Math G180
Blank Lecture Notes
Chapter 1 – Section 1.2

1.2 | Basic Classes of Functions

Slope of a line containing points $A(x_1, y_1)$ and $B(x_2, y_2)$: $slope = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{rise(\uparrow\downarrow)}{run(\leftrightarrow)}$

Equation of a line (**slope-intercept form with *y*-intercept** $(0, b)$ **and slope** m): $y = mx + b$

Equation of a line (**point-slope form with point** (x_1, y_1) **and slope** m): $y - y_1 = m(x - x_1)$

Equation of a line (**standard form; where** $A \neq 0$, $B \neq 0$ **& C are integers**): $Ax + By = C$

Equation of a **horizontal line**: $y = b$

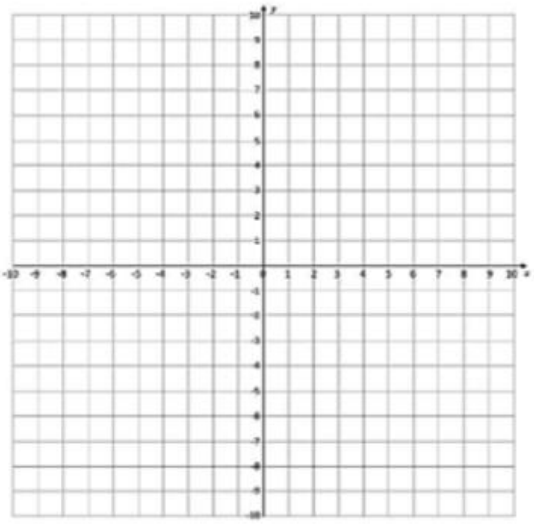
Equation of a **vertical line**: $x = a$

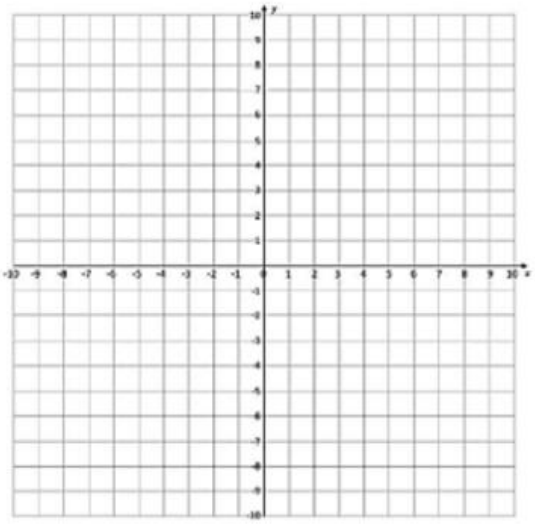
Intercepts: ***x*-intercept** $(a, 0)$ & ***y*-intercept** $(0, b)$

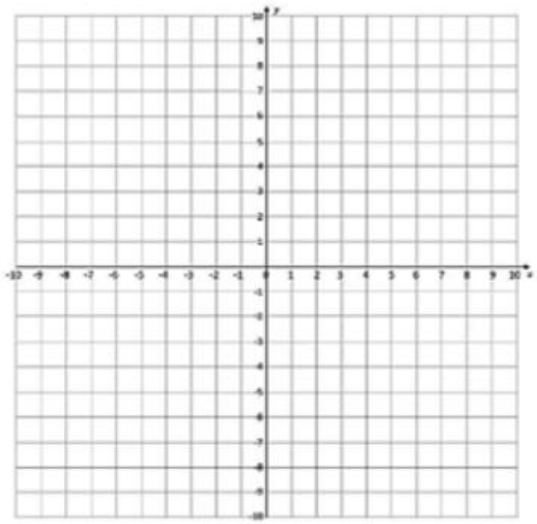
Intercepts	x	y
x-intercept $(a,0)$	a	0
y-intercept $(0,b)$	0	b

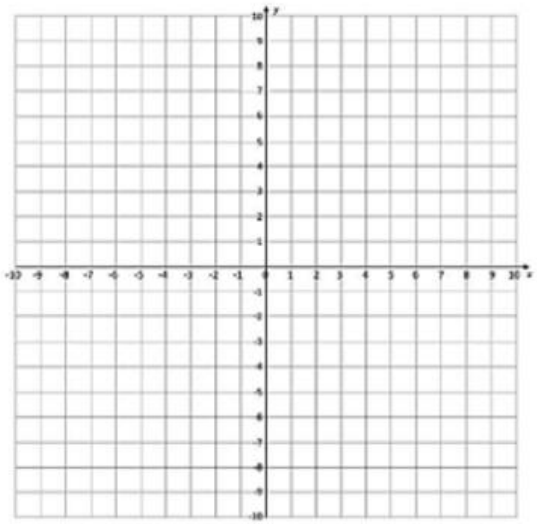
Parallel lines *have the same slope.* (Example: $y = 2x + 1$ & $y = 2x - 3$)

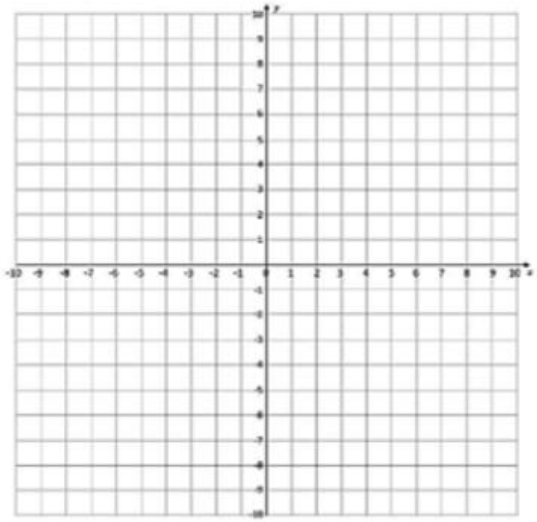
Perpendicular lines: *Slopes have opposite signs and are reciprocals.* (Example: $y = 2x + 1$ & $y = -\frac{1}{2}x - 5$)

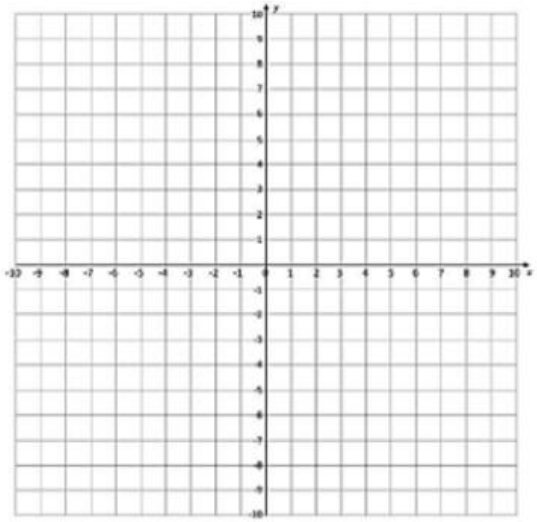


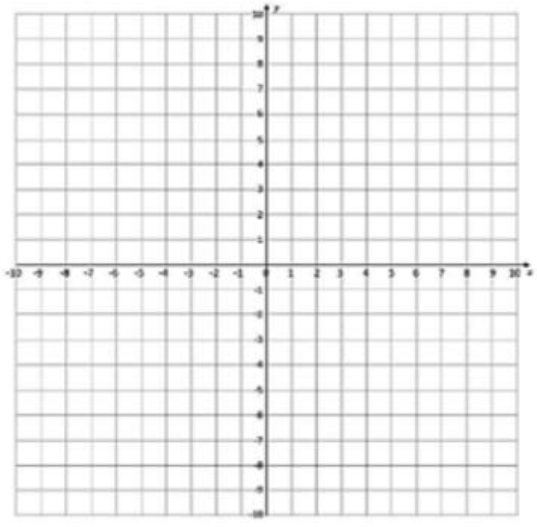


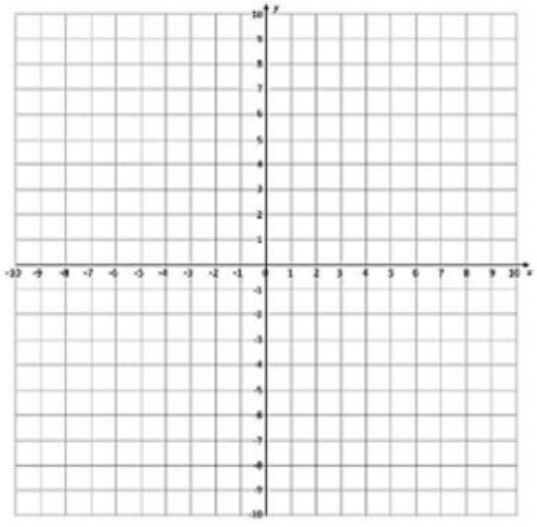












1.2 EXERCISES

For the following exercises, for each pair of points, a. find the slope of the line passing through the points and b. indicate whether the line is increasing, decreasing, horizontal, or vertical.

59. $(-2, 4)$ and $(1, 1)$

60. $(-1, 4)$ and $(3, -1)$

61. $(3, 5)$ and $(-1, 2)$

62. $(6, 4)$ and $(4, -3)$

63. $(2, 3)$ and $(5, 7)$

64. $(1, 9)$ and $(-8, 5)$

65. $(2, 4)$ and $(1, 4)$

66. $(1, 4)$ and $(1, 0)$

For the following exercises, write the equation of the line satisfying the given conditions in slope-intercept form.

67. Slope $= -6$, passes through $(1, 3)$

68. Slope $= 3$, passes through $(-3, 2)$

69. Slope $= \frac{1}{3}$, passes through $(0, 4)$

70. Slope $= \frac{2}{5}$, x-intercept $= 8$

71. Passing through $(2, 1)$ and $(-2, -1)$

72. Passing through $(-3, 7)$ and $(1, 2)$

73. x-intercept $= 5$ and y-intercept $= -3$

74. x-intercept $= -6$ and y-intercept $= 9$

For the following exercises, for each linear equation, a. give the slope m and y-intercept b, if any, and b. graph the line.

75. $y = 2x - 3$

76. $y = -\frac{1}{7}x + 1$

77. $f(x) = -6x$

78. $f(x) = -5x + 4$

79. $4y + 24 = 0$

80. $8x - 4 = 0$

81. $2x + 3y = 6$

82. $6x - 5y + 15 = 0$

For the following exercises, for each polynomial, a. find the degree; b. find the zeros, if any; c. find the y-intercept(s), if any; d. use the leading coefficient to determine the graph's end behavior; and e. determine algebraically whether the polynomial is even, odd, or neither.

83. $f(x) = 2x^2 - 3x - 5$

84. $f(x) = -3x^2 + 6x$

85. $f(x) = \frac{1}{2}x^2 - 1$

86. $f(x) = x^3 + 3x^2 - x - 3$

87. $f(x) = 3x - x^3$

For the following exercises, use the graph of $f(x) = x^2$ to graph each transformed function g.

88. $g(x) = x^2 - 1$

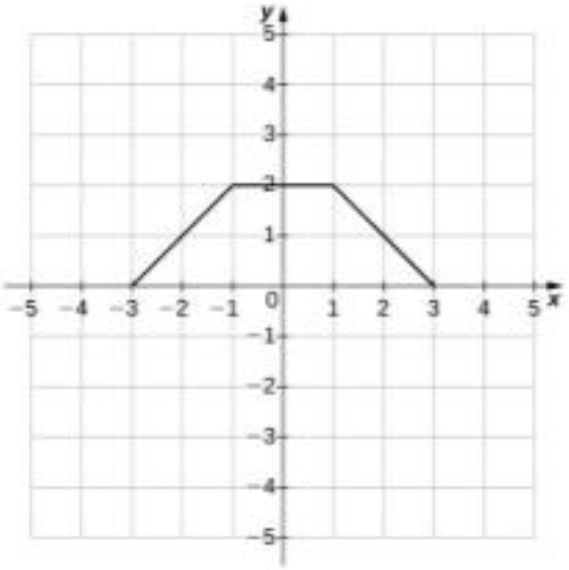
89. $g(x) = (x + 3)^2 + 1$

For the following exercises, use the graph of $f(x) = \sqrt{x}$ to graph each transformed function g.

90. $g(x) = \sqrt{x + 2}$

91. $g(x) = -\sqrt{x} - 1$

For the following exercises, use the graph of $y = f(x)$ to graph each transformed function g.



92. $g(x) = f(x) + 1$

93. $g(x) = f(x - 1) + 2$

For the following exercises, for each of the piecewise-defined functions, a. evaluate at the given values of the independent variable and b. sketch the graph.

94. $f(x) = \begin{cases} 4x + 3, & x \le 0 \\ -x + 1, & x > 0 \end{cases}$; $f(-3)$; $f(0)$; $f(2)$

95. $f(x) = \begin{cases} x^2 - 3, & x < 0 \\ 4x - 3, & x \ge 0 \end{cases}$; $f(-4)$; $f(0)$; $f(2)$

96. $h(x) = \begin{cases} x + 1, & x \le 5 \\ 4, & x > 5 \end{cases}$; $h(0)$; $h(x)$; $h(5)$