LESSON MAKER PRO

Turns and Intercepts

Read what a polynomial graph reveals

HIGH SCHOOL · A2.F.1.5

A2.F.1.5 "Analyze the graph of a polynomial function by identifying the domain, range, intercepts, zeros, relative maxima, relative minima, and intervals of increase and decrease."

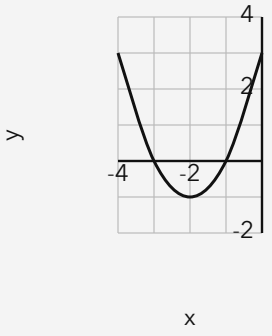
NAME _____ DATE _____

READ THE CURVE

Zeros are the x-values where a graph meets the x-axis. A relative maximum is a high turning point, and a relative minimum is a low turning point. Read intervals of increase and decrease from left to right; the domain lists possible x-values, and the range lists possible y-values.

WORKED EXAMPLE

The curve continues beyond the grid in both directions. Find its zeros, relative minimum, and intervals of decrease and increase.



1. The graph meets the x-axis at x = -3 and x = -1.
2. Its low turning point is (-2, -1).
3. Moving right, the graph falls until x = -2, then rises.

Answer: Zeros: -3, -1. Relative minimum: (-2, -1). Decreasing: (-infinity, -2). Increasing: (-2, infinity).

PRACTICE 4 problems

1 Find the zeros of $f(x) = (x - 4)(x - 6)$.

ANSWER _____

2 Find the relative maximum and range of $g(x) = -(x + 3)^2 + 5$.

ANSWER _____

3 Find the y-intercept and zeros of $h(x) = x^2 + 2x - 8$.

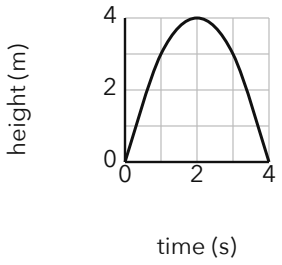
ANSWER _____

4 Find the domain and interval of decrease of $j(x) = (x - 5)^2 - 7$.

ANSWER _____

APPLY IT Show your work

1 The graph shows a basketball's height from release to landing. When is the ball highest, what is its height, and when does it land?



ANSWER _____

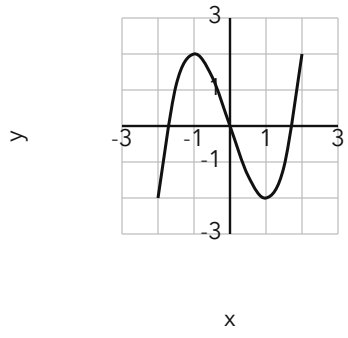
2 A school concert's revenue, in hundreds of dollars, is $R(x) = -x^2 + 8x$ for ticket price x dollars, where $0 <= x <= 8$. What price gives the greatest revenue, and how much is it?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The curve continues beyond the grid in both directions. Identify both relative extrema and the interval where the graph decreases.



WORK SPACE AND ANSWER

ANSWER KEY

Turns and Intercepts

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the zeros of $f(x) = (x - 4)(x - 6)$.	**4 and 6**
2	Find the relative maximum and range of $g(x) = -(x + 3)^2 + 5$.	**Relative maximum: (-3, 5). Range: y <= 5.**
3	Find the y-intercept and zeros of $h(x) = x^2 + 2x - 8$.	**Y-intercept: (0, -8). Zeros: -4 and 2.**
4	Find the domain and interval of decrease of $j(x) = (x - 5)^2 - 7$.	**Domain: all real numbers. Decreasing: (-infinity, 5).**

PART 2 · APPLY IT

1. **Highest at 2 seconds, at a height of 4 meters. It lands at 4 seconds.** Read the maximum at (2, 4). The landing time is the right-hand zero, $x = 4$.
2. **$4 per ticket; $1,600 in revenue.** The maximum occurs at $x = -8/(2 \times -1) = 4$. Then $R(4) = 16$, or $1,600.

CHALLENGE

Relative maximum: (-1, 2). Relative minimum: (1, -2). Decreasing: (-1, 1).

Accept equivalent interval notation. For the practice problems, students may state zeros as x-intercepts with coordinates.