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.*   |  | | --- | | *Example:*    ***We are all winners in the circle of math…***  *So…neither x nor y wins.* | | **Parabola**  *1 squared binomial: either positive or negative.*   |  |  | | --- | --- | | *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.*** | |

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:* |

|  |  |  |
| --- | --- | --- |
| 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* |