AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.1.1.1 ENERGY STORES AND SYSTEMS (PACK 1)

SCORE	PERCENTAGE
/33	%

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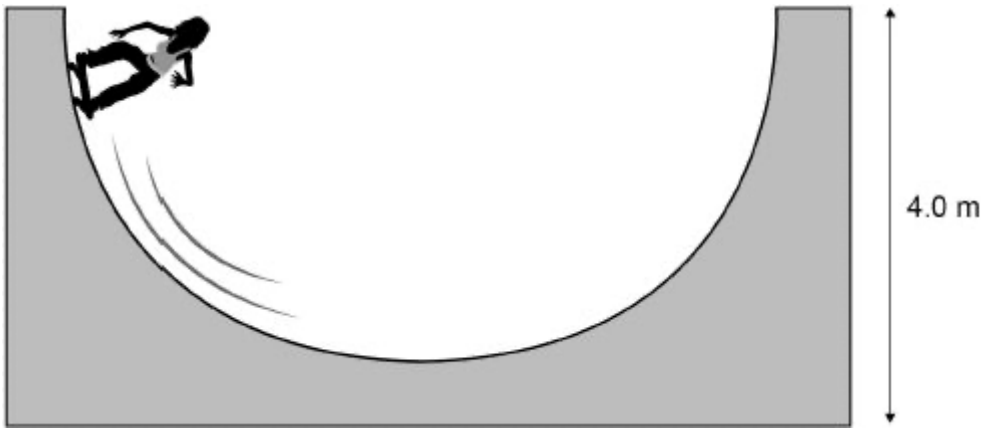
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Q1.

The diagram below shows a girl skateboarding on a semi-circular ramp.



The girl has a mass of 50 kg

(a) Calculate the gravitational potential energy (g.p.e.) of the girl at the top of the ramp.

Use the equation:

g.p.e. = mass × gravitational field strength × height

gravitational field strength = 9.8 N/kg

_____

_____

g.p.e. = _____ J

(2)

(b) The girl has a speed of 7 m/s at the bottom of the ramp.

Calculate the kinetic energy of the girl at the bottom of the ramp.

Use the equation:

kinetic energy = 0.5 × mass × $(\text{speed})^2$

_____

_____

Kinetic energy = _____ J

(2)

(c) Not all of the g.p.e. has been transferred to kinetic energy.

Which **two** statements explain why?

Tick **two** boxes.

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Some energy is wasted. ☐

The mass of the girl is too low. ☐

The ramp is not high enough. ☐

The g.p.e. of the girl is not zero. ☐

The speed of the girl is too great. ☐

(2)

(d) Explain how lubricating the wheels of the skateboard can increase the speed of the girl.

Use ideas about energy in your explanation.

_____

_____

_____

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_____

(3)

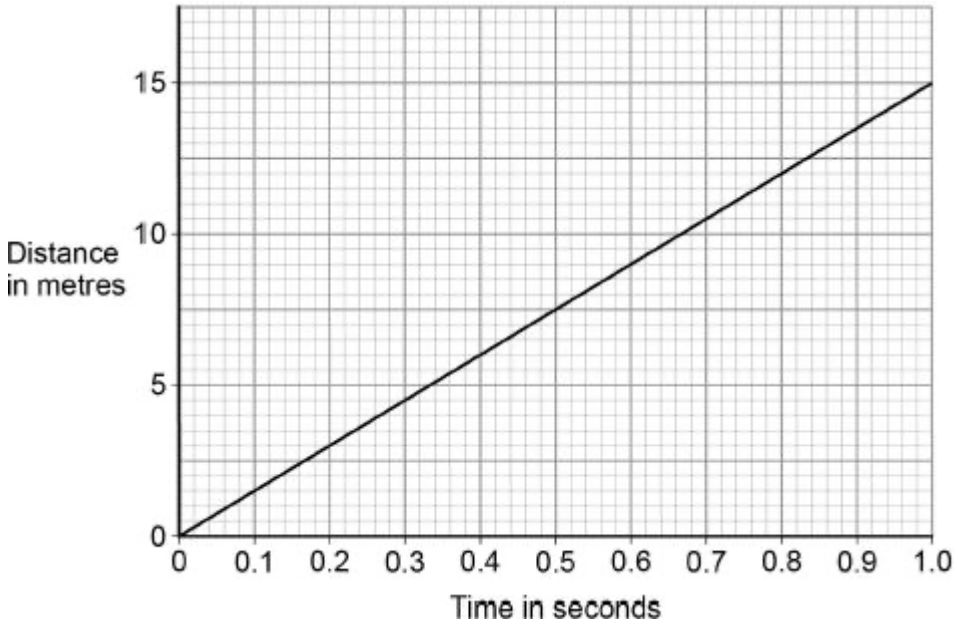
(Total 9 marks)

Q2.

(a) **Figure 1** shows the distance-time graph for a car travelling at 15 m/s

Figure 1

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When the driver is tired, his reaction time increases from 0.50 seconds to 0.82 seconds.

Determine the **extra** distance the car would travel before the driver starts braking.

Distance = _____ m

(2)

(b) When the brakes are used, the temperature of the brakes increases.

Explain why. Use ideas about energy in your explanation.

(2)

(c) A lorry travels 84 m with a constant acceleration of 2.0 m/s^2 to reach a velocity of 19 m/s

Calculate the initial velocity of the lorry.

Use the Physics Equations Sheet.

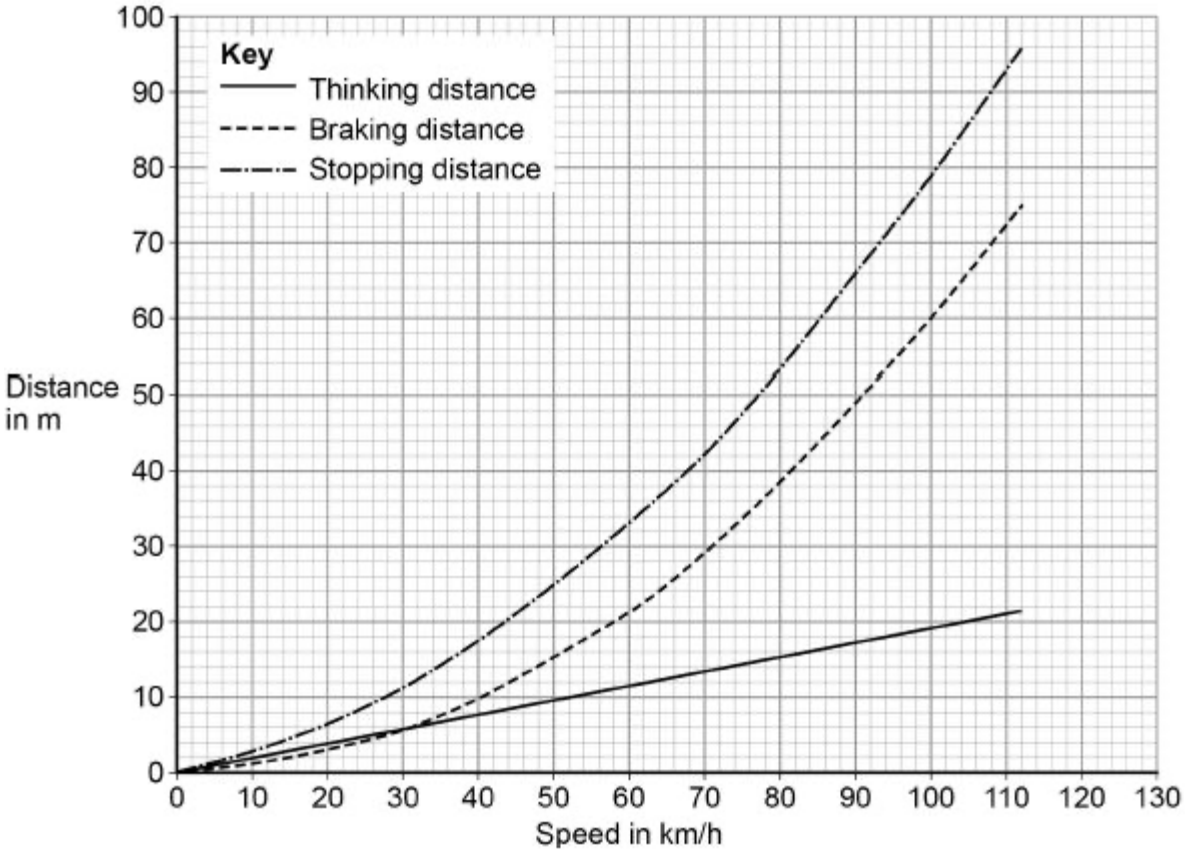
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Initial velocity = _____ m/s

(3)

(d) **Figure 2** shows how the thinking distance, braking distance and stopping distance for a car vary with the speed of the car.

Figure 2



Describe the relationships shown in **Figure 2**

You should include factors that would affect the gradient of the lines.

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_____

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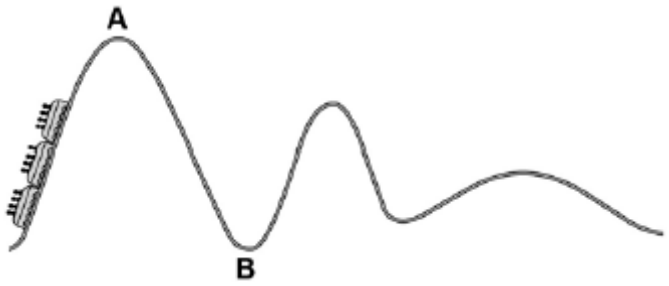
_____

(6)

(Total 13 marks)

Q3.

The figure below shows a rollercoaster.



The rollercoaster car is raised a vertical distance of 35 m to point **A** by a motor in 45 seconds.

The mass of the rollercoaster is 600 kg.

The motor has a power rating of 8 000 W.

(a) Calculate the percentage efficiency of the motor.

Gravitational field strength = 9.8 N / kg.

_____

_____

_____

_____

_____

_____

_____

Efficiency = _____ %

(5)

(b) The rollercoaster rolls from point **A** to point **B**, a drop of 35 m.

Calculate the speed of the roller coaster at point **B**.

Assume that the decrease in potential energy store is equal to the increase in kinetic energy store.

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Speed at point **B** = _____ m / s

(6)

(Total 11 marks)

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