

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

The Earth is surrounded by an atmosphere.

- (a) The radius of the Earth is 6400 km.

Which of the following could be an approximate depth of the Earth's atmosphere?

Tick (✓) **one** box.

100 km

☐

6400 km

☐

100 000 km

☐

640 000 km

☐

(1)

- (b) What state of matter is most of the Earth's atmosphere?

Tick (✓) **one** box.

Gas

☐

Liquid

☐

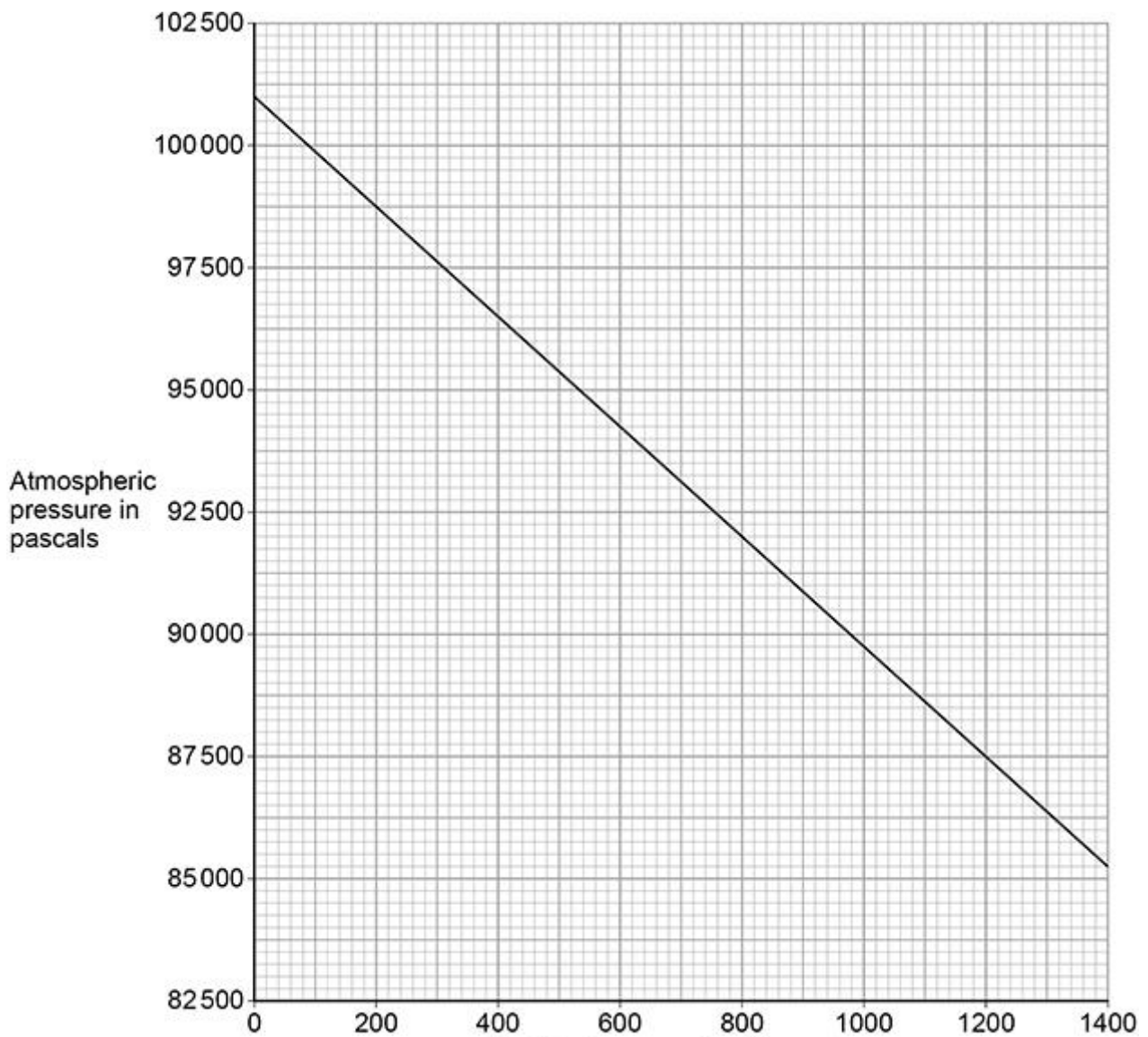
Solid

☐

(1)

Figure 1 shows how atmospheric pressure varies with height above sea level.

Figure 1



- (c) The highest point above sea level in England is the top of a mountain called Scafell Pike.

The height above sea level of Scafell Pike is 978 m.

Determine the atmospheric pressure at the top of Scafell Pike.

Use **Figure 1**.

Atmospheric pressure = _____ Pa

(1)

- (d) Determine the difference between the atmospheric pressure at sea level and at the top of Scafell Pike.

Use **Figure 1** and your answer from part (c)

- (e) A student climbs Scafell Pike.

Why does the atmospheric pressure decrease as the student climbs higher?

Tick (✓) **two** boxes.

The air exerts a greater force on the student.

☐

The density of the air decreases.

☐

The mass of air above the student decreases.

☐

The temperature of the air increases.

☐

The volume of air above the student increases.

☐

(2)

- (f) **Figure 2** shows a mountain lake.

Figure 2



The lake has a surface area of 2000 m².

Atmospheric pressure exerts a force of 188 000 000 N on the surface of the lake.

Calculate the atmospheric pressure at the surface of the lake.

Use the equation:

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

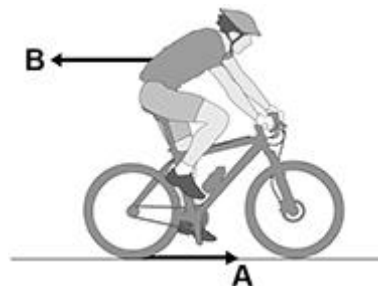
Q2.

Figure 1 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 1



(a) What is force **A**?

Tick (✓) **one** box.

Air resistance

☐

Friction

☐

Tension

☐

Upthrust

☐

(1)

(b) What is force **B**?

Tick (✓) **one** box.

Air resistance

☐

Magnetic

☐

Tension

☐

Upthrust

☐

(1)

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

Tick (✓) **one** box.

A = B

☐

A > B

☐

A < B

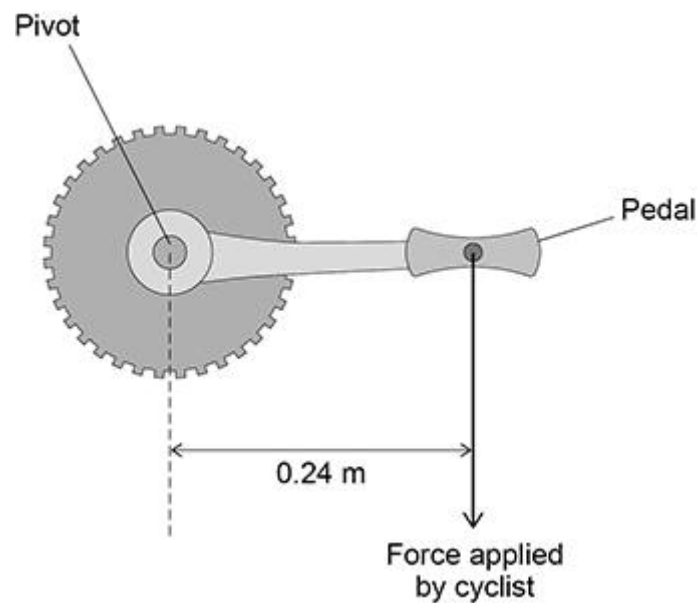
☐

(1)

- (d) The cyclist applies a force of 150 N to one of the bicycle pedals.

Figure 2 shows the distance between the force applied and the pivot.

Figure 2



Calculate the moment about the pivot caused by the force applied to the pedal in **Figure 2**.

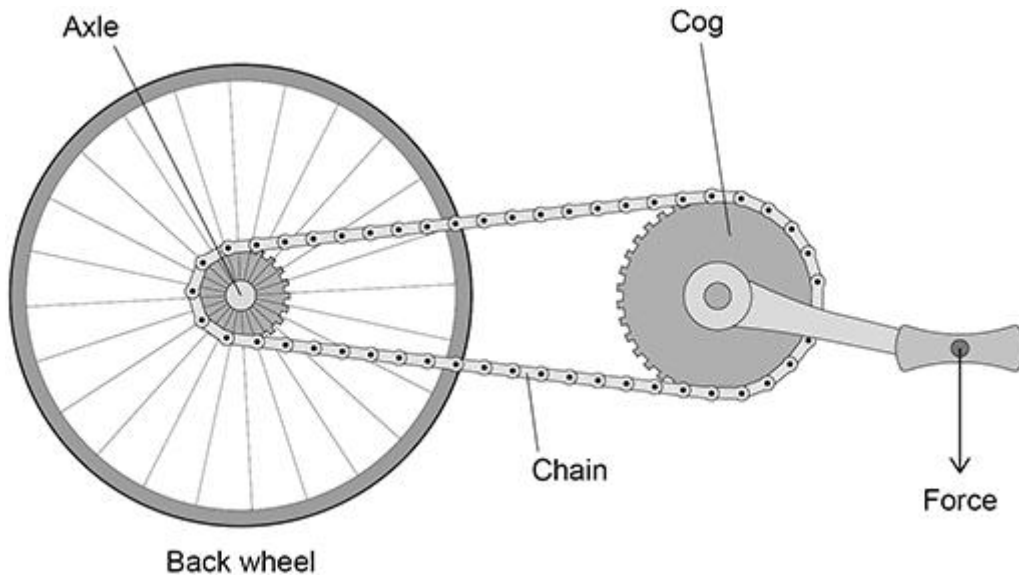
Use the equation:

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

Moment = _____ N m

- (e) **Figure 3** shows how the pedal is connected to the back wheel of the bicycle.

Figure 3



Complete the sentence.

Choose the answer from the box.

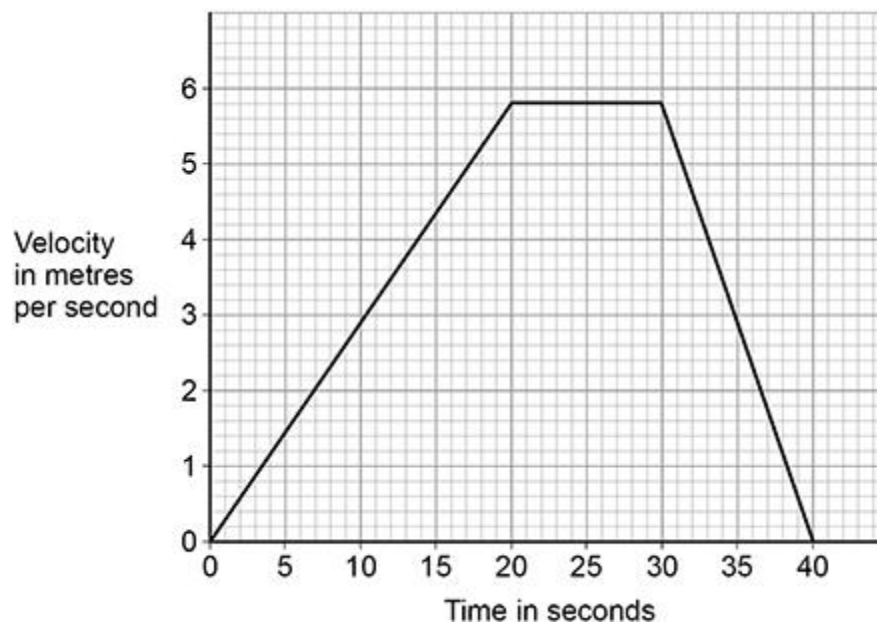
axle	chain	cog
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The force from the cyclist pushing down on the pedal is transmitted to the back wheel by the _____.

(1)

Figure 4 shows how the velocity of the cyclist changes during a journey.

Figure 4



- (f) What is the change in velocity of the cyclist in the first 20 seconds of the journey?

Tick (✓) **one** box.

5.2 m/s

☐

5.4 m/s

☐

5.6 m/s

☐

5.8 m/s

☐

(1)

- (g) Determine the acceleration of the cyclist during the first 20 seconds of the journey.

Use your answer from part (f)

Use the equation:

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

Acceleration of the cyclist = _____ m/s²

(2)

- (h) Complete the sentence.

Choose the answer from the box.

deceleration	speed	velocity
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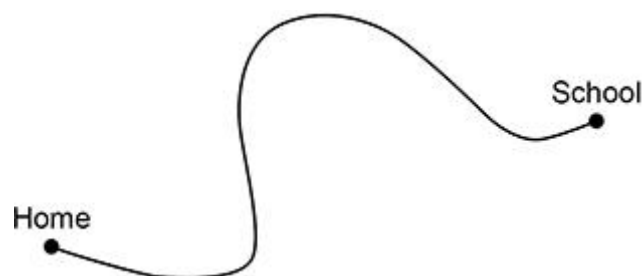
Between 30 and 40 seconds the cyclist moves with a constant _____.

(1)

- (i) The cyclist travels from home to school.

Figure 5 shows the route the cyclist followed.

Figure 5



Draw an arrow on **Figure 5** to show the displacement of the cyclist.

(1)

(Total 11 marks)