U1 L2 Graphs of Equations

Name: _____ HR: _____

Skills: Sketch graphs, find intercepts, test for symmetry, and write equations of circles.

Warm-Up: Prerequisite Skills

You'll use these three skills constantly in this lesson — make sure they're solid before we start.

1. Evaluating by Substitution	*2. The Distance Formula (1.1)*	*3. Solving for y*
Ex: evaluate y = 2x − 3 when x = −1.	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Ex: solve 2x + y = 6 for y.
	Ex: (-4,-1) and (2, 7)	y = 6 − 2x
Your turn — evaluate $y = x^2 - 4$ when x = 3:	Your turn — find the distance between (0, 0) and (3, 4):	Your turn — solve x − y = 4 for y:

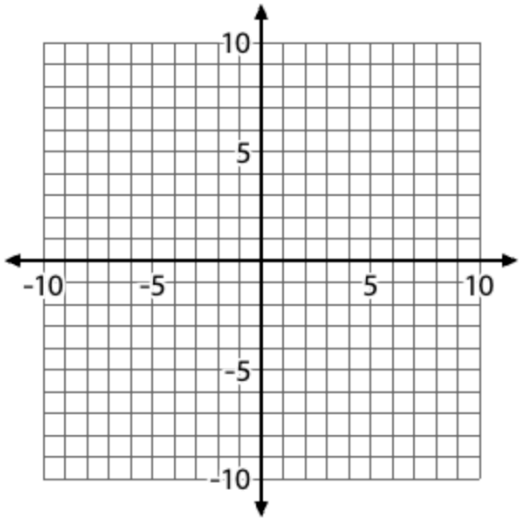
Vocabulary

- solution point — an ordered pair (a, b) that makes an equation true when x = a and y = b
- graph of an equation — the set of all solution points
- intercepts — the points where a graph crosses or touches an axis
- symmetry — x-axis, y-axis, or origin symmetry (see below)
- circle — the set of points a fixed distance r (the radius) from a center (h, k)

Sketching a Graph by Plotting Points

A solution point (a, b) makes the equation true. To sketch a graph:

1. Make a table of x-values.
2. Compute y for each x.
3. Plot the points.
4. Connect with a smooth curve.



Ex: $y = x^2 - 3$

x:	-2	-1	0	1	2
y:					

You try: y = 2x − 1

x:	-1	0	1	2
y:				

x- and y-Intercepts

To find x-intercepts: let y = 0, solve for x.

To find y-intercepts: let x = 0, solve for y.

An x-intercept is written (a, 0). A y-intercept is written (0, b).

Ex: Find the intercepts of $y = x^3 - 4x$.

Let y = 0:

x-intercepts:

Let x = 0:

y-intercept:

You try: Find the intercepts of $y = -x^2 - 5x$.

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Symmetry

Knowing a graph's symmetry means you need only half as many solution points to sketch it.

x-Axis Symmetry	***y-Axis Symmetry***	***Origin Symmetry***
Replace y with −y. If you get an equivalent equation, the graph is symmetric about the x-axis. $x - y^2 = 1$	Replace x with −x. If you get an equivalent equation, the graph is symmetric about the y-axis. $y = x^2 - 2$	Replace x with −x AND y with −y. If you get an equivalent equation, the graph is symmetric about the origin. $x^2 + y^2 = 9$

Ex: Test $y = x^2 - 2$ for symmetry.

You try: Test $y = x^3$ for symmetry.

Circles

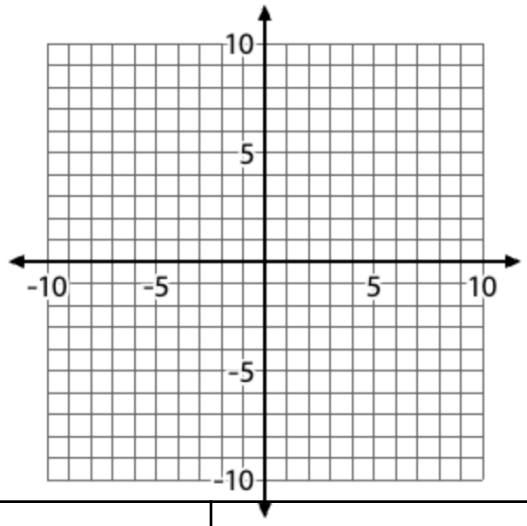
A circle is the set of points (x, y) a fixed distance r from a center (h, k). This comes straight from the Distance Formula:

$$\sqrt{(x-h)^2 + (y-k)^2} = r$$

Squaring both sides gives the standard form:

$$(x-h)^2 + (y-k)^2 = r^2$$

$$(x-2)^2 + (y+3)^2 = 9$$



Ex: center (1, 3), radius 4

You try: center (0, 0), radius 5

Extension: Circle from Center + a Point on It

The point (3, 4) lies on a circle centered at (−1, 2). Use the Distance Formula to find r, then write the standard-form equation.

Application: Maximum Weight

For men in the U.S. Marine Corps, maximum weight y (lb) for height x (in.) is modeled by

$$y = 0.040x^2 - 0.11x + 3.9$$

Use the model to find y when x = 66.

You try: find y when x = 72.

Section 1.2 Summary — Can you...

☐ Sketch a graph by plotting solution points?

☐ Find the x- and y-intercepts of a graph?

☐ Test an equation for symmetry (3 types)?

☐ Write the standard-form equation of a circle?

☐ Use a graph/model to solve a real-life problem?

Formulas at a Glance — Section 1.2

x-int: let y = 0, solve for x

y-int: let x = 0, solve for y

$$(x-h)^2 + (y-k)^2 = r^2$$