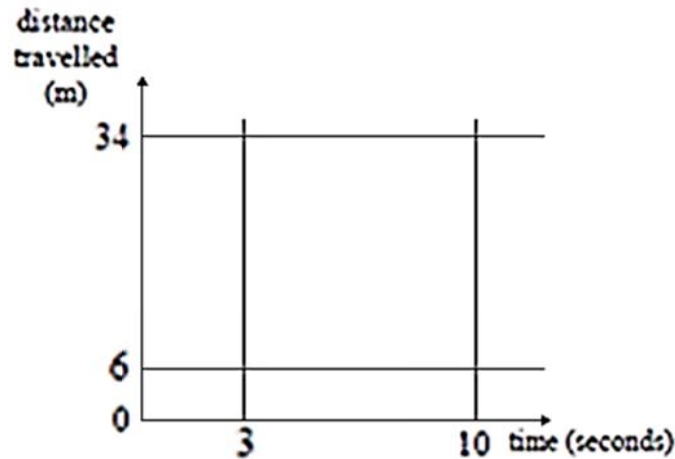


SCIENCE: PHYSICS 90191 MECHANICS: MOTION

A REMOTE CONTROL CAR (2008;2)

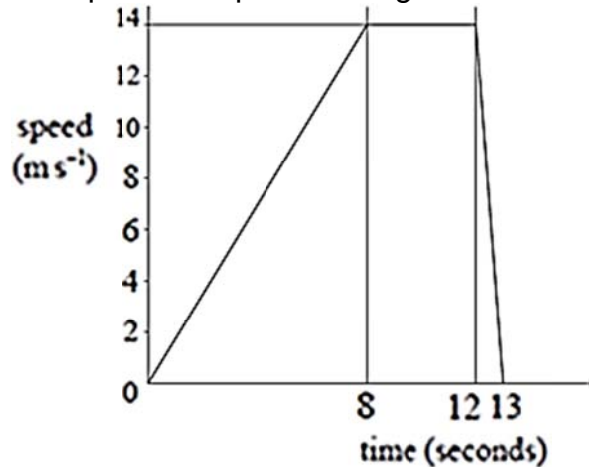
A child plays with a remote control car on concrete.

- (a) The car starts from rest and travels a distance of 6 m in 3 seconds. Calculate the average speed of the car in the 3 seconds.
- (b) The car then travels a further 28 m at a constant speed of 4 ms^{-1} for 7 seconds. Draw in the appropriate shaped lines on the distance-time graph below to represent the journey of the car during the first 10 seconds.



SPORTS TRAINING (2007;1)

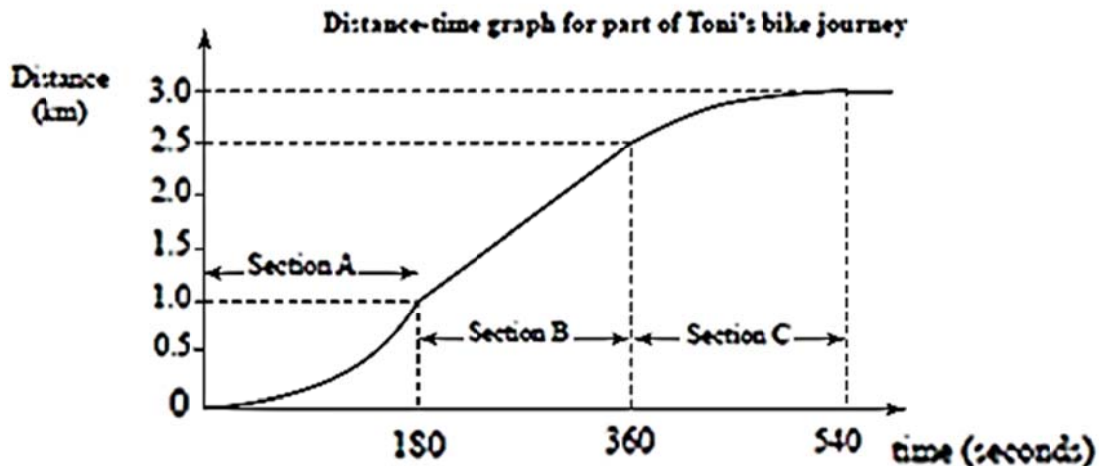
The speed-time graph below represents sprint training for an athlete.



- (a) State the speed of the athlete at 10 seconds.
- (b) Describe the motion of the athlete between 12 and 13 seconds.
- (c) Calculate the acceleration of the athlete during the first 8 seconds.
- (d) Using the graph, calculate the total distance travelled by the athlete in the first 12 seconds.
- (e) Another part of the athlete's training is swimming. Using the equation $v_{av} = d/t$ calculate the average speed of the athlete during the 90 seconds that the athlete swims two lengths (one length = 50 m) of a pool.

CYCLING (2006;1)

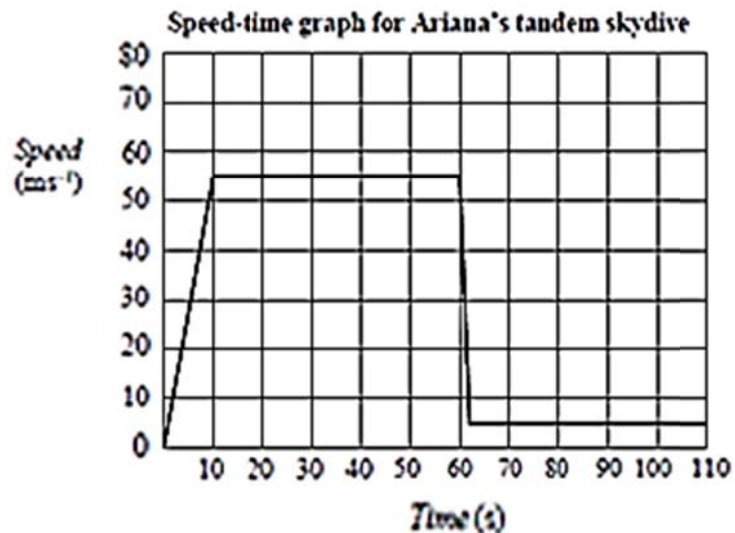
Toni cycles each day on her mountain bike. The distance-time graph below shows part of her journey on one day.



- How far, in metres, does Toni travel in the first 360 seconds?
- Calculate Toni's average speed over the 540-second bike journey.
- Describe the motion of Toni and the bike during Section A.
- Using the graph above, show that the speed of Toni and the bike during Section B is 8.3 ms^{-1} .
- As shown on Section C of the graph, Toni reduces her speed from 8.3 ms^{-1} to 0 ms^{-1} in 180 seconds to come to a stop. Calculate the deceleration of Toni during these 180 seconds.

TANDEM SKYDIVING (2005;1)

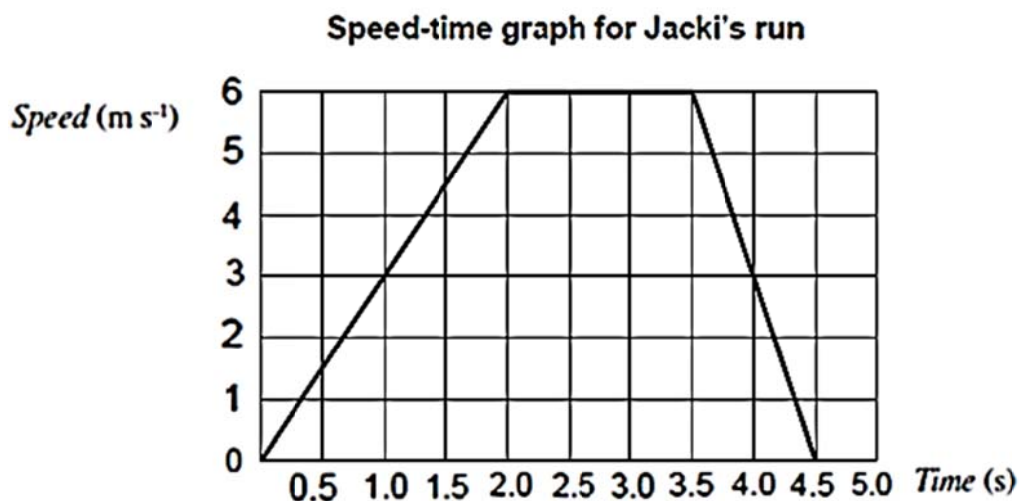
Ariana wins a competition for a Tandem Skydive. The plane flies to a height of 5 000 m above sea level. Ariana is strapped to her jumpmaster. Ariana and the jumpmaster jump out of the plane. After 60 seconds the jumpmaster pulls the cord and releases the parachute. The speed-time graph below shows the motion of Ariana and the jumpmaster from when they leave the plane until after the parachute is released.



- Describe the motion of Ariana and the jumpmaster during the first 10 seconds.
- Calculate how far Ariana and the jumpmaster fell during the first 60 seconds.

THE GAME BEGINS! (2004;2)

In the team's first game, Jacki is the opening bowler. The speed-time graph below shows the motion of Jacki as she runs in to bowl.



- (a) What is the maximum speed Jacki reaches?
- (b) Fully describe the motion of Jacki between 2.0 s and 3.5 s.
- (c) Use the formula $a = \frac{\text{change in speed}}{\text{change in time}}$ to calculate Jacki's acceleration between 0 s and 2.0 s.
- (d) Using the speed-time graph, calculate the total distance travelled by Jacki as she ran in to bowl.

QUESTION TWO (2003;1)

A group of friends have decided to help in the school stage production. William helped the sound technician to bring in boxes of sound gear. The boxes were pushed across the stage.



The stage floor is 15 m from one side to the other. It takes 5 seconds to push the box across the stage. Calculate the average speed of the box. Show all working. The units are required.