Rosary School – Marj Elhamam
Study sheet 3 - 9Ic Speed Worksheet

Name: _____ Date: ____ /____ / 2025

Grade: 8 ( ) Subject: Physics

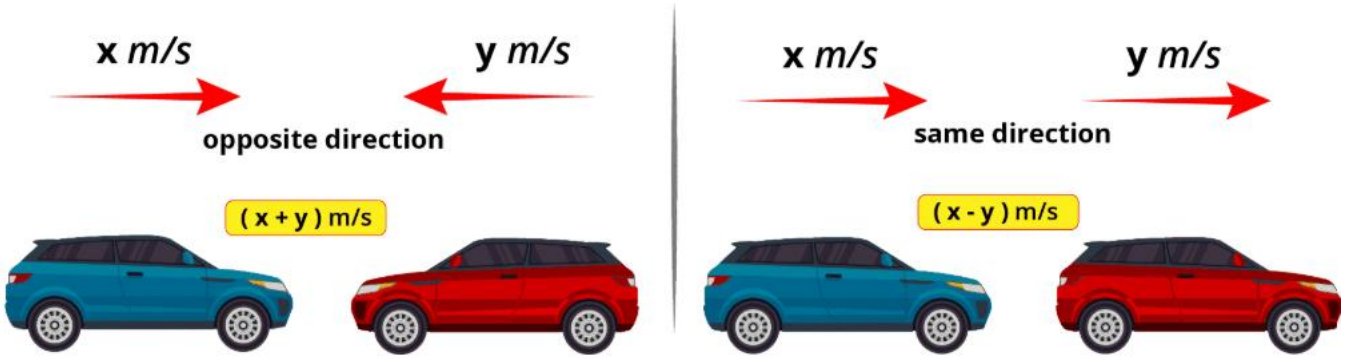
Speed:

- $Speed = \frac{Distance}{Time}$ $Distance = Speed\ x\ Time$ $Time = \frac{Distance}{Speed}$
- Units of speed are **m/s** and **km/h**
- Convert **m/s → km/h** by multiplying by 3.6
- Convert **km/h → m/s** by dividing by 3.6

Relative speed:
The speed of a moving object with respect to another object.

- Two bodies moving in the same direction
  Relative speed = difference in their speeds.

- Two bodies moving in opposite directions towards or away from each other.
  Relative speed = sum of their speeds.



- The speed of an object moving on a moving surface.
  Example: a boat on a flowing river / a person on a moving belt or escalator.

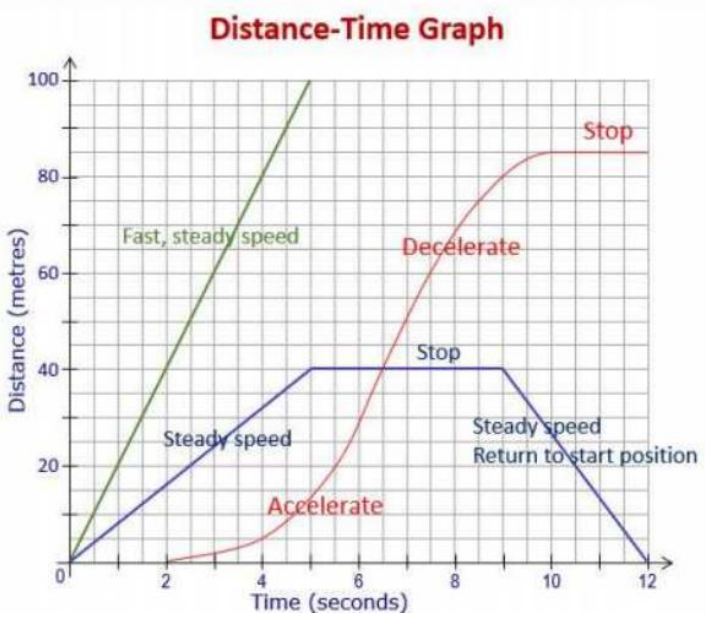
  Two bodies moving in the same direction (water and boat): their speeds add up.
  Two bodies moving in opposite directions (water and boat): subtract their speeds.

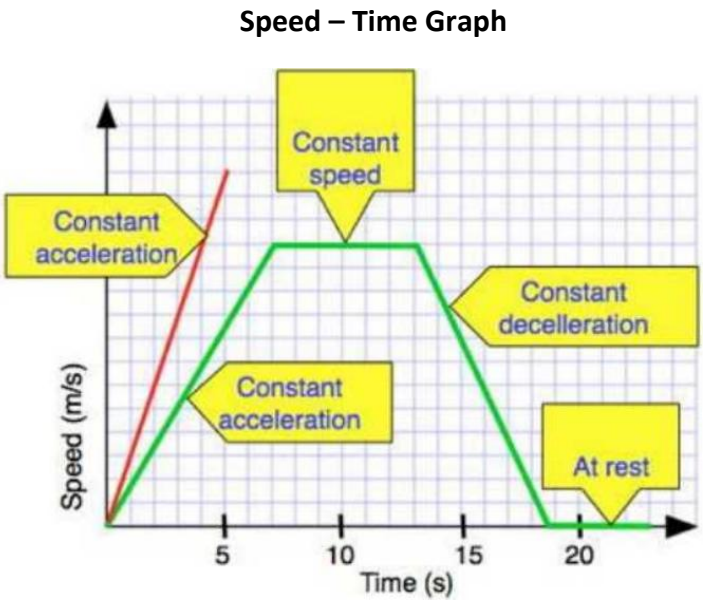
Speed graphs:

When you draw a **distance-time graph** or a **speed-time graph** pay attention to the following:

- Draw the axes using a **ruler** and a sharp **pencil**.
- The y-axis (vertical axis) represents distance. **Label** the axis using the appropriate **unit** of distance. Choose a scale that would go up to the highest value of distance in the given example. Divide the axis equally.
- The x-axis (horizontal) represents time. **Label** the axis with appropriate **units** of time. Choose a scale that would go up to the highest value of time in the given example. Divide your axis equally.
- Your scales must use more than **50%** of the given graph paper.
- Write a **title** for the graph that shows the type of graph and what it represents.
- Plot the coordinates of every part of the given journey using (x).
- Connect the points in straight lines with a ruler and a sharp pencil.

Use the same instructions to draw a **speed-time graph** but instead of distance, speed is represented on the y- axis and the scale would go up to the highest value of speed.

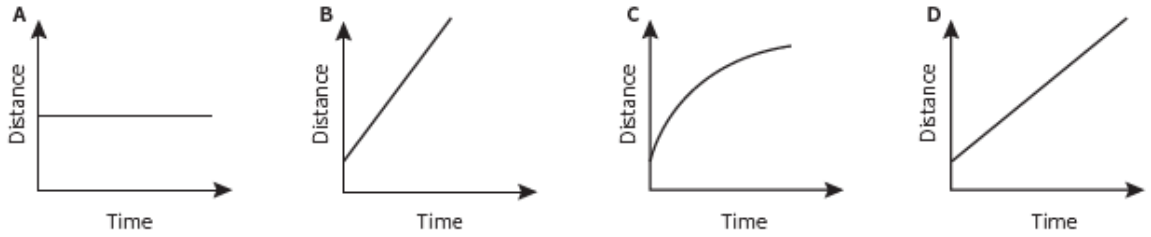




Exercise (1) Distance – time graphs:

In this exercise, you draw and interpret some distance–time graphs. You can calculate the speed of an object from the gradient (slope) of the graph.

a The diagrams **A–D** show distance–time graphs for four moving objects. Complete Table 2.03 by indicating (in the second column) the graph or graphs that represent the motion described in the first column.

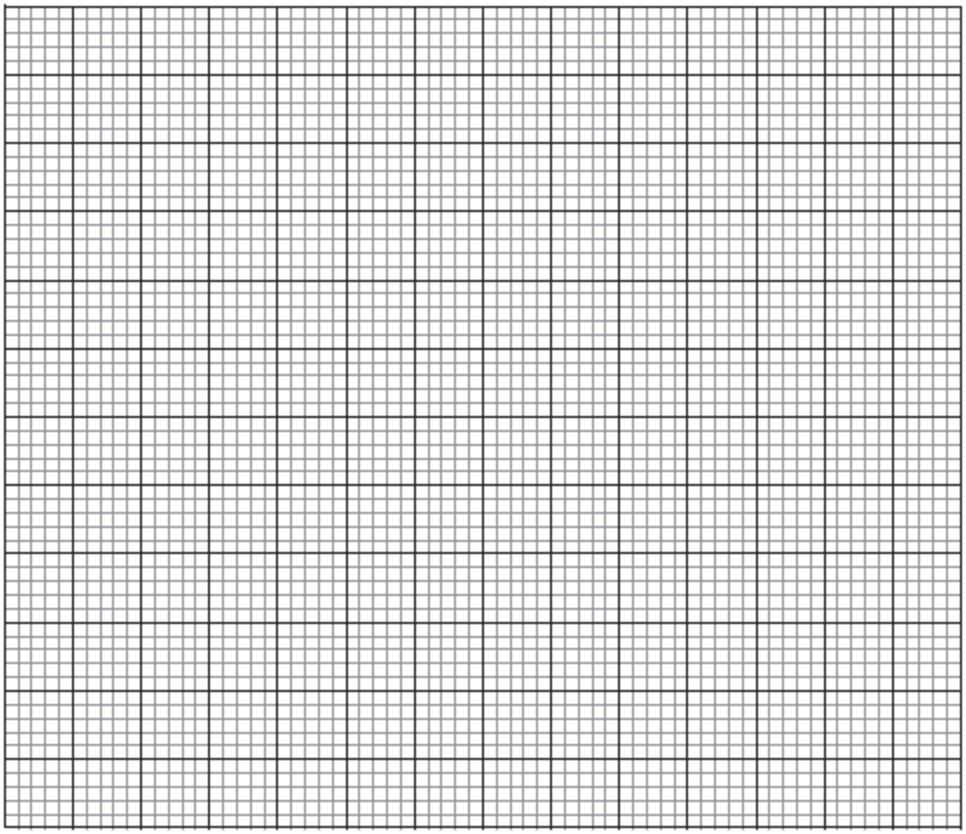


Description of motion	Graph(s)
moving at a steady speed	
stationary (not moving)	
moving fastest	
changing speed	

b Table 2.04 shows the distance travelled by a runner during a 100 m race. Use the data to draw a distance–time graph on the graph paper grid provided.

Distance / m	0	10.0	25.0	45.0	65.0	85.0	105.0
Time / s	0.0	2.0	4.0	6.0	8.0	10.0	12.0

Table 2.04



Now use your graph to answer these questions:

How far did the runner travel in the first 9.0 s? .....

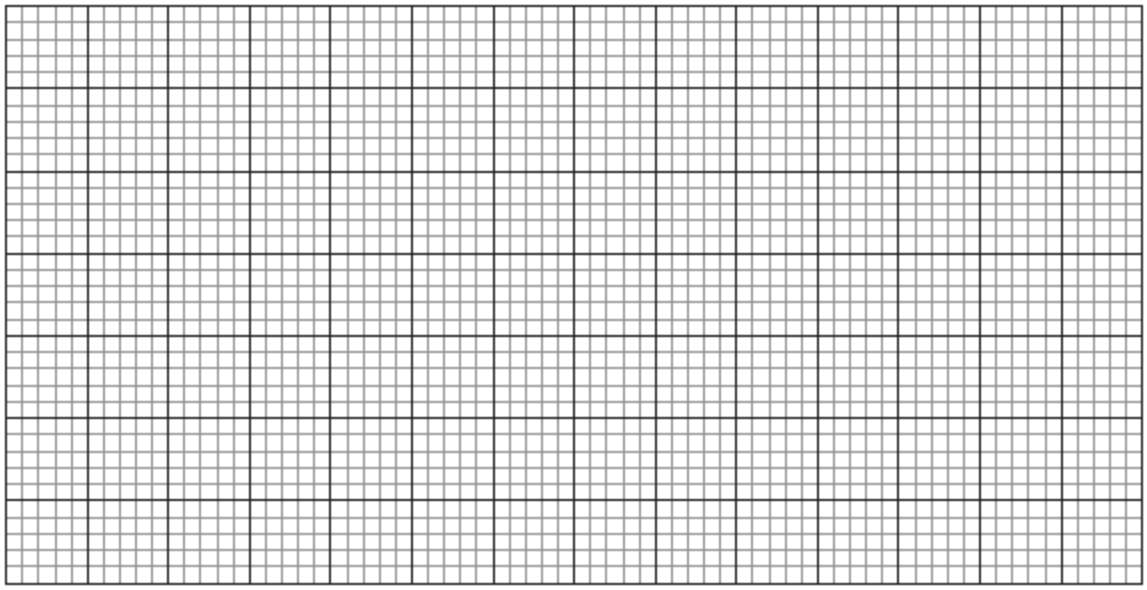
How long did the runner take to run the first 50.0 m? .....

How long did the runner take to complete the 100 m? .....

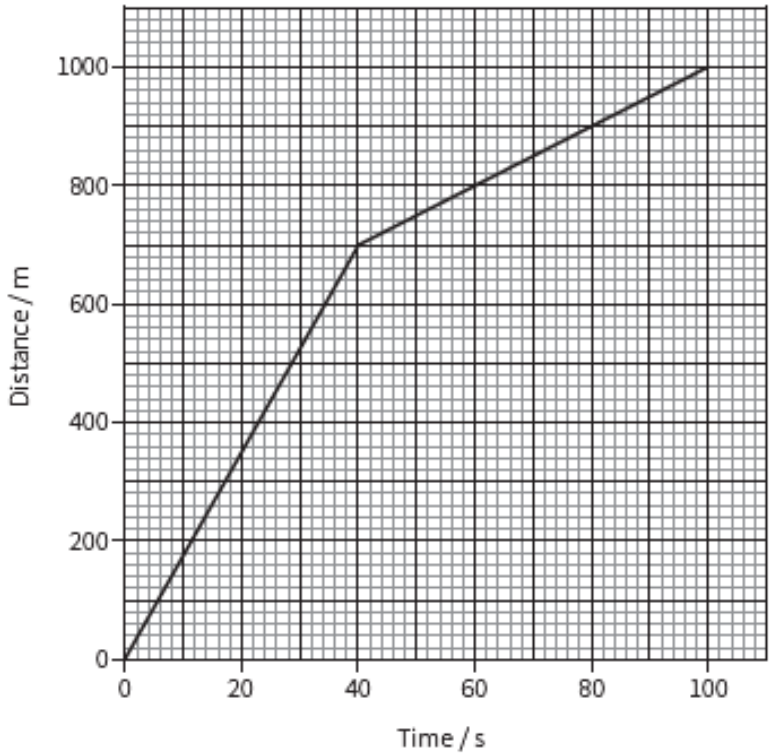
Use the gradient of your graph to determine the runner's average speed between 4.0 s and 10.0 s.

c On the graph paper grid provided, sketch a distance–time graph for the car whose journey is described here:

- The car set off at a slow, steady speed for 20 s.
- Then it moved for 40 s at a faster speed.
- Then it stopped at traffic lights for 20 s before setting off again at a slow, steady speed.



d The graph represents the motion of a bus for part of a journey.



On the graph, mark the section of the journey where the bus was moving faster.

Explain your answer:

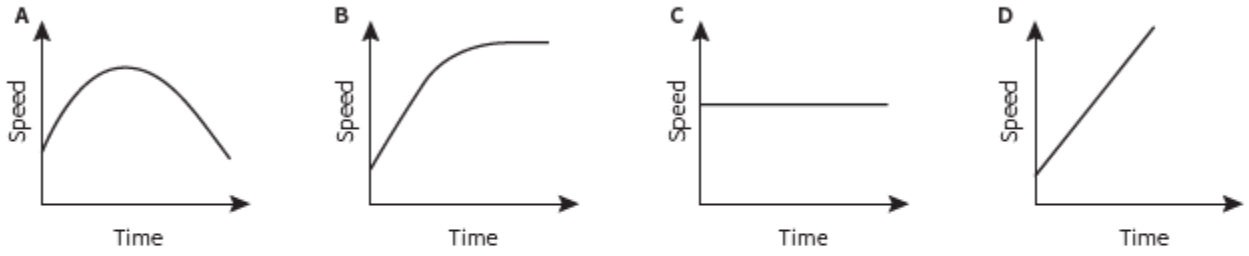
From the graph, calculate the following:

a) The speed of the bus when it was moving faster

b) The average speed of the bus

Exercise (2) Speed – time graphs:

a The diagrams **A–D** show speed–time graphs for four moving objects. Complete Table 2.05 by indicating (in the second column) the graph or graphs that represent the motion described in the first column.

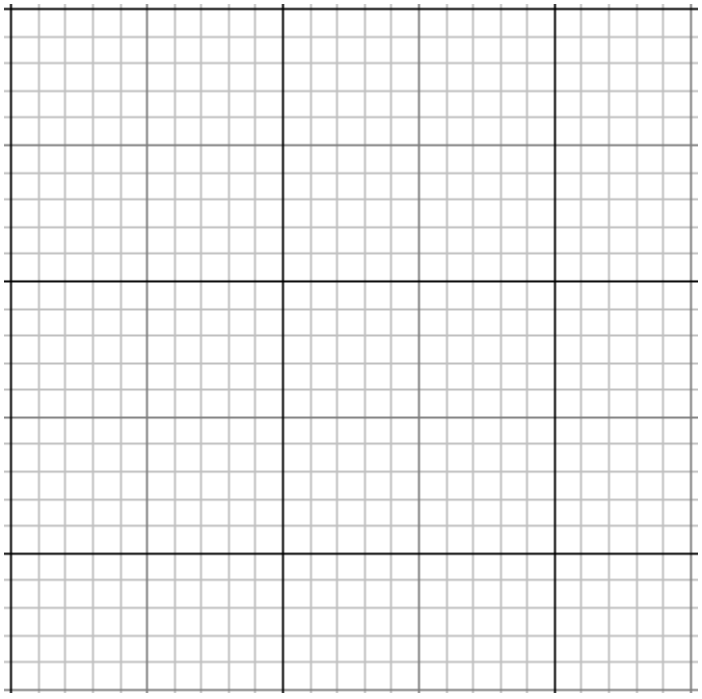


Description of motion	Graph(s)
moving at a steady speed	
speeding up, then slowing down	
moving with constant acceleration	
accelerating to a steady speed	

b. Laith cycles for 1.5 hours and covers a distance of 30 km. He takes a rest for 30 minutes, and then cycles at a speed of 15 km/h for an extra 30 km.

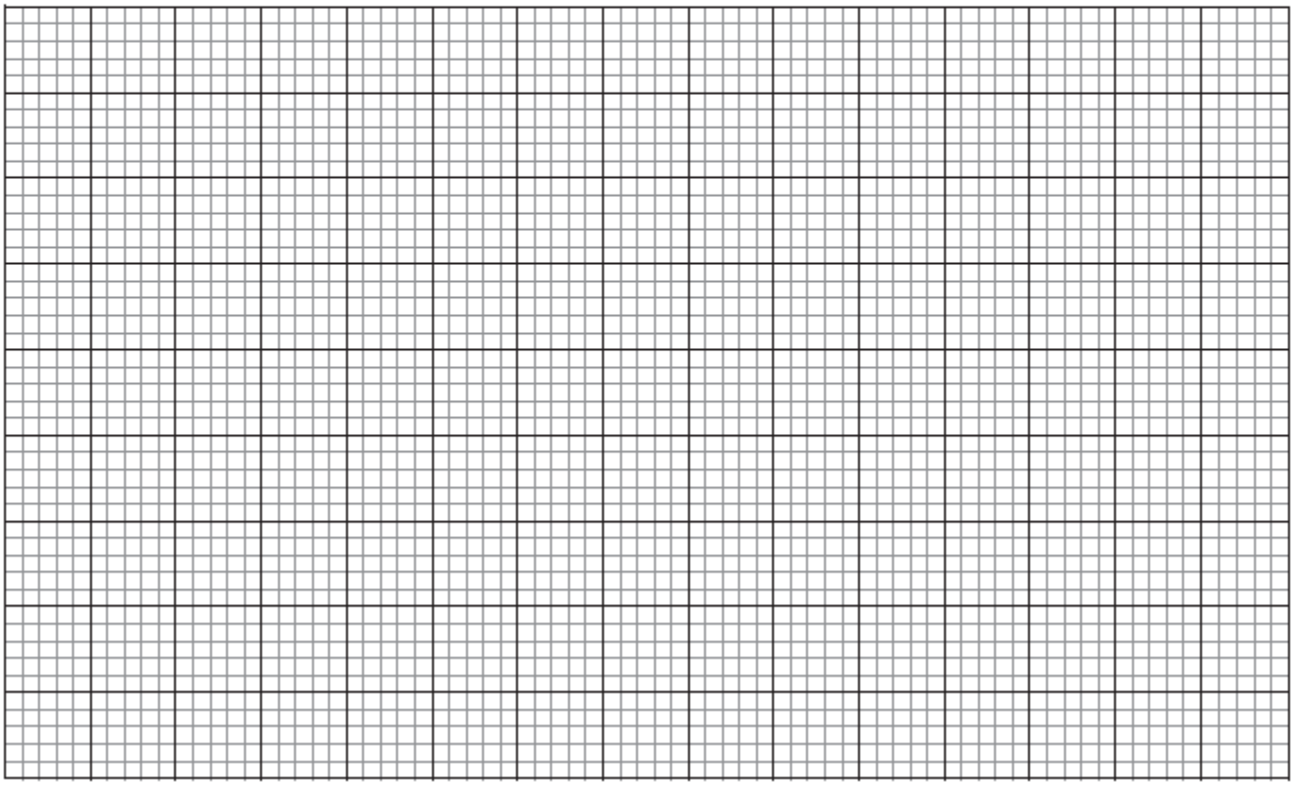
Construct a speed –time graph to represent Laith's journey on the graph paper provided.

Show all relevant calculations.



c On the graph paper grid, sketch a speed–time graph for the car whose journey is described here:

- The car set off at a slow, steady speed for 20 s.
- Then, during a time of 10 s, it accelerated to a faster speed.
- It travelled at this steady speed for 20 s.
- Then it rapidly decelerated and came to a halt after 10 s.



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