

Q1.(2021)

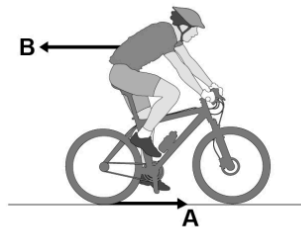
a)

Figure 3 shows a cyclist on a bicycle.

The cyclist is moving at a constant velocity.

Arrows **A** and **B** represent the horizontal forces acting on the bicycle and cyclist.

Figure 3



What is force **A**?

[1 mark]

Tick (✓) **one** box.

Air resistance

☐

Friction

☐

Tension

☐

Upthrust

☐

b)

What is force **B**?

[1 mark]

Tick (✓) **one** box.

Air resistance

☐

Magnetic

☐

Tension

☐

Upthrust

☐

c)

What is the relationship between force **A** and force **B** when the cyclist travels at a constant velocity?

[1 mark]

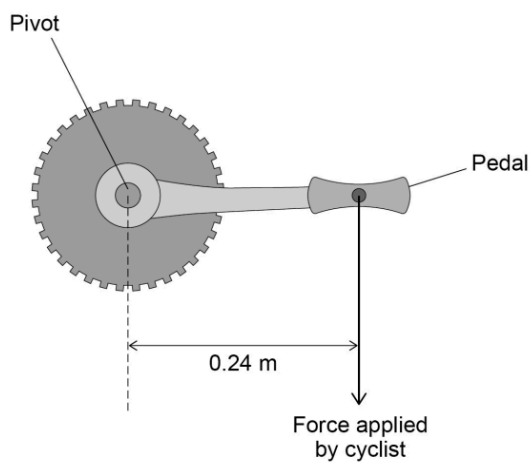
Tick (✓) **one** box.

A = B☐**A > B**☐**A < B**☐

d)

The cyclist applies a force of 150 N to one of the bicycle pedals.

Figure 4 shows the distance between the force applied and the pivot.

Figure 4

Calculate the moment about the pivot caused by the force applied to the pedal in **Figure 4**.

Use the equation:

$$\text{moment of a force} = \text{force} \times \text{distance}$$

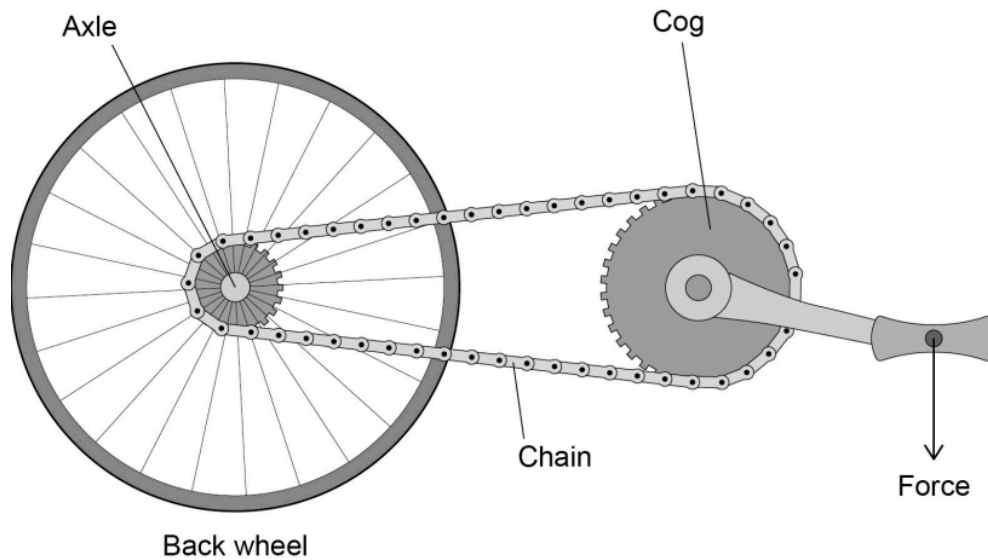
[2 marks]

Moment = _____ N m

e)

Figure 5 shows how the pedal is connected to the back wheel of the bicycle.

Figure 5



Complete the sentence.

Choose the answer from the box.

[1 mark]

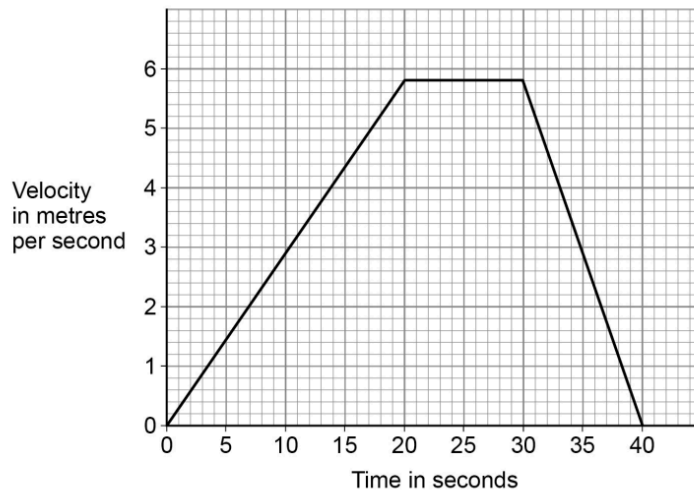
axle	chain	cog
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The force from the cyclist pushing down on the pedal is transmitted to the back wheel by the _____.

f)

Figure 6 shows how the velocity of the cyclist changes during a journey.

Figure 6



What is the change in velocity of the cyclist in the first 20 seconds of the journey?

[1 mark]

Tick (✓) **one** box.

5.2 m/s

☐

5.4 m/s

☐

5.6 m/s

☐

5.8 m/s

☐

Q1.g)(2021)

Determine the acceleration of the cyclist during the first 20 seconds of the journey.

Use your answer from Question **02.6**

Use the equation:

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

[2 marks]

Acceleration of the cyclist = _____ m/s²

h)

Complete the sentence.

Choose the answer from the box.

[1 mark]

deceleration	speed	velocity
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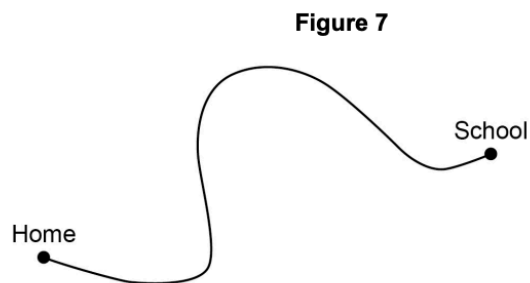
Between 30 and 40 seconds the cyclist moves with

a constant _____.

i)

The cyclist travels from home to school.

Figure 7 shows the route the cyclist followed.



Draw an arrow on **Figure 7** to show the displacement of the cyclist.

[1 mark]

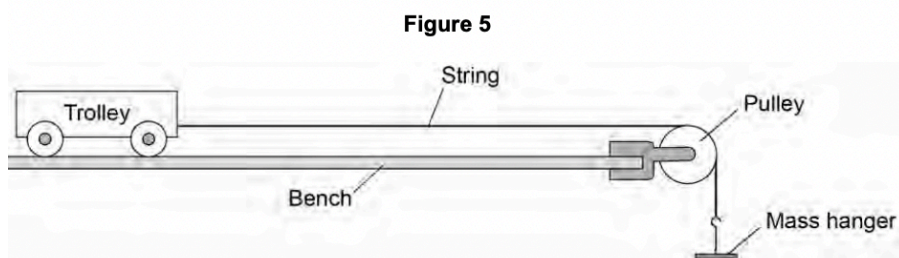
Q2.(2024)

a)

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A student investigated how changing the mass of a trolley affects the acceleration of the trolley.

Figure 5 shows some of the equipment used.



Which force prevents the trolley from moving?

Tick (✓) **one** box.

1

For each different mass the acceleration of the trolley was measured.

[2 marks]

Quantity

Force pulling on the trolley

c)

For one of the masses put on the trolley, the student recorded three values of acceleration.

1.58 m/s²1.53 m/s²1.54 m/s²

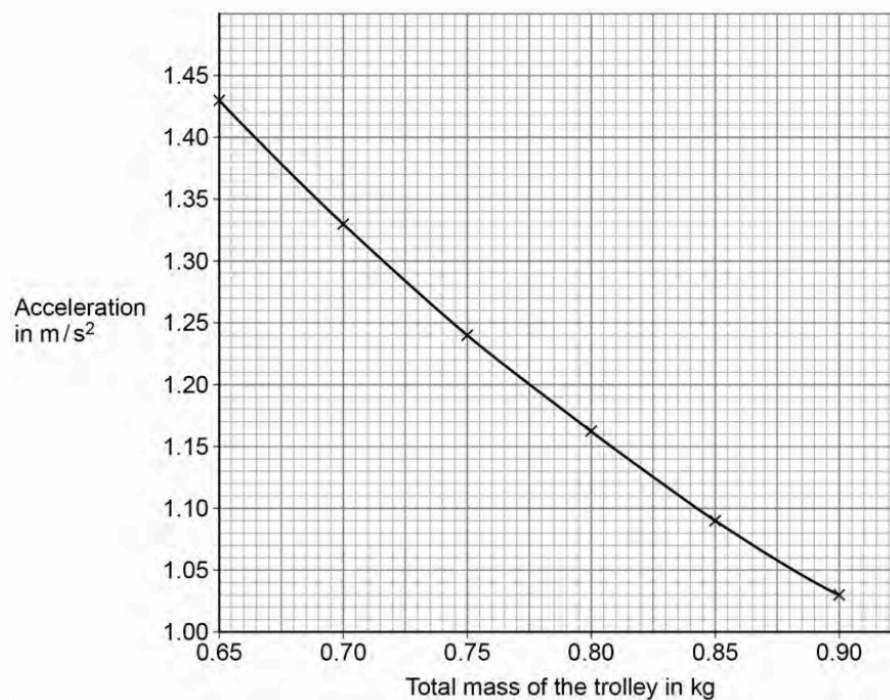
Calculate the mean acceleration of the trolley.

[2 marks]

Mean acceleration = _____ m/s²

d)

Figure 6 shows some of the results.

Figure 6

Describe the relationship shown in **Figure 6**.

[1 mark]

e)

When the total mass of the trolley was 1.5 kg, the acceleration of the trolley was 0.62 m/s^2 .

Calculate the resultant force acting on the trolley.

Use the equation:

$$\text{resultant force} = \text{mass} \times \text{acceleration}$$

[2 marks]

Resultant force = _____ N