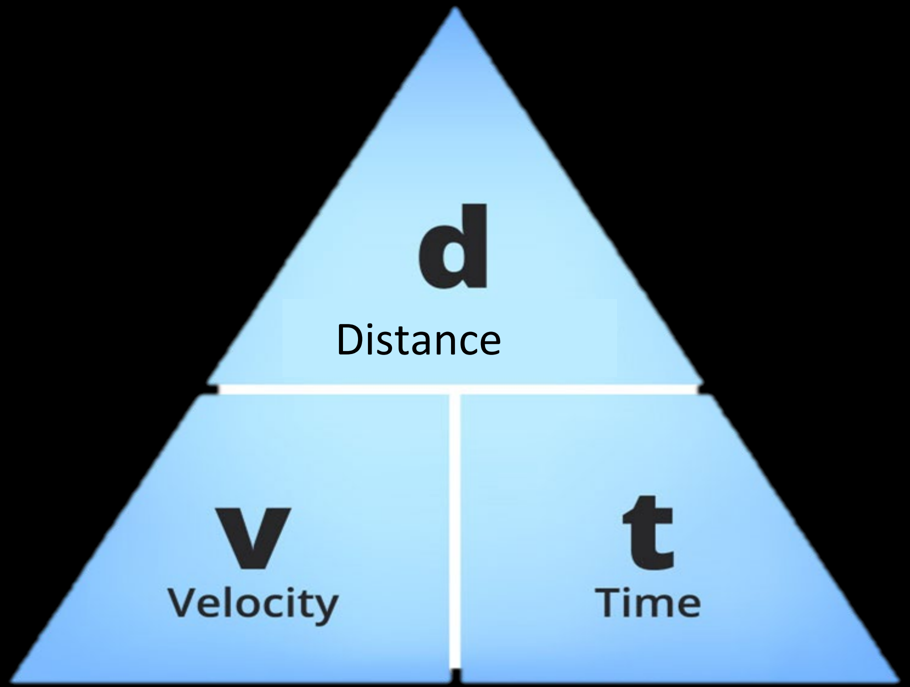
CHAPTER FOURTEEN: THE NATURE OF SPEED

VARIABLES



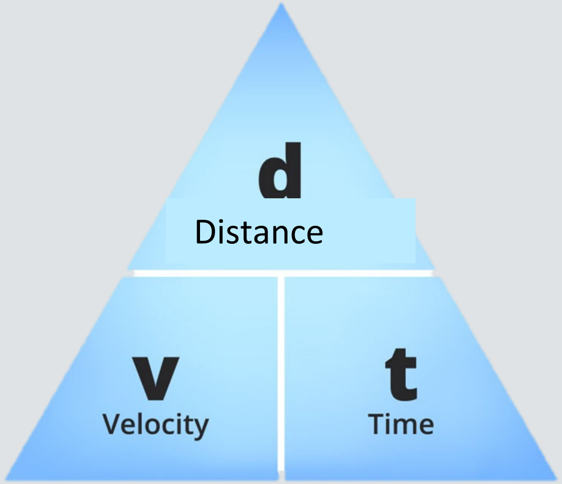
d = **<u>distance</u>**, a change in an object’s position (m)

t = **<u>time</u>**, the time it took the object to move that distance (s)

v = **<u>velocity</u>**, how fast the object moved (m/s)

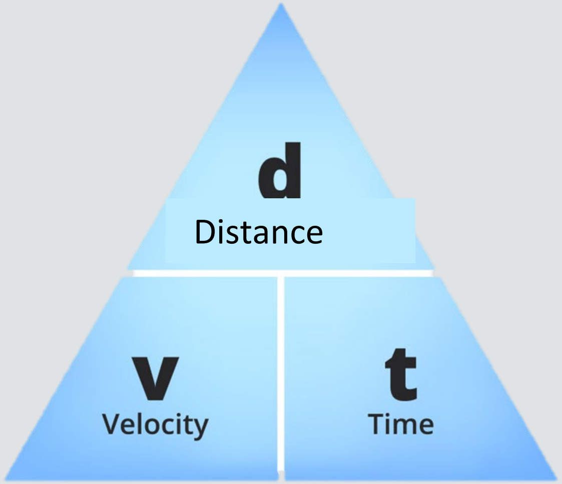
A vehicle travelling at v = 100 km/h will move d = 100km in t = 1 hour

VELOCITY EXAMPLE ONE:



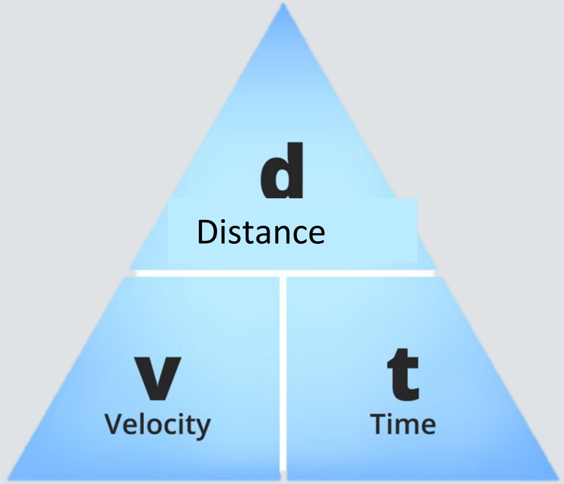
________is 10m from ________. If ________ travels that distance in 30 seconds, how fast is it moving? (0.33 m/s)

VELOCITY EXAMPLE TWO:



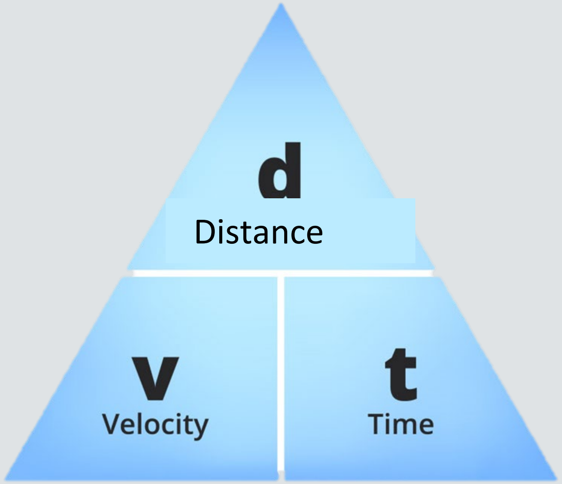
______ is two meters from _________. It takes _________ 0.5s to travel that distance. What is its velocity? (4 m/s)

VELOCITY EXAMPLE THREE:



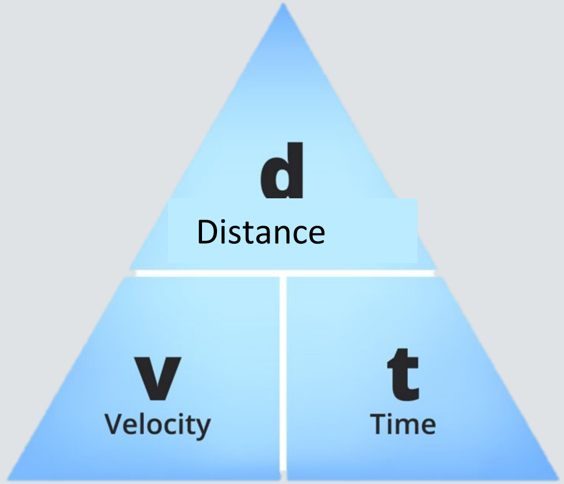
To get to _______ you drive 25km in half an hour. How fast did you drive? (50 km/h)

VELOCITY EXAMPLE FOUR:



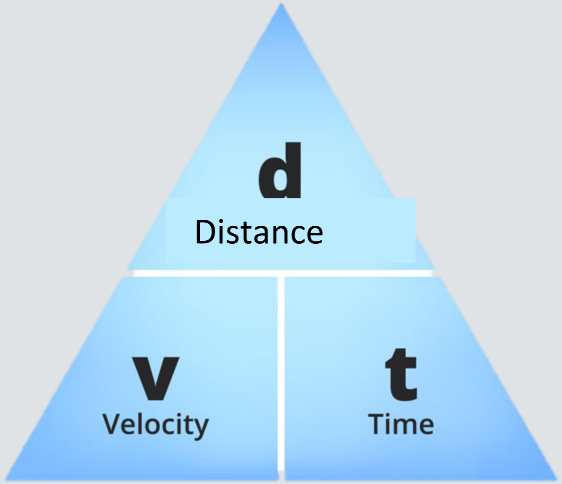
You got in your car to escape ______ . you drive 20km in 15 minutes. How fast did you drive? (80 km/h)

DISTANCE EXAMPLE ONE:



What distance will you travel in _______ seconds at an average speed of _______ meters per second? Let’s roll the dice.

DISTANCE EXAMPLE TWO:

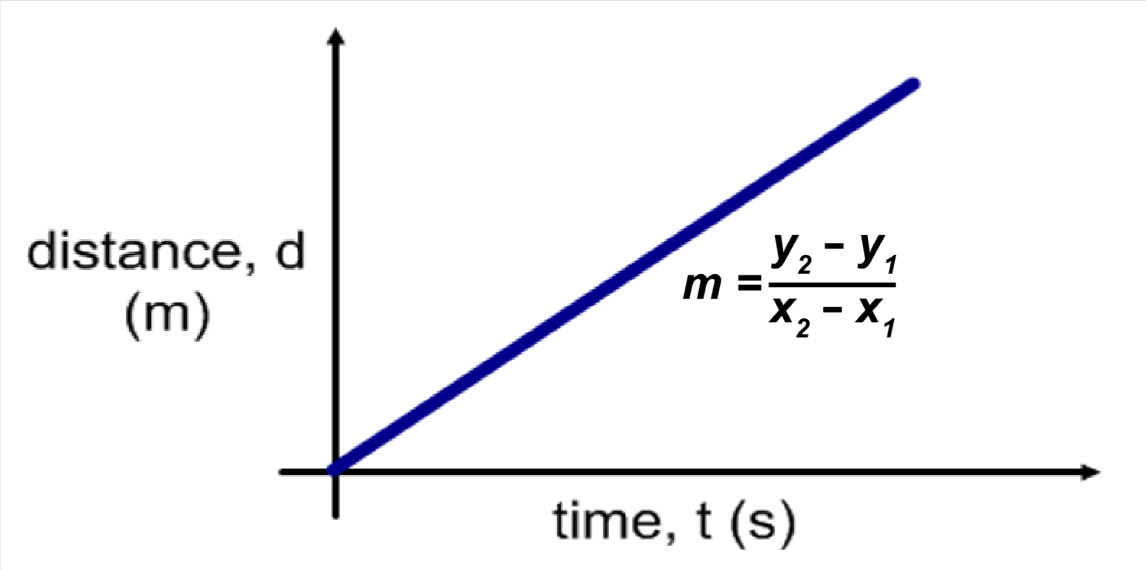


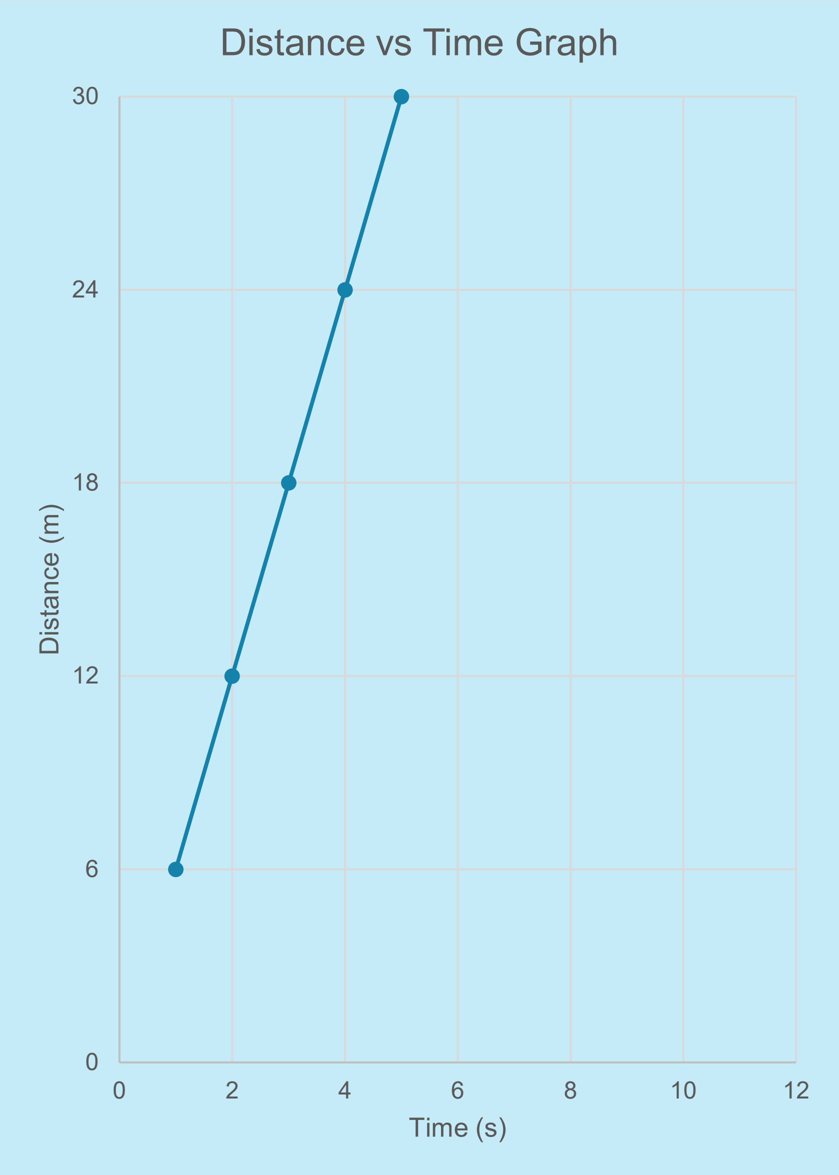
What distance will you travel in ________ hours at an average speed of ________ kilometers per hour?
Let’s roll the dice.

GRAPHING

- Properties of the graph
  - Time on the x-axis
  - Distance on the y-axis
  - **Velocity is the slope**
- Slope Formula:

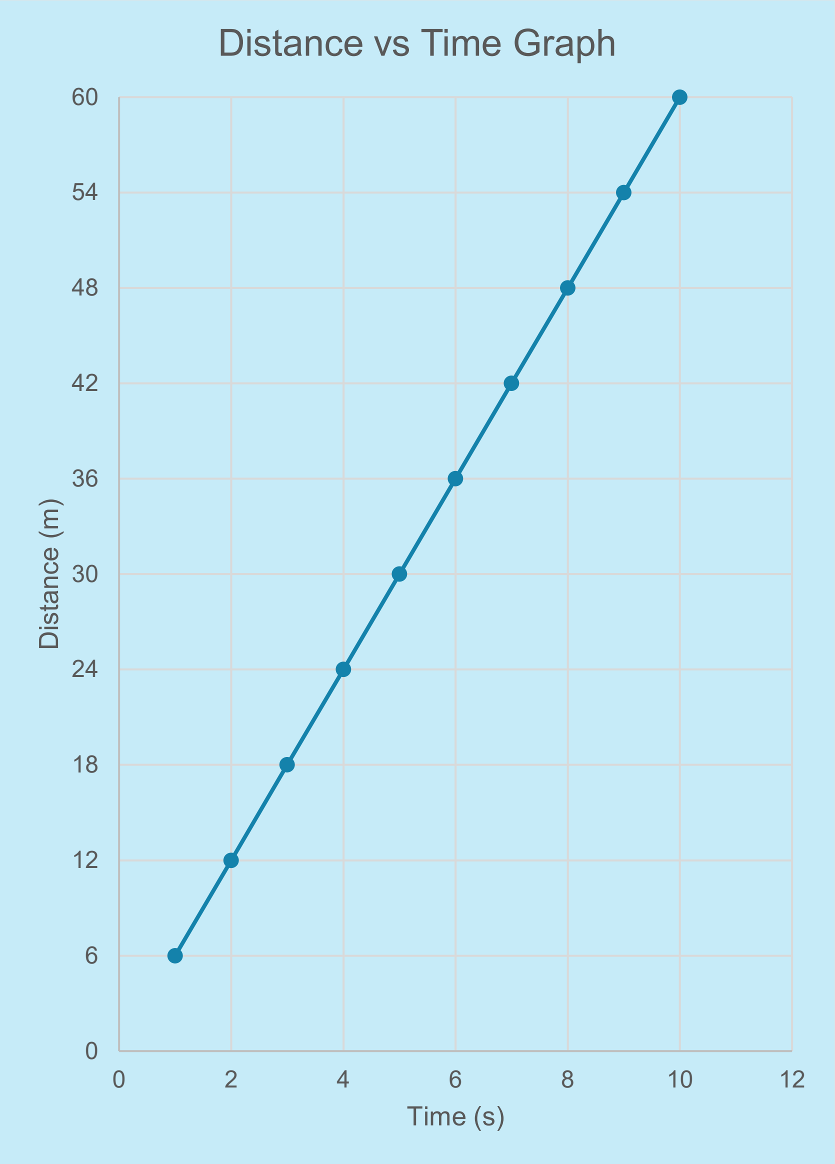
$$\mathbf{V} = \frac{d_2 - d_1}{t_2 - t_1}$$





GRAPHING EXAMPLE ONE

Calculate the velocity using the slope of this graph.



GRAPHING EXAMPLE TWO

Calculate the velocity using the slope of this graph.

DISTANCE TRAVELLED DURING REACTION TIME

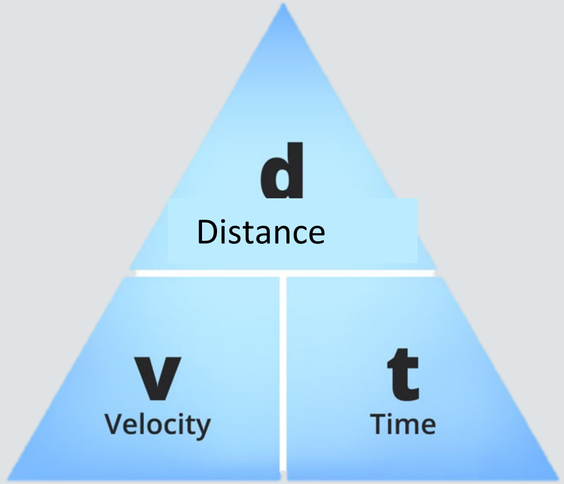
- Recall: Reaction time is the time it takes to recognize something **and** act on it
- Drivers reaction time **does not** change at different speeds
- The distance travelled during reaction time **does** change

- Using this information, why might different roads have different speed limits?

DISTANCE TRAVELLED DURING REACTION TIME

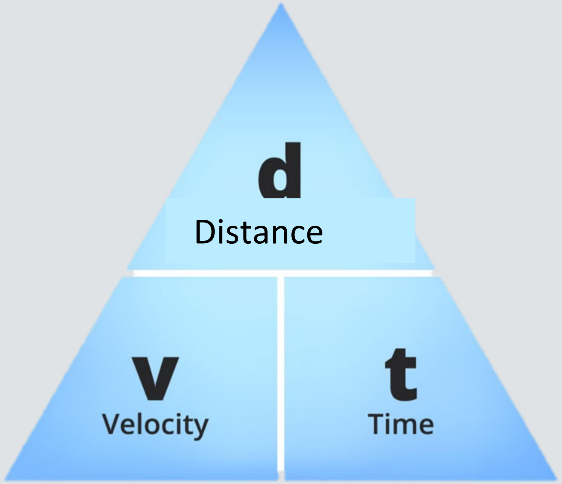
- **Reaction distance** is how far the car travels before the driver reacts
- **Braking distance** is how far the car travels after the driver starts braking
- **Stopping distance** is the total distance the car travels before coming to a stop
  - Stopping Distance = Reaction Distance + Braking Distance

TIME EXAMPLE ONE:



The average driver's reaction time is 2.5 seconds. How far does a car moving at 60 km/h travel before the average driver reacts? (42 m)

TIME EXAMPLE TWO:



The braking distance of the average car at 60 km/h is 43 meters. Combined with the reaction distance we just calculated, what is the total stopping distance? (86 m)

SAFE FOLLOW DISTANCE REVISITED)

- Cars have a very long stopping distance even in ideal conditions (86m at 60km/h)
- Stopping distance gets longer under the following conditions:
  - Slippery road surface (ice, snow, rain)
  - Higher speeds
  - Lower driver reaction time (distraction, impairment)
  - Defective braking systems

- **Make sure you leave enough space**