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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

# Motion (Kinematics)

Paper 2 — Theory Worksheet (topical compilation)


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# The City School

PAF CHAPTER

**KINEMATICS P2**

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***Question # 1: May June 2003/P2/Q1***

Fig. 1.1 shows the speed-time graph for the first 125 s of the journey of a lorry.

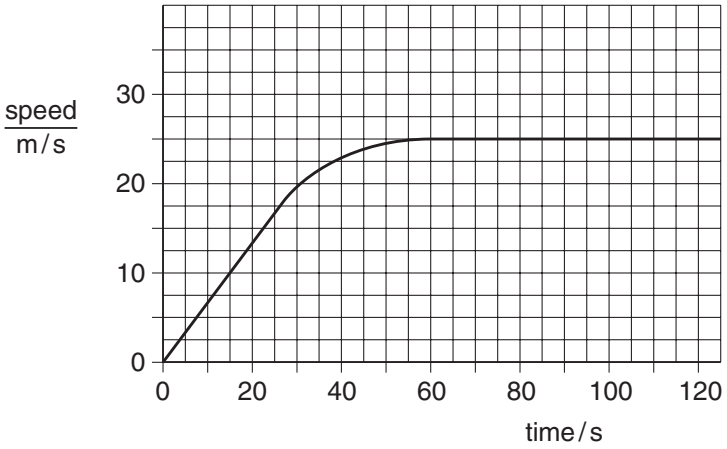


**Fig. 1.1**

**(a)** During the motion shown, describe what happens to

**(i)** the speed of the lorry,

.....

.....

.....

**(ii)** the acceleration of the lorry.

.....

.....

.....

[4]

**(b)** Determine the maximum speed of the lorry in m/s and in km/h.

speed = ..... m/s

speed = ..... km/h

[2]

***Question # 2: May June 2005/P2/Q1***

Fig. 1.1 represents the motion of Earth and the planet Venus around the Sun. The orbits shown are circles.

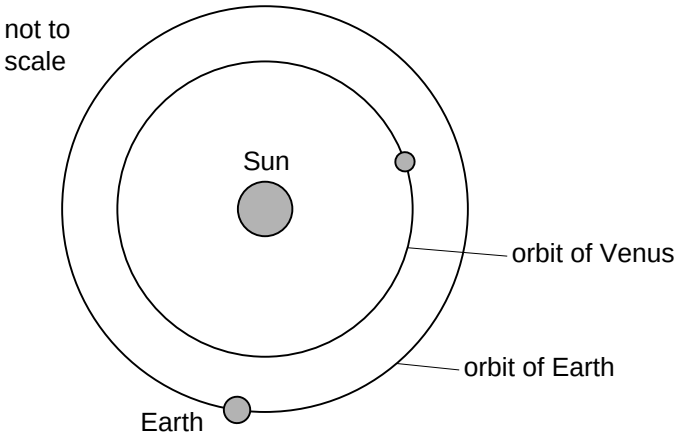


**Fig. 1.1**

**(a)** On Fig. 1.1, draw an arrow to show the direction of the force exerted by the Sun on the Earth. [1]

**(b)** Information about Earth and Venus is given in the table.

| planet | time for one orbit in (Earth) years | radius of orbit / million km | circumference of orbit / million km |
|---|---|---|---|
| Venus | 0.7 | 108 | 679 |
| Earth | 1.0 | 150 | 942 |

**(i)** Use the information in the table to show that Venus has a greater speed than Earth.

.....

.....

.....

..... [2]

**(ii)** As Earth and Venus move in their orbits, the distance between them changes. Calculate the largest possible distance between them.

distance = ..... million km [1]

***Question # 3: May June 2006/P2/Q2***

A cyclist starts from rest. He accelerates and then travels at a constant speed. At 12 s, the cyclist applies the brakes and slows down. Photographs are taken of the cyclist at 4 s intervals. Fig. 2.1 shows the results.

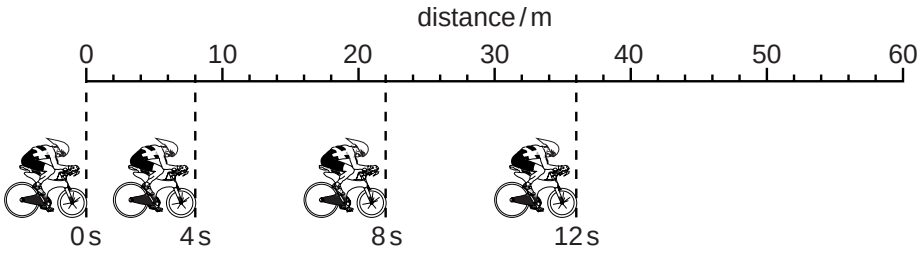


**Fig. 2.1**

**(a)** On Fig. 2.1, draw a possible position of the front wheel of the cycle at 16 s. [1]

**(b)** On Fig. 2.2, plot a distance-time graph of the cyclist for the first 16 s. [4]

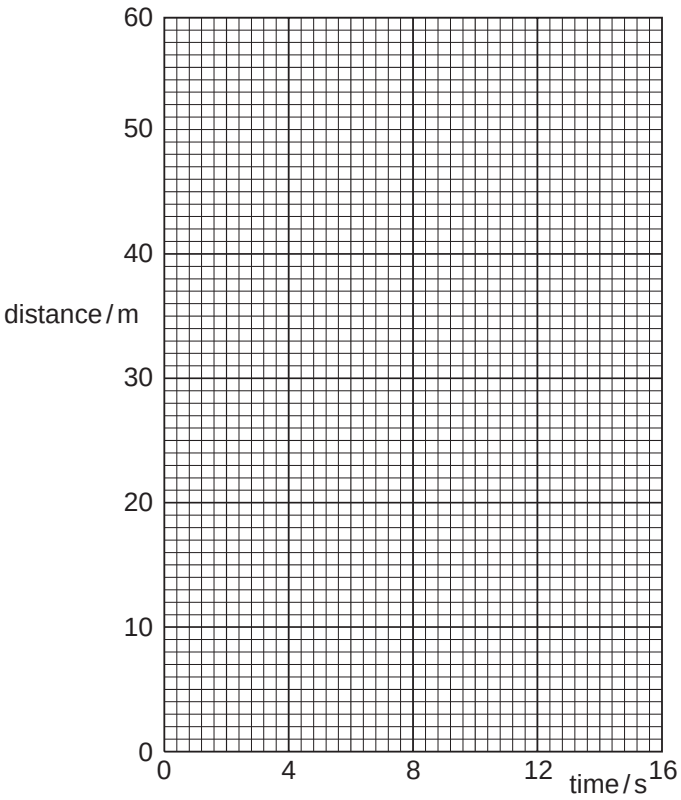


**Fig. 2.2**

**(c)** Calculate the average speed of the cyclist during the first 12 s.

average speed = ..... [2]

***Question # 4: May June 2007/P2/Q1***

**1** Two athletes, A and B, run a 100 m race. At time $t = 0$, a gun is fired to start the race.

Fig. 1.1 shows the distance-time graph for the two athletes.

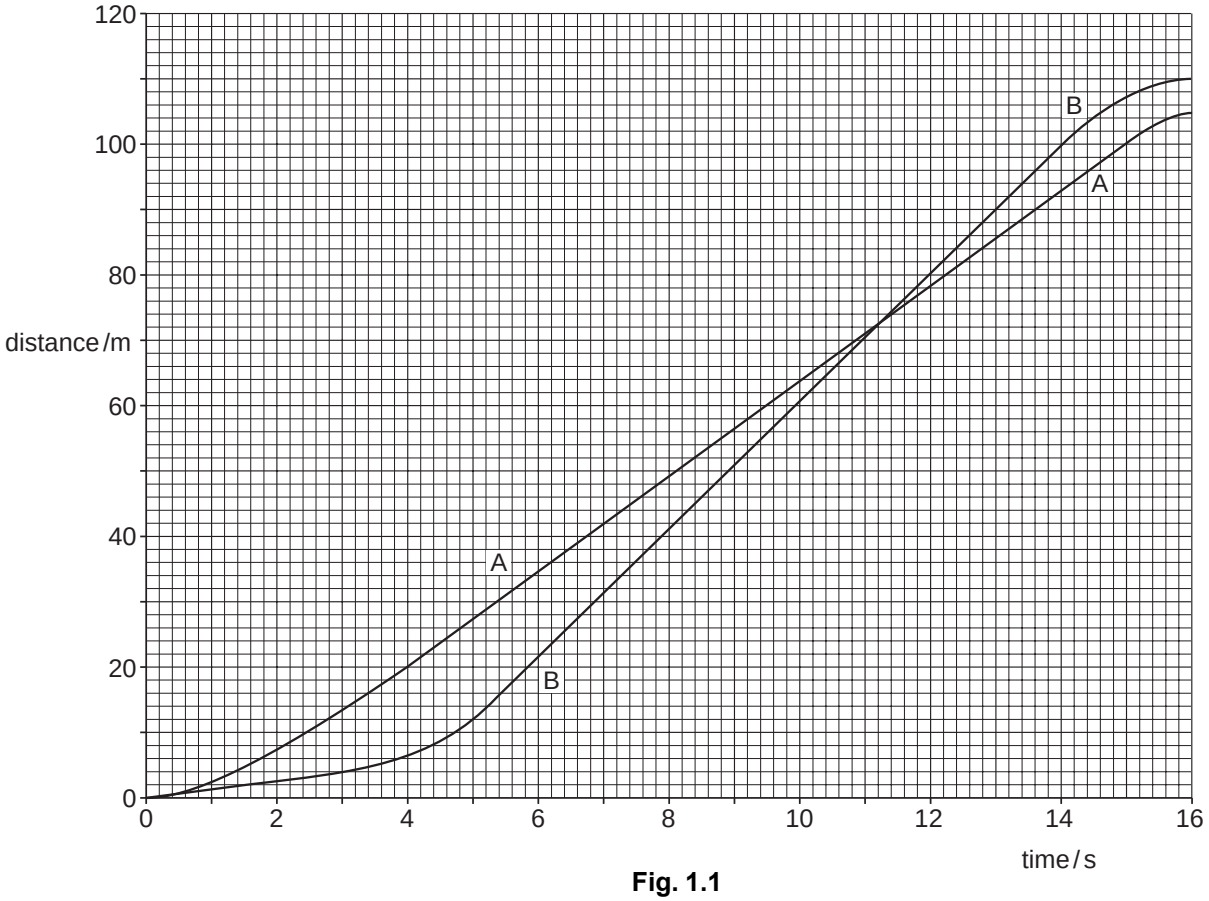


**Fig. 1.1**

**(a)** Describe the motion of athlete A during the first 8 s of the race.

.....

.....

.....

.....

..... [2]

**(b)** State the distance between the two athletes as the winner passes the 100 m mark.

..... [1]

**(c)** Calculate the speed of athlete A between $t = 4$ s and $t = 15$ s.

speed = ..... [2]

***Question # 5: May June 2015/P21/Q1***

Fig. 1.1 shows the distance-time graph for two cyclists A and B. They start a 500 m race together but finish the race at different times.

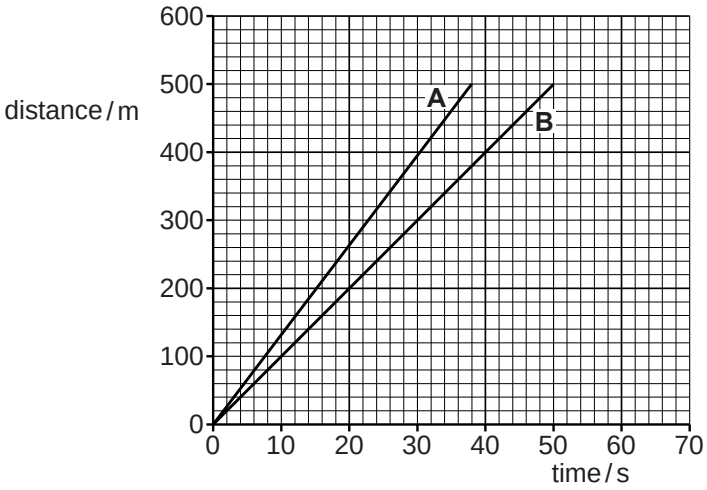


**Fig. 1.1**

**(a)** Use Fig. 1.1 to determine

**(i)** the distance between A and B at time $t$ = 20 s,

.....[1]

**(ii)** the difference in the time taken by A and B for the race.

.....[1]

**(b)** Cyclist C starts the race at the same time as A and B and covers the first 200 m of the race at a constant speed of 5.0 m / s. He then accelerates and finishes the race at $t$ = 60 s.

**(i)** On Fig. 1.1, draw the distance-time graph for cyclist C. [2]

**(ii)** Calculate the average speed of cyclist C for the whole race.

speed = .....[2]

***Question # 6: May June 2018/P21/Q1***

A cyclist travels along a straight, horizontal road, as shown in Fig. 1.1.

**Fig. 1.1**

**(a)** Describe how the average speed of the cyclist can be measured.

In your account, suggest what equipment is used, the measurements that are made and how the average speed is calculated.

.....

.....

.....

.....

.....

.....[3]

**(b)** For part of the journey, the cyclist has a constant, negative acceleration.

**(i)** State what is meant by a *negative acceleration*.

.....

.....[1]

**(ii)** The size of the acceleration is $1.8\,m/s^2$.

Calculate the change in speed of the cyclist in a time of 2.5 s.

change in speed = .....[2]

***Question # 7: Oct Nov 2004/P2/Q1***

Fig. 1.1 shows a simplified speed-time graph for a train that travels between two stations.

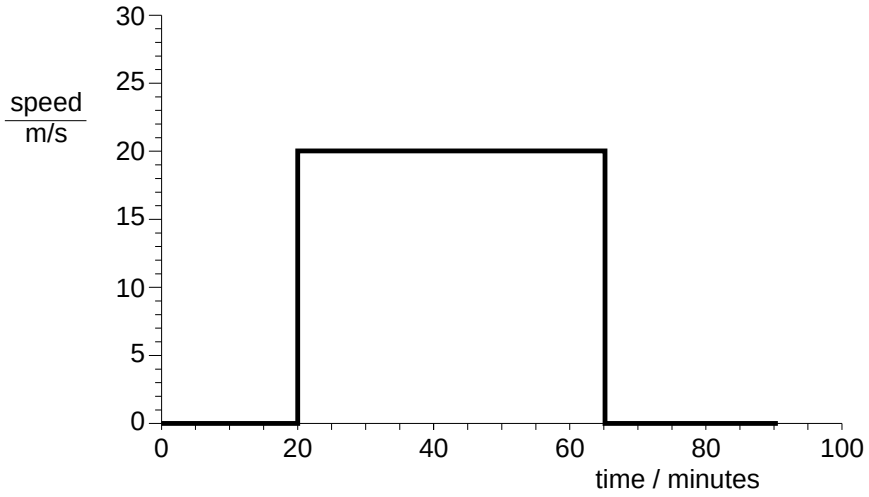


**Fig. 1.1**

**(a)** Describe the motion of the train.

.....

.....

.....

.....

.....[2]

**(b)** Calculate the distance travelled by the train between the two stations.

distance = …….. [2]

**(c)** Another train travels between the same two stations on a parallel track. This train travels at a constant speed. It starts its journey at time $t = 0$ and finishes at $t = 90$ minutes.

On Fig. 1.1, draw the speed-time graph for this train. [2]

***Question 8: Oct Nov 2005/P2/Q1***

Fig. 1.1 represents the motion of a car along a straight road. As the car approaches a small town, it slows down. The car travels at a constant speed from the start of the town to the end of the town. After passing through the town, the car speeds up.

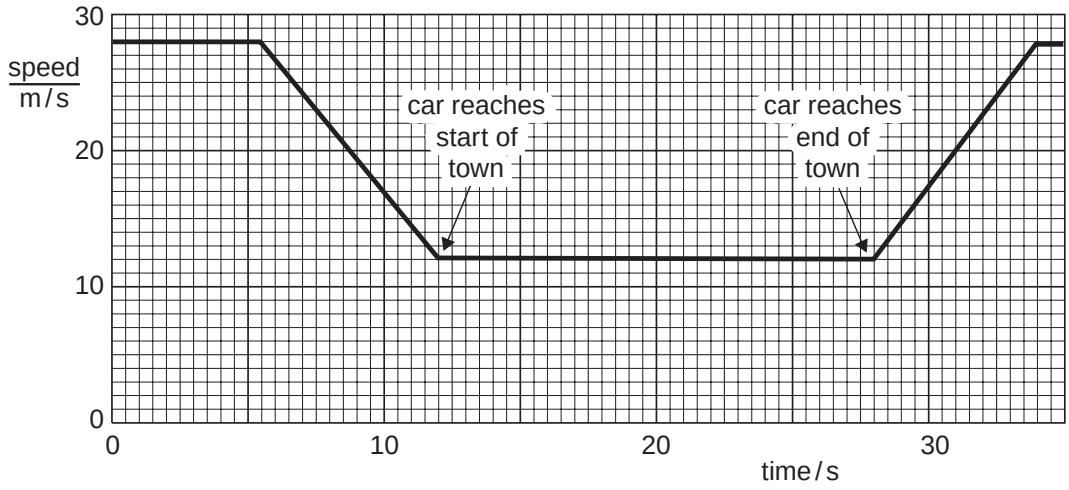


**Fig. 1.1**

**(a)** **(i)** Determine the speed of the car in the town.

speed = ..... [1]

**(ii)** Determine the time taken by the car to pass through the town.

time taken = ..... [1]

**(iii)** Calculate the distance travelled by the car in the town.

distance = ..... [1]

**(b)** The car accelerates after passing through the town.

Calculate the acceleration. Give the unit of your answer.

acceleration = ..... [3]

***Question # 9: Oct Nov 2010/P21/Q1***

A window cleaner drops a sponge from the balcony of a hotel at time $t = 0$. Fig. 1.1 is the speed-time graph for the motion of the sponge.

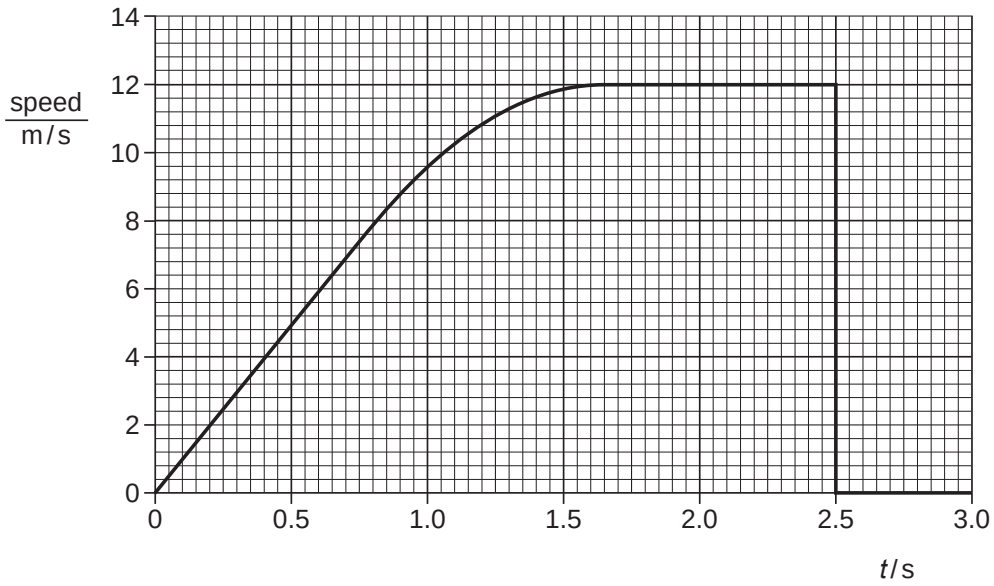


**Fig. 1.1**

**(a)** State a value for $t$ when the sponge is

**(i)** moving with a uniform speed,

..... [1]

**(ii)** accelerating at a non-uniform rate,

..... [1]

**(iii)** decelerating.

..... [1]

**(b)** Calculate the distance travelled by the sponge between $t = 0$ and $t = 0.75$ s.

distance = ..... [2]