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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Forces (Dynamics)

Paper 2 — Theory Worksheet (topical compilation)

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The City School

PAF CHAPTER

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DYNAMICS P2 (worksheet # 2)

Question # 1: May June 2008/P2/Q9

When a car driver sees an emergency ahead, he applies the brakes. During his reaction time the car travels at a steady speed and covers a distance known as the thinking distance. The braking distance is the distance travelled by the car after the brakes are applied.

(a) State the energy change that occurs as the car brakes. [2]

(b) Fig. 9.1 shows the speed-time graph of a car.
The driver sees the emergency at time $t = 0$.
The total mass of the car is 800 kg.

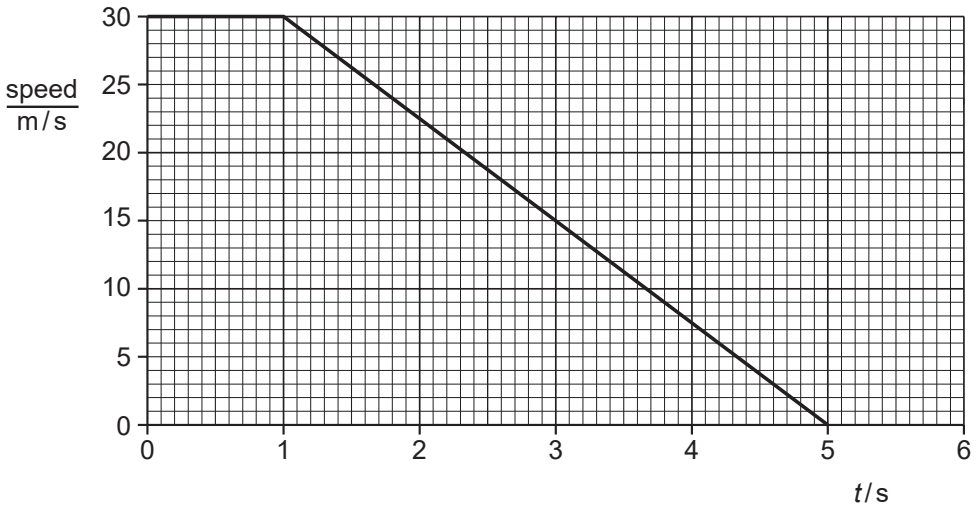


Fig. 9.1

Determine

(i) the thinking distance, [1]

(ii) the braking distance, [2]

(iii) the deceleration of the car during braking, [2]

(iv) the force provided by the brakes. [2]

(c) Using ideas about friction and deceleration, state and explain how the braking distance is affected by

(i) using new tyres rather than badly worn tyres, [2]

(ii) the car skidding on a wet road, [2]

(iii) the car carrying a heavy load of passengers. [2]

Question # 2: May June 2010/P21/Q9

Fig. 9.1 shows a car braking on a road and coming to rest.

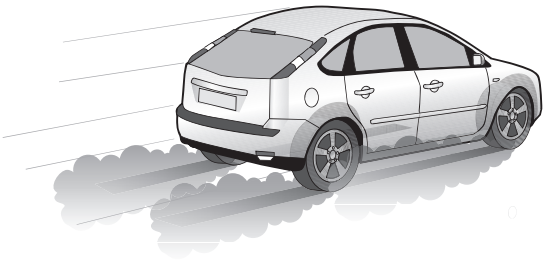


Fig. 9.1

(a) Explain what is meant by

(i) the *thinking distance*,

.....

.....[1]

(ii) the *braking distance*.

.....

.....[1]

(b) An engineer conducts a test on the car and finds that the braking distance is greater when the car is fully loaded than when it is unloaded.

(i) Apart from the road conditions, state what must be kept the same in the test.

.....[1]

(ii) Explain why the car has a greater braking distance when fully loaded.

.....

.....[1]

(c) State and explain how one road condition affects the braking distance of the car. Use ideas about friction in your answer.

.....

.....[2]

(d) Explain how wider tyres affect the pressure of the car on the surface of the road.

.....

.....[1]

(e) The car has a total mass of 900 kg and is travelling at 20 m/s. At time t = 0, the driver sees an accident ahead. He applies the brakes at t = 0.60 s to stop the car. After the brakes are applied, the car comes to rest in a further 4.0 s.

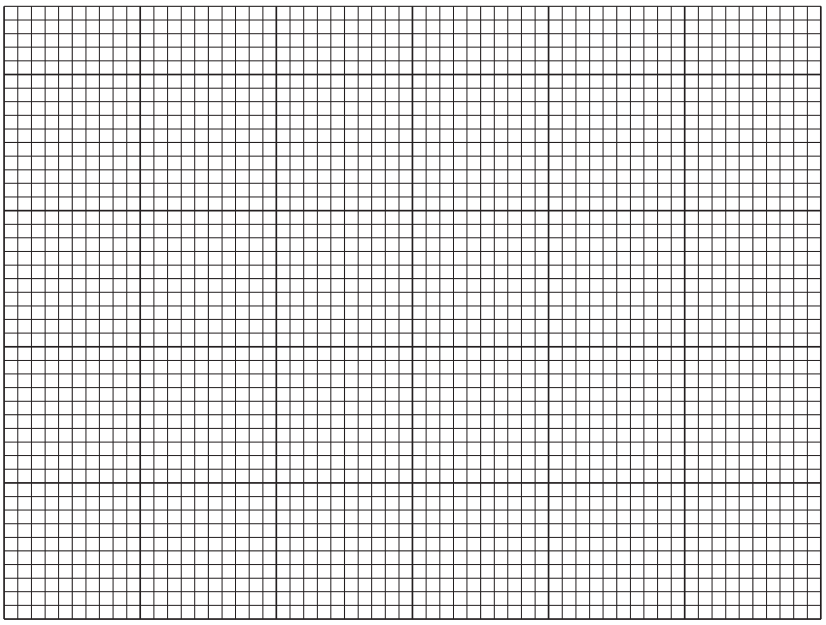
(i) Calculate the deceleration of the car as it brakes.

deceleration = ...[2]

(ii) Calculate the braking force acting on the car.

force = ...[2]

(iii) On Fig. 9.2, draw a speed-time graph for the car as it brakes.



[3]

Fig. 9.2

(iv) State how your graph in **(iii)** can be used to find the total distance travelled by the car.

.....

.....[1]

Question # 3: Oct Nov 2002/P2/Q1

Fig. 1.1 shows a car travelling at a uniform speed of 18 m/s. At time t = 0, the driver sees a child run out in front of the car.

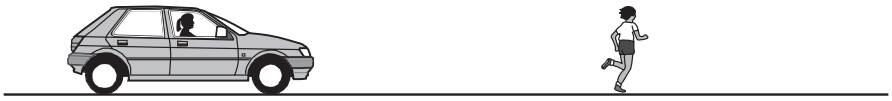


Fig. 1.1

At time t = 0.6 s the driver starts to apply the brakes. The car then decelerates uniformly, taking a further 3.0 s to stop.

(a) (i) On Fig. 1.2, draw a graph to show how the speed of the car varies with t.

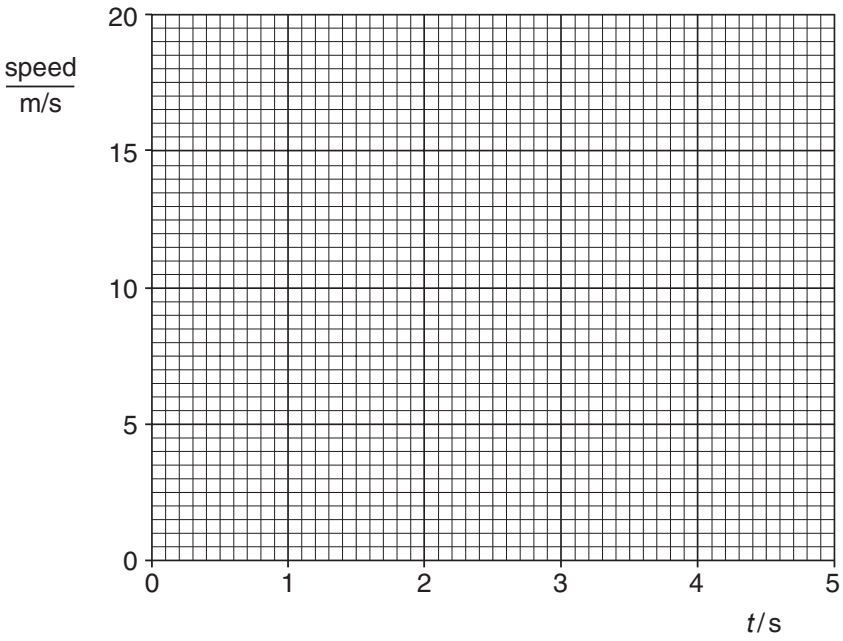


Fig. 1.2

(ii) Calculate the distance travelled in the first 0.6 s of the motion.

distance = ...
[5]

(b) The braking distance is the distance travelled by the car after the driver starts to apply the brakes. The braking distance is not the same each time that the car stops.

State two factors that could increase braking distance.

1. .....

.....

2. .....

.....[2]

Question # 4: Oct Nov 2010/P21/Q2

Fig. 2.1 shows the planet Venus orbiting the Sun in a circular orbit at constant speed.

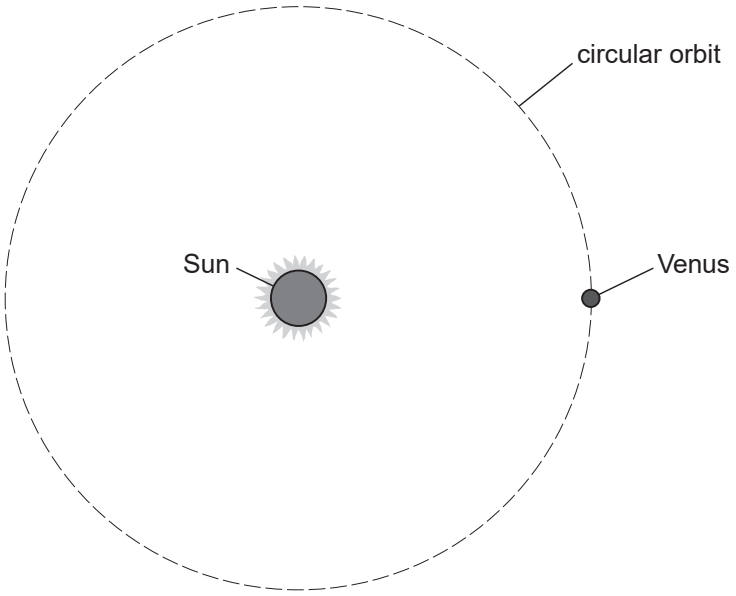


Fig. 2.1 (not to scale)

A force acting on Venus keeps it moving in a circle.

(a) State the name of this force and the object that causes it.

.....

..... [2]

(b) **(i)** On Fig. 2.1, draw an arrow through Venus that represents the direction of its acceleration. [1]

(ii) The size of this acceleration is $9.7 \times 10^{-3}\,m/s^2$ and the mass of Venus is $4.9 \times 10^{24}\,kg$. Calculate the size of the force acting on the planet.

force = ... [2]

(c) As time passes, the planet Venus moves a considerable distance around the circular orbit. State why no work is done by the force acting on the planet as it moves.

.....

.....

..... [2]

Question # 5: Oct Nov 2018/P22/Q1

Fig. 1.1 shows a satellite travelling at a constant speed in a circular orbit around the Earth.

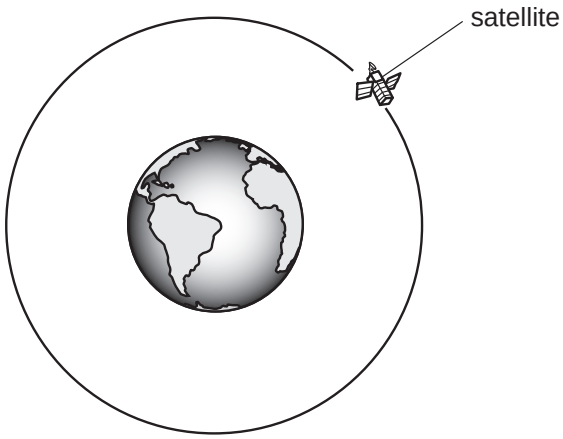


Fig. 1.1 (not to scale)

(a) State how *speed* differs from *velocity*.

.....

..... [1]

(b) As it orbits the Earth, the satellite is experiencing an acceleration.

(i) Explain, in terms of its velocity, why the satellite is accelerating.

.....

.....

..... [2]

(ii) On Fig. 1.1, draw an arrow, starting on the satellite, to show the direction of the satellite's acceleration. [1]

(c) As the satellite orbits the Earth, it experiences a force due to gravitational attraction.

State and explain whether this force does work on the satellite and state whether the energy of the satellite is affected.

.....

.....

.....

..... [2]