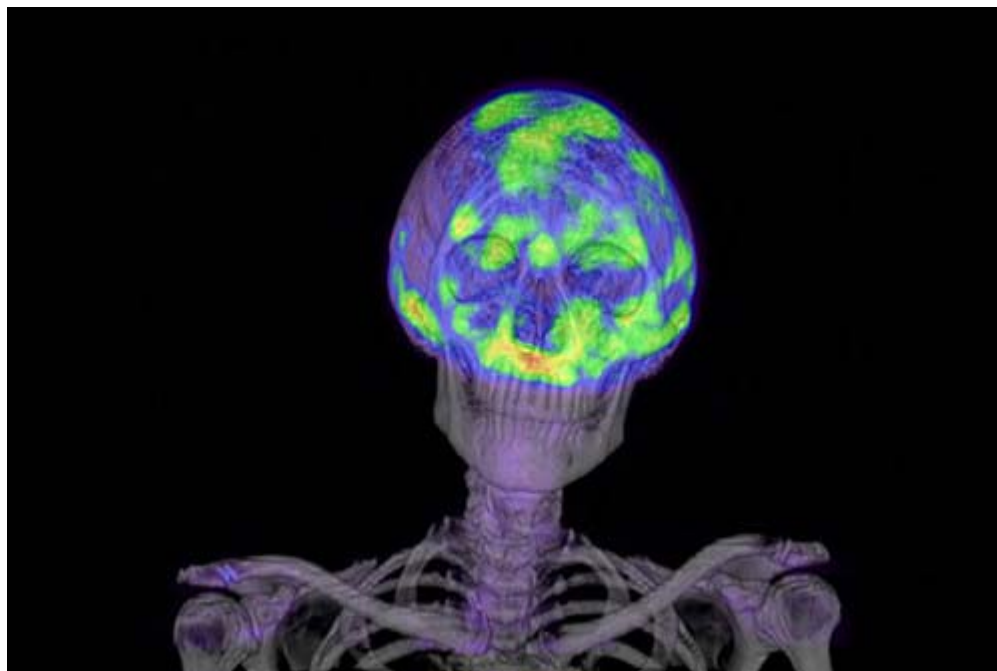




Graph Exponential Functions



Solve.

Technetium-99m is a radioactive element used in brain scans. It has a half-life of about 6 h, so if you start with 10 units of the element, the equation

$f(t) = 10\left(\frac{1}{2}\right)^{\frac{t}{6}}$ approximates the remaining amount after t hours. Graph the function over the practical domain.

Determine whether the function is exponential growth or exponential decay.

The function $f(t) = 10\left(\frac{1}{2}\right)^{\frac{t}{6}}$ is an exponential decay function.

Identify the value of b .

In the function $f(t) = 10\left(\frac{1}{2}\right)^{\frac{t}{6}}$, $b = \frac{1}{2}$. Because $0 < b < 1$, this function is an exponential decay function.

Make a table of values.

t	$10\left(\frac{1}{2}\right)^{\frac{t}{6}}$	$f(t)$

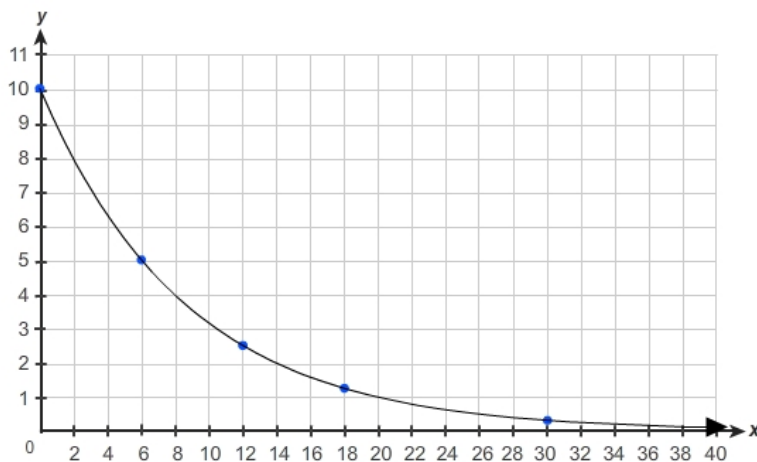
Because the input is divided by 6, choose inputs that are multiples of 6.

Do not choose negative values as they do not make sense in this context.

t	$10\left(\frac{1}{2}\right)^{\frac{t}{6}}$	$f(t)$
0	$10\left(\frac{1}{2}\right)^{\frac{0}{6}} = 10\left(\frac{1}{2}\right)^0$ $= 10(1)$	10
6	$10\left(\frac{1}{2}\right)^{\frac{6}{6}} = 10\left(\frac{1}{2}\right)^1$	5
12	$10\left(\frac{1}{2}\right)^{\frac{12}{6}} = 10\left(\frac{1}{2}\right)^2$ $= 10\left(\frac{1}{4}\right)$	$2\frac{1}{2}$
18	$10\left(\frac{1}{2}\right)^{\frac{18}{6}} = 10\left(\frac{1}{2}\right)^3$ $= 10\left(\frac{1}{8}\right)$	$1\frac{1}{4}$
30	$10\left(\frac{1}{2}\right)^{\frac{30}{6}} = 10\left(\frac{1}{2}\right)^5$ $= 10\left(\frac{1}{32}\right)$	$\frac{5}{16}$

situation.

Plot the points from the table and connect with a smooth curve.



Connect the points in a smooth curve, using the general shape of an exponential decay function as a guide.

Because negative inputs would not make sense, the graph starts on the left, at the y-intercept. It continues forever on the right, approaching, not reaching, the x-axis.

Think About It Why don't negative inputs make sense? Because there cannot be negative time. The output are not negative because there cannot be a negative amount of an element

the body.

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