Limits: 3 Versions

There are three different versions of this limit worksheet which will allow you to differentiate this activity in different ways.

One possibility is to run each version off on a different color of paper. Give your weakest students version 1, your strongest students version 2 and the middle group version 3. After they have each worked on their respective versions for about 10 minutes, then have the students form groups of 3, where each member of the group has a different color of paper. This will allow them to check their answers and discuss their reasoning and correct any bad notation.

A second possibility is to re-visit the activity at three different times during the school year. Give version 1 first and then a few weeks later you can give version 2 and then after another period of time, give the students version 2. This will allow you to provide scaffolding for a challenging concept.

Another possibility is to have students produce graphs to illustrate each situation.

This activity addresses MPAC 1 (definitions and theorems), MPAC 2 (connecting concepts), MPAC 4 (multiple representations) and MPAC 5 (notations fluency).

Have fun with this and consider ways to adapt this type of activity to other topics you will be covering.

Dixie

Limits: Version 1

Match each of the limit statements on the left with the corresponding description of the graph on the right.

1. $\lim_{x \to \infty} f(x) = 2$

2. $\lim_{x \to 2+} f(x) \neq \lim_{x \to 2-} f(x)$

3. $\lim_{x \to 2-} f(x) = -\infty$

4. $\lim_{x \to 4} f(x) \neq f(4)$

5. $\lim_{x \to 4+} f(x) = \infty$

6. $\lim_{x \to -\infty} f(x) = 4$

7. $\lim_{x \to 2} \frac{f(x)-f(2)}{x-2} = 4$

8. $\lim_{x \to 2+} f'(x) \neq \lim_{x \to 2-} f'(x)$

A. The function is not differentiable at $x = 2$

B. There is a vertical asymptote at $x = 2$

C. There is a horizontal asymptote at $y = 4$

D. The slope of $f(x)$ at $x = 2$ is 4.

E. There is a point discontinuity at $x = 4$

F. There is a horizontal asymptote at $y = 2$

G. There is a jump discontinuity at $x = 2$

H. There is a vertical asymptote at $x = 4$

Limits: Version 2

Write a limit statement for each of the descriptions on the right.

For example, $\lim_{x\to\infty} f(x) = 4$ indicates that there is a horizontal asymptote located at $y = 4$.

1. _____ A. The function is not differentiable at $x = 2$

2. _____ B. There is a vertical asymptote at $x = 2$

3. _____ C. There is a horizontal asymptote at $y = 4$

4. _____ D. The slope of $f(x)$ at $x = 2$ is 4.

5. _____ E. There is a point discontinuity at $x = 4$

6. _____ F. There is a horizontal asymptote at $y = 2$

7. _____ G. There is a jump discontinuity at $x = 2$

8. _____ H. There is a vertical asymptote at $x = 4$

Limits: Version 3

For each of the limit statements on the left, write a description of the graphical feature.

For example, $\lim_{x\to\infty} f(x) = 4$ indicates that there is a horizontal asymptote located at $y = 4$.

1. $\lim_{x\to\infty} f(x) = 2$

2. $\lim_{x\to 2+} f(x) \neq \lim_{x\to 2-} f(x)$

3. $\lim_{x\to 2-} f(x) = -\infty$

4. $\lim_{x\to 4} f(x) \neq f(4)$

5. $\lim_{x\to 4+} f(x) = \infty$

6. $\lim_{x\to-\infty} f(x) = 4$

7. $\lim_{x\to 2} \frac{f(x)-f(2)}{x-2} = 4$

8. $\lim_{x\to 2+} f'(x) \neq \lim_{x\to 2-} f'(x)$

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____