Domain and Range in Context { 5.3 }

Secondary Math II Notes

OBJECTIVE: Graph functions in algebraic form to help determine the domain and range. Determine an appropriate set of numbers for the domain and range of a function in a specific context.

Graphing to Determine Domain and Range

Graph each function on your calculator. Write the domain and range below in ***interval notation***.

$f(x)=3x+4$ Domain: $(-\infty,\infty)$ Range: $(-\infty,\infty)$	$f(x)=x^2$ Domain: $(-\infty,\infty)$ Range: $[0,\infty)$	$f(x)=2^x$ Domain: $(-\infty,\infty)$ Range: $(0,\infty)$
$f(x)=-2x^2+11$ Domain: $(-\infty,\infty)$ Range: $(-\infty,11]$	$f(x)=x^2-9$ Domain: $(-\infty,\infty)$ Range: $[-9,\infty)$	$f(x)=\frac{1}{x+3}$ Domain: $(-\infty,-3)\cup(-3,\infty)$ Range: $(-\infty,0)\cup(0,\infty)$

Graph each function on your calculator. Write the domain and range below in ***set notation or interval notation.***

$f(x)=\frac{1}{3}x-2$ Domain: *All Real Numbers* Range: $\{y \mid y\in\Re\}$	$f(x)=3^x+2$ Domain: *All Real Numbers* Range: $\{y \mid y>2\}$	$f(x)=6$ Domain: *All Real Numbers* Range: $\{6\}$
$f(x)=\sqrt{x-2}$ Domain: $[2,\infty)$ Range: $[0,\infty)$	$f(x)=\frac{2x^2-17}{x^2-9}$ Domain: $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$ Range: $(-\infty,2)\cup(2,\infty)$	$f(x)=4(x-5)^2-12$ Domain: $(-\infty,\infty)$ Range: $[-12,\infty)$

Domain and Range in Context

The area of a square is given by $A=s^2$, where s represents the length of the side of the square and A represents the area. Your teacher asks you to create a square that has a side length of at least 3 inches.

Domain: The domain in this situation is $[3,\infty)$ because the input for the length of the side can be any number that is 3 inches or greater.

Range: The range in this situation is $[9, \infty)$ because the smallest possible area is 9 square inches.

The volume of a cube is given by $V=s^3$, where s represents the length of the side of the square and V represents the volume. Your teacher asks you to create a cube that has a volume that is smaller than 8 cubic feet.

Domain: The domain in this situation is $(0,2)$ because the input for the length of the side must be greater than 0 to be a cube and must be less than 2 to avoid getting a volume that is greater than 8.

Range: The range in this situation is $(0,8)$ because the volume must be less than 8 cubic feet.

Henry is inviting his friends over for a BBQ. Each hamburger costs 82 cents so if every guest gets one hamburger the total cost of the hamburgers for his BBQ is represented by C=0.82g where g is the number of guests and C is the total cost in dollars.

Domain: The domain in this situation is the finite set {0,1,2,3,4…} because the number of guests can only be represented by whole numbers.

Range: The range in this situation is also a finite set. {0, .82, 1.64, 2.46, 3, 28, …}

A group of drama students is planning a trip to see a popular play. They are taking a bus that will only carry 30 passengers. It will cost $25 to park their bus at the theater and tickets to the play are $15.00 per person. The situation is represented by C=15n+25, where n is the number of students and C is the total cost.

Domain: The domain in this situation is the finite set {0,1,2,3,4…} because the number of students can only be represented by whole numbers.

Range: The range in this situation is also a finite set. {25, 40, 55, 70, 85, …}

There are 32 basketball teams competing in a tournament. After each round half of the remaining teams are eliminated. The situation is represented by $E=32(1/2)^r$ where r is the number of the round and E is the number of teams eliminated during that round.

Domain: The domain in this situation is the finite set {1, 2, 3, 4, 5} because after five rounds all of the teams but one have been eliminated.

Range: The range in this situation is also a finite set. {1, 2, 4, 8, 16} because these are the only number of teams that will ever be eliminated at any point during the tournament.

Benny is building a ramp to meet wheelchair accessibility requirements. The ramp is 4 feet tall and for every 12 inches that the wheelchair moves forward, the wheelchair drops a total of 1 inch. This situation is represented by $H=-\frac{1}{12}f+48$ where H is the height that the front of the wheelchair is off of the ground and f is the number of inches that the chair has been moved forward.

Domain: The domain in this situation is $[0, 576]$ because at 576 the wheelchair touches the ground.

Range: The range in this situation is $[0,48]$ because the lowest possible height is 0 and the highest possible height is 48 inches.

Jason has created a function that will tell him his share of the waiters' tips in a tip jar based on the total amount in the jar. Which of the following would be an appropriate domain for this function?

a. all real numbers
b. non-negative integers
c. positive multiples of 0.01
d. non-negative multiples of 0.01

non-negative multiples of 0.01

Choose all of the functions below for which the set of positive integers is an appropriate domain.

a. A function that calculates the height of a ball at a specific time
b. A function that converts degrees Fahrenheit to degrees Celsius
c. A function calculates the cost of a field trip based on the number of students attending
d. A function that takes a student's height in inches and returns the student's weight
e. A function that calculates the revenue for a company based on the number of sales of a particular item

only letters c and e