

**ST. MARY'S DOMINICAN HIGH SCHOOL**  
**Algebra II and Algebra II (Honors) Summer Worksheet**



Dear student:

The purpose of this summer worksheet is to help you practice your math skills while providing examples of ACT/PSAT-type questions. The questions were specifically chosen because they relate to topics that will be used in your math class next year or because they cover material you have learned that is on the ACT/PSAT.

**In order to receive full credit for your work, be sure to follow these instructions.**

- 1. Print out the worksheet and show all work neatly and in a concise manner next to each question– in PENCIL! If work can not be shown, explain how you were able to solve the problem or what strategy you used (process of elimination, guess and check, graphing calculator, etc.).**
- 2. Check your answers with the answer key provided. Review and re-try any questions you missed. If you have difficulty with any of the concepts, please review them during the summer.**
- 3. Bring your completed assignment to school on the second day of class.**

**Standardized Test-Taking Tips:**

1. Underline or circle key numbers/words in the problem.
2. Read the question that is being asked. Many times the answer to the question is not necessarily the solution to the equation.
3. As you eliminate choices, scratch them out.
4. Use these strategies as they apply:
  - Guess and check with the choices (start with the middle choice)
  - Assign numbers to represent variables in the question
  - Start at the end and work backwards
  - Look for a pattern on a simpler problem
  - Use a graphing calculator to assist when needed

**Note: On the ACT, unless otherwise stated, all of the following should be assumed:**

1. Illustrative figures lie in a plane.
2. Geometric figures lie in a plane.
3. The word “line” indicates a straight line.
4. The word “average” indicates the arithmetic mean.

Choices are usually listed from either greatest to least or least to greatest.

You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator. Reference the “ACT Math Formulas” file in School Links and Files.

Your work will be collected, and a grade will be given based on **completeness and effort**.

Try your best!!! If you need assistance, consult the video tutors available at [khanacademy.org](https://khanacademy.org) or <https://academy.act.org/summer-slide-educator/>.

Sincerely,

St. Mary's Dominican Mathematics Department

## Pre-Algebra

- Sales for a business were 3 million dollars more the second year than the first, and sales for the third year were double the sales for the second year. If sales for the third year were 38 million dollars, what were sales, in millions of dollars, for the first year?
  - 16
  - 17.5
  - 20.5
  - 22
  - 35
- What is 6% of 1250?
  - 75
  - 150
  - 208
  - 300
  - 750
- What is the sum of the prime factors of 60?
  - 12
  - 15
  - 16
  - 19
  - 24
- The normal price for a pair of skis is \$399. If the skis are 10% off and the shop charges 8.75% sales tax, what is the total sale price of the skis?
  - \$359.10
  - \$390.52
  - \$394.01
  - \$400.50
  - \$433.91
- Amy has  $\frac{3}{4}$  of a yard of string to make bracelets. Each bracelet requires  $\frac{1}{8}$  of a yard of string. What is the greatest number of bracelets Amy can make with this length of string?
  - 8
  - 6
  - 4
  - 3

## Elementary Algebra

6. Jody is the timer for a road race. She is 200 feet from the starting gun. Using 1,120 feet per second for the speed of sound, which of the following is closest to how many seconds after the starting gun is fired that Jody will hear the starting gun?

- A. 0.1 second
- B. 0.2 second
- C. 0.6 second
- D. 0.9 second
- E. 1.3 seconds

7. Given  $f = cd^3$ ,  $f = 450$ , and  $d = 10$ , what is  $c$ ?

- A. 0.45
- B. 4.5
- C. 15
- D. 45
- E. 150

8. Which of the following expressions is equivalent to  $\frac{1}{2}y^2(6x + 2y + 12x - 2y)$ ?

- A.  $9xy^2$
- B.  $18xy$
- C.  $3xy^2 + 12x$
- D.  $9xy^2 - 2y^3$
- E.  $3xy^2 + 12x - y^3 - 2y$

9. Last month, Lucie had total expenditures of \$900. The expenditures were broken down into the following categories:

|               |       |
|---------------|-------|
| Clothes       | \$254 |
| Gas           | \$120 |
| Insurance     | \$182 |
| Entertainment | \$125 |
| Food          | \$219 |

The category in which Lucie's expenditures were greatest is what percent of her total expenditures, to the nearest 1%?

- A. 24%
- B. 28%
- C. 32%
- D. 34%
- E. 39%

10. Which of the following is an equivalent form of the expression  $15x + 24ax$ ?

- A.  $39ax^2$
- B.  $39(a + 2x)$
- C.  $(5 + 8a)x$
- D.  $(15 + 24a)x$

11. When  $x = 3$  and  $y = 5$ , by how much does the value of  $3x^2 - 2y$  exceed the value of  $2x^2 - 3y$ ?

- A. 4
- B. 14
- C. 16
- D. 20
- E. 50

12. If  $14x = 6(-4 + x)$ , then  $x = ?$

- A. -6
- B. -3
- C.  $-\frac{6}{14}$
- D.  $\frac{13}{24}$
- E. 1

13. Which of the following is equivalent to the following expression?

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

- A.  $2x^2y + 2xy^2$
- B.  $8xy^2 - 6y^2$
- C.  $2x^2y + 8xy^2 - 6y^2$
- D.  $x^4y^2 + 9xy^4 - 15xy^2$

14. If  $r = 9$ ,  $b = 5$ , and  $g = -6$ , what does  $(r + b - g)(b + g)$  equal?

- A. -20
- B. -8
- C. 8
- D. 19
- E. 20

15. The table below presents the information about the 810 train cars in service on a railroad. Approximately what percentage of the train cars in service are double-decker cars that have been in service for less than 10 years?

|               | In service less than 10 years | In service 10 or more years |
|---------------|-------------------------------|-----------------------------|
| Single level  | 215                           | 497                         |
| Double-decker | 16                            | 82                          |

- A. 2%  
B. 7%  
C. 10%  
D. 16%
16. Which of the following mathematical expressions is equivalent to the verbal expression, “A number,  $x$ , squared is 39 more than the product of 10 and  $x$ ”?
- A.  $2x = 39 + 10x$   
B.  $2x = 39x + 10x$   
C.  $x^2 = 39 - 10x$   
D.  $x^2 = 39 + x^{10}$   
E.  $x^2 = 39 + 10x$
17.  $(a + 2b + 3c) - (4a + 6b - 5c)$
- A.  $-4a - 8b - 2c$   
B.  $-4a - 4b + 8c$   
C.  $-3a + 8b - 2c$   
D.  $-3a - 4b - 2c$   
E.  $-3a - 4b + 8c$
18. The inequality  $6(x + 2) > 7(x - 5)$  is equivalent to which of the following inequalities?
- A.  $x < -23$   
B.  $x < 7$   
C.  $x < 17$   
D.  $x < 37$   
E.  $x < 47$

19. If  $2x+3=8$ , what is  $4x+1$ ?

- A. 7
- B. 11
- C. 19
- D. 25
- E. 41

20. On her first three Geometry tests, Sarah scored 89, 93, and 84. If there are four tests total and Sarah needs at least a 90 average for the four tests, what is the lowest score she can receive on the final test?

- A. 86
- B. 90
- C. 92
- D. 94
- E. 95

21. If  $6x+4=11x-21$ , what is the value of  $x$ ?

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6

22. The expression  $3x^2y(xy^2+4x^3y)$  is equivalent to which of the following?

- A.  $3xy+12x$
- B.  $xy^2+4x^3y$
- C.  $15x^8y^5$
- D.  $3x^3y^3+12x^5y^2$
- E.  $3xy^2+12x^3y$

### Plane Geometry

23. The legs of a right triangle measure 18m and 24m. What is the length in meters of its hypotenuse?

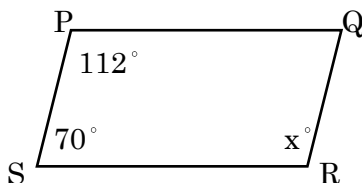
- A. 21 m
- B. 30 m
- C. 42 m
- D.  $\sqrt{252}$  m
- E.  $\sqrt{432}$  m

24. If the circumference of a circle is  $96\pi$  centimeters, what is the radius of the circle, in centimeters?
- A.  $\sqrt{96}$
  - B. 24
  - C. 48
  - D. 96
  - E. 192

25. In  $\triangle XYZ$ ,  $\overline{XY} \cong \overline{XZ}$  and the measure of  $\angle Y$  is  $22^\circ$ . What is the measure of  $\angle X$ ?
- A.  $136^\circ$
  - B.  $79^\circ$
  - C.  $68^\circ$
  - D.  $44^\circ$
  - E.  $22^\circ$

26. In Quadrilateral PQRS below, sides PS and QR are parallel for what value of  $x$ ?

- A. 158
- B. 132
- C. 120
- D. 110
- E. 70



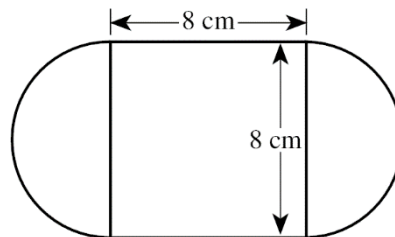
27. If the measures of the angles of a triangle can be represented by  $x + 15$ ,  $3x - 75$ , and  $2x - 12$ , what kind of triangle must it be?
- A. Right
  - B. Equilateral
  - C. Obtuse
  - D. Scalene
  - E. No such triangle exists

28. The cost of a certain type of carpet is \$10 per square *yard*. What would be the cost of carpet of this type to cover a rectangular floor 12 *feet* by 18 *feet*?
- A. \$ 216  
 B. \$ 240  
 C. \$ 600  
 D. \$ 720  
 E. \$2,160

29. The formula for the volume of a sphere with radius  $r$  is  $V = \frac{4}{3}\pi r^3$ . The radius of the planet Jupiter is about 11 times the radius of planet Earth. Assuming that planets are spheres, about how many times larger is the volume of Jupiter than the volume of Earth?
- A. 1  
 B. 121  
 C. 1,331  
 D. 1,775

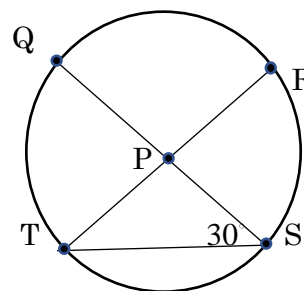
30. The figure below consists of a square and 2 semicircles, with dimensions as shown. What is the outside perimeter, in centimeters, of the figure?

- A.  $8 + 8\pi$   
 B.  $16 + 8\pi$   
 C.  $16 + 16\pi$   
 D.  $32 + 8\pi$   
 E.  $32 + 16\pi$



31. In the circle shown below, chords  $\overline{TR}$  and  $\overline{QS}$  intersect at P, which is the center of the circle, and the measure of  $\angle PST$  is  $30^\circ$ . What is the degree measure of minor arc  $QT$ ?

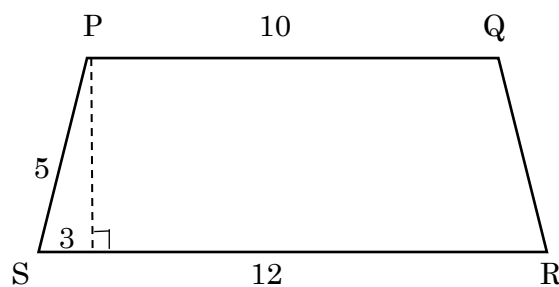
- A.  $30^\circ$   
 B.  $45^\circ$   
 C.  $60^\circ$   
 D.  $90^\circ$   
 E. Cannot be determined from the given information





32. The sides of a triangle are in the ratio 4:3:2. If the perimeter of the triangle is 792, what is the length of the smallest side?
- A. 88
  - B. 176
  - C. 200
  - D. 264
  - E. 352

33. In trapezoid PQRS, the lengths marked are in feet. What is the area of the trapezoid in square feet?



- A. 44
  - B. 50
  - C. 62.5
  - D. 88
  - E. 100
34. A rectangle has a side length of 8 and a perimeter of 24. What is the area of the rectangle?
- A. 16
  - B. 24
  - C. 32
  - D. 64
  - E. 96

### Intermediate Algebra

35. The second term of an arithmetic sequence is -14 and the third term is -34. What is the first term? Note: In an arithmetic sequence, consecutive terms differ by the same amount.
- A. -20
  - B.  $\frac{1}{14}$
  - C. 6
  - D. 14
  - E. 20

36. Stella practiced her ballet routine for twice as many minutes on Monday as she did on Tuesday. She practiced her routine those two days for a total of 2 hours and 45 minutes. For how many minutes did Stella practice her ballet routine on Monday?

- A. 55 minutes
- B. 100 minutes
- C. 110 minutes
- D. 165 minutes

37. A grocer carries two types of frozen meals that have the fat and carbohydrate content shown in the table below. John wants to purchase a combination of the two types of meals with no more than 350 grams of fat and no more than 2975 grams of carbohydrates. If John purchases 10 Szechuan chicken meals, what is the greatest number of stir-fry meals he can purchase so that the combination will satisfy the requirements?

| Type of Meal     | Fat (g) | Carbohydrates (g) |
|------------------|---------|-------------------|
| Stir-fry         | 4       | 40                |
| Szechuan chicken | 5       | 35                |

- A. 60
- B. 65
- C. 70
- D. 75

38. A function  $f(x)$  is defined as  $f(x) = -8x^2$ . What is  $f(-3)$ ?

- A. -576
- B. -72
- C. 72
- D. 192
- E. 576

39. For all  $x$  for which it is defined,  $\frac{x^3 - 9x}{2x^2 - 3x - 9}$  simplifies to:

- A.  $\frac{x^2 + 3x + 9}{2x + 3}$
- B.  $\frac{x(x - 3)}{2x - 9}$
- C.  $\frac{x(x + 3)}{2x + 3}$
- D.  $\frac{x^2(x + 3)}{2x + 9}$
- E.  $\frac{x(x - 3)}{2x - 3}$

40. The slope of the line with equation  $2x - 2y = 7$  is

- A.  $-\frac{7}{2}$
- B.  $-1$
- C.  $1$
- D.  $2$
- E.  $\frac{7}{2}$

41. A playground is  $(x + 7)$  units long and  $(x + 3)$  units wide. If a square of side length  $x$  is sectioned off from the playground to make a sandpit, which of the following could be the remaining area of the playground?

- A.  $x^2 + 10x + 21$
- B.  $10x + 21$
- C.  $x^2 + 21$
- D.  $2x + 10$
- E.  $21$

42. What is the median of the following list of numbers: 3, 8, 5, 13, 9, 15, 3?

- A. 3
- B. 8
- C. 9
- D. 13
- E. 15

43. If  $\frac{a}{b} = 4c$ ,  $a = 8c$ , and  $c = 9$ , what is the value of  $b$ ?

- A. 2
- B. 8
- C. 18
- D. 36
- E. 72

44. The value of  $3x+9$  is how much more than the value of  $3x-2$ ?

- A. 7
- B. 11
- C.  $3x+7$
- D.  $3x+11$
- E.  $6x+7$

**Coordinate Geometry**

45. When the equation  $y = 5x + p$ , where  $p$  is a constant, is graphed in the  $xy$ -plane, the line passes through the point  $(-2, 1)$ . What is the value of  $p$ ?

- A. -9
- B. -2
- C. 3
- D. 11

46. In the standard  $(x, y)$  coordinate plane,  $M(9, -8)$  is the midpoint of  $\overline{TW}$ . If  $W$  has coordinates  $(3, 1)$ , what are the coordinates of  $T$ ?

- A.  $(15, -7)$
- B.  $(15, -17)$
- C.  $(6, -\frac{7}{2})$
- D.  $(6, -9)$
- E.  $(6, -15)$

47. What are the quadrants of the standard  $(x, y)$  coordinate plane below that contain points on the graph of the equation  $4x - 2y = 8$ ?

- A. I and III only
- B. I, II, and III only
- C. I, II, and IV only
- D. I, III, and IV only
- E. II, III, and IV only

48. The graph of  $y = -5x^2 + 9$  passes through  $(1, 2a)$  in the standard  $(x, y)$  coordinate plane. What is the value of  $a$ ?

- A. -8
- B. -1
- C. 2
- D. 4
- E. 7

49. What is the x-intercept of the line given by  $3x + y = 9$ ?

- A. -3
- B. 1
- C. 2
- D. 3
- E. 6

50. What is the equation of a line that has a y-intercept of -3 and is parallel to the line  $3x = 4 + 5y$ ?

- A.  $y = -\frac{3}{5}x + 3$
- B.  $y = -\frac{5}{3}x + 3$
- C.  $y = -\frac{5}{3}x - 3$
- D.  $y = \frac{3}{5}x + 3$
- E.  $y = \frac{3}{5}x - 3$

51. How many units long is one side of a square with perimeter  $16 - 24h$  units?

- A.  $16 - 24h$
- B.  $16 - 6h$
- C.  $8h$
- D.  $4 - 24h$
- E.  $4 - 6h$

52. A square has sides of length  $(w+5)$  units. Which of the following is the remaining area of the square, in square units, if a rectangle with sides of length  $(w+2)$  and  $(w-3)$  is removed from the interior of the square?

- A. 31
- B.  $9w + 19$
- C.  $11w + 31$
- D.  $w^2 + 10w + 25$
- E.  $2w^2 + 9w + 19$

53. The points  $(-2, 3)$  and  $(0, 1)$  lie on a straight line. What is the slope-intercept equation of the line?

- A.  $y = 2x - 1$
- B.  $y = x + 5$
- C.  $y = x + 1$
- D.  $y = -x + 1$
- E.  $y = -2x + 3$

54. Points  $R(6, 4)$  and  $S(-4, 5)$  lie in the standard  $(x, y)$  coordinate plane. What is the slope of  $\overline{RS}$ ?

- A.  $-\frac{2}{9}$
- B.  $-\frac{1}{10}$
- C.  $\frac{1}{10}$
- D.  $\frac{2}{9}$
- E.  $\frac{9}{2}$

55. A map is laid out in the standard  $(x, y)$  coordinate plane. How long, in units, is an airplane's path on the map as the airplane flies along a straight line from City A located at  $(20, 14)$  to City B located at  $(5, 10)$ ?

- A.  $\sqrt{1,201}$
- B.  $\sqrt{241}$
- C.  $\sqrt{209}$
- D. 7
- E.  $\sqrt{19}$

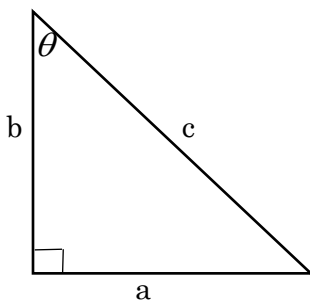
56. What is the equation of the line perpendicular to a line with undefined slope?

- A.  $y = x$
- B.  $y = 4$
- C.  $x = 9$
- D.  $y = 3x$

**Trigonometry**

57. In the right triangle shown below, what is  $\sin \theta$ ?

- A.  $\frac{a}{b}$
- B.  $\frac{a}{c}$
- C.  $\frac{a}{c}$
- D.  $\frac{b}{a}$
- E.  $\frac{c}{a}$



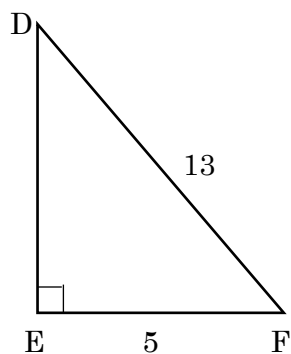
58. A painter leans a 40-foot ladder against the wall of a building. The side of the building is perpendicular to the ground, and the bottom of the ladder is 15 feet from the base of the building. If  $\theta$  is the angle that the ladder makes with the ground, which expression could be used to find  $\theta$ ?

- A.  $\sin \theta = \frac{15}{40}$
- B.  $\cos \theta = \frac{15}{40}$
- C.  $\tan \theta = \frac{5\sqrt{55}}{40}$
- D.  $\csc \theta = \frac{40}{5\sqrt{55}}$
- E.  $\cot \theta = \frac{40}{15}$

59. A building contractor determines that the angle of elevation from the ground to the top of a small office building is  $67^\circ$ . If the contractor is standing 50 meters from the base of the building when she measures the angle of elevation, what is the height, in meters, of the building?

- A.  $50 \sin 67^\circ$
- B.  $50 \cos 67^\circ$
- C.  $50 \tan 67^\circ$
- D. None of the Above

60. What is the tangent of  $\angle EFD$  below?



- A.  $\frac{5}{13}$
- B.  $\frac{5}{12}$
- C.  $\frac{12}{13}$
- D.  $\frac{12}{5}$
- E.  $\frac{13}{5}$



**Answer Key**

1. A
2. A
3. A
4. B
5. B
6. B
7. A
8. A
9. B
10. D

11. B
12. B
13. A
14. A
15. A
16. E
17. E
18. E
19. B
20. D

21. D
22. D
23. B
24. C
25. A
26. D
27. D
28. B
29. C
30. B

31. C
32. B
33. A
34. C
35. C
36. C
37. B
38. B
39. C
40. C

41. B
42. B
43. A
44. B
45. D
46. B
47. D
48. C
49. D
50. E

51. E
52. C
53. D
54. B
55. B
56. B
57. C
58. B
59. C
60. D