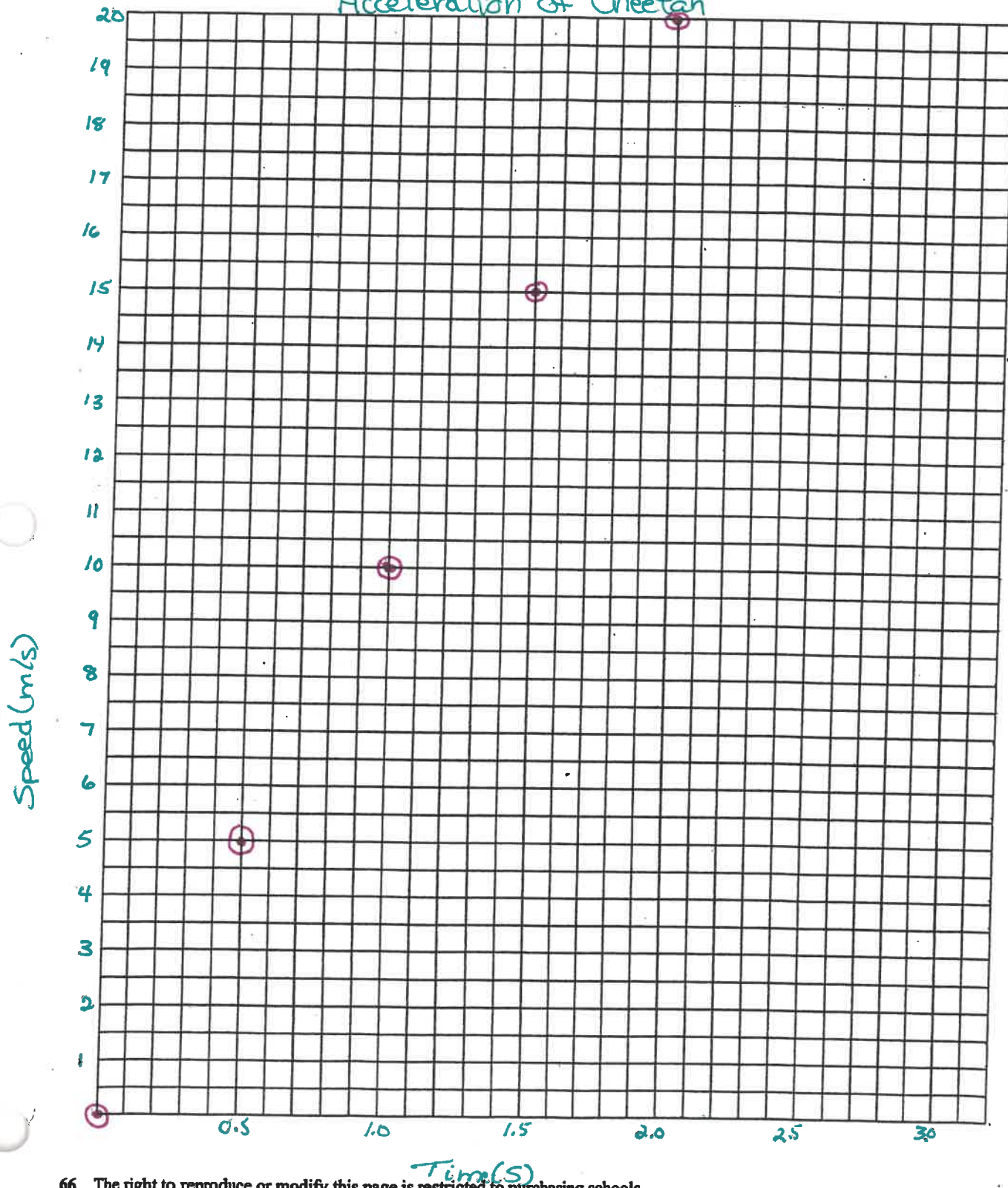


Acceleration of Cheetah



Understanding Concepts

- How can you tell from a speed-time table whether an object is accelerating?
- How can you tell from a speed-time graph whether an object is accelerating? *Line is slants down*
- Sketch a speed-time graph with two separate labelled lines for
 - high positive acceleration;
 - low negative acceleration.
- What feature of a speed-time graph communicates
 - the acceleration? *the slope of the line*
 - the distance travelled? *the area below the line*
- Two runners, Cathryn and Keir, take part in a fundraising marathon. The graph in **Figure 7** shows how their speeds change for the first 100 s from the start of the marathon.

Table 3 Acceleration of Cheetah

Time (s)	Speed (m/s)
0.0	0.0
0.5	5.0
1.0	10.0
1.5	15.0
2.0	20.0

- Create a scientific question about the acceleration characteristics of different vehicles. State the variables clearly.
- Sketch and label distance-time and speed-time graphs for constant speed and a speed-time graph for constant acceleration (three graphs in total).
- Why does $\Delta d = v_{av} \Delta t$ but $A = \frac{1}{2}bh$? Where does the half (1/2) come from? If $\Delta d = A$ and $\Delta t = b$, then why does $v_{av} = \frac{1}{2}h$?
- Draw a speed-time graph for your movements as you go from your desk in the classroom to the pencil sharpener.
- Clayton sets out on his motorcycle. His speed at different times is shown on the graph in **Figure 8**.

Cathryn and Keir's Acceleration

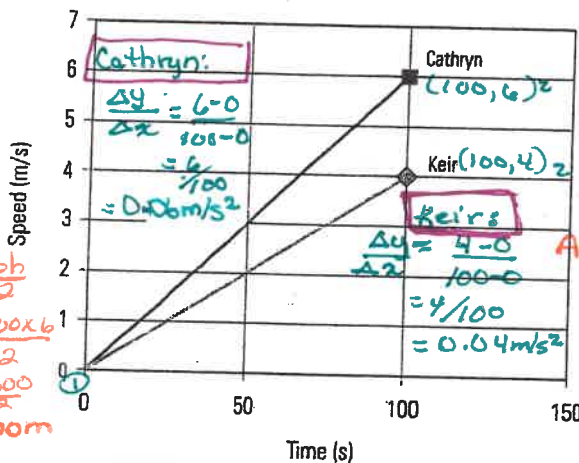
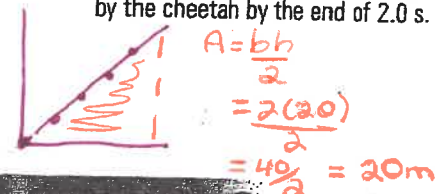


Figure 7

- Which runner has the greater acceleration? Show this by calculating the acceleration of each. *Cathryn*
 - Which runner is ahead after 100 s? Calculate and compare the distance travelled by each. *Cathryn*
- The cheetah is the fastest land animal and can accelerate rapidly in an attack. **Table 3** shows some typical speeds and times for a cheetah.
 - Draw a speed-time graph using the information in **Table 3**.
 - Using your graph, calculate the average acceleration of the cheetah. $\frac{\Delta y}{\Delta x} = \frac{20-0}{2.0-0} = \frac{20}{2} = 10 \text{ m/s}^2$
 - Using your graph, calculate the total distance travelled by the cheetah by the end of 2.0 s.



Graphing ● Asking the Questions

Clayton's Speed on his Motorcycle

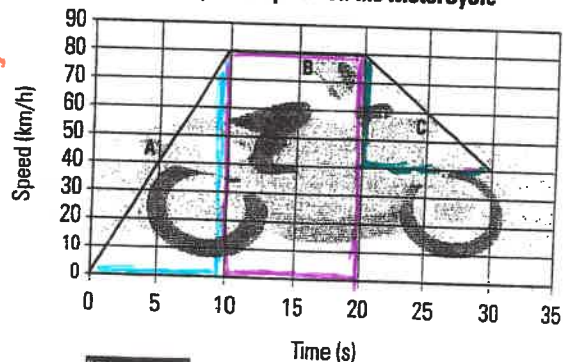


Figure 8

- Calculate the accelerations during each of the time intervals, A, B, and C. *A = 8 km/h/s B = 0 km/h/s C = 4 km/h/s*
- Without calculating, list the time intervals during which the distances travelled are, in order, from largest to smallest. *B, C, A*

Reflecting

- What assumption have you been making about acceleration in this chapter?