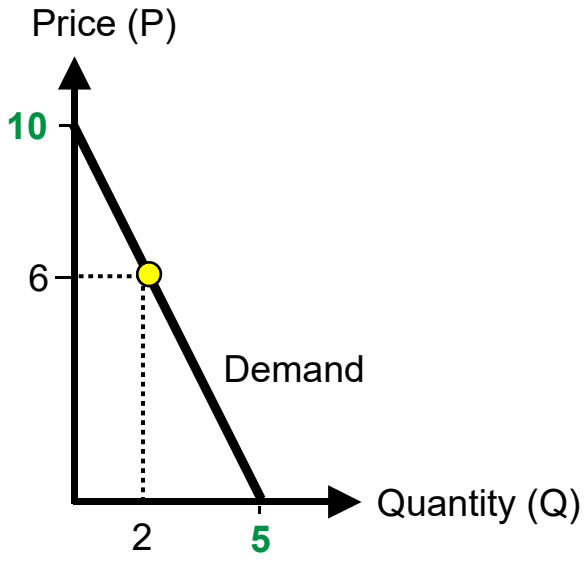
Price elasticity of demand 2_Formula

1 Example

Calculation of the price elasticity of demand at a given point (P = 6, Q = 2) of a linear demand function (numbers in absolute values):



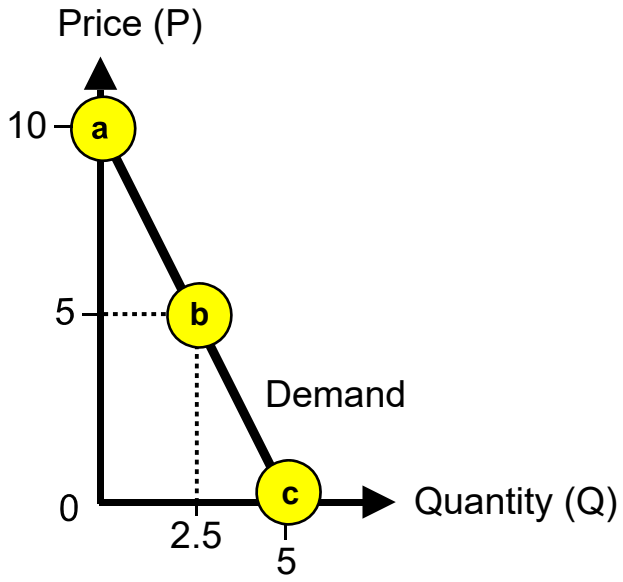
(1) Price elasticity of demand = $\frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$, therefore, (2)

(2) Price elasticity of demand = $(\frac{\Delta Q}{Q} * 100) / (\frac{\Delta P}{P} * 100) = \frac{\Delta Q}{\Delta P} * \frac{P}{Q}$

(3) **Slope** (constant) = $\frac{\Delta P}{\Delta Q} = \frac{10}{5} = 2$ ($\frac{\Delta P}{\Delta Q} \rightarrow$ reciprocal value of $\frac{\Delta Q}{\Delta P}$)

(4) Price elasticity of demand = $\frac{\Delta Q}{\Delta P} * \frac{P}{Q} = \frac{1}{\text{Slope}} * \frac{P}{Q} = \frac{1}{2} * \frac{6}{2} = \mathbf{1.5}$

2 Calculation of the price elasticity of demand in points a,b and c



a Price elasticity of demand = $\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \frac{1}{2} * \frac{10}{0} = \infty$

b Price elasticity of demand = $\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \frac{1}{2} * \frac{5}{2.5} = \mathbf{1}$

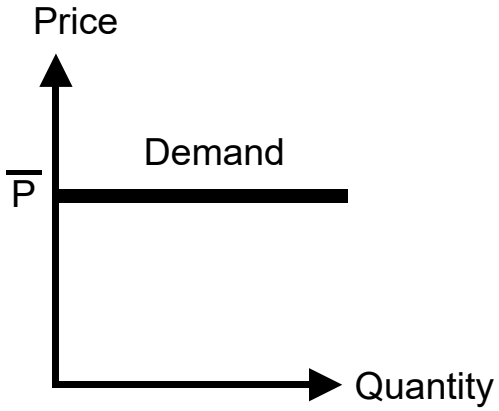
c Price elasticity of demand = $\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \frac{1}{2} * \frac{0}{5} = \mathbf{0}$

It can be seen that the price elasticity of demand decreases continuously from a to c because $\frac{P}{Q}$ becomes smaller, while the slope and, therefore, $\frac{1}{\textbf{Slope}}$ remain constant over the whole range of P and Q:

P 10, Q 0	P 8, Q 1	P 6, Q 2	P 4, Q 3	P 2, Q 4	P 0, Q 5
$\frac{P}{Q} = \infty$	$\frac{P}{Q} = 8$	$\frac{P}{Q} = 3$	$\frac{P}{Q} = 1.333$	$\frac{P}{Q} = 0.5$	$\frac{P}{Q} = 0$
$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \infty$	$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = 4$	$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = 1.5$	$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = 0.666$	$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = 0.25$	$\frac{1}{\textbf{Slope}} * \frac{P}{Q} = 0$

3 Cases of constant price elasticity of demand

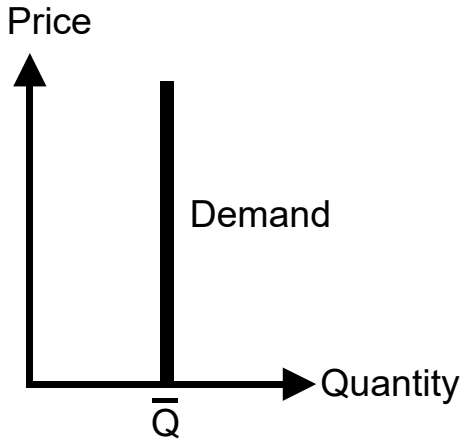
3.1 Horizontal demand



Price elasticity of demand = $\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \frac{1}{0} * \frac{P}{Q} = \infty$

The slope determines the price elasticity of demand, while $\frac{P}{Q}$ plays no role.

3.2. Vertical demand



Price elasticity of demand = $\frac{1}{\textbf{Slope}} * \frac{P}{Q} = \frac{1}{\infty} * \frac{P}{Q} = \mathbf{0}$

The slope determines the price elasticity of demand, while $\frac{P}{Q}$ plays no role.