How fast is the propeller vehicle travelling?

Distance time graph

A student video recorded their propeller vehicle travelling along a tape measure. The vehicle starts at a point 130 cm along the tape.

Download the video of the student's vehicle from the link provided. Collect data from the video and complete the table below. The first three data points have been collected and entered for you.

Time (s)	Distance reached along the tape (cm)	Total distance travelled (cm)
0	130	0
1	165	35
2	194	64

Table 1

Using the graph paper provided, graph the data shown in table 1 above. Draw two graphs on the same axis:

i. one that is formed by joining one data point to the next by a red, straight line.
ii. one that is a blue, line of best fit through the set of data points.

1. After plotting the graph of total distance vs time answer the following.

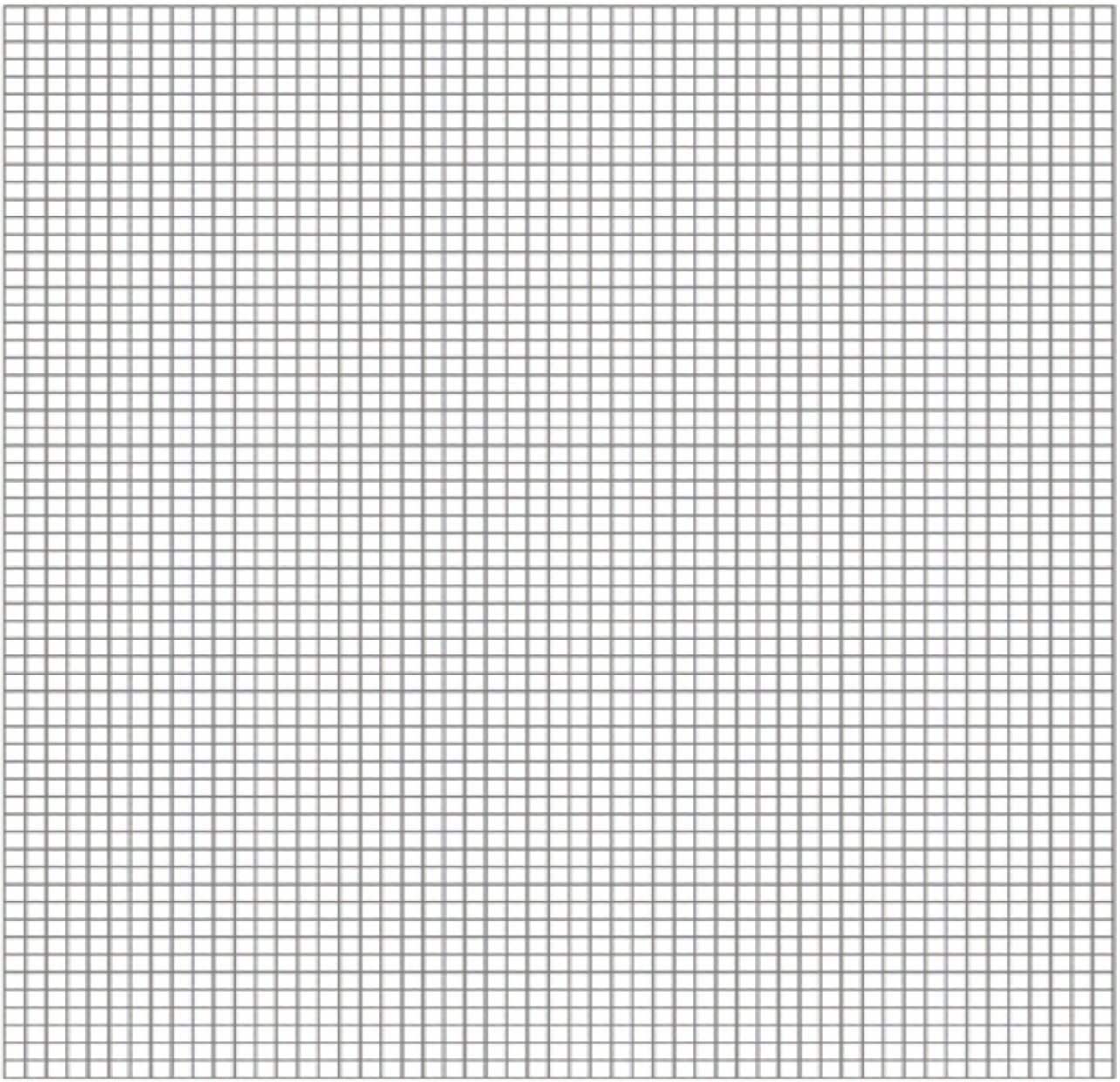
a. During what time interval is the vehicle travelling the fastest? Explain

b. During what time interval is the vehicle travelling the slowest? Explain

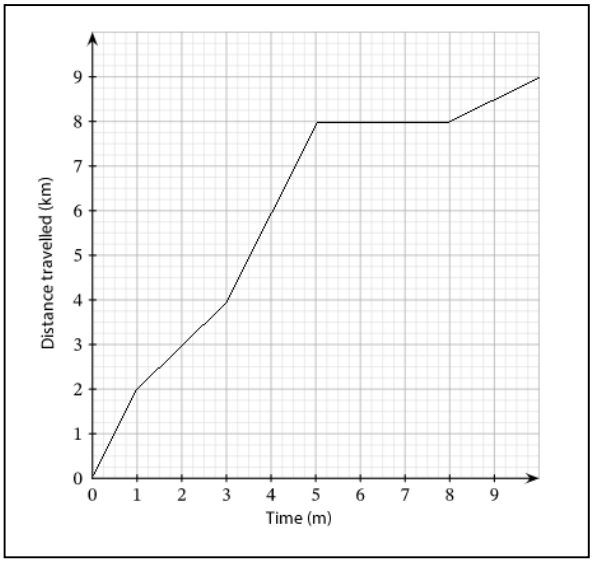
c. During what time interval are frictional forces the highest? Explain

d. Is the vehicle travelling at constant speed throughout its 10m journey? Explain

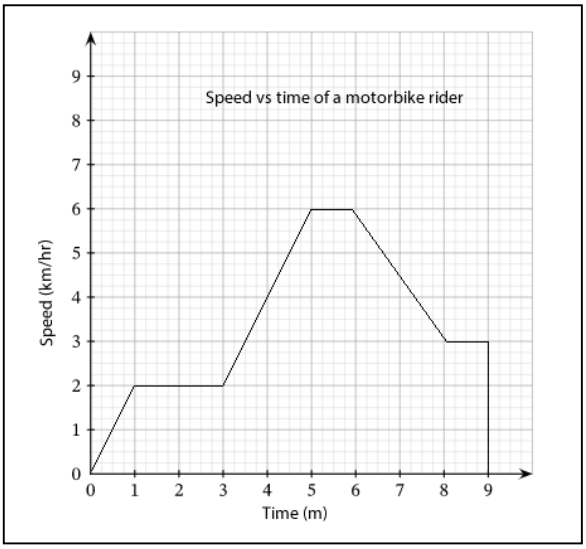
e. Reading from your graph, predict at which point on the tape measure the vehicle will be at the 19 second mark.



2. Consider the distance time of graph of motor cyclist riding away from home in a straight line up the street to the Milk Bar.
   a. How far is the Milk Bar from home?
   b. At some point along the journey the cyclist has to stop to adjust the mirrors. How long after the rider sets off for the Milk Bar must they stop and fix the mirrors?
   c. How long do they stop for?
   d. During what time periods is the rider travelling at the highest speed?
   e. During what time interval is the rider travelling at the slowest speed?
   f. What is the slowest speed of the motorbike during the journey in km/min?



3. Another motorbike rider sets off from home to go to a supermarket a few kilometres down the road. This time the speed of the motorcycle is monitored and represented as a graph, shown on the right.
   a. During what time interval/s is the motorbike accelerating (increasing in speed)?
   b. At white time/s does the motorbike come to a complete stop?
   c. How many minutes after leaving home does the cyclist start to apply the brakes?
   d. During what time interval is the bike travelling at top speed?



   e. Only when the bike is accelerating or decelerating (slowing down) are unbalanced forces acting on the bike.
      i. During what time interval/s is the bike acted on by balanced forces? Explain

      ii. During what time interval/s is the bike acted on by unbalanced forces? Explain

Solutions