Topic: Domain and range

Question: What is the domain and range of the set?

$(3,4)$

$(4,1)$

$(5,2)$

$(7,1)$

Answer choices:

A	The domain is $3, 4, 5, 7$	The range is $1, 2, 4$
B	The domain is $3, 7$	The range is $1, 4$
C	The domain is $3, 4, 5, 7$	The range is $1, 1, 2, 4$
D	None of these	

Solution: A

Remember that coordinate points are given in the form (x, y).

Since the domain of a set is all of the x-values, we can say that the domain of this set includes

$$3,\ 4,\ 5,\ 7$$

The range of a set is all of the y-values, so we can say that the range of this set includes

$$4,\ 1,\ 2,\ 1$$

We don't need to include the same value more than once, so we'll list 1 only once, and rearrange the set so that the values are in ascending order. The range is

$$1,\ 2,\ 4$$

Topic: Domain and range

Question: What is the domain and range of the function?

$$f(x) = \frac{2}{x}$$

Answer choices:

A Domain $(-\infty,2) \cup (2,\infty)$ Range $(-\infty,2) \cup (2,\infty)$

B Domain $(-\infty,0) \cup (0,\infty)$ Range $(-\infty,0) \cup (0,\infty)$

C Domain $(-\infty,0) \cup (0,\infty)$ Range $(-\infty,2) \cup (2,\infty)$

D Domain $(-\infty,2) \cup (2,\infty)$ Range $(-\infty,0) \cup (0,\infty)$

Solution: B

The domain of a function is all of the x-values where the function exists. The range of a function is all of the y-values where the function exists. To solve for the domain and range of a function, we look for any places where the function does not exist. This can happen if there's a variable in the denominator of a rational function, if a radical has a negative sign under it and if a logarithmic function has an argument equal to or less than zero.

The function

$$f(x) = \frac{2}{x}$$

can't exist when $x = 0$, because functions don't exist when a zero is in the denominator of a rational function. For this function, there will be a vertical asymptote at $x = 0$, but otherwise the domain of the function will span the entire set of real numbers. This means the domain of the function is $(-\infty,0) \cup (0,\infty)$.

To solve for the range of the function, we need to look for y-values where the function does and does not exist. There's a discontinuity at $y = 0$ since the function can't be solved at $y = 0$.

To find the rest of the range we can use points approaching $x = 0$ since we know that point is a discontinuity.

When $x = -\frac{1}{10}$ $\qquad y = \frac{2}{-\frac{1}{10}} = -20$

When $x = -\frac{1}{1{,}000}$ $\quad y = \frac{2}{-\frac{1}{1{,}000}} = -2{,}000$

This means that y is approaching $-\infty$.

When $x = \frac{1}{10}$ $\quad y = \frac{2}{\frac{1}{10}} = 20$

When $x = \frac{1}{1{,}000}$ $\quad y = \frac{2}{\frac{1}{1{,}000}} = 2{,}000$

This means that y is approaching ∞. This means the range of the function is $(-\infty, 0) \cup (0, \infty)$.