Reading the Graph

y-intercept (0, a). Domain all reals. Range y greater than 0. Asymptote y = 0, never touched. End behavior at both ends. Match by elimination: b then a.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
y-intercept	Where the curve crosses the y-axis: (0, a).	Read a off the equation, or read the crossing off the graph.
Domain	All the x values you can put in: for an exponential, all real numbers.	The curve never ends left or right.
Range	All the y values that come out: y greater than 0 when a is positive.	Never 0, never negative.
Asymptote	A line the graph gets closer and closer to without touching. Here, y = 0.	Walk the table left (growth) or right (decay) and watch the outputs shrink.
End behavior	What the graph does at the far right and far left.	Say it plainly, then as x goes to infinity or negative infinity.
Increasing, decreasing	Goes up from left to right (b above 1), or goes down (b between 0 and 1).	Decided by b.

Part A Key features from the equation

EQUATION	Y-INTERCEPT	INC. OR DEC.	ASYMPTOTE	DOMAIN	RANGE
$y = 5 \cdot 2^x$					
$y = 40 \cdot 0.25^x$					
$y = 3^x$					
$y = 9 \cdot 0.5^x$					

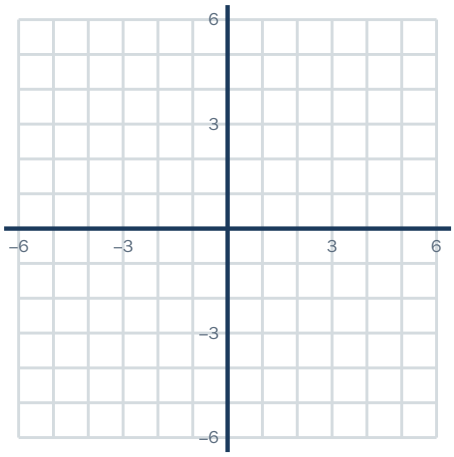
Part B End behavior, plain then math

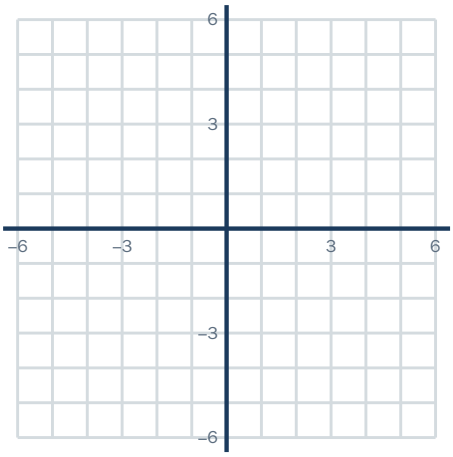
1. $y = 3 \cdot 4^x$: far right? far left?

2. $y = 9 \cdot 0.5^x$: far right? far left?

Part C Sketch and label

Sketch $y = 2 \cdot 2^x$ on the left grid and $y = 8 \cdot 0.5^x$ on the right (x from -3 to 3, each square is 1; y from 0 to 12 counting by 2, so a square is 2 up). Mark the y-intercept and draw the asymptote dashed.





Part D Why never zero?

1. Explain why $y = 2 \cdot 3^x$ never equals 0, even far to the left.

Part E Match by elimination

Four graphs: A climbs and crosses at 1. B falls and crosses at 3. C climbs and crosses at 3. D falls and crosses at 1. Write the letter and the two looks you used.

EQUATION	LOOK 1: DIRECTION (B)	LOOK 2: CROSSING (A)	GRAPH
$y = 3 \cdot 0.8^x$			
$y = 2^x$			
$y = 3 \cdot 1.5^x$			
$y = 0.5^x$			

Part F Exit ticket

1. $y = 7 \cdot 3^x$: y-intercept, asymptote, increasing or decreasing?

2. End behavior of $y = 10 \cdot 0.5^x$, plainly and in math words.

Answer key

Part A. (0, 5), increasing, $y = 0$, all reals, $y > 0$. (0, 40), decreasing, $y = 0$, all reals, $y > 0$. (0, 1), increasing, $y = 0$, all reals, $y > 0$. (0, 9), decreasing, $y = 0$, all reals, $y > 0$.

Part B. 1. Right: huge, y goes to infinity. Left: close to 0, y goes to 0. 2. Right: close to 0. Left: huge.

Part C. Left: through (0, 2), (1, 4), (2, 8), flattening left. Right: through (0, 8), (1, 4), (2, 2), (3, 1), flattening right. Dashed line along the x-axis on both.

Part D. Positive times positive is positive; each step left divides by 3 and never reaches 0.

Part E. B (falls, 3). A (climbs, 1). C (climbs, 3). D (falls, 1).

Part F. 1. (0, 7); $y = 0$; increasing. 2. Right: close to 0 (as x goes to infinity, y goes to 0). Left: huge (as x goes to negative infinity, y goes to infinity).