Lesson 5: Acceleration (2)

P3: FORCES FOR TRANSPORT

ACCELERATION (2)

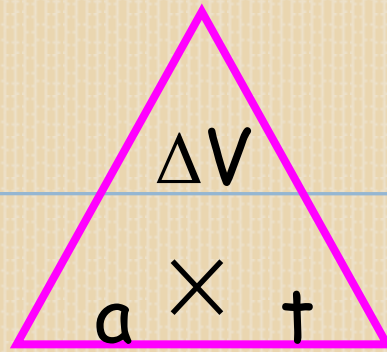
Objective

- Practice drawing a graph of speed against time (All)
- To use speed-time graph to measure acceleration (Most)
- To use speed-time equation to calculate acceleration (Some)

Success Criteria

- Successfully make speed-time graph from Matrix task
- Correctly measure gradient using the graph to give acceleration
- Correctly measure acceleration using the equation

HOMEWORK IN TODAY
STARTER – 4 QUESTIONS



Acceleration = $\frac{\text{change in speed (m/s)}}{\text{time taken (s)}}$

Units = **m / s²**

1. A cyclist accelerates from 0 to 10m/s in 5 seconds. What is her acceleration? **2m/s2**

2. A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its acceleration? **6 m/s2**

3. A car accelerates from 10 to 20m/s with an acceleration of 2m/s². How long did this take? **5 seconds**

4. A race horse gallops from at a speed of 40 km/h and then accelerates up to a speed of 60km/h in 10 seconds. What is its acceleration in m/s2 (to 2 decimal places)? **0.56 m/s2**

Watch the Matrix and fill in the sheet .. . . . .

http://www.youtube.com/watch?v=SLtbQLv9-NA – start minute 01:05 for 2mins 40.

Incident	(A) Car moves onto motorway	(B) Twin shoots at car	(C) Gold car turns over	(D) Black car turns over	(E) Twin flies into car	(F) Agent jumps onto car
Speed(m/s)	20	20	20	25	30	30
Time on stop watch	0	0:04	0:27	0:51	1:10	1:52
Time in seconds	0	4	27	51	70	112

Incident	(G) Agent pulls off top of car	(H) Trinity slams on the breaks
speed(m/s)	35	0
Time on stop watch	2:24	2:31
Time in seconds	144	151

- Write the letters B to H in rough – fill in rough
- We will go through together before putting in table
- Be READY – it goes fast
- Be looking to the next part

Activity 1

Plot these results on a speed time graph, with time on the bottom axis (the x axis) and speed on the side axis (the y axis).

Label the points where there is a change in motion A,B,C,D,E,F,G,H. Example: point A is at time 0 and speed 0.

Activity 2

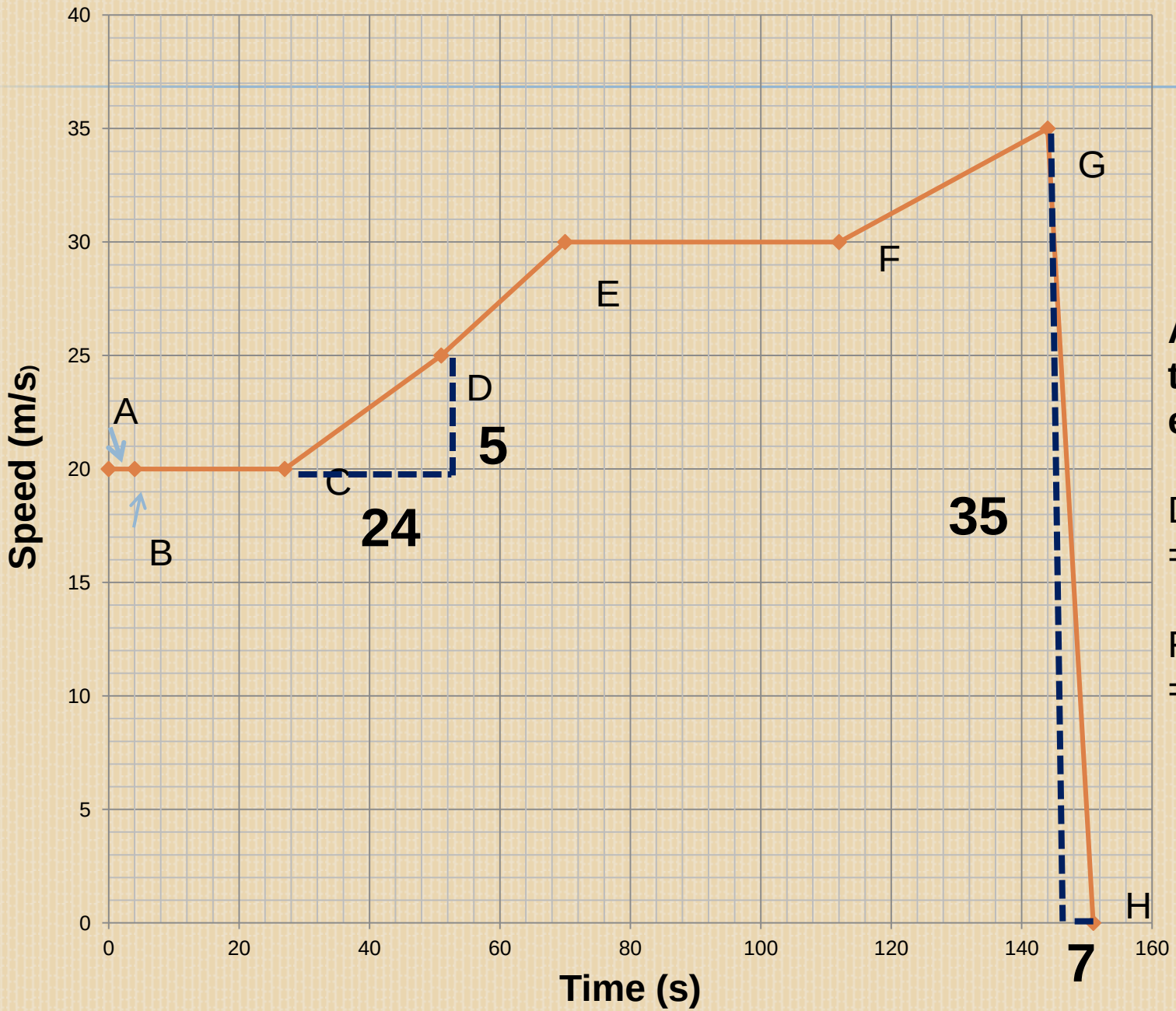
To measure the acceleration on a speed-time graph, you need to calculate the gradient of the line. Use the graph to calculate the following accelerations: Points **B to C**, **C to D** and **G to H**. Draw your working on the graph and put your answers on the back of your graph.

Activity 3

Using the equation

$$\textbf{Acceleration} = \frac{\textbf{Change in speed}}{\textbf{Change in time}} = \frac{\text{(final speed – initial speed)}}{\text{(final time – initial time)}}$$

Work out the following accelerations (show your working and answers on the back of the graph): **D to E** and **F to G**



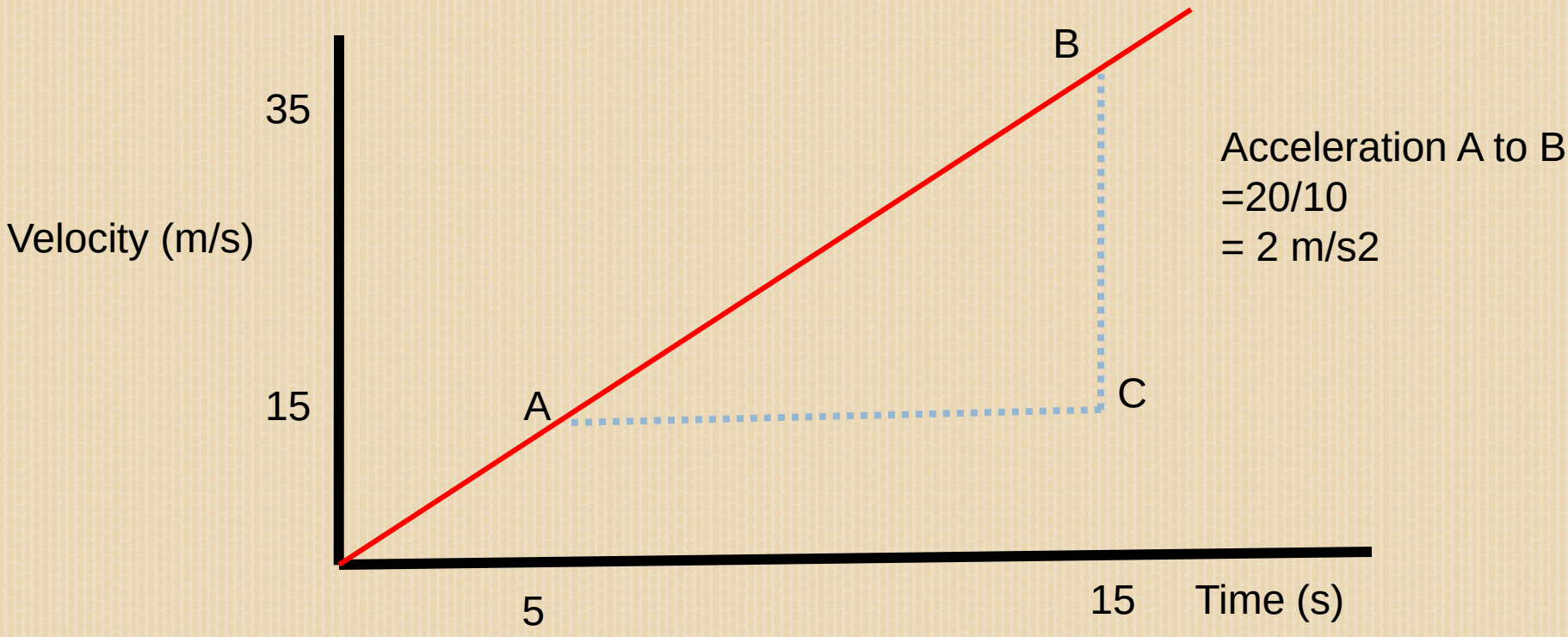
Answers to equations:

D to E =0.26 m/s2

F to G =0.16 m/s2

QUICK RECAP

- What is the acceleration between points A and B on this speed-time graph?



ACCELERATION AT CONSTANT SPEED

- Observe the ball being swung around on string
- You can drive around a roundabout at a constant speed but the car is still accelerating
- Driver applies force towards centre of roundabout to get car to change direction – this force is actually causing an acceleration

PLENARY: Write numbers 1-3 in your books and explain what the graphs below show.