## Arithmetic Means

The terms between two given terms of an arithmetic sequence are called the arithmetic means between the two terms.

Example Given the sequence with the missing terms (arithmetic means) 4, __ ,_, 22, ..., find the missing terms and describe the sequence as a function.

| $1^{\text {st }}$ term | $2^{\text {nd }}$ term | $3^{\text {rd }}$ term | $4^{\text {th }}$ term | $5^{\text {th }}$ term | $6^{\text {th }}$ term |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathbf{4}$ |  |  | $\mathbf{2 2}$ |  |  |

Treat this like an $x-y$ chart and find the slope. Slope is the

$$
\frac{\Delta y}{\Delta x}=\frac{22-4}{4-1}=\frac{18}{3}=6
$$

Substituting $m=6$ into the Point Slope Form of a Line (finding an equation of a line), we can write a rule, an equation, a function. Using $(1,4)$ and (4, 22) as ordered pairs.

$$
y-y_{1}=m\left(x-x_{1}\right) \quad \text { Given Pt Slope Form of a Line }
$$

$y-4=6(x-1) \quad$ Substitute $(1,4)$
$y-4=6 x-6 \quad$ Distributive Property
$y=6 x-2$
$f(x)=6 x-2$
Addition Prop of Equality
Substitution

Please take note that the common difference in an arithmetic sequence is the rate of change, the slope. $f(x)=6 x-2$ is in the Slope Intercept Form of a Line and the slope is 6 - the same as the common difference.

By using this formula, to find the $101^{\text {st }}$ term, we merely substitute 101 in to the function.

$$
\begin{aligned}
f(x) & =6 x-2 \\
f(101) & =6(101)-2 \\
f(101) & =604
\end{aligned}
$$

