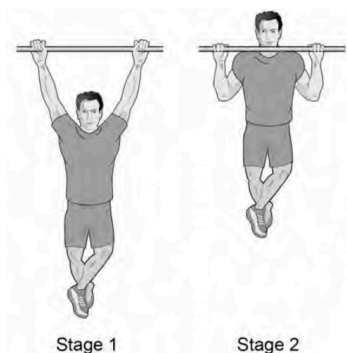


## Q1. (2018)

03

**Figure 4** shows a man doing two stages of a pull up. In both diagrams the man is stationary.

Figure 4



a)

03.2

The man has a mass of 85 kg

Gravitational field strength = 9.8 N/kg

Calculate the weight of the man.

Use the equation:

$$\text{weight} = \text{mass} \times \text{gravitational field strength}$$

[2 marks]

\_\_\_\_\_

\_\_\_\_\_

Weight = \_\_\_\_\_ N

b)

03.3

The man raises his body a vertical distance of 0.63 m to go from stage 1 to stage 2

Calculate the work done by the man.

Use your answer to question 03.2

Use the equation:

$$\text{work done} = \text{force} \times \text{distance}$$

[2 marks]

\_\_\_\_\_

\_\_\_\_\_

Work done = \_\_\_\_\_ J

c)

03.4

The man was **not** moving at stage 2

How much work is done by the man at stage 2?

[1 mark]

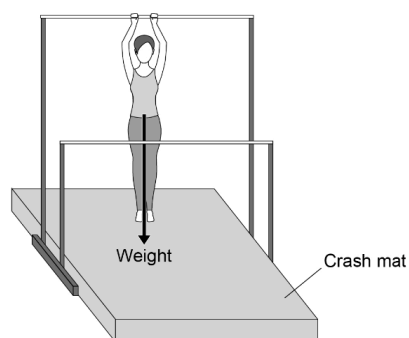
Work done = \_\_\_\_\_ J

## Q2. (2019)

0 2

**Figure 3** shows a gymnast on a piece of gymnastic equipment.

The equipment consists of two bars at different heights.

**Figure 3**

0 2 . 5

The gymnast swings from one bar to the other bar several times.

Describe how the gravitational potential energy store and the kinetic energy store of the gymnast change as she moves between the bars.

**[4 marks]**

Q3. (2019)

0 4 . 7

Write down the equation that links distance, force and work done.

**[1 mark]**

Q4. (2019)

A driver measured her reaction time using an online test. She did the test five times.

**Table 2** shows the results.**Table 2**

| Reaction time in milliseconds |     |     |     |     |
|-------------------------------|-----|-----|-----|-----|
| 258                           | 265 | 302 | 248 | 327 |

0 4 . 8

When the driver applies the brakes, there is a constant resultant force of 6.0 kN on the car.

The car travels a distance of 75 m before stopping.

Calculate the work done in stopping the car.

**[3 marks]**

Q5. (2020)

0 1

**Figure 1** shows a girl bowling a ball along a ten-pin bowling lane.

**Figure 1**

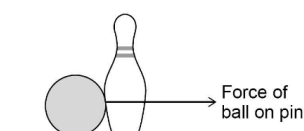


The girl is trying to knock down the ten pins at the end of the bowling lane.

As the ball travels along the lane the velocity of the ball decreases.

**Figure 2** shows the ball hitting one of the pins.

**Figure 2**



0 1 . 6

When the pin is struck it accelerates.

Complete the sentences.

Choose answers from the box.

Each answer can be used once, more than once, or not at all.

**[3 marks]**

**decreases**

**increases**

**stays the same**

The displacement of the pin from the girl \_\_\_\_\_.

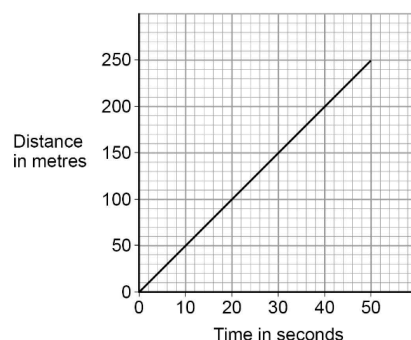
The mass of the pin \_\_\_\_\_.

The kinetic energy of the pin \_\_\_\_\_.

0 4

Figure 5 shows a distance-time graph for 50 seconds of a bicycle ride.

Figure 5



a)

0 4 . 3

The bicycle travels a distance of 250 m

The bicycle exerts a constant horizontal force of 30 N on the ground.

Calculate the work done.

Use the equation:

$$\text{work done} = \text{force} \times \text{distance}$$

Choose the unit from the box.

[3 marks]

|   |    |   |
|---|----|---|
| J | kg | m |
|---|----|---|

b)

0 4 . 4

The bicycle travels at a constant speed.

Complete the sentences.

Choose answers from the box.

[3 marks]

|          |            |         |
|----------|------------|---------|
| chemical | frictional | kinetic |
| magnetic |            | tension |

As the bicycle moves, work is done against \_\_\_\_\_ forces.

There is no change in the cyclist's \_\_\_\_\_ store of energy.

There is a decrease in the cyclist's \_\_\_\_\_ store of energy.

## Q7. (2021)

The braking distance of a car is the distance travelled between the driver applying the brakes and the car stopping.

**0 3 . 4** Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

**[2 marks]**

|           |                |           |
|-----------|----------------|-----------|
| decreases | stays the same | increases |
|-----------|----------------|-----------|

When the brakes are applied, the kinetic energy of the car \_\_\_\_\_.

The temperature of the brakes \_\_\_\_\_.

## Q8. (2021)

**0 5 . 4** Write down the equation which links distance ( $s$ ), force ( $F$ ) and work done ( $W$ ).

**[1 mark]**

## Q9. (2021)

**0 5** Scientists are developing a rocket aeroplane designed to travel much faster than jet aeroplanes.

**0 5 . 5** When the rocket aeroplane travels a distance of 270 m on the runway the engines will do 54 000 000 J of work.

Calculate the average force exerted by the engines.

**[3 marks]**

## Q10. (2022)

**0 7** **Figure 10** shows competitors in the wheelchair race at the London Marathon.

The distance of the London Marathon is 42 000 m

**Figure 10**



Use the Physics Equations Sheet to answer questions **07.1** and **07.2**.

a)

**0 7 . 1** Write down the equation that links distance ( $s$ ), force ( $F$ ) and work done ( $W$ ).

**[1 mark]**

b)

0 7 . 2 During the race competitors work against air resistance.

The work done against air resistance by the winner of the race was 3 360 000 J

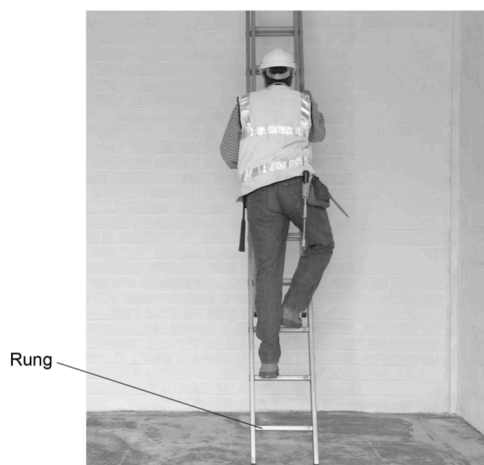
Calculate the average air resistance acting on the winner of the race.

[3 marks]

Q11. (2023)

0 5 Figure 13 shows an engineer climbing up a ladder.

Figure 13



The distance between each rung on the ladder is 30 cm.

a)

0 5 . 2 The engineer has a weight of 710 N.

Calculate the work done when climbing up one rung of the ladder.

Use your answer to Question 05.1 and the equation:

$$\text{work done} = \text{force} \times \text{distance}$$

[2 marks]

b)

0 5 . 3 The engineer climbs the ladder carrying some equipment.

Give the reason why carrying equipment increases the work done by the engineer when climbing the ladder.

[1 mark]

c)

0 5 . 4 The engineer is stationary at the top of the ladder.

Which energy stores of the engineer increase due to the engineer climbing the ladder?

[2 marks]

Tick (✓) **two** boxes.

Chemical

☐

Elastic potential

☐

Gravitational potential

☐

Kinetic

☐

Thermal

☐

Q12. (2024)

When the brakes are applied, a force does work to stop the car.

Use the Physics Equations Sheet to answer questions 05.4 and 05.5.

a)

0 5 . 4 Write down the equation that links distance ( $s$ ), force ( $F$ ) and work done ( $W$ ). [1 mark]

b)

0 5 . 5 The braking force acting on a car is 6000 N.

The work done to stop the car is 300 000 J.

Calculate the braking distance of the car.

[3 marks]