TRAIN OF THOUGHT

Passage 1

As a train travels along a track, it is maintaining a constant speed. To find the average velocity of the train, the distance traveled can be divided by the time taken using the formula below:

$$V = \frac{D}{T}$$

The train travels at a constant speed for 3 seconds. Table 1 shows the distance the train travels over those first three seconds. As the train moves through a town, it decelerates for safety. Deceleration is found the same way acceleration is calculated, by looking at the change of velocity over time. Table 2 shows its velocity. When the train leaves the town, it accelerates until it resumes a constant speed. Figure 1 shows a graph of the train's velocity as it travels on this trip.

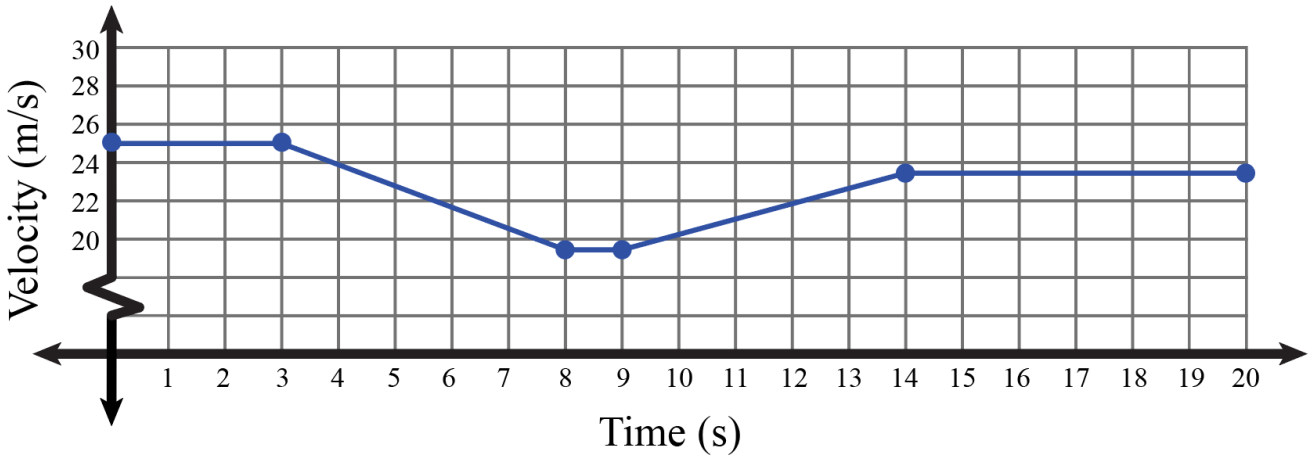
Table 1: Distance

Time (s)	Distance (m)
1	25
2	50
3	75

Table 2: Velocity

Time (s)	Velocity (m/s)
3	25
4	23.9
5	22.8
6	21.7
7	20.6
8	19.5

Figure 1: Record of train's velocity over time



Questions:

1. What is the train's acceleration over the first 3 seconds?
   A) 75 m/s^2
   B) 25 m/s^2
   C) 50 m/s^2
   D) 0 m/s^2

2. How far does the train travel in the first three seconds?
   A) 19.5m
   B) 50m
   C) 75m
   D) 25m/s

3. What is the velocity of the train at 6 seconds?
   A) 22 m/s
   B) 21.7 m/s
   C) 23.9 m/s
   D) 22.8 m/s

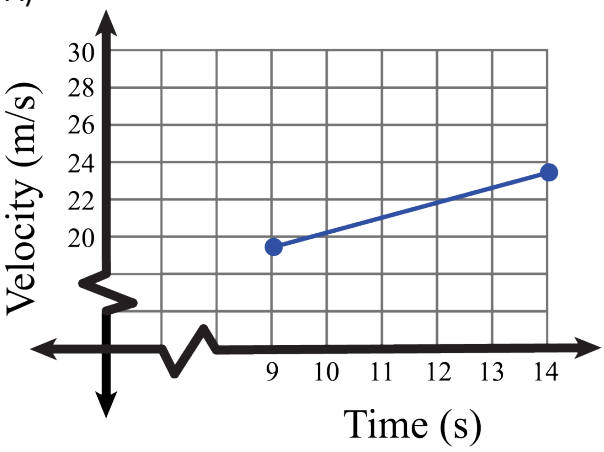
4. What is the deceleration for the train based on Table 2:
   A) 2 m/s^2
   B) 1.5 m/s^2
   C) 1.1 m/s^2
   D) 1 m/s^2

5. The train accelerates from t = 9 to t = 14 to reach a velocity of 23.5 m/s at 14 seconds. Using Table 2 and Figure 1, what is the train's acceleration over this period of time?
   A) 0.8 m/s^2
   B) 1.5 m/s^2
   C) 3 m/s^2
   D) 2.1 m/s^2

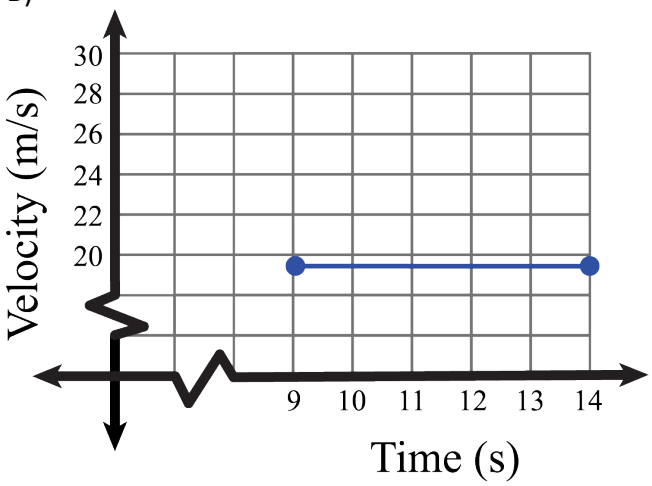
6. Which is the best description of what is seen in Figure 1:
   A) The train maintains a constant speed, accelerates, maintains its speed, decelerates, and then returns to a constant speed.
   B) The train maintains a constant speed, decelerates, maintains that lower speed, accelerates, and then returns to its initial speed.
   C) The train decelerates, accelerates, and then maintains a constant speed.
   D) The train maintains a constant speed, decelerates, maintains that lower speed, accelerates, and then maintains its speed.

7. If the conductor decided to not accelerate when exiting the town, what would you expect the graph to look like from t = 9 to t = 14?

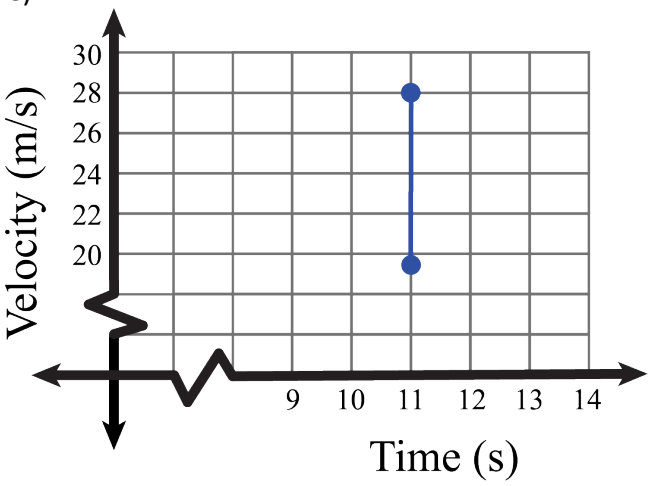
A)



B)



C)



D)