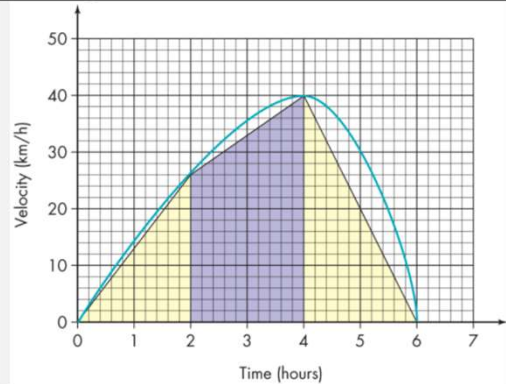


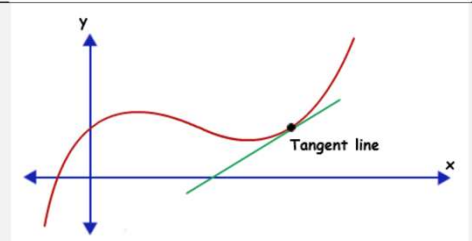
Area under a curve

To find the area under a curve, **split it up into simpler shapes** – such as rectangles, triangles and trapeziums – that approximate the area.



Tangent

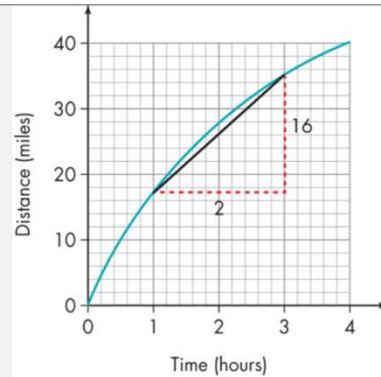
A straight line that **touches** a curve at **exactly one point**.



Gradient of a curve

The **gradient of a curve** at a point is the same as the **gradient of the tangent** at that point.

1. Draw a tangent carefully at the point.
2. Make a right-angled triangle.
3. Use the measurements on the axes to calculate the rise and run (change in y and change in x)
4. Calculate the gradient.

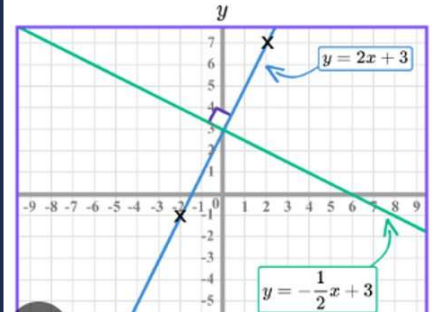


$$\begin{aligned} \text{Gradient} &= \frac{\text{Change in } y}{\text{Change in } x} \\ &= \frac{16}{2} = 8 \end{aligned}$$

Perpendicular lines

Perpendicular lines have gradients that multiply to give -1 .

The gradients of perpendicular lines are the **negative reciprocals** of each other.



Example

The line $y = 2x + 3$ has a gradient of 2

The line $y = -\frac{1}{2}x + 3$ has a gradient of $-\frac{1}{2}$

$$2 \times -\frac{1}{2} = \frac{-2}{2} = -1$$

The gradients multiply to give -1

Parallel Lines

Any line with the same gradient is parallel