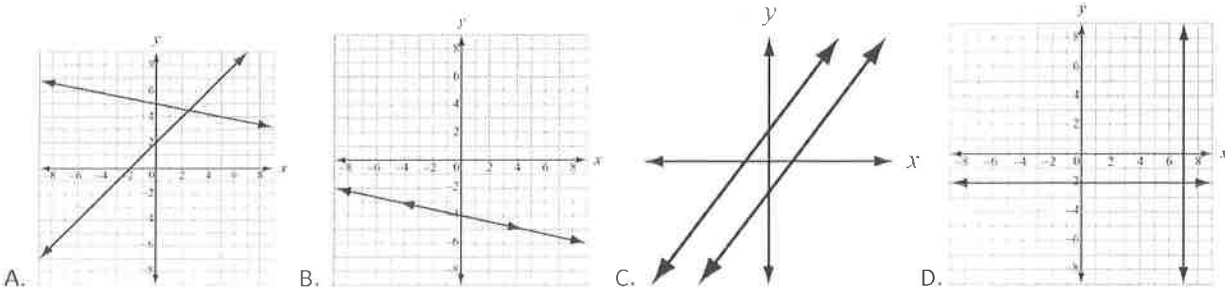
Pre-Requisite Skills Review

**Part 1: Relationships Between Quantities**

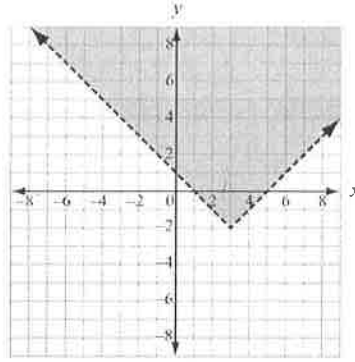
- The tension caused by a wave moving along a string is found using the formula  $T = \frac{mv^2}{L}$ . If  $m$  is the mass of the string in grams,  $L$  is the length of the string in centimeters, and  $v$  is the velocity of the wave in centimeters per second, what is the unit of the tension of the string,  $T$ ?
- Write the possible range for the measurement  $24 \pm 14.1\%$ .
- Write the expression for the area of a rectangle if its width is 6 units less than its length.
- Kevin ran at a rate of 13 km/h. Convert his speed to meters per minute.
- The ratio of students to faculty members in a high school is 23:5. If there are 80 faculty members, how many students are there?
- The area of a rectangle was  $15 \text{ cm}^2$ . Every dimension was multiplied by a scale factor and the new area was  $3.75 \text{ cm}^2$ . What was the scale factor?
- A tree casts a shadow 8.5 ft long at the same time that a nearby 3-foot-tall pole casts a shadow 3.75 feet long. Write and solve a proportion to find the height of the tree.
- Solve:  $\frac{1}{x-6} = \frac{3}{12x}$ .

**Part 2: Reasoning with Equations and Inequalities**

- Bruce owns a business that produces widgets. He must bring in more in revenue than he pays out in costs in order to turn a profit. It costs \$10 in labor and materials to make each of his widgets. His rent each month for his factory is \$4000. He sells each widget for \$25. How many widgets does Bruce need to sell each month to make the minimum profit?
- Solve for  $y$ :  $6(x + 4) = 2(y + 5)$ .
- Solve:  $-4(x - 1) < 12$  and sketch the solution on a number line.
- A shop sells one-pound bags of peanuts for \$2 each and three-pound bags for \$5 each. If 9 bags are purchased for a total cost of \$36, how many three-pound bags were purchased?
- Which graph below would represent a system of linear equations that has multiple common coordinates? Explain your answer.



14. Write the pair of inequalities shown in the graph.



15. Solve by any method:

$$\begin{cases} 8y - 6x = 48 \\ 2y = \frac{3}{2}x - 12 \end{cases}$$

16. Jasmine and her sister are saving to buy MP3 players. Jasmine has \$50 and plans to save \$10 per week. Her sister has \$80 and plans to save \$7 per week. How many weeks will it take for Jasmine to have more money saved than her sister?

17. Solve  $7(x+2) = 7x+14$ .

18. The average of Cindy's three test scores must be greater than 70 for her to pass the class. She got a 76 on the last test. She got the same score on her first and second test. She passed the class. What scores could she have gotten on the first two tests?

### Part 3: Linear and Exponential Functions

19. A certain population of bacteria has a growth rate of 0.02 bacteria/hour. The formula for the growth of the bacteria's population is  $A = P_0 (2.71828)^{0.02t}$  where  $P_0$  is the original population and  $t$  is the time in hours. If you begin with 200 bacteria, approximately how many of the bacteria can you expect after 100 hours?

20. What are the domain and range for the function  $f(x) = 26 - 2x$ ?

21. Write the function modeled by this table:

$x$	$f(x)$
1	8
2	11
3	14
4	17

22. The graph of a function passes through the points (4, 2) and (6, 8). What are the coordinates of these points after the function has been stretched horizontally by a factor of 2?

23. Describe the transformation from the parent graph  $f(x) = 3^x$  represented by  $f(x) = 3^{x-2} + 1$ .

24. What is the average rate of change over the interval [1, 3] for each equation? What type of model is represented by each set of data?

Equation A  $\{(1, 5), (2, 25), (3, 125), (4, 625)\}$       Equation B:  $f(x) = 5x - 12$

### Part 4: Describing Data

25. This table shows the average low temperature, in °F, recorded in Macon, GA, and Charlotte, NC, over a six-day period.

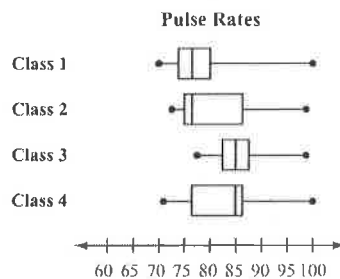
Day	1	2	3	4	5	6
Temp. in °F, in Macon, GA	71	72	66	69	71	73
Temp. in °F, in Charlotte, NC	69	64	68	74	71	75

Which conclusion can be drawn from the data? (Show your work)

- A. The interquartile range of the temperatures is the same for both cities.
  - B. The lower quartile for the temperatures in Macon is lower than the lower quartile for the temperatures in Charlotte.
  - C. The mean and median temperatures of Macon were higher than the mean and median temperatures of Charlotte.
  - D. The upper quartile for the temperatures in Charlotte was lower than the upper quartile for the temperatures in Macon.
26. A reading teacher recorded the number of pages read in an hour by each of her students. The numbers are shown below.  
44, 49, 39, 43, 50, 44, 45, 49, 51

For this data, which summary statistic is NOT correct?

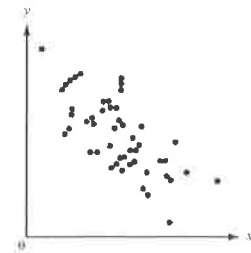
- A. The minimum is 39.
  - B. The lower quartile is 44.
  - C. The median is 45.
  - D. The maximum is 51.
27. A science teacher recorded the pulse rates for each of the students in her classes after the students had climbed a set of stairs. She displayed the results, by class, using the box plots shown. Which class had the highest pulse rates after climbing the stairs? Justify your answer.



28. Museum prices in a city are listed as \$9.00, \$12.00, \$9.75, \$8.25 and \$11.75. What is the absolute mean deviation for this set of data?

29. The high temperatures for Concord, CA, for October 1–15, 2005, are given below.  
High Temperatures (°F): 80 73 72 76 84 86 82 73 81 84 78 85 87 84 70
- a) Determine the mean, median, and mode
  - b) Draw and label a box plot to represent the data.

30. How would you describe the correlation of the two variables based on the scatter plot?



31. Given the sequence 9, -3, 1, -1/3, ..., state the formula for the general term.

32. Which function represents this sequence?

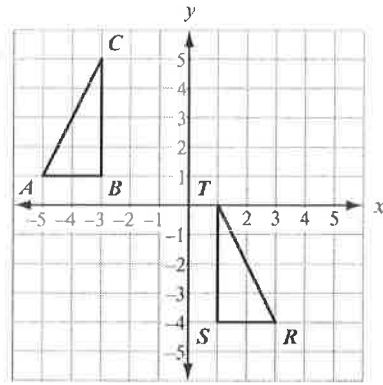
n	1	2	3	4	5	...
$a_n$	6	18	54	162	486	...

- A.  $f(n) = 3^{n-1}$
- B.  $f(n) = 6^{n-1}$
- C.  $f(n) = 3(6^{n-1})$
- D.  $f(n) = 6(3^{n-1})$

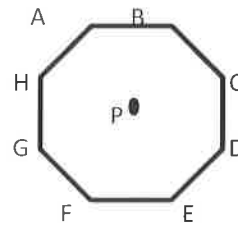
**Part 5: Transformations in the Coordinate Plane**

33. Given the points  $P(2, -1)$  and  $Q(-9, -6)$ , what are the coordinates of the point on directed line segment  $PQ$  that partition  $PQ$  in the ratio  $\frac{3}{2}$ ?

34. Identify the series of transformations that map  $\triangle ABC$  to  $\triangle RST$ .

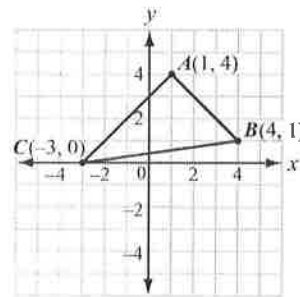


35. Identify the angle of rotation about  $P$  that maps  $C$  to  $H$ .

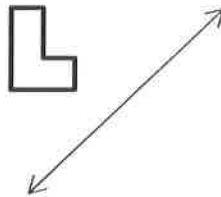


36. After a translation, the image of  $P(-3, 5)$  is  $P'(-4, 3)$ . Identify the image of the point  $(1, -6)$  after this same translation.

37. Sketch the  $90^\circ$  rotation of  $\triangle ABC$  about the origin.



38. Sketch the reflection of the figure over the line  $m$ .



39. a) Does the figure have line symmetry? If so determine how many lines of symmetry the figure has.  
 b) Does the figure have rotational symmetry? If so give the angle and order of the symmetry.



For questions 38-43, use the given information to write a linear equation.

40. A line that is perpendicular to  $y = -\frac{1}{2}x - 2$  and passes through the point (2, 7).

41. A line that is parallel to  $y = \frac{3}{4}x - 5$  and passes through the point (8, -1).

42. A horizontal line that contains the point (4, 7).

43. A vertical line that contains the point (-2, -5).

44. A line with that contains the point (3, 8) and has an x-intercept of -2.

45. A line with a slope of  $-\frac{5}{6}$  and a y-intercept of 3.

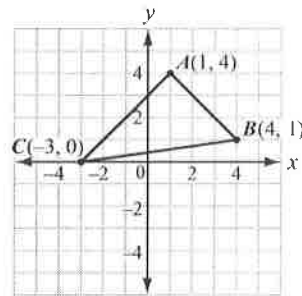
46.  $M$  is the midpoint of  $\overline{RS}$ . Given the coordinates of  $R(-2, 10)$  and  $M(3, 5)$ , what are the coordinates of  $S$ ?

47. What is the distance from  $E(9, -4)$  to  $F(-1, -2)$ ?

48. Write an equation in point-slope form for the perpendicular bisector of the segment with endpoints  $A(1, -1)$  and  $B(6, 3)$

49. What is the area of  $\triangle ABC$ ?

50. What is the perimeter of  $\triangle ABC$ ? (round answer to nearest whole unit)



### Part 7: Similarity, Congruence, and Proofs

51. Fill in the missing statements and reasons in the following proof:

Given:  $m\angle 1 = 30^\circ$  and  $m\angle 2 = 2m\angle 1$ .

Prove:  $\angle 1$  and  $\angle 2$  are complementary

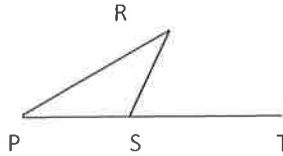
Proof:

Statements	Reasons
1. $m\angle 1 = 30^\circ$ and $m\angle 2 = 2m\angle 1$ .	1. Given
2. ?	2. ?
3. ?	3. ?
4. ?	4. ?
5. ?	5. Simplify
6. $\angle 1$ and $\angle 2$ are complementary	6. Def. complementary

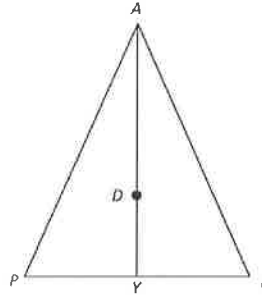
52. Two congruent triangles have the following corresponding congruent parts:  $\overline{RS} \cong \overline{UV}$ ,  $\overline{RT} \cong \overline{UW}$ , and  $\angle R \cong \angle U$ . Write a congruence statement for the two triangles.

53.  $ABCD$  is a parallelogram and the diagonals meet at  $E$ . Given that  $AE = 8y - 4$ ,  $CE = 5y + 2$ ,  $DE = 8x - 7$ ,  $BE = 5x + 2$ ,  $AB = 2x + 3y$ , and  $BC = 2x + 5y$ , what is the perimeter of  $ABCD$ ?

54. Determine the measure of  $\angle RST$ .  
 $m\angle P = m\angle R = 27^\circ$

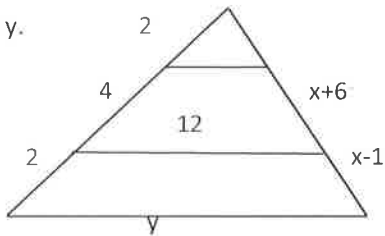


55. Given:  $D$  is the centroid of  $\triangle PAL$   
 $\overline{AY} \perp \overline{PL}$   
 $PA = 15x - 37$   
 $LA = 8x + 12$   
 $DY = 3x - 1$



Find the length of  $\overline{AY}$

56. Solve for  $x$  and  $y$ .

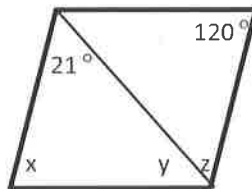


57. Ethan is 6 feet tall and casts a 14-foot shadow. A nearby flag pole casts a 32-foot shadow. How tall is the flag pole?

58. Given:  $\triangle MAR \sim \triangle TIN$   
 $m\angle M = 66^\circ$   
 $m\angle T = (4x + 3y)^\circ$   
 $m\angle N = 27^\circ$   
 $m\angle A = (5x + 4y)^\circ$

Solve for  $x$  and  $y$ .

59. In the parallelogram at the below, determine the values of  $x$ ,  $y$ , and  $z$ .

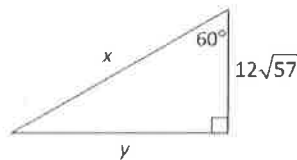


### Part 8: Right Triangle Trigonometry

60. Find the perimeter of an

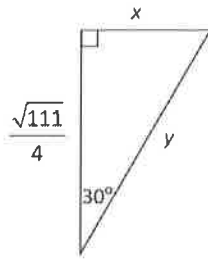
61. A square has an area of 1058

62. Give the exact value for  $x$  and  $y$ .

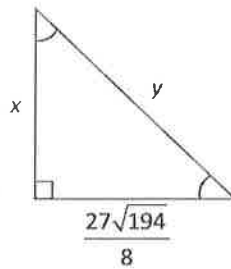


equilateral triangle whose altitude is  $7\sqrt{2}$  meters.  
 $\text{feet}^2$ . Find the length of one of the diagonals.

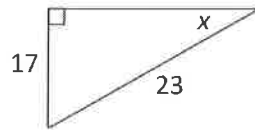
63. Give the exact value for  $x$  and  $y$ .



64. Give the exact value for  $x$  and  $y$ .



65. Solve the right triangle.



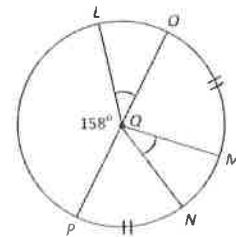
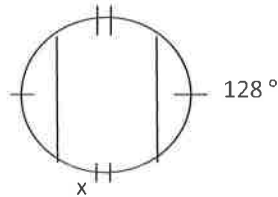
66. A 25 foot ladder leans against a building. The angle of elevation of the ladder to the building is  $70^\circ$ . How high is the top of the ladder on the building?

Part 9: Circles and Volumes - Part 9 is optional (You may review using Khan Academy first)

67. Determine the diameter and volume of a sphere whose surface area is  $244\pi \text{ in}^2$ .

68. A quarter circle has an arc length of  $14\pi \text{ mm}$ . What is the circumference of the circle?

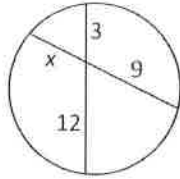
69. Solve for  $x$ .



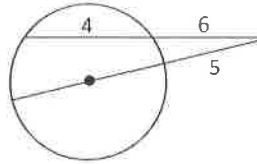
70. Use the figure at the right to find the measure of  $\angle MPL$  and  $\angle LQM$ .



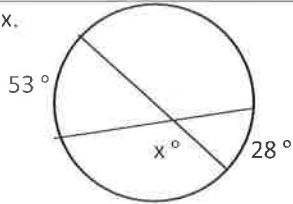
71. Solve for  $x$ .



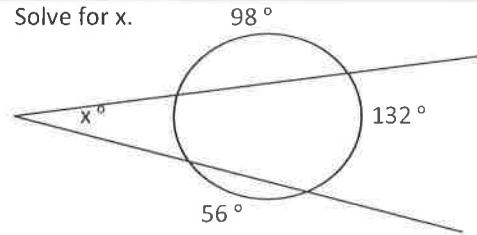
72. Determine the length of the radius.



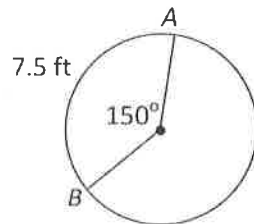
73. Solve for  $x$ .



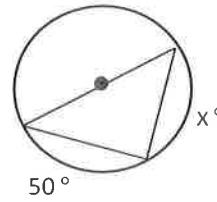
74. Solve for  $x$ .



75. Determine the circumference.



76. Solve for  $x$ .



77. A sphere has volume equal to  $36\pi$  cubic feet. If the length of the radius of this sphere is tripled, then what is the volume of this new sphere?

78. A cylinder with a height of 6 meters has a volume of  $294\pi$   $\text{cm}^3$ . Find the diameter of one of the bases of the cylinder.

79. The base of a pyramid is a square with side lengths of 13 ft. If the height of the pyramid is 12 ft, then find its volume.

80. What is the volume of a right circular cone whose base has a diameter of 12 and whose height is 16?

NAME \_\_\_\_\_

Summer Packet Answer Sheet

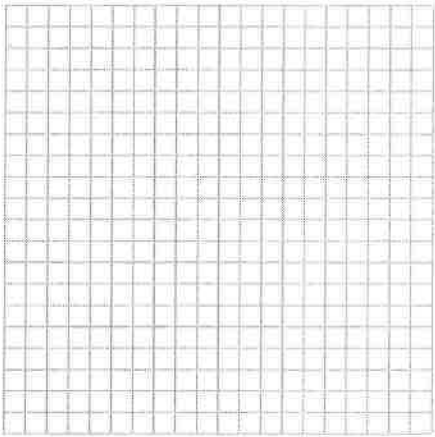
1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.
17.	18.

19.	20.
21.	22.
23.	24. Equation A: _____ Equation B: _____
25.	26.
27.	28.
29.	30.
31.	32.
33.	34.

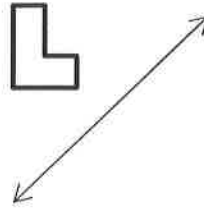
35.

36.

37.



38.



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43.

44.

45.

46.

47.

48.

49.

50.

51.

Statements	Reasons
1. $m\angle 1 = 30^\circ$ and $m\angle 2 = 2m\angle 1$ .	1. Given
2.	2.
3.	3.
4.	4.
5.	5. Simplify
6. $\angle 1$ and $\angle 2$ are complementary	6. Def. complementary

52.	53.
54.	55.
56.	57.
58.	59.
60.	61.
62.	63.
64.	65.
66.	67.
68.	69.

70.	71.
72.	73.
74.	75.
76.	77.
78.	79.
80.	

# Part II. (Extra Practice) - Optional

## Solving

Directions: Solve each problem completely in the space provided, circling your final answer. Recall: For quadratics you may need the zero-product property... if  $ab = 0$ , then  $a = 0$  or  $b = 0$ .

## Strategies

1. Factor out a GCF (if one exists).
2. Quadratic - factor, completing the square or quadratic formula.  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
3. Cubic - try to factor by grouping.
4. Absolute value equations:  $|a + b| = c$   
 $a + b = c$  or  $a + b = -c$
5. Radical equations - raise each side to the root.

45. $3(x - 7) + 5 = -2x - 8$	46. $\frac{x + 1}{3} = 5$	47. $(x + 4)(9x - 3) = 0$
48. $x^2 + x - 12 = 0$	49. $x^2 + 2x - 35 = 0$	50. $x^2 + 3x = -1$
51. $ 1 - 4x  = 5$	52. $-4x + 7 \leq 5$	53. $2\sqrt{x} - 3 = 5$

## Factoring

Directions: Factor each problem completely in the space provided, circling your final answer. Recall: if not factorable, it is "prime".

### Strategies

1. GCF
2. Difference of Squares  $(a+b)(a-b) = a^2 - b^2$
3. Trinomials: factors of  $ac$  that add up to  $b$
4. Sum and Difference  
 $a^2 + 2ab + b^2 = (a+b)^2$   
 $a^2 - 2ab + b^2 = (a-b)^2$
- 5 Grouping

Example: $3b^2 + 15b + 18$ $= 3(b^2 + 5b + 6)$ $= 3(b+3)(b+2)$	37. $x^2 + 6x + 5$	38. $x^2 + x - 6$
39. $3x^3 + 18x^2 + 24x$	40. $4n^2 - 24n$	41. $144x^2 - 36$
42. $2x^2 + 7x - 4$	43. $2x^5 + 10x^4 + 12x^3$	44. $2x^3 + 3x^2 - 8x - 12$



## Simplifying Polynomials

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents and be in simplest form. No decimal approximations allowed.

### Properties

$$c(x + y) = cx + cy$$

$$(a + b)(c + d) = ac + ad + bc + bd$$

<p>Example:</p> $(4x^2 + 7x - 12) - (3x^2 + 5x + 2)$ $= 4x^2 + 7x - 12 - 3x^2 - 5x - 2$ $= 4x^2 - 3x^2 + 7x - 5x - 12 - 2$ $= x^2 - 2x - 14$	29. $(7x - 2y) - (3x + 5y)$	30. $-7x(2x - 9)$
31. $(-3x + y) + (2x - y)$	32. $(3x + 4)(2x - 9)$	33. $7(3x^2 + 10x) - 4x$
34. $3x^2 + 10x - 4(x - 7)$	35. $(3x^2 + 5)(2x - 3)$	36. $(-3x + y)(2x - y)$

## Simplifying Radicals

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents and be rationalized. No decimal approximations allowed.

### Properties

$$\bullet \sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$

$$\bullet \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$\bullet a^{\frac{m}{n}} = \sqrt[n]{a^m} \text{ or } (\sqrt[n]{a})^m$$

$$\bullet \sqrt{x^2} = x$$

<p>Example:</p> $\begin{aligned} \sqrt{24} &= \sqrt{4 \cdot 6} \\ &= \sqrt{4} \cdot \sqrt{6} \\ &= 2\sqrt{6} \end{aligned}$	<p>22. <math>3\sqrt{700}</math></p>	<p>23. <math>\sqrt{\frac{100}{49}}</math></p>
<p>24. <math>3\sqrt{700} + 2\sqrt{7}</math></p>	<p>25. <math>(2\sqrt{6}) \cdot (3\sqrt{15})</math></p>	<p>26. <math>\sqrt{12} - \sqrt{48}</math></p>
<p>27. <math>\sqrt{75x^3} \cdot \sqrt{3x^3}</math></p>	<p>28. <math>\frac{50a}{2\sqrt{25a^2}}</math></p>	<p><b>BE CAREFUL:</b></p> $\sqrt[n]{a+b} \neq \sqrt[n]{a} + \sqrt[n]{b}$ $\sqrt[n]{a-b} \neq \sqrt[n]{a} - \sqrt[n]{b}$ $\sqrt[n]{a^n + b^n} \neq a + b$