

Name Key

Date: _____

Graph the following piecewise functions & determine the characteristics:

1. $h(x) = \begin{cases} -2x-6, & x < -3 \\ x-2, & x \geq -3 \end{cases}$

Increasing:

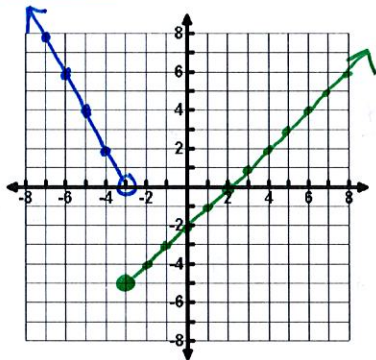
$(-3, \infty)$

Decreasing:

$(-\infty, -3)$

Point of Discontinuity:

$x = -3$



2. $h(x) = \begin{cases} (x+1)^2 - 2, & x < 1 \\ x+1, & x \geq 1 \end{cases}$

Domain:

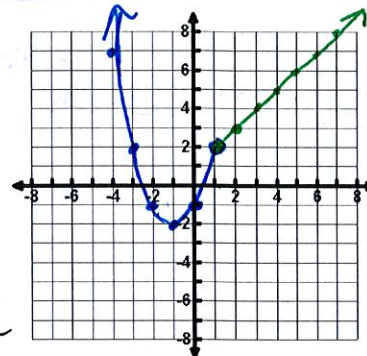
\mathbb{R}

Range:

$[-2, \infty)$

Point of Discontinuity:

None



3. $f(x) = \begin{cases} -x^2+2, & x < 1 \\ 2x+1, & x \geq 1 \end{cases}$

Domain:

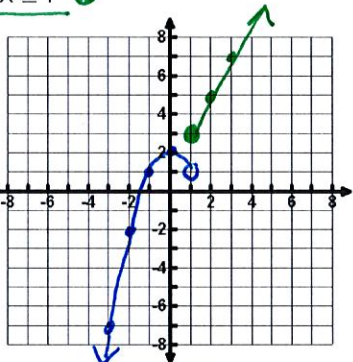
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Range:

$(-\infty, 2] \cup [3, \infty)$

Point of Discontinuity:

$x = 1$



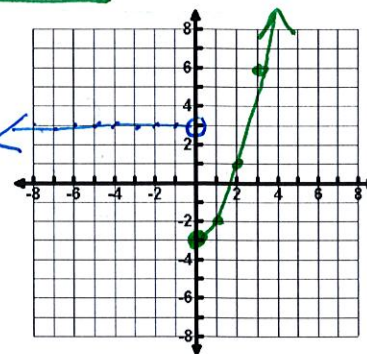
4. $f(x) = \begin{cases} 3, & x < 0 \\ x^2-3, & x \geq 0 \end{cases}$

Constant:

$(-\infty, 0)$

Increasing:

$(0, \infty)$



5. $f(x) = \begin{cases} \frac{1}{2}x & x < 4 \\ -x+3 & x \geq 4 \end{cases}$

Increasing:

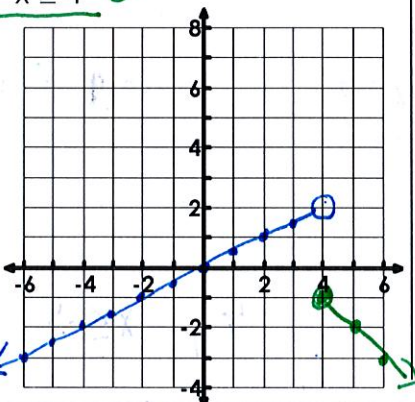
$(-\infty, 4)$

Decreasing:

$(4, \infty)$

Point of Discontinuity:

$x = 4$



6. $f(x) = \begin{cases} -x+3 & x \leq -1 \\ 2x & -1 < x \leq 3 \\ 5 & x > 3 \end{cases}$

Increasing:

$(-1, 3)$

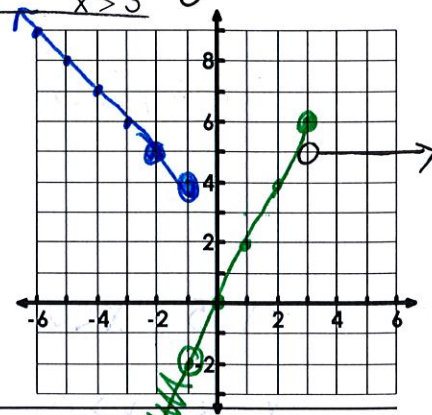
Decreasing:

$(-\infty, -1)$

Constant:

$(3, \infty)$

Point of Discontinuity: $x = -1$
 $x = 3$



Evaluate using the indicated function.

$f(x) = \begin{cases} x^2, & x > -1 \\ x-2, & x \leq -1 \end{cases}$

$g(x) = \begin{cases} 2x, & x \leq -3 \\ 3x-1, & x > -3 \end{cases}$

$h(x) = \begin{cases} |x|-2, & x \geq 0 \\ |x-2|, & x < 0 \end{cases}$

7. $f(4) = (4)^2 = 16$

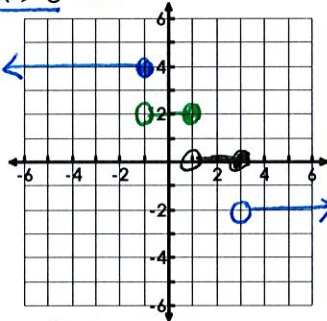
8. $g(-3) = 2(-3) = -6$

9. $h(3) = |3|-2 = 1$

10. Graph: $f(x) = \begin{cases} 4 & x \leq -1 \\ 2 & -1 < x \leq 1 \\ 0 & 1 < x \leq 3 \\ -2 & x > 3 \end{cases}$

Range: $\{-2, 0, 2, 4\}$
 $\{0\} \cup \{2\} \cup \{4\}$

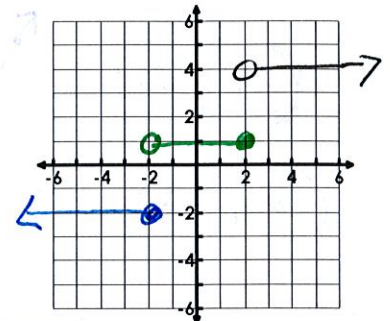
Constant:
 $(-\infty, \infty)$



11. Graph: $f(x) = \begin{cases} -2 & x \leq -2 \\ 1 & -2 < x \leq 2 \\ 4 & x > 2 \end{cases}$

Range: $\{-2, 1, 4\}$

Point of Discontinuity:
 $x = -2$ $x = 2$



12. Your parents are giving you money based on the number of points you score in the basketball game.

- Up to 7 points: No money
- More than 7 points up to 15 points: \$10
- More than 15 points: \$20

Write a piecewise function to show the money based on points.

$$f(x) = \begin{cases} 0, & x \leq 7 \\ 10, & 7 < x \leq 15 \\ 20, & x > 15 \end{cases}$$

13. When a diabetic takes long-acting insulin, the insulin reaches its peak effect on the blood sugar level in about three hours. This effect remains fairly constant for 5 hours, then declines, and is very low until the next injection. In a typical patient, the level of insulin might be modeled by the following function on the right.

$$f(t) = \begin{cases} 40t + 100 & 0 \leq t \leq 3 \\ 220 & 3 < t \leq 8 \\ -80t + 860 & 8 < t \leq 10 \\ 60 & 10 < t \leq 24 \end{cases}$$

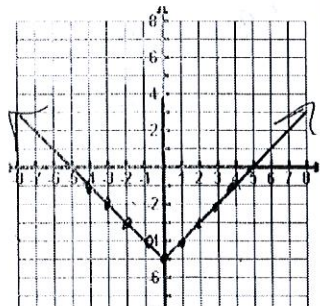
Here, $f(t)$ represents the blood sugar level at time t hours after the time of the injection. If a patient takes insulin at 6 am, find the blood sugar level at each of the following times.

- a. 7 am $f(1) = 140$ b. 11 am $f(5) = 220$ c. 3 pm $f(9) = 140$ d. 5 pm $f(11) = 60$

Given the graph, determine the piecewise function (include the domain restriction):

14.

$$f(x) = \begin{cases} -x - 5, & x < 0 \\ x - 5, & x \geq 0 \end{cases}$$



15.

$$f(x) = \begin{cases} 4, & x \leq -5 \\ 1, & -5 < x \leq 4 \\ -2, & x > 4 \end{cases}$$

