Reading a Graph: The Behaviors

One checklist for any graph: intercepts, increasing or decreasing, positive or negative, maximum and minimum, end behavior. Read left to right and say where with an inequality.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Intercept	Where the graph crosses an axis.	Find both kinds and say what each means in the story.
x-intercept	Where the graph crosses the x-axis. The output is 0 there.	Read the x value. In a story it is often when something reaches zero: lands, empties, breaks even.
y-intercept	Where the graph crosses the y-axis. The input is 0 there, so it is the starting value.	Read the y value. In a story it is the amount at the start.
Increasing	Climbing as you read left to right.	Say where with an inequality: increasing when $3 < x < 15$.
Decreasing	Falling as you read left to right.	Say where with an inequality.
Positive	Above the x-axis: the output is more than 0.	Say where. A graph can be climbing and still be negative.

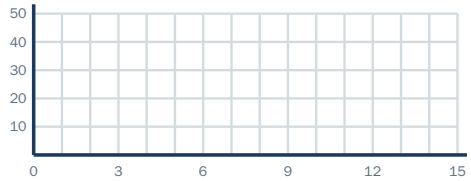
Part A Match the word to its plain English

Draw a line from each math word to what it means.

x-intercept	the highest point
y-intercept	where the output is 0, crossing the x-axis
increasing	above the x-axis
positive	what happens at the far ends
maximum	climbing, left to right
end behavior	the starting value, crossing the y-axis

Part B The checklist on a described graph

A graph of a kite's height (y, feet) against time (x, minutes) starts at (0, 0), climbs to (6, 50), dips to (9, 30), climbs to (12, 45), and lands at (15, 0). Sketch it, then run the checklist.



1. Intercepts and meaning:

2. Increasing when: Decreasing when:

3. Positive when: Negative when:

4. Maximum: Minimum:

Part C Increasing is not positive

A submarine's depth (y, feet above sea level) against time (x, minutes): from (0, 0) down to (5, –300), up to (12, –100), up to (15, 0).

1. Increasing when:

2. Negative when:

3. Where is it both increasing and negative? What is the submarine doing then?

Part D End behavior

Say each one plainly, then with the word infinity.

1. A line that keeps climbing to the right.

2. A curve that keeps falling to the right.

3. A curve that flattens out toward the x-axis on the right.

Part E Read a real record

Outdoor temperature: 65 degrees at midnight (x = 0), falling to 50 at 3 a.m. (x = 3), climbing to 80 at 3 p.m. (x = 15), falling back to 65 at midnight (x = 24).

1. y-intercept and meaning:

2. Minimum and maximum, with x and y:

3. Increasing when: Decreasing when:

4. Is it ever negative? Are there x-intercepts? Why?

Part F Exit ticket

1. A diver's height above water: from (0, 3) down through the axis at x = 1 to (2, –4), back to the axis at x = 3. Decreasing when? Negative when? Both increasing and negative when?

Answer key

Part A. x-intercept: output 0, crosses the x-axis. y-intercept: the starting value. Increasing: climbing. Positive: above the x-axis. Maximum: highest point. End behavior: the far ends.

Part B. x-intercepts (0, 0) and (15, 0): on the ground at launch and landing; y-intercept (0, 0): starts on the ground. Increasing when $0 < x < 6$ and $9 < x < 12$; decreasing when $6 < x < 9$ and $12 < x < 15$. Positive when $0 < x < 15$; never negative. Maximum (6, 50); minimum (0, 0) and (15, 0), on the ground.

Part C. Increasing when $5 < x < 15$. Negative when $0 < x < 15$. Both when $5 < x < 15$: rising toward the surface but still underwater.

Part D. 1. Keeps climbing; as x goes to infinity, y goes to infinity. 2. Keeps falling; as x goes to infinity, y goes to negative infinity. 3. Levels off; as x goes to infinity, y goes to 0.

Part E. y-intercept (0, 65): 65 degrees at midnight. Minimum (3, 50), maximum (15, 80). Increasing when $3 < x < 15$; decreasing when $0 < x < 3$ and $15 < x < 24$. Never negative, no x-intercepts: the temperature never reaches 0.

Part F. Decreasing when $0 < x < 2$. Negative when $1 < x < 3$. Both when $2 < x < 3$.