LESSON MAKER PRO

Conic Clues

Classify curves from their equations

HIGH SCHOOL · PC.CS.1.5

PC.CS.1.5 "Given the equation $ax^2 + by^2 + cx + dy + e = 0$, determine if the equation represents a circle, ellipse, parabola, or hyperbola."

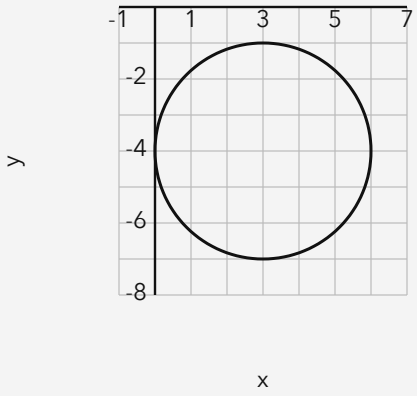
NAME _____ **DATE** _____

COMPARE THE SQUARES

First, write the equation equal to 0. Equal nonzero coefficients of x^2 and y^2 indicate a circle, unequal coefficients with the same sign indicate an ellipse, opposite signs indicate a hyperbola, and only one squared term indicates a parabola.

WORKED EXAMPLE

Use the equation to classify the graphed path: $x^2 + y^2 - 6x + 8y + 16 = 0$.



1. The coefficients of x^2 and y^2 are both 1.
2. They are equal and nonzero.
3. Check the curve: $(x - 3)^2 + (y + 4)^2 = 9$.

Answer: Circle

PRACTICE 4 problems

1 Classify $4x^2 + 4y^2 - 12x + 20y + 9 = 0$.

ANSWER _____

2 Classify $3x^2 + 7y^2 - 6x + 14y - 11 = 0$.

ANSWER _____

3 Classify $5x^2 - 2y^2 + 10x + 8y - 1 = 0$.

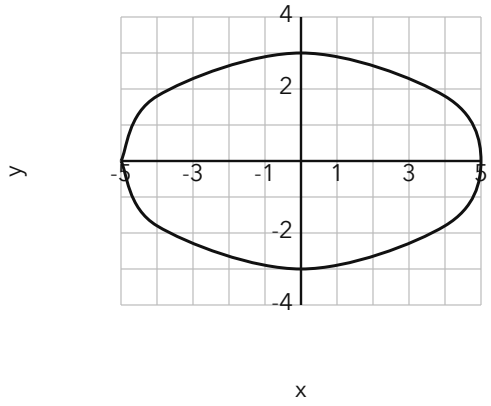
ANSWER _____

4 Classify $6y^2 + 12x - 18y + 3 = 0$.

ANSWER _____

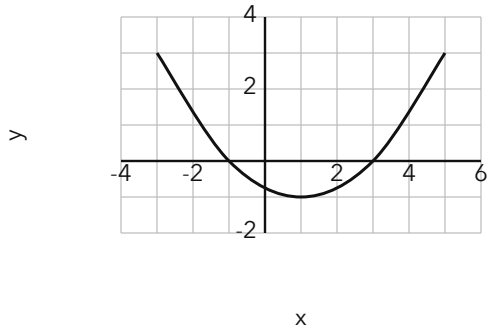
APPLY IT Show your work

1 A drone show traces the graphed path. Use its equation, $9x^2 + 25y^2 - 225 = 0$, to classify the path.



ANSWER _____

2 A skate park ramp has the graphed cross section. Use its equation, $x^2 - 2x - 4y - 3 = 0$, to classify the curve.



ANSWER _____

CHALLENGE One step up

Classify $7x^2 + 5y^2 - 2x + 6y - 1 = 12x^2$. Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Conic Clues

HIGH SCHOOL · PC.CS.1.5

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Classify $4x^2 + 4y^2 - 12x + 20y + 9 = 0$.	**Circle**
2	Classify $3x^2 + 7y^2 - 6x + 14y - 11 = 0$.	**Ellipse**
3	Classify $5x^2 - 2y^2 + 10x + 8y - 1 = 0$.	**Hyperbola**
4	Classify $6y^2 + 12x - 18y + 3 = 0$.	**Parabola**

PART 2 · APPLY IT

1. **Ellipse** The squared-term coefficients, 9 and 25, are positive and unequal.
2. **Parabola** The equation has an x^2 term but no y^2 term.

CHALLENGE

Hyperbola. Subtracting $12x^2$ gives $-5x^2 + 5y^2 - 2x + 6y - 1 = 0$, so the squared-term coefficients have opposite signs.

Accept conic names alone for Parts 1 and 2. For the challenge, require the student to move the squared term before comparing signs.