# Mathematics 06.09.22 Notes

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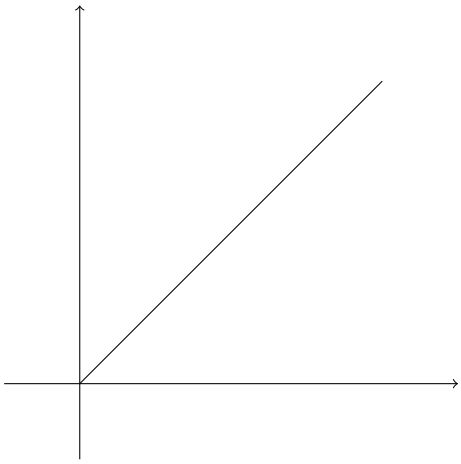
# Contents



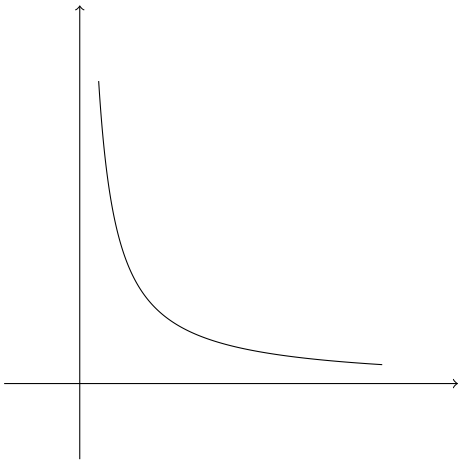
# Section 1 Proportion

**Definition 1.1. (Direct Proportion)** $x$ and $y$are directly proportional states that $y = kx$, using the symbol $x \propto y$. Another term used is $x$ and $y$ **vary directly**.



Whatever we $\times, \div$ $y$ by, we do the same to $x$.

**Definition 1.2. (Inversely Proportion)** $x$ and $y$ are inversely proportional to $y$ states that $x \propto 1/y$, same as $y = k/x$. Another term used is $x$ and $y$ **vary indirectly**.



Whatever we $\times y$ by, we do $\div$ to $x$.
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**Example 1.3. (Proportion)** 6 workers take 20 days to build 15 products. Fill in the table below: (Do assume that products is directly proportional to workers and days)

| Workers | Days | Products |
|---|---|---|
| 6 | 20 | 15 |
| 6 | 4 | 3 |
| 16 | 20 | 40 |
| 18 | 100 | 225 |
| 2 | 60 | 15 |
| 30 | 4 | 15 |
| 30 | 16 | 60 |
| 0.6 | 40 | 3 |
| 4 | 20 | 10 |
| 1.2 | 20 | 3 |
| 6 | 10 | 7.5 |

**Problem 1.4.** The square root of $a$ or $\sqrt{a}$ is inversely proportional to $b^3$. When $a = 16$, $b = 10$.

**(1)** Find an equation linking $a$ and $b$.

**Solution.** $\sqrt{a} \propto b^{-3}$, therefore $a \propto b^{-6}$. $a = k \times b^{-6}$, and $16 = k \times 10^{-6}$. Therefore $k = 1.6 \times 10^7$ and $a = 1.6 \times 10^7 b^{-6}$.

**(2)** Find $b$ when $a = 36$.

**Solution.** Too difficult to calculate, skipped.