Speed and Velocity

(a) (i) Define *speed*.

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(ii) Define *velocity*.

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(iii) State and explain the differences between these quantities.

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[4]

(b) Fig. 1.1 shows a fairground big wheel. The wheel is rotating in a vertical plane and carriages travel round a circle of diameter 40 m at a constant speed. The carriages complete one revolution in 3.5 minutes.

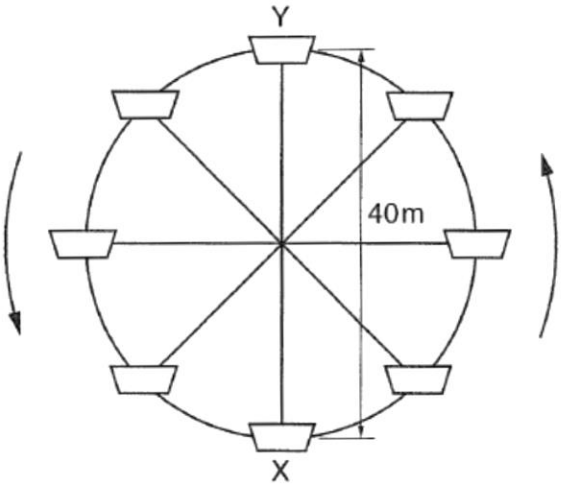

Fig. 1.1

(i) A carriage moves half a revolution from X to Y. Calculate

1. the speed of the carriage

2821 Jan02 speed = …… $m\,s^{-1}$

2. the magnitude of the average velocity of the carriage.

magnitude of the average velocity = ... $m\,s^{-1}$
[4]

(ii) The carriage in **(b)(i)** returns to point X. Calculate, for the **complete revolution**,

1. the speed of the carriage

speed = ... $m\,s^{-1}$

2. the average velocity of the carriage.

average velocity = ... $m\,s^{-1}$

Comment on your answer.

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..... [3]

(c) Describe how the instantaneous velocity of the carriage at Y differs from the average velocity of the carriage after travelling from X to Y.

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..... [3]

2.

(a) Fig. 1.1 shows a table of vector and scalar quantities.

speed, acceleration	
energy, power	
force, pressure	
velocity, displacement	

Fig. 1.1

In the blank spaces provided in Fig. 1.1, label the pair of quantities that are both vectors with a V and the pair that are both scalars with an S. [2]

(b) Fig. 1.2 shows the path taken by an athlete when she runs a 200 m race in 24 s from the start position at S to the finish at F.

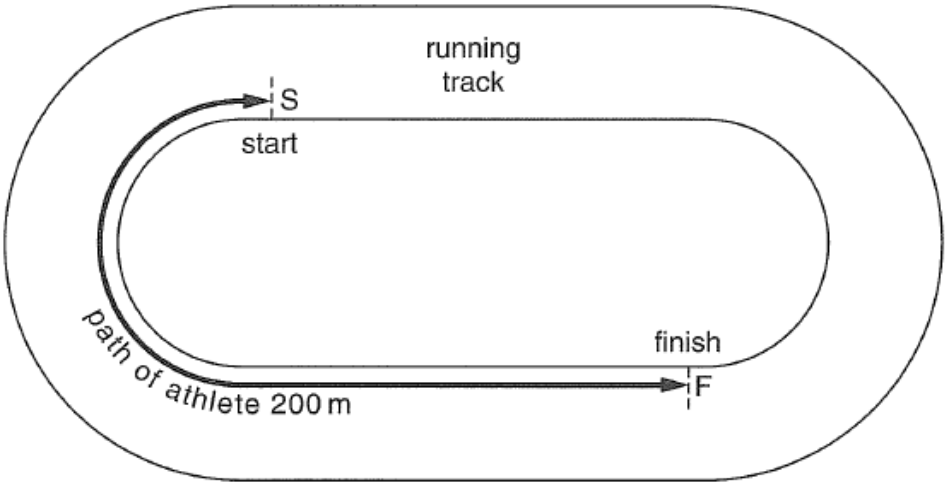

Fig. 1.2

(i) Calculate the average speed of the athlete.

average speed = ...$m\,s^{-1}$ [2]

(ii) Explain how the magnitude of the average velocity of the athlete would differ from her average speed. A quantitative answer is not required.

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.....[2]