5- Forces
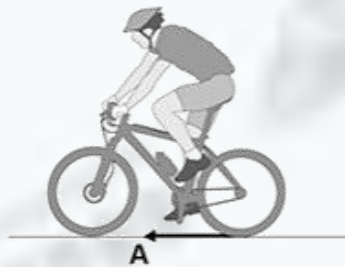
Question: 1

Figure 1 shows a cyclist riding a bicycle.

Force **A** causes the bicycle to accelerate forwards.
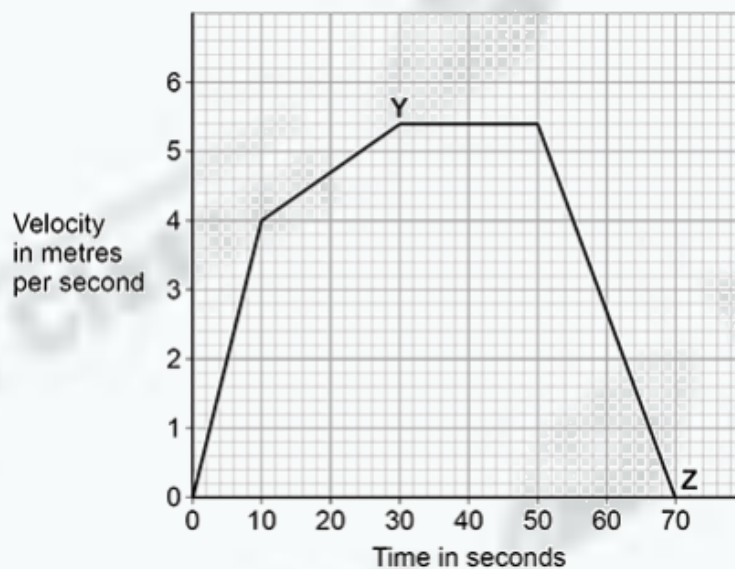
Figure 1

(a)   What name is given to force **A**?

_____

(1)

Figure 2 shows how the velocity of the cyclist changes during a short journey.

Figure 2

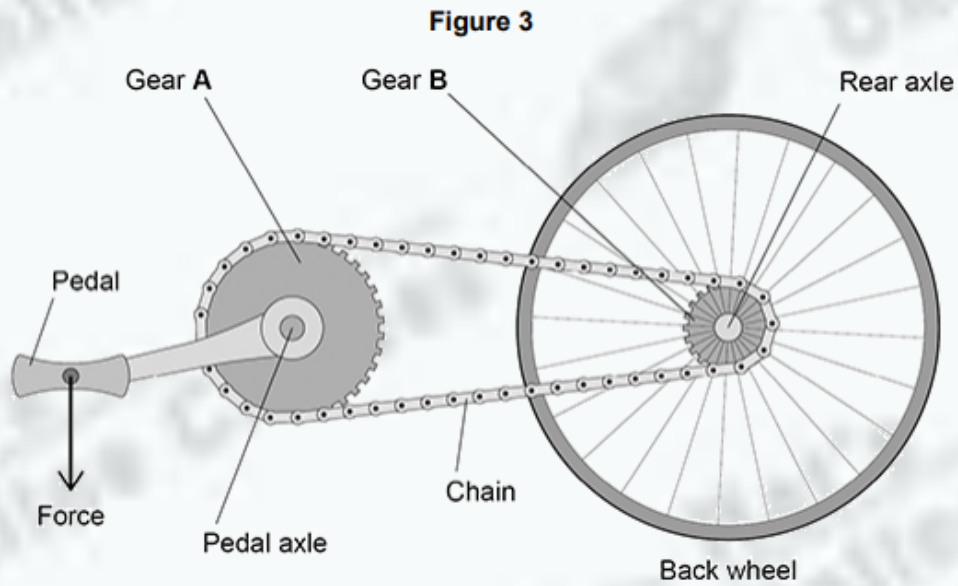(b) Determine the distance travelled by the cyclist between **Y** and **Z**.

_____

_____

Distance travelled by the cyclist between **Y** and **Z** = _____ m

(3)

(c) **Figure 3** shows the gears on the bicycle.
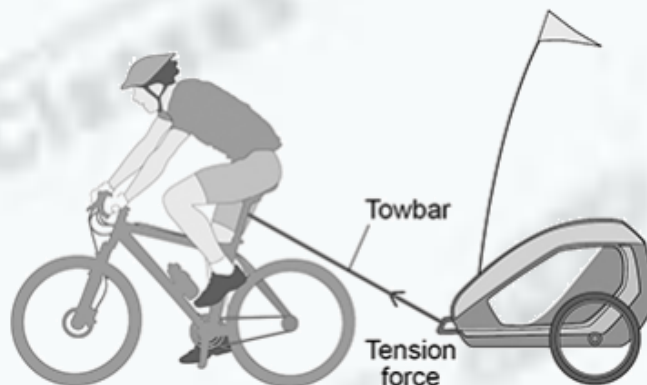
Figure 3

Describe how the force on the pedal causes a moment about the rear axle.

(2)

Figure 4 shows a different cyclist towing a trailer.

Figure 4

(d)   The speed of the cyclist and trailer increased uniformly from 0 m/s to 2.4 m/s.

The cyclist travelled 0.018 km while accelerating.

Calculate the initial acceleration of the cyclist.

_____
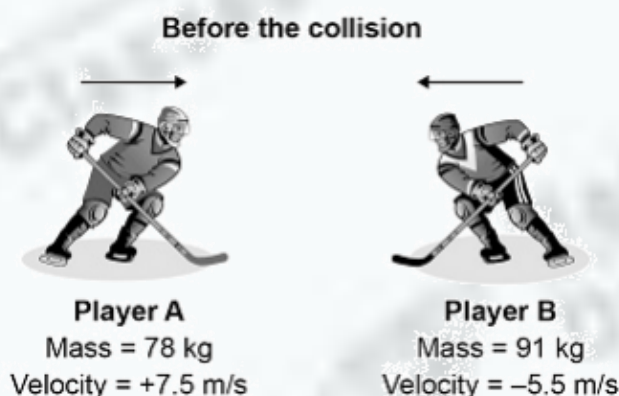
_____

Acceleration = _____ m/s^2

(3)

Question: 2

The image below shows two ice hockey players moving towards each other.

They collide and then move off together.

Before the collision

Player A	Player B
Mass = 78 kg	Mass = 91 kg
Velocity = +7.5 m/s	Velocity = –5.5 m/s

During the collision, the total momentum of the players is conserved.

(a)   What is meant by 'momentum is conserved'?

_____

_____

(1)

(b)   Immediately after the collision the two players move together to the right.

Calculate the velocity of the two players immediately after the collision.

_____

_____

Velocity = _____ m/s

(4)

(c) The ice hockey players wear protective pads filled with foam.

Explain how the protective pads help to reduce injury when the players collide.

_____

_____

(3)