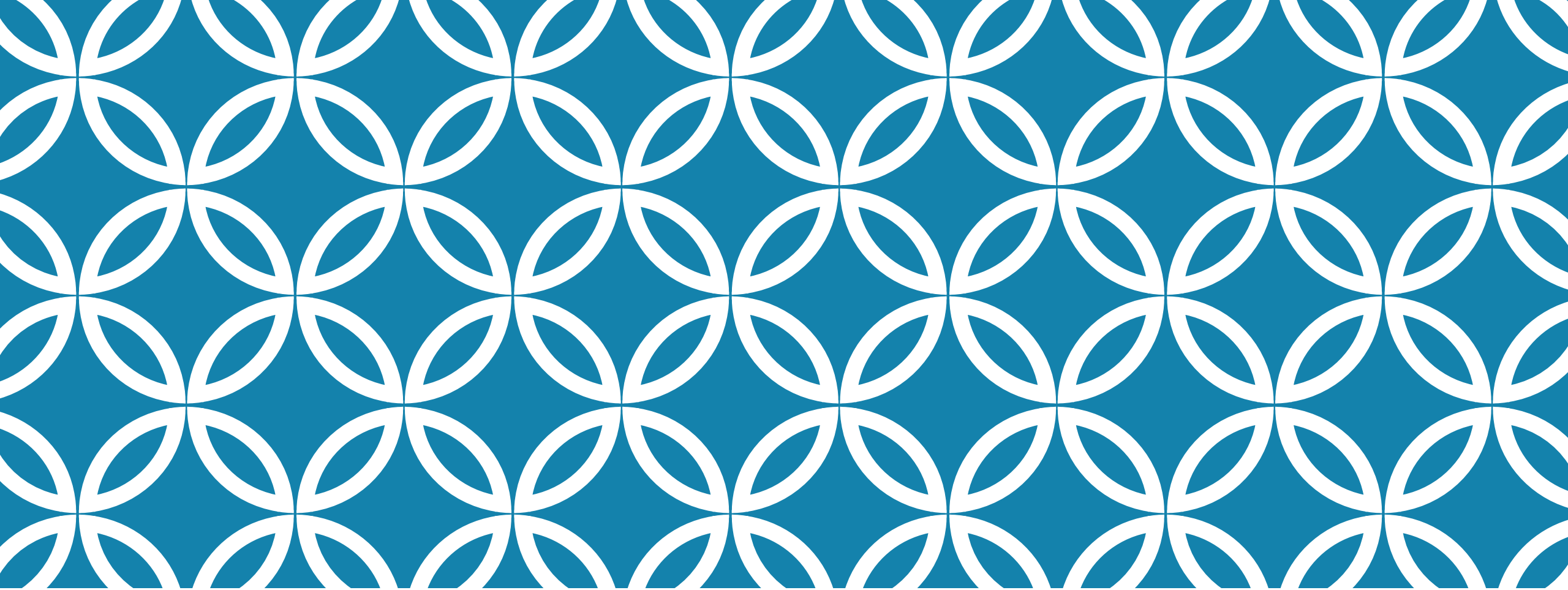


MATHS TO SMASH FIRST YEAR ECON

FUNCTIONS

- A relationship between 2 variables
- One output for each input
- Expressed as an equation and can be shown on a graph

example …

Understand the variables…

Price (P) in dollars, and quantity Q.

Demand Curve $P = 16 - 2\,Q$

Supply Curve $P = 4 + Q$

SUBSTITUTION

We can find the value of one variable if we are given the value of the other.

Eg $P = 16 - 2Q$

The Price when the Quantity is 5

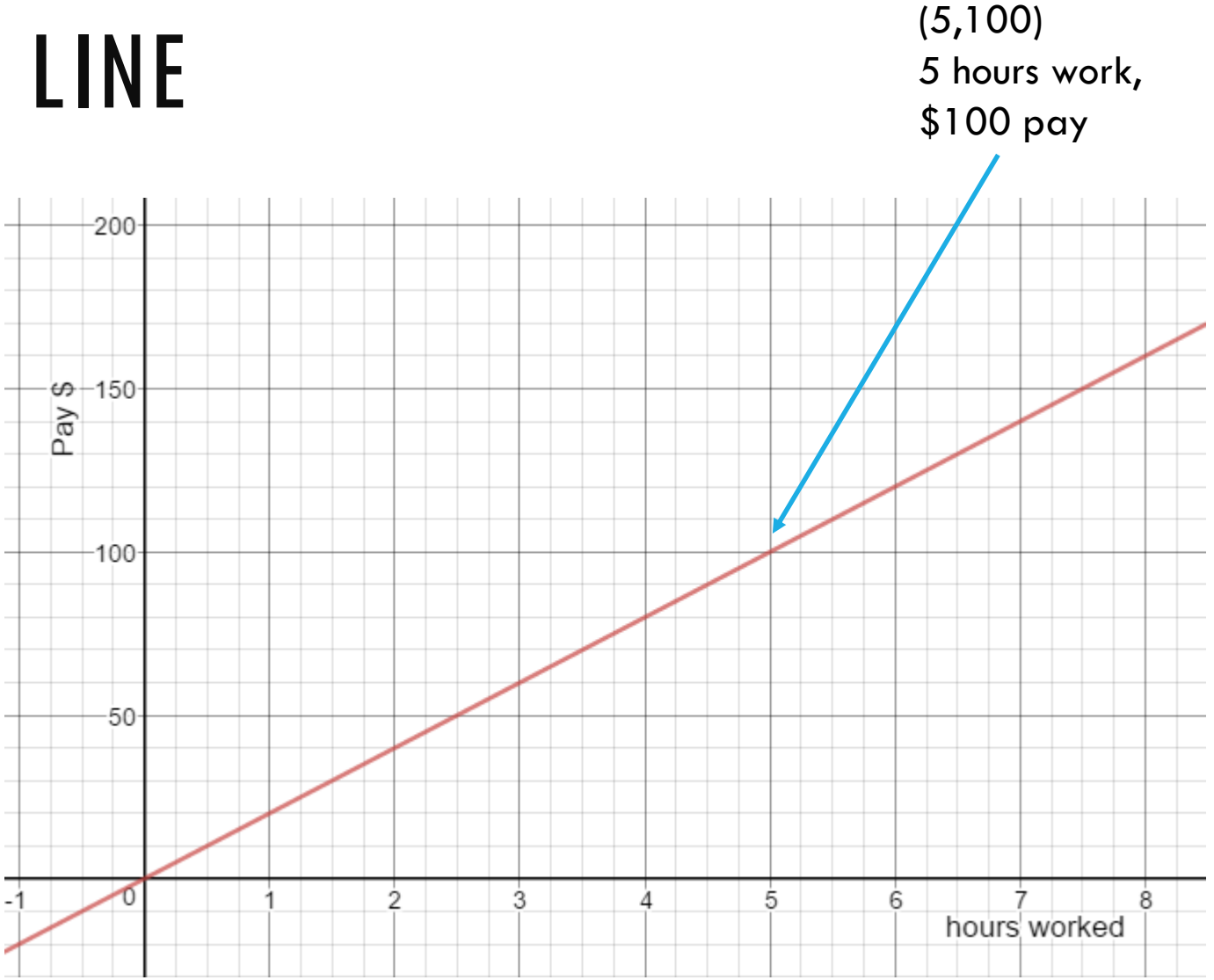
$$P = 16 - 2 \text{ x } 5$$

$$P = \$6$$

LINEAR = STRAIGHT LINE

- Easiest type of relationship to describe, draw and generalise
- A change in the explanatory variable will always produce a corresponding change in the dependent variable.

eg. For each hour I work I get paid $20.



SLOPE

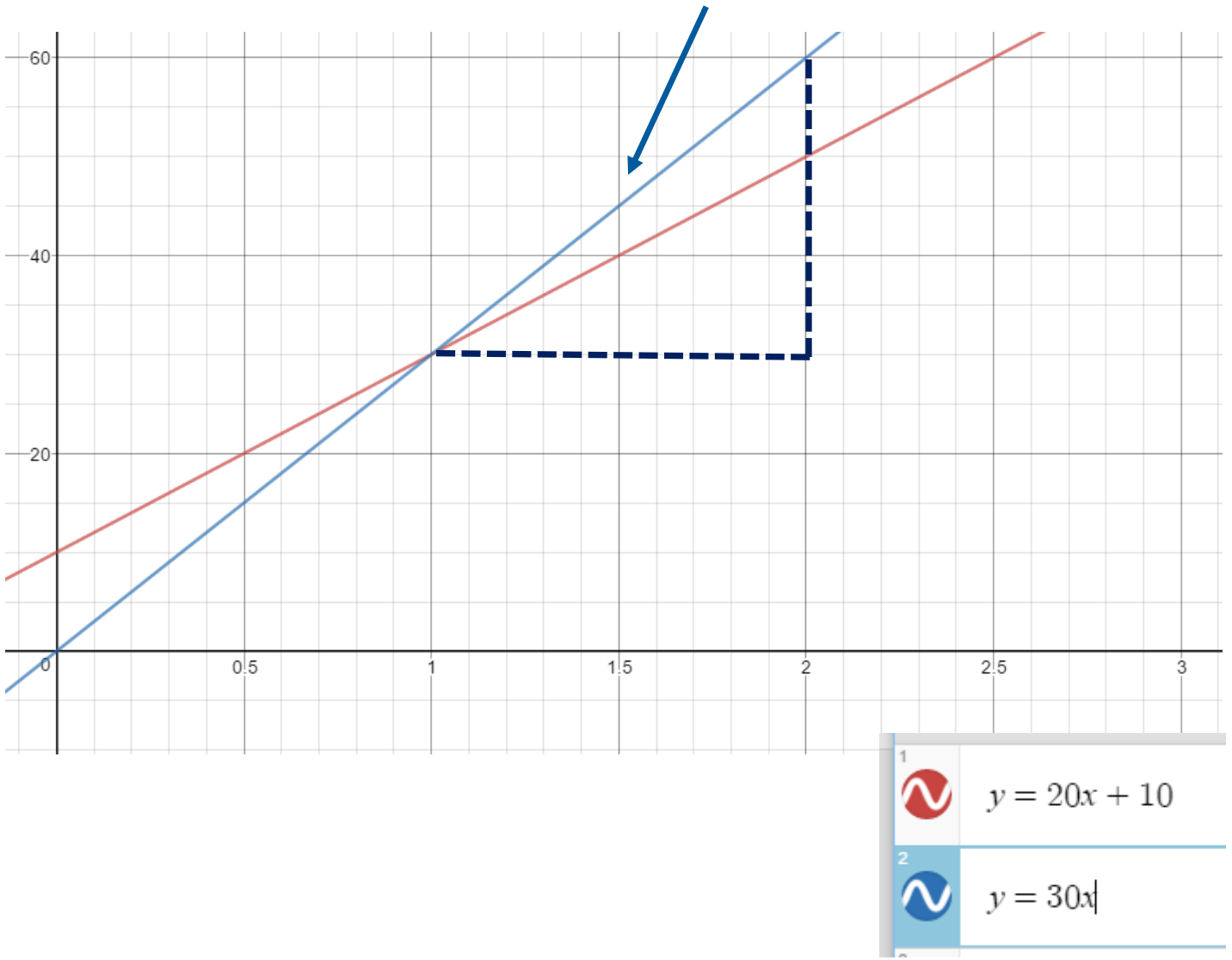
- The Slope (gradient) defines the steepness of the line.
- eg. Pay= the rate of payment per hour

Slope = pay per hour

Slope = $/hour

$$\text{Slope} = \frac{RISE}{RUN} = \frac{\Delta pay}{\Delta hours}$$

Gradient = $30 per hour



A LINEAR GRAPH

- Any straight line can we defined by an equation in the form $y = mx + c$

$$y = mx + c$$

The variables in our problem … in our example:
y=pay and
x= hours worked

m = slope
In our examples:
m = $30 per hour
m= $20 per hour

c= y intercept
In our example:
c =0
c = 10

Our equation is: $y = 20x + 10$ and $y = 30x$

PLOT SUPPLY & DEMAND

$$y = mx + c$$

OR

$$y = c + mx$$

Example:

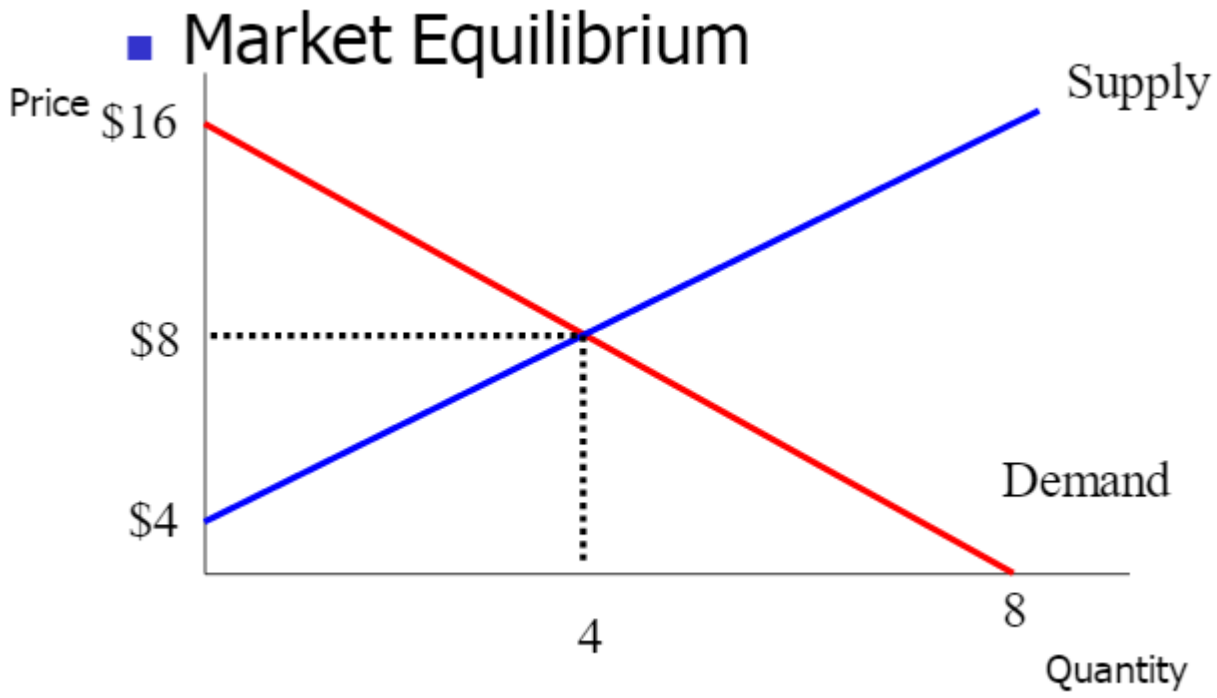
Demand Curve $P = 16 - 2Q$

variables y int = 16 grad = -2

Supply Curve $P = 4 + Q$

variables y int = 4 grad = 1

SLOPE INTERPRETATION

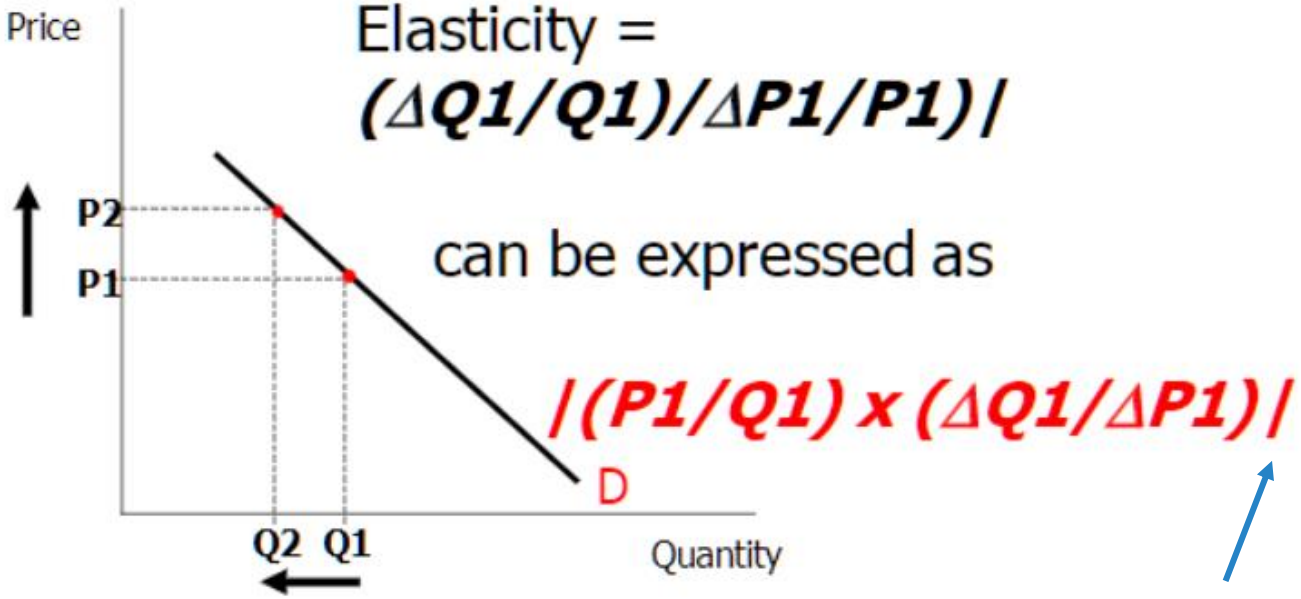


$$\text{Slope} = \frac{rise}{run} = \frac{\Delta P}{\Delta Q}$$

Change in P

Change in Q

ELASTICITY



Elasticity $=$

$$\frac{\%\ change\ of\ Q}{\%\ change\ of\ P} = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P}$$

$$\frac{\Delta Q}{Q} \times \frac{P}{\Delta P} = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

Slope upside down: reciprocal (inverse) of the slope

$$\text{Elasticity} = \left|\frac{P}{Q} \times \frac{1}{slope}\right|$$

INTERSECTIONS

Our example:

$$P = 16 - 2Q$$
$$P = 4 + Q$$

The intersection shows where the dependent variable has the same values for 2 (or more equations)

2 Methods

Use the graph … can you estimate the intersection…. Note you should look for the value of BOTH variables as this gives the location of a specific point (x, y)

Simultaneous Equations

Solve the equations together … insert one equation into the other.

SUBSTITUTION OF EQUATIONS

Find the equilibrium price and quantity in this market:

$$P = 16 - 2Q_d$$

$$P = 4 + Q_s$$

We need to find Q_e (where $Q_d = Q_s$) Make one equation equal to the other…

$$16 - 2Q = 4 + Q$$

$$-3Q = -12$$

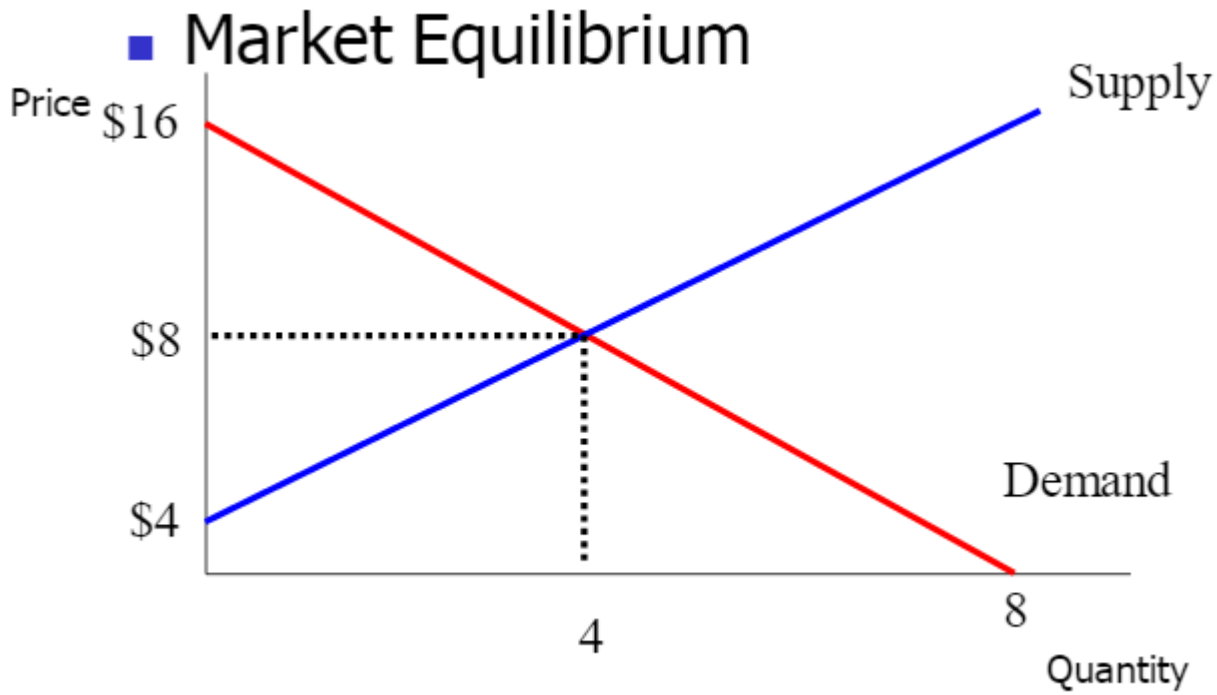
$$Q = -12/-3$$

$$Q = 4$$

Interpret: The Quantity that satisfies both equations at the same time is 4

Note: sometimes it pays to calculate the value of the other variable too .. P=?

SOLUTION FITS THE GRAPH



ANOTHER EXAMPLE... HAVE A GO

$P = 32 - Q$

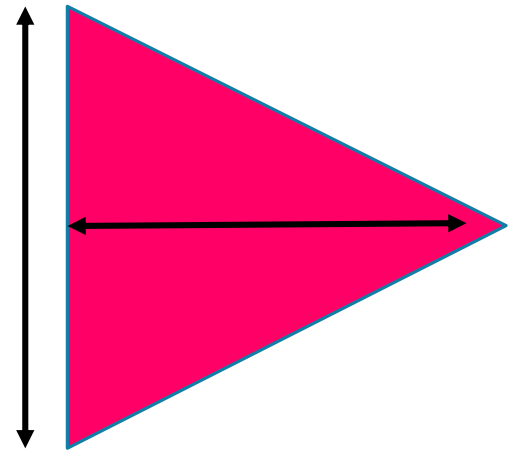
$P = 5 + 2Q$

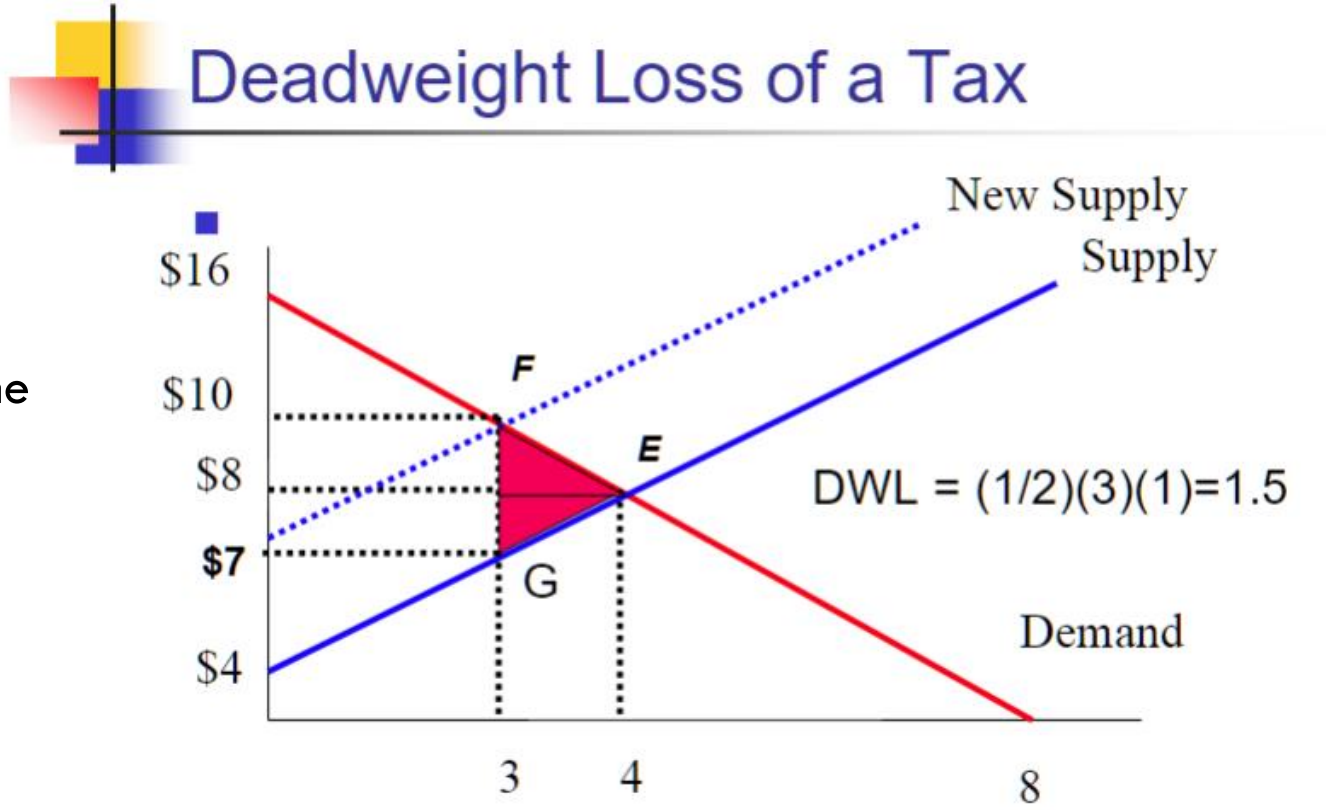
AREAS OF TRIANGLES

$$Area = \frac{1}{2} \times Base \times Height$$

Height and base must be perpendicular

Use the coordinate values to find the length of the height and base.



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Need further HELP?