Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

The stopping distance of a car is the braking distance added to the thinking distance.

(a) Complete the sentences.

Choose answers from the box.

chemical	**electrostatic**	**kinetic**
nuclear	**thermal**	

A driver applies the brakes to a moving car.

As the car slows down, there is a decrease in the _____

energy of the car.

The work done by friction causes an increase in the _____

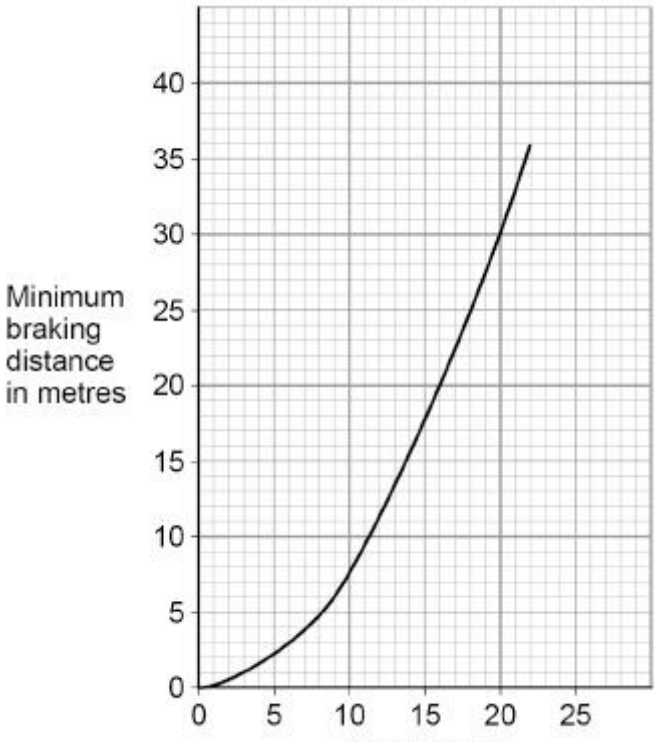
energy store of the brakes.

(2)

(b) **Figure 1** shows how the speed of the car affects the minimum braking distance of the car.

Figure 1

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Describe the relationship between the speed of the car and the minimum braking distance of the car.

_____

_____

(1)

(c) Complete the sentence.

Choose the answer from the box.

decreases	**stays the same**	**increases**

When the road becomes icy, the braking distance _____.

(1)

A car driver applies the brakes to decelerate the car as it approaches a road junction.

The car decelerates at 0.25 m/s^2.

mass of the car = 1600 kg

(d) Calculate the time taken for the velocity of the car to decrease from 12.5 m/s to 5.0 m/s.

Use the equation:

$$\text{time taken} = \frac{\text{change in velocity}}{\text{deceleration}}$$

_____

_____

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Time taken = _____ s

(3)

(e) Calculate the resultant force causing the car to decelerate.

Use the equation:

resultant force = mass × deceleration

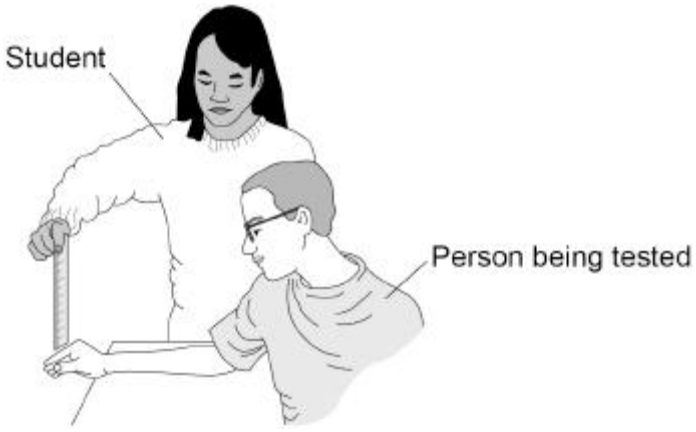
Resultant force = _____ N

(2)

Thinking distance is affected by the reaction time of the driver.

Figure 2 shows how a student tested a person's reaction time.

Figure 2



The student held a ruler and then released it.

The person being tested closed his hand to catch the ruler as quickly as possible.

The further the ruler fell the greater the person's reaction time.

(f) The student wanted to test the reaction time of the people in her class.

Which of the following could have been a control variable in this investigation?

Tick (✓) **one** box.

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Distance fallen by the ruler before being caught ☐

Initial height of the ruler above the person's hand ☐

Reaction time of the person being tested ☐

(1)

(g) The student tested three people in her class.

The mean distance that the ruler fell before being caught was 18.2 cm.

If all of the people in her class were tested, the mean distance may not be 18.2 cm.

Suggest why.

_____

_____

(1)

(h) Describe how this investigation could be changed to find out how listening to music affects reaction time.

_____

_____

_____

_____

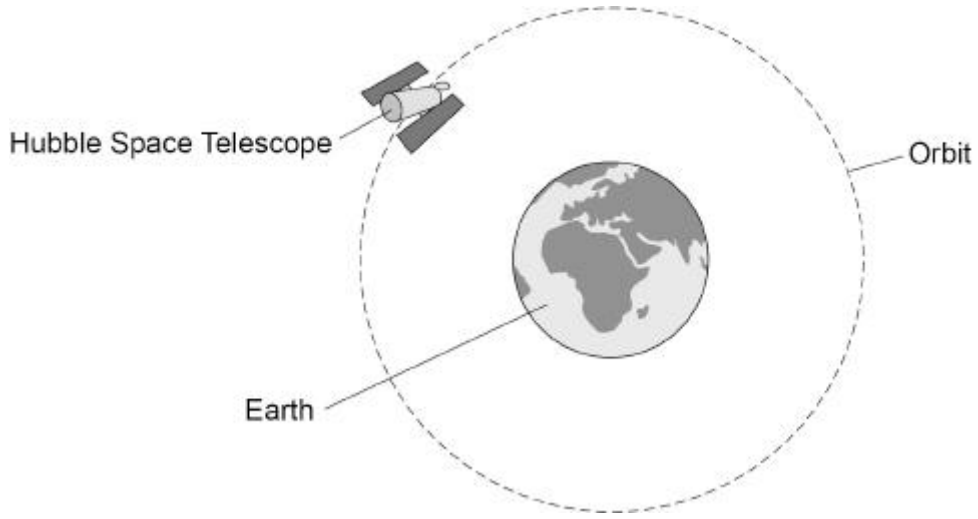
(2)

(Total 13 marks)

Q2.

Figure 1 shows the Hubble Space Telescope orbiting the Earth.

Figure 1



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(a) What name is given to an object that orbits a planet?

Tick (✓) **one** box.

A comet ☐

A satellite ☐

A star ☐

(1)

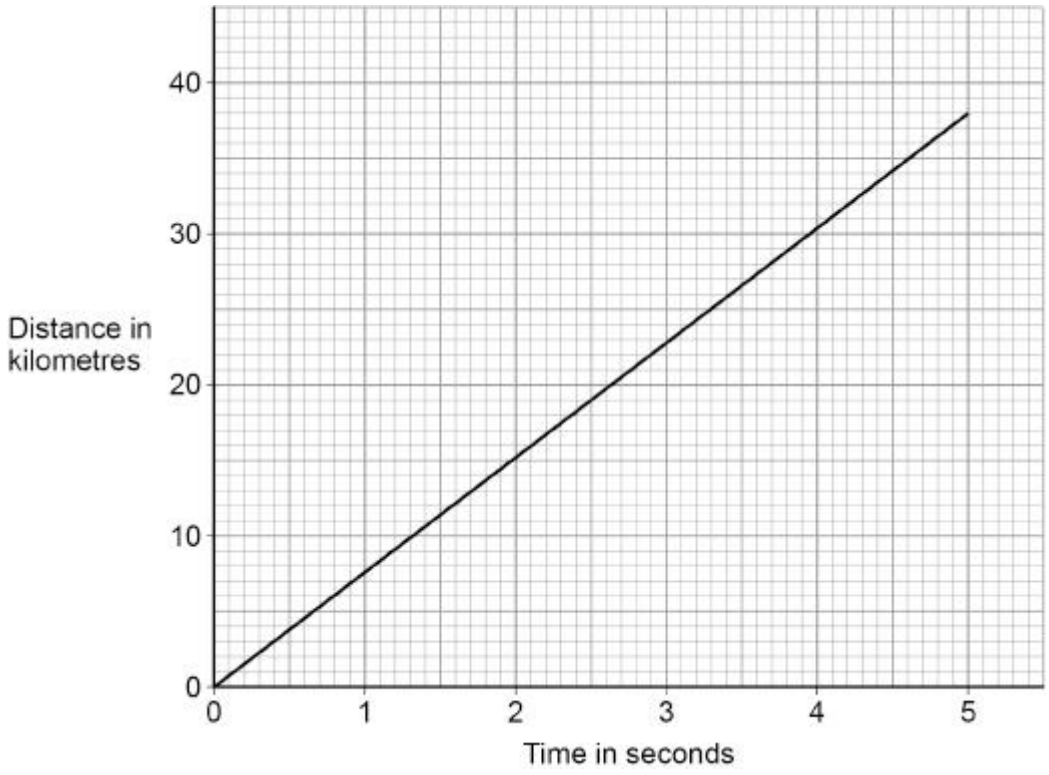
(b) The Earth exerts a gravitational force on the Hubble Space Telescope.

Draw an arrow on **Figure 1** to show the gravitational force.

(1)

(c) **Figure 2** shows how the distance travelled by the Hubble Space Telescope during its orbit changes with time.

Figure 2



The gradient of the line in **Figure 2** gives the speed of the Hubble Space Telescope.

Determine the speed of the Hubble Space Telescope.

Give your answer in km/s.

_____

_____

_____

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_____

_____

Speed = _____ km/s

(3)

The Hubble Space Telescope can detect the visible light spectra from distant galaxies.

The visible light spectra from stars and galaxies include dark lines at specific wavelengths.

Figure 3 shows the visible light spectra from the Sun and three galaxies.

Figure 3



(d) Which galaxy is moving away from the Earth the fastest?

Tick (✓) **one** box.

Galaxy **A** ☐

Galaxy **B** ☐

Galaxy **C** ☐

(1)

(e) Which galaxy is the furthest away from the Earth?

Tick (✓) **one** box.

Galaxy **A** ☐

Galaxy **B** ☐

Galaxy **C** ☐

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(1)

(f) New scientific observations indicate that many galaxies rotate too quickly for the known mass of the stars they contain.

Why is it important that new scientific observations are peer reviewed?

Tick (✓) **one** box.

To check the observations are correct ☐

To identify control variables ☐

To provide more proof ☐

(1)

(Total 8 marks)

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