Identifying Conics – Circles & Parabolas



There are four kinds of conic sections: *Ellipses, Circles, Hyperbolas,* and *Parabolas*. They are called conics because they are shapes cut out of two cones standing tip-to-tip. Each conic has its own formula and graph. Today, we are going to focus on Circles and Parabolas.

**SECTION A:**

The first step to working with conic sections is being able to identify the conic and its direction. The direction that a conic faces depends entirely on whether *x* or *y* “wins.” Below is a table with examples of the graph and the equation of two of the four conic sections, showing the difference between *x* winning and *y* winning.

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| **Circle***2 squared binomials: added.*

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| *Example:****We are all winners in the circle of math…****So…neither x nor y wins.* |

 | **Parabola***1 squared binomial: either positive or negative.*

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| *Example:****POSITIVE x “wins”…****when the parabola opens* ***right*** *& when the* ***x*** *binomial is* ***not squared,*** *and the* ***squared one is positive.*** | *Example:****POSITIVE y “wins”…****when the parabola opens* ***up*** *& when the* ***y*** *binomial is* ***not squared,*** *and the* ***squared one is positive.*** |
| *Example:****NEGATIVE x “wins”…****when the parabola opens* ***left*** *& when the* ***x*** *binomial is* ***not squared,*** *and the* ***squared one is negative****.* | *Example:****NEGATIVE y “wins”…****when the parabola opens* ***down*** *& when the* ***y*** *binomial is* ***not squared,*** *and the* ***squared one is negative.*** |

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Compare each equation or graph to the table above. Identify the type of conic section and whether *x* or *y* “wins.”

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| 1.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative* | 2.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative* | 3.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative* |
| 4.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative* | 5.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative* | 6.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  |
| 7.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  | 8.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  | 9.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  |
| 10.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  | 11.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  | 12.The conic is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas, circle the “winners” :  *X* or *Y* *Positive* or *negative*  |

**SECTION B:**

Now that you know how to identify conic types, we are going to learn how to identify parts on a conic using the graph.

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| Graph of a Circle is the center point (the point exactly in the middle)***r*** is **radius** (distance from the center to the curve).*Example:* | Graph of a Parabola is the center point (the vertex, in this case)***p*** is the distance **from the center to the focus** (point  inside the parabola)  or **from the center to the directrix** (line outside)*Example:* |

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| 1. | 2. | 3. |
| Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  |
| 4. | 5. | 6. |
| Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  |

**SECTION C:**

The final skill for identifying conic is being able to identify the parts when given an equation.

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| Standard Equation of a Circle ***h*** is always being **subtracted from *x*** ***k*** is always being **subtracted from *y******r*** is the **square root** of the **constant** (the number) on the  right side of the equal sign**.***Example:**h is subtracted from x, so…*  *k is subtracted from y, but there’s nothing there. Normally, we see , or something like it. Here, it’s just . This means we’re working with , and the inside is just y. So…*  *Subtract y from both sides* *The constant on the right side of the equal sign in 100, and r is the square root of the constant, so…*  | Standard Equations of a Parabola OR   ***h*** is always being **subtracted from *x*** ***k*** is always being **subtracted from *y******p*** ***4p*** is always in front of the **non-squared** binomial (if it’s in front of the squared binomial, first multiply by it’s reciprocal to move it)*Example:**h is subtracted from x, so…* *k is subtracted from y, so…* *4p is the number multiplied in front of the* ***non-squared*** *binomial****.*** *So…* |

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| 1. | 2. | 3. |
| Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  |
| 4. | 5. | 6. |
| Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  |
| 7. | 8. | 9. |
| Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  | Conic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_For Parabolas: *X* or *Y*  + or -  *; or*  |