

Name of the Student: _____

Max. Marks : 16 Marks

Time : 16 Minutes

Q1.

A student has some cupcake cases.
One cupcake case is shown in Figure 14.



(Source: © Anton Starikov/Shutterstock)

Figure 14

The student drops a stack of cupcake cases with the base facing downwards, as shown in Figure 15.



(Source: © Elena Schweitzer/Shutterstock)

Figure 15

The speed of the falling stack of cupcake cases depends on the number of cupcake cases in the stack.

(i) The student also has a stop clock and a metre rule.

Describe an investigation to show how the speed of the falling stack of cupcake cases depends on the number of cupcake cases in the stack.

(4)

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(ii) A stack of cupcake cases has a mass of 0.005 kg.

Calculate the weight, in newtons, of the stack of cupcake cases.
Gravitational field strength = 10 N / kg

(2)

Use the equation

$$W = mg$$

weight = N

Figure 16 shows a cupcake case that is falling at a constant velocity.

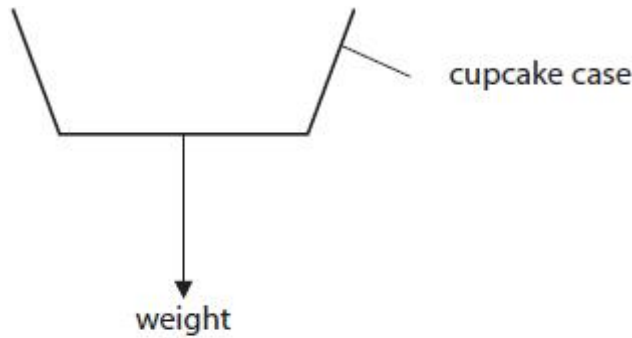


Figure 16

(iii) Draw an arrow on Figure 16 to show the force due to air resistance on the cupcake case.

(1)

(iv) State the value of the acceleration of the cupcake case when it is falling at a constant velocity

(1)

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(Total for question = 8 marks)

Q2.

A car is travelling down a slope at 2.0 m/s.

The car accelerates for 4.0 s.

The speed of the car increases to 12 m/s.

Calculate the acceleration of the car.

Use the equation

$$a = \frac{(v - u)}{t}$$

(2)

acceleration of the car = m/s²

(Total for question = 2 marks)

Q3.

A cyclist travels 1200 m in a time of 80 s.

Calculate the average speed of the cyclist.

Use the equation

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

(2)

average speed = m/s

(Total for question = 2 marks)

Q4.

A car travels along a straight road.

The car accelerates at 3 m / s^2 for a time of 7 s.

Calculate the change in velocity of the car.

Use the equation

$$\text{change in velocity} = \text{acceleration} \times \text{time taken}$$

(2)

change in velocity = m/s

(Total for question = 2 marks)

Q5.

An aircraft waits at the start of a runway.

The aircraft accelerates from a speed of 0 m/s to a speed of 80 m/s.

The acceleration of the aircraft is 4 m/s².

Calculate the distance, x , travelled by the aircraft while it is accelerating.

Use the equation

$$x = \frac{v^2 - u^2}{2a}$$

(2)

$x = \dots\dots\dots$ m

(Total for question = 2 marks)