

# AICE Mathematics 1

## Summer Assignment for Students Entering August 2018

This assignment is for students who are currently scheduled for AICE Mathematics 1 in the 2018 – 2019 school year. Each section of this assignment is based upon the topics covered in Pre-AICE Mathematics 3 during the 2017 – 2018 school year. It is important that you complete each section of problems in its entirety. The goal of this assignment is not merely completion, but completion with excellence. These are topics and skills that need to be **mastered** by the time you come to school on August 10, 2018. Students who have not mastered these topics will experience extraordinary difficulty in AICE Mathematics 1 as these topics will not be taught as part of that class. If you are struggling with this assignment, please refer to your notes from this year on these topics or you may consult the websites listed below. You are also welcome to work with a friend, but make sure that you understand the material. During the first week of school, we will briefly review these topics. Following the review, there will be an exam covering this material. See you August 10<sup>th</sup> 😊

**IMPORTANT:** This assignment is due on August 10, 2018. Ten percent will be deducted for every day it is late, and will not be accepted after Friday, August 17, 2018.

**Final Note:** The goal of this assignment is for you to have mastered and retained the information. I recommend you complete this assignment in “chunks” so you do not overwhelm yourself, and so you have continuous exposure throughout the summer.

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If you need to email me with a question:

- 1.) Include your name in the email.
- 2.) Try to send a photo of the problem you’re working on.
- 3.) State clearly which part you are experiencing difficulty with.
- 4.) I will only be checking my email occasionally. So, please try all other avenues of getting your questions answered first. Thank you.

Helpful Websites:

[www.khanacademy.org](http://www.khanacademy.org)

[www.kutasoftware.com](http://www.kutasoftware.com)

[www.learnzillion.com](http://www.learnzillion.com)

[www.math-drills.com](http://www.math-drills.com)

[www.youtube.com](http://www.youtube.com)

### Section 1: Simplifying Radicals

Directions: Simplify each of the following radicals. You should also memorize all of your perfect squares up to  $15^2 = 225$  by the first day of school.

1.  $\sqrt{507}$

2.  $\sqrt{864}$

3.  $\sqrt{320}$

4.  $\sqrt{512}$

5.  $\sqrt{72}$

6.  $\sqrt{108}$

7.  $\sqrt{343}$

8.  $\sqrt{567}$

9.  $\sqrt{45}$

10.  $\sqrt{175}$

11.  $\sqrt{208}$

12.  $\sqrt{425}$

13.  $\sqrt{304}$

14.  $\sqrt{261}$

### Section 2: Quadratic Equations

Directions: Solve #15 – 24 by factorizing (factoring). Remember to check your work by distributing your factors. **Remember to check for a GCF when factorizing.**

15.  $x^2 + 13x - 30$

16.  $x^2 - 5x - 24$

17.  $x^2 + 15x + 56$

18.  $x^2 + 15x + 54$

19.  $x^2 - 8x - 20$

20.  $x^2 + 4x - 32$

21.  $2x^2 - 2x - 40$

22.  $3x^3 + 33x^2 + 90x$

$$23. x^2 + 5x - 36$$

$$24. 2x^2 + 20x + 32$$

Directions: Solve #25 – 34 using the quadratic formula.

$$25. 3x^2 + 7x + 2$$

$$26. 2x^2 + 5x + 3$$

$$27. 3x^2 - 16x + 5$$

$$28. 7x^2 - 9x + 2$$

$$29. 6x^2 + 5x + 1$$

$$30. 8x^2 - 9x + 1$$

$$31. 10x^2 + 17x + 3$$

$$32. 9x^2 - 9x + 2$$

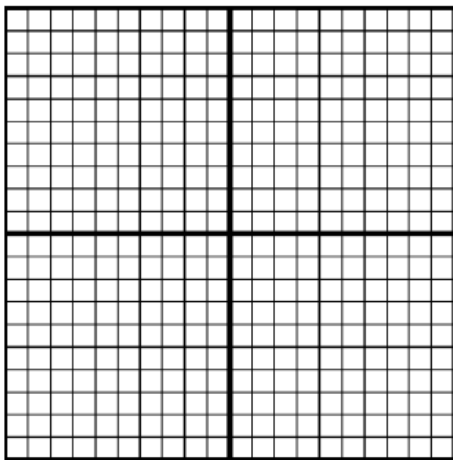
$$33. 5x^2 + 11x + 6$$

$$34. 3x^2 + 2x - 1$$

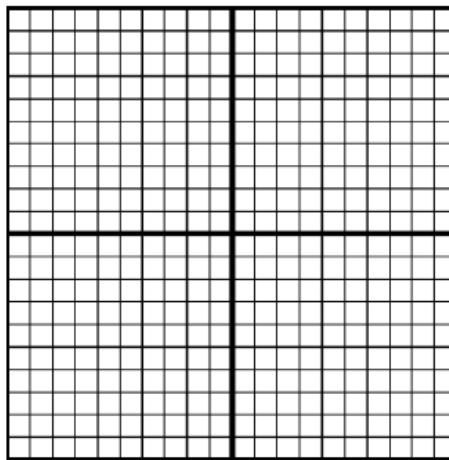
### Section 3: Graphing Linear Equations

Directions: Graph each of the following linear equations on the coordinate plane. Check your graphs using DESMOS (if you have access to a computer or SMART phone).

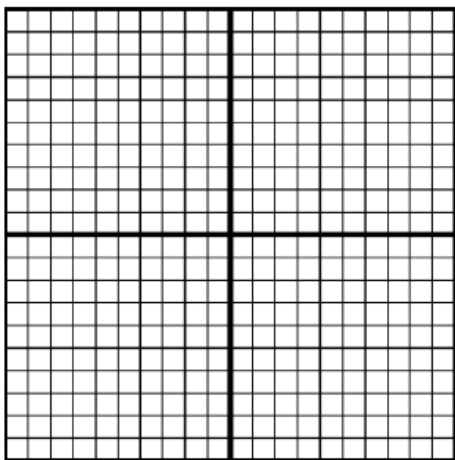
$$35. y = \frac{7}{2}x - 2$$



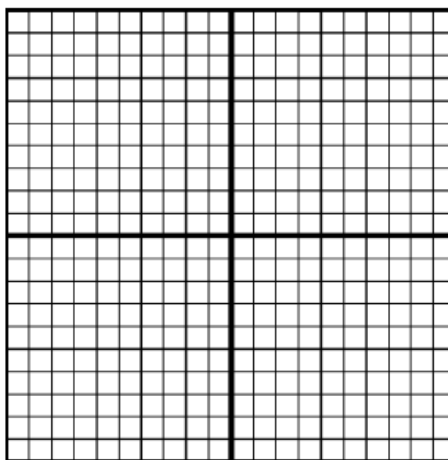
$$36. y = -6x + 3$$



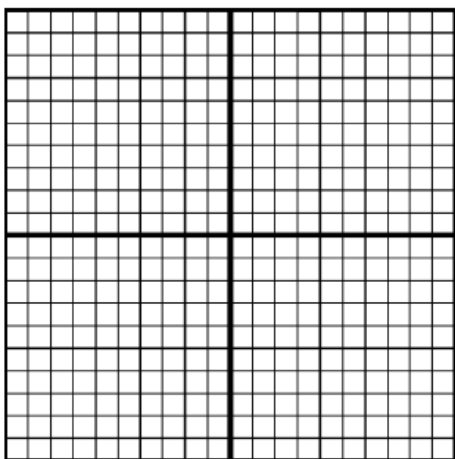
37.  $y = -5$



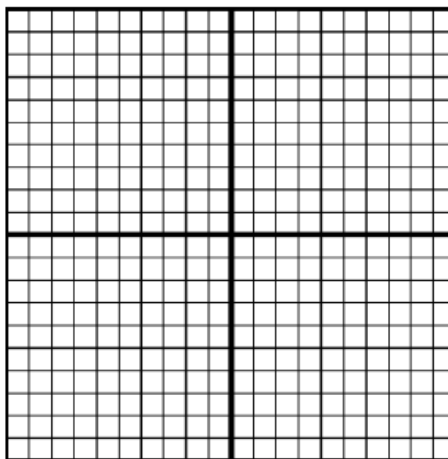
38.  $y = \frac{6}{5}x + 1$



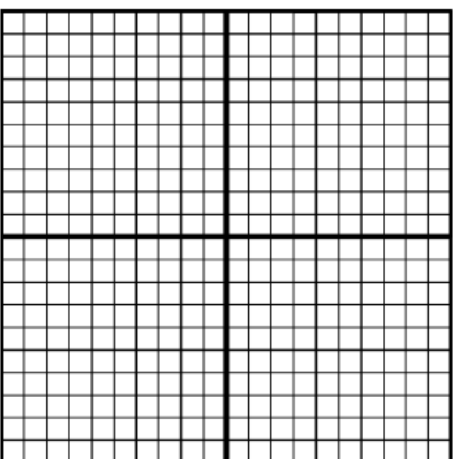
39.  $y = \frac{1}{4}x + 2$



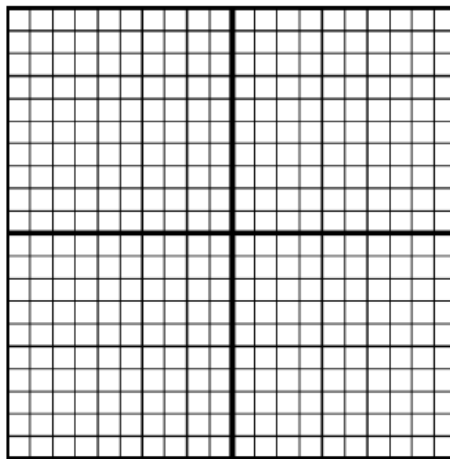
40.  $x = 5$



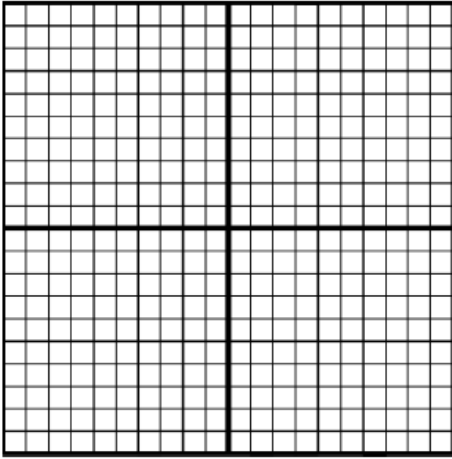
41.  $y = \frac{5}{3}x$



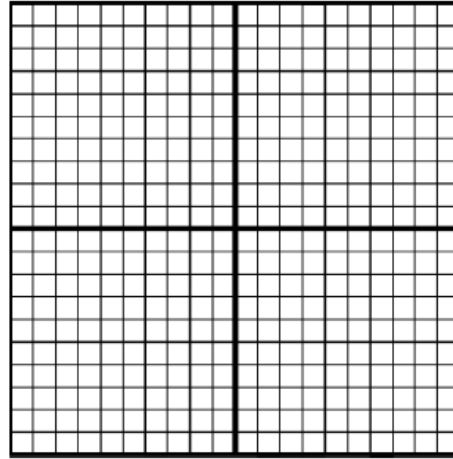
42.  $y = -\frac{1}{3}x + 3$



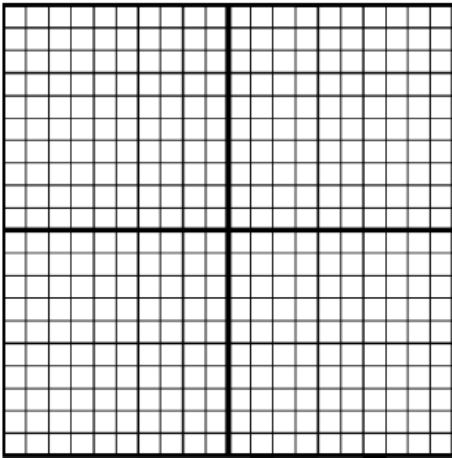
$$43. y = \frac{1}{5}x - 4$$



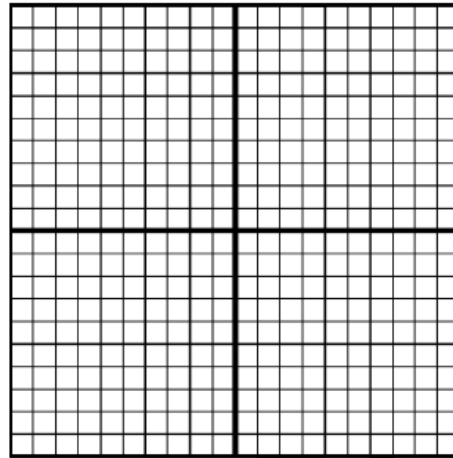
$$44. y = -\frac{1}{2}x - 2$$



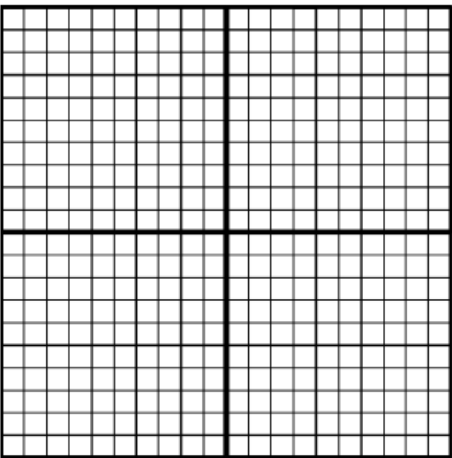
$$45. y = 2x + 5$$



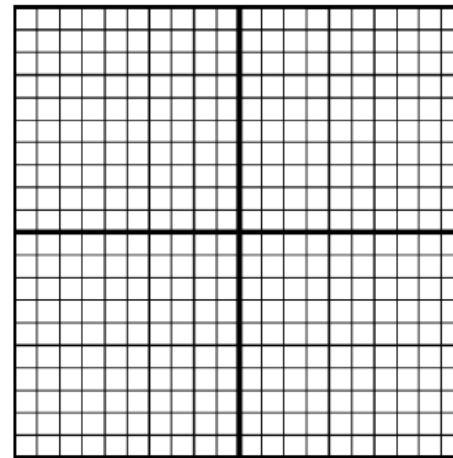
$$46. x - 2y = 6$$



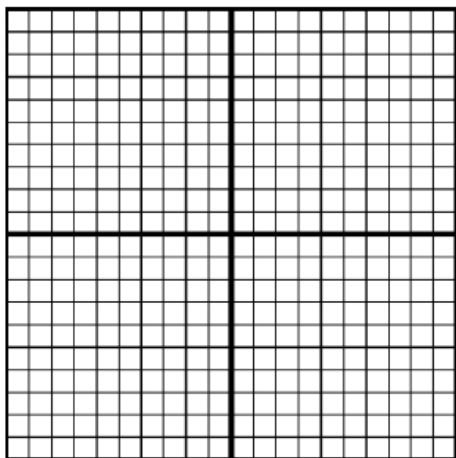
$$47. 3x - 2y = -2$$



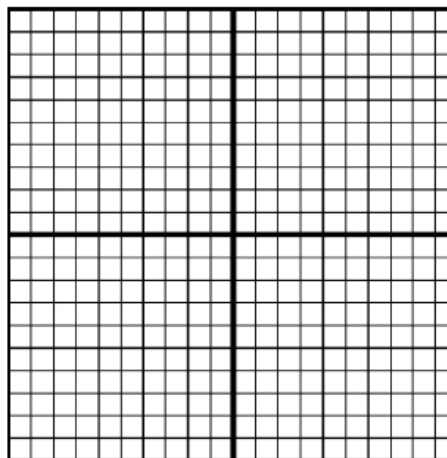
$$48. 3x + 2y = 4$$



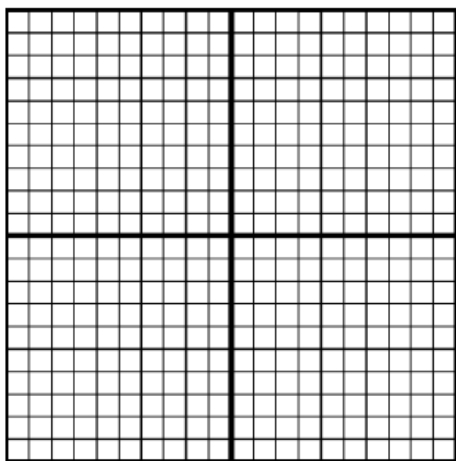
49.  $x + 4y = 4$



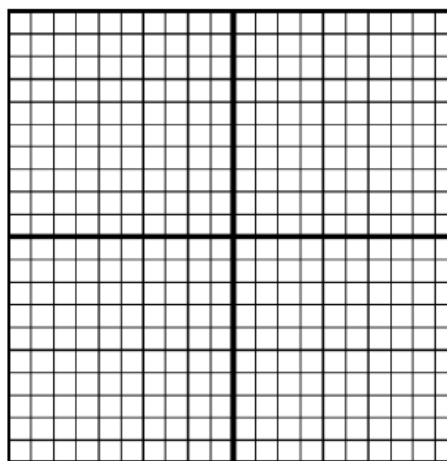
50.  $4x + y = -1$



51.  $5x + 2y = -10$



52.  $x + 5y = 10$



#### Section 4: Writing Equations of Lines

Directions: Write the equation of the line that passes through the following points in slope intercept form. **Reminder:** Find the slope first 😊

53.  $(0,1)$  and  $(7,14)$

54.  $(-13,-4)$  and  $(1,4)$



55.  $(-3,5)$  and  $(2,-13)$

56.  $(11,31)$  and  $(25,36)$

57.  $(-41,12)$  and  $(-10,-2)$

58.  $(12,18)$  and  $(26,31)$

59.  $(13,-17)$  and  $(-3,11)$

60.  $(-5,-16)$  and  $(6,17)$

61.  $(-4, -9)$  and  $(9, 18)$

62.  $(19, -2)$  and  $(-4, 14)$

Directions: Write the equation of each of the following lines using the given slope and point. Write your final equation in simplified point slope form.

63. *through:*  $(1, 2)$  *slope* = 7

64. *through:*  $(3, -1)$  *slope* =  $-1$

65. *through:*  $(-2, 5)$  *slope* =  $-4$

66. *through:*  $(3, 5)$  *slope* =  $\frac{5}{3}$

67. *through*  $(2, -4)$  *slope* = 0

68. *through*  $(2, 5)$  *slope* = *undefined*

69. *through*  $(3, 1)$  *slope* =  $\frac{1}{2}$

70. *through*  $(-1, 2)$  *slope* = 2

### **Section 5: Midpoint & Distance**

Directions: Find the midpoint and distance of each of the following ordered pairs. Write all midpoints as simplified fractions, and round all distances to two decimal places.

71.  $(-2, 5)$  *and*  $(3, -4)$

72.  $(5, 14)$  *and*  $(-6, -15)$

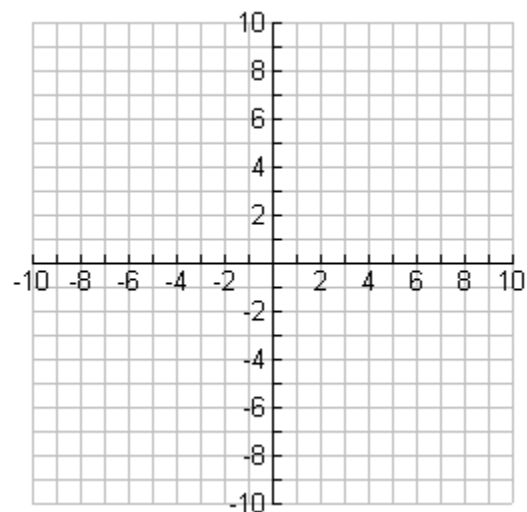
73.  $(-11, 15)$  and  $(22, 12)$

74.  $(12, 24)$  and  $(-9, -6)$

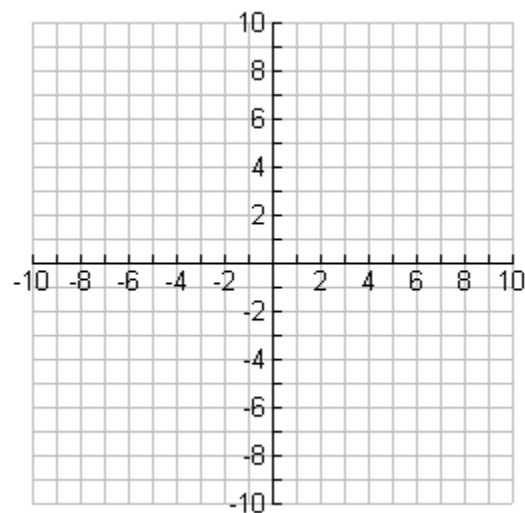
### Section 6: Graphing Quadratic Equations

Directions: Sketch a graph of each of the following functions. Clearly identify the vertex and any x-intercepts.

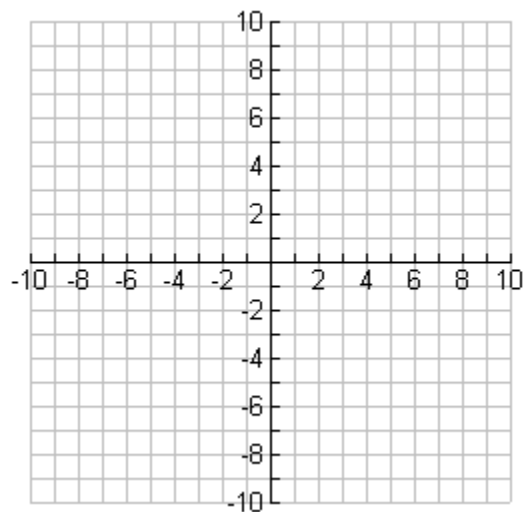
75.  $y = (x + 1)^2$



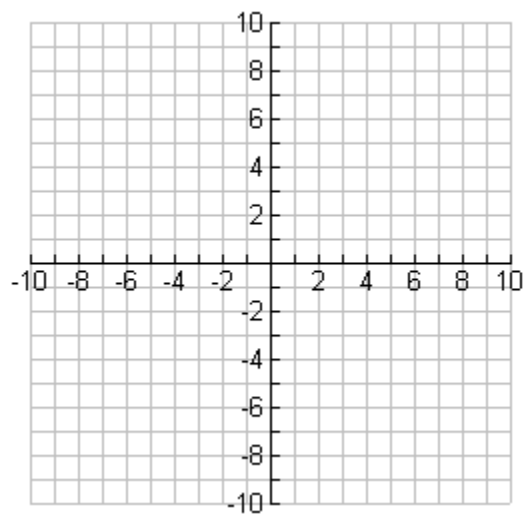
76.  $y = x^2 + 3$



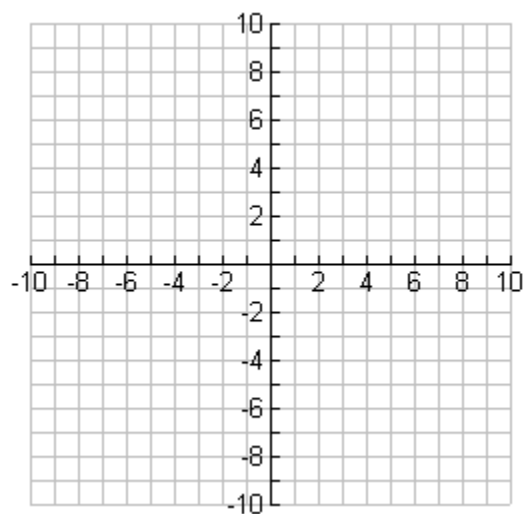
$$77. y = (x + 1)^2 - 2$$



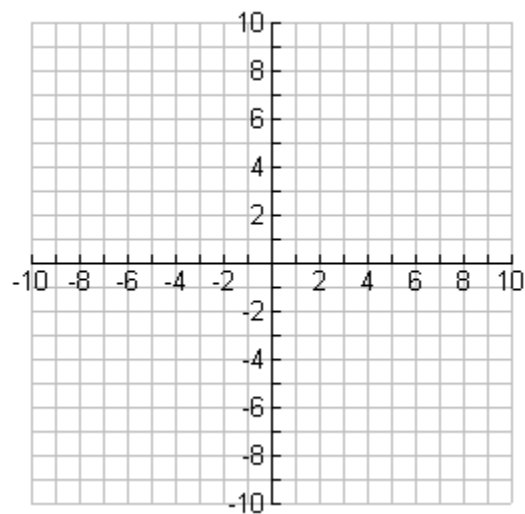
$$78. y = -2(x - 1)^2 + 4$$



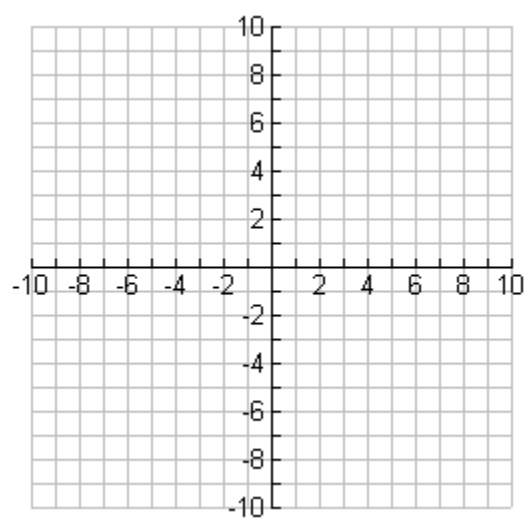
$$79. y = x^3$$



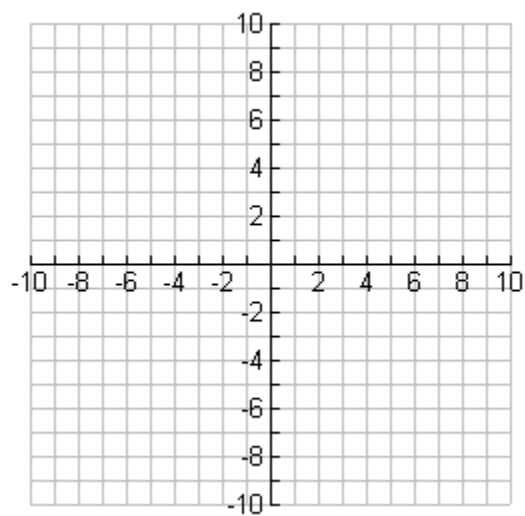
$$80. y = (x - 3)^3$$



$$81. y = x^3 + 2$$



$$82. y = -(x + 2)^3 - 1$$



### Section 7: Exponents

Directions: Simplify the following expressions. Your answer should contain only positive exponents.

$$83. \left( \frac{x^7 y^3}{x^2 y} \right)^4$$

$$84. \frac{(8k^{-5})(2k^3)}{4k^{-6}}$$

$$85. (u^{-3} v^5) \left( \frac{9u^{-5} v^2}{3u^6 v^{-8}} \right)$$

$$86. (3l^{-2} m^3)(2m^{-5})^2 (lm^4)^{-3}$$

$$87. \left( \frac{3n}{5m^{-3}} \right)^2 \left( \frac{3m^4}{2n^2} \right)^{-3}$$

$$88. \frac{3^{-2} s^5 (s^{-1})^{-3}}{s(s^2)^{-4}}$$

89. 
$$\left( \frac{x^{-2}(y^5z^{-2})^3}{(x^{-5}y^6z^{-2})^{-5}(x^3y^{-8})^{-2}} \right)^{-3}$$

90. 
$$\frac{(4a^2b^{-3})^2(b^{-7}c^8)^{-3}}{(2b^3c^{-5})^3(a^{-5}b^{-6})^{-4}}$$

### Section 8: Trigonometry

Directions: Find the exact value of the following angles (**HINT:** Use the unit circle).

91.  $\sin\left(\frac{\pi}{2}\right)$

92.  $\cos\left(\frac{2\pi}{3}\right)$

93.  $\tan\left(\frac{5\pi}{6}\right)$

94.  $\tan 210^\circ$

95.  $\cos 330^\circ$

96.  $\tan 135^\circ$

97.  $\cos 225^\circ$

98.  $\sin\left(\frac{3\pi}{2}\right)$

99.  $\sin\left(\frac{4\pi}{3}\right)$



Directions: Solve each of the following trigonometric functions without the use of a calculator. All answers should be in the interval  $0^\circ \leq \theta \leq 360^\circ$ .

$$100. 3\tan\theta = -3$$

$$101. -4\sqrt{3} = 8\cos\theta$$

$$102. -2\sin\theta = -\sqrt{2}$$

$$103. 5\tan\theta = 2\sqrt{3} + 3\tan\theta$$

$$104. 4\cos\theta = \sqrt{2} + 2\cos\theta$$

$$105. 6\sin\theta - 2 = 4\sin\theta$$

$$106. 2\cos^2\theta - \cos\theta = 0$$

$$107. 3\tan^2\theta + \sqrt{3}\tan\theta = 0$$

$$108. 3\sin^2\theta - 3 = 0$$

$$109. \cos^2\theta + 2\cos\theta = 3$$

$$110. \sin^2\theta + 3\sin\theta + 7 = 5$$

## Section 9: Simultaneous Equations (Systems of Equations)

Directions: Solve the following simultaneous equations using graphing, substitution, and elimination. Verify that you obtain the same solution using all three methods. **Use Graph paper for the graphs.**

$$111. \begin{cases} y = -3x + 4 \\ y = 3x - 2 \end{cases}$$

Elimination:

Substitution:

$$112. \begin{cases} x - y = 3 \\ 7x - y = -3 \end{cases}$$

Elimination:

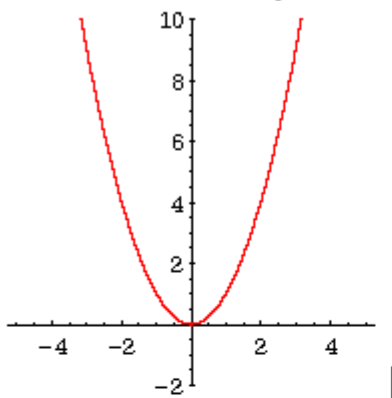
Substitution:

**Directions:** You will need to have the following formulas, equations, graphs, and information memorized by the time we take our in-class test on the summer assignment

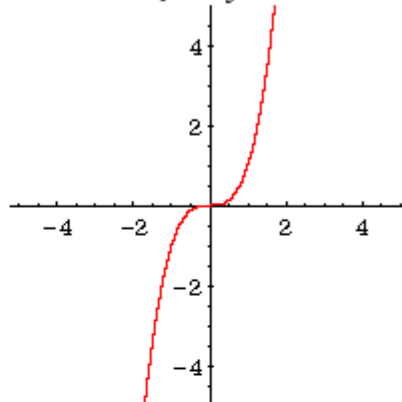
- **Quadratic Equation:**  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- **Gradient Formula:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$
- **Midpoint Formula:**  $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
- **Slope-Intercept Form:**  $y = mx + c$ , where  $m = \text{gradient}$  and  $c = y - \text{intercept}$
- **Point-Slope Form:**  $y - y_1 = m(x - x_1)$ , where  $m = \text{gradient}$  and  $(x_1, y_1)$  is an ordered pair on the line
- **Horizontal Lines:**  $y = c$ , where  $c$  is a constant. Also, the gradient = 0.
- **Vertical Lines:**  $x = c$ , where  $c$  is a constant. Also, the gradient = undefined.
- **Laws of Indices:**
  - RULE 1:  $a^m \times a^n = a^{m+n}$
  - RULE 2:  $a^m \div a^n = a^{m-n}$
  - RULE 3:  $(a^m)^n = a^{mn}$
  - RULE 4:  $a^{-m} = \frac{1}{a^m}$
  - RULE 5:  $a^0 = 1$
- **Area Formulas:**
  - Square =  $s^2$
  - Rectangle =  $lw$
  - Circle =  $\pi r^2$
  - Trapezium =  $\frac{1}{2}h(b_1 + b_2)$
- **Circumference of a circle:**  $C = 2\pi r$
- **The Unit Circle:** All angle measures, and ordered pairs.
- **Vocabulary:**
  - Gradient = Slope
  - Surd = Radical (Square root, cube root, etc.)
  - Indices = Exponents

|                       |
|-----------------------|
| $s = \text{side}$     |
| $l = \text{length}$   |
| $w = \text{width}$    |
| $r = \text{radius}$   |
| $h = \text{height}$   |
| $b_1 = \text{base 1}$ |
| $b_2 = \text{base 2}$ |

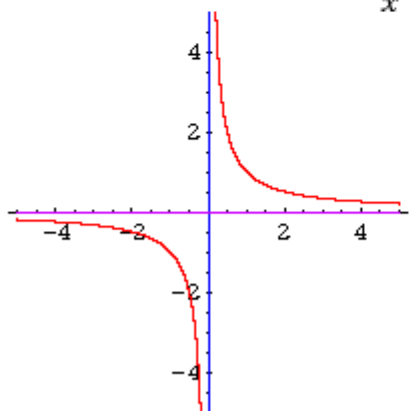
- **Quadratic Graph:**  $y = x^2$



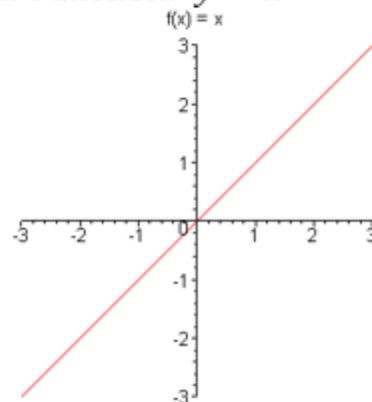
- **Cubic Graph:**  $y = x^3$



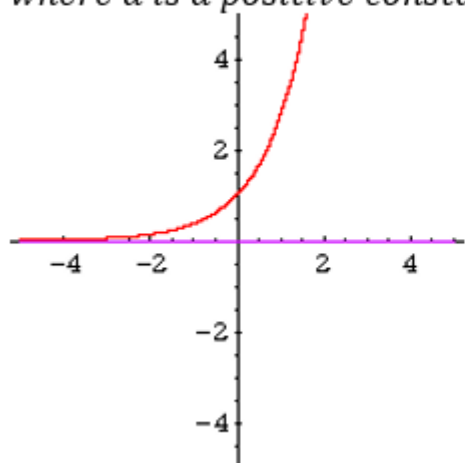
- **Reciprocal Graph:**  $y = \frac{1}{x}$



- **Linear Function:**  $y = x$



- **Exponential Graph:**  $y = a^x$ ,  
where  $a$  is a positive constant



You should be able to name, write the equation, and draw a rough sketch of each

### Answer Key for Selected Problems

1.  $3\sqrt{3}$

3.  $8\sqrt{5}$

5.  $6\sqrt{2}$

7.  $7\sqrt{7}$

9.  $3\sqrt{5}$

11.  $4\sqrt{13}$

13.  $4\sqrt{19}$

15.  $x = -15, 2$

17.  $x = -8, -7$

19.  $x = 10, -2$

21.  $x = 5, -4$

23.  $x = -9, 4$

25.  $x = -\frac{1}{3}, -2$

27.  $x = \frac{1}{3}, 5$

29.  $x = -\frac{1}{3}, -\frac{1}{2}$

31.  $x = -\frac{1}{5}, -\frac{3}{2}$

33.  $x = -1, -\frac{6}{5}$

53.  $y = \frac{7}{3}x + 1$

55.  $y = -\frac{18}{5}x - \frac{29}{5}$

57.  $y = -\frac{14}{31}x - \frac{202}{31}$

59.  $y = -\frac{7}{4}x + \frac{23}{4}$

61.  $y = \frac{27}{13}x - \frac{9}{13}$

2.  $12\sqrt{6}$

4.  $16\sqrt{2}$

6.  $6\sqrt{3}$

8.  $9\sqrt{7}$

10.  $5\sqrt{7}$

12.  $5\sqrt{17}$

14.  $3\sqrt{29}$

16.  $x = 8, -3$

18.  $x = -9, -6$

20.  $x = -8, 4$

22.  $x = -5, -6$

24.  $x = -8, -2$

26.  $x = -1, -\frac{3}{2}$

28.  $x = 1, \frac{2}{7}$

30.  $x = \frac{1}{8}, 1$

32.  $x = \frac{2}{3}, \frac{1}{3}$

34.  $x = \frac{1}{3}, -1$

\*\*\*Answers to #35 – 52 not provided\*\*\*

54.  $y = \frac{4}{7}x + \frac{3}{7}$

56.  $y = \frac{5}{14}x + \frac{379}{14}$

58.  $y = \frac{13}{14}x + \frac{204}{7}$

60.  $y = 3x - 1$

62.  $y = -\frac{16}{23}x + \frac{258}{23}$

\*\*\*Answers to #63 – 70 not provided\*\*\*

71. *midpoint:*  $(\frac{1}{2}, \frac{1}{2})$   
*distance:* 10.30

72. *midpoint:*  $(-\frac{1}{2}, -\frac{1}{2})$   
*distance:* 31.02

73. midpoint:  $(\frac{11}{2}, \frac{27}{2})$   
distance: 33.14

74. midpoint:  $(\frac{3}{2}, 9)$   
distance: 36.62

**\*\*\*Answers to #75 – 82 not provided\*\*\***

83.  $x^{20}y^8$

84.  $4k^4$

85.  $\frac{3v^{15}}{u^{14}}$

86.  $\frac{12}{l^5m^{19}}$

87.  $\frac{8n^8}{75m^6}$

88.  $\frac{s^{15}}{9}$

89.  $\frac{x^{63}z^{48}}{y^{87}}$

90.  $\frac{2}{a^{16}b^{18}c^9}$

91. 1

92.  $-1/2$

93.  $-\frac{\sqrt{3}}{3}$

94.  $\frac{\sqrt{3}}{3}$

95.  $\frac{\sqrt{3}}{2}$

96. -1

97.  $-\frac{\sqrt{2}}{2}$

98. -1

99.  $-\frac{\sqrt{3}}{2}$

100.  $\theta = 135^\circ, 315^\circ$

101.  $\theta = 150^\circ, 210^\circ$

102.  $\theta = 225^\circ, 315^\circ$

103.  $\theta = 60^\circ, 240^\circ$

104.  $\theta = 45^\circ, 315^\circ$

105.  $\theta = 90^\circ$

106.  $\theta = 90^\circ, 270^\circ, 60^\circ, 300^\circ$

107.  $\theta = 0^\circ, 180^\circ, 150^\circ, 330^\circ$

108.  $\theta = 90^\circ, 270^\circ$

109.  $\theta = 0^\circ$

110.  $\theta = 270^\circ$

111. (1, 1)

112. (-1, -4)