

Approach the Answer

Read tables and graph behavior to estimate limits.

HIGH SCHOOL • MA.912.C.1.1

MA.912.C.1.1 "Demonstrate understanding of the concept of a limit and estimate limits from graphs and tables of values."

NAME _____

DATE _____

LIMITS FROM NEARBY VALUES

The limit of $f(x)$ as x approaches a is the y -value that $f(x)$ gets close to when x is near a . Check values or graph behavior from both the left and the right. If both sides approach the same value, that value is the limit. If they approach different values, the limit does not exist.

WORKED EXAMPLE

Use the table to estimate $\lim_{x \rightarrow 12} f(x)$. x : 11.8, 11.98, 12.02, 12.2. $f(x)$: 4.8, 4.98, 5.02, 5.2.

1. As x approaches 12 from the left, $f(x)$ approaches 5.
2. As x approaches 12 from the right, $f(x)$ approaches 5.
3. Both sides approach the same value.

Answer: $\lim_{x \rightarrow 12} f(x) = 5$

PRACTICE 6 problems

- 1** Use the table to estimate $\lim_{x \rightarrow 2} f(x)$. x : 1.7, 1.97, 2.03, 2.3. $f(x)$: 8.5, 8.95, 9.05, 9.5.

ANSWER _____

- 2** A graph has an open circle at $(4, -6)$. The curve approaches that open circle from both sides. Estimate $\lim_{x \rightarrow 4} f(x)$.

ANSWER _____

- 3** Use the table to determine whether $\lim_{x \rightarrow -1} f(x)$ exists. x : -1.3, -1.03, -0.97, -0.7. $f(x)$: 2.6, 2.96, -3.04, -3.4.

ANSWER _____

- 4** A graph has a filled point at $(3, -2)$, but the curve from both sides approaches an open circle at $(3, 7)$. Estimate $\lim_{x \rightarrow 3} f(x)$.

ANSWER _____

- 5** Use the table to estimate $\lim_{x \rightarrow 0} f(x)$. x : -0.4, -0.04, 0.04, 0.4. $f(x)$: -1.2, -1.02, -0.98, -0.8.

ANSWER _____

- 6** On a graph, the y -values approach 10 as x approaches 6 from the left and from the right. The function is undefined at $x = 6$. Estimate $\lim_{x \rightarrow 6} f(x)$.

ANSWER _____

APPLY IT Show your work

- 1** A fitness app models a cyclist's speed, $S(t)$, in miles per hour near $t = 9$ seconds. Its table shows t : 8.7, 8.97, 9.03, 9.3 and $S(t)$: 17.4, 17.94, 18.06, 18.6. Estimate $\lim_{t \rightarrow 9} S(t)$.

WORK SPACE

ANSWER _____

- 2** A game studio tests a bonus meter $B(s)$ near a difficulty setting of $s = 8$. Its table shows s : 7.7, 7.97, 8.03, 8.3 and $B(s)$: 3.7, 3.97, 6.03, 6.3. Does $\lim_{s \rightarrow 8} B(s)$ exist?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Use the table to estimate $\lim_{x \rightarrow -4} f(x)$, then explain why the value $f(-4)$ does not change your answer. x : -4.2, -4.02, -4, -3.98, -3.8. $f(x)$: 1.1, 1.01, 30, 0.99, 0.9.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the table to estimate $\lim_{x \rightarrow 2} f(x)$. x: 1.7, 1.97, 2.03, 2.3. f(x): 8.5, 8.95, 9.05, 9.5.	9
2	A graph has an open circle at (4, -6). The curve approaches that open circle from both sides. Estimate $\lim_{x \rightarrow 4} f(x)$.	-6
3	Use the table to determine whether $\lim_{x \rightarrow -1} f(x)$ exists. x: -1.3, -1.03, -0.97, -0.7. f(x): 2.6, 2.96, -3.04, -3.4.	DNE
4	A graph has a filled point at (3, -2), but the curve from both sides approaches an open circle at (3, 7). Estimate $\lim_{x \rightarrow 3} f(x)$.	7
5	Use the table to estimate $\lim_{x \rightarrow 0} f(x)$. x: -0.4, -0.04, 0.04, 0.4. f(x): -1.2, -1.02, -0.98, -0.8.	-1
6	On a graph, the y-values approach 10 as x approaches 6 from the left and from the right. The function is undefined at $x = 6$. Estimate $\lim_{x \rightarrow 6} f(x)$.	10

PART 2 · APPLY IT

- 18 mph** The speeds from times just below and just above 9 seconds both approach 18. Therefore, $\lim_{t \rightarrow 9} S(t) = 18$ mph.
- DNE** As s approaches 8 from the left, $B(s)$ approaches 4. As s approaches 8 from the right, $B(s)$ approaches 6, so the two-sided limit does not exist.

CHALLENGE

$\lim_{x \rightarrow -4} f(x) = 1$ because the values near -4 approach 1 from both sides, even though $f(-4) = 30$.

Accept "does not exist" in place of DNE. For limit questions, accept the numerical value with or without limit notation, and accept the unit in the first word problem when it is included.