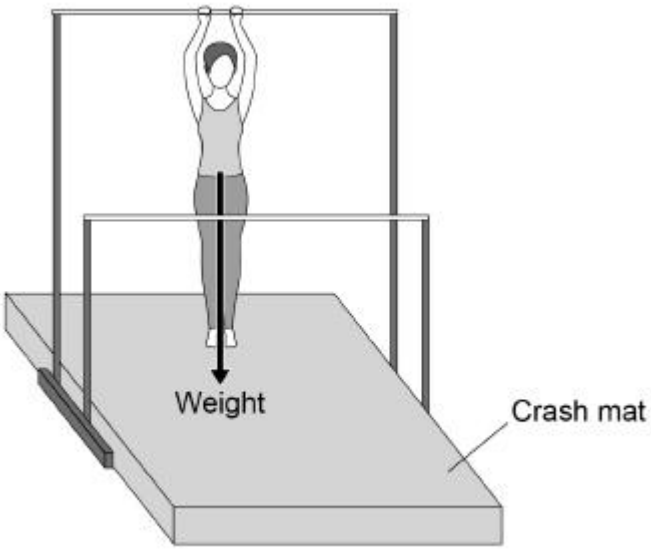
**Name of the Student**:_____
**Max. Marks : 19 Marks** **Time : 19 Minutes**

## Q1.

The diagram shows a gymnast on a piece of gymnastic equipment.

The equipment consists of two bars at different heights.




(a) The gymnast exerts a downward force on the bar.

What is the size of the upward force acting on the gymnast from the bar?

Tick (✓) **one** box.

| | |
|---|---|
| It is greater than the downward force. | ☐ |
| It is less than the downward force. | ☐ |
| It is the same size as the downward force. | ☐ |

**(1)**

(b) Why is the weight of the gymnast represented by an arrow?

Tick (✓) **one** box.

Weight is a constant. ☐

Weight is a scalar. ☐

Weight is a unit. ☐

Weight is a vector. ☐

**(1)**

(c) The diagram above shows the weight of the gymnast acting from a point.

What name is given to this point?

Tick (✓) **one** box.

Centre of force ☐

Centre of mass ☐

Centre of tension ☐

Centre of weight ☐

**(1)**

(d) The gymnast has a mass of 45 kg

gravitational field strength = 9.8 N/kg

Calculate the weight of the gymnast.

Use the equation:

weight = mass × gravitational field strength

_____

_____

_____

_____

Weight = _____ N

**(2)**

(e) 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)**

(f) Falling on the crash mat reduces the average deceleration of the gymnast compared with falling on a hard surface.

Explain why reducing the deceleration is important to the gymnast.

**(2)**

**(Total 11 marks)**

## Q2.

**Figure 1** shows two children playing table tennis.

The boy hits the ball from one end of the table.

**Figure 1**

(a) Why does the velocity of the ball change when the boy hits it?

Tick (✓) **one** box.

| | |
|---|---|
| The direction of the ball does not change. | ☐ |
| There is a resultant force on the ball. | ☐ |
| The mass of the ball increases. | ☐ |
| The speed of the ball is constant. | ☐ |

**(1)**

(b) The ball has an average speed of 11 m/s

The ball takes 0.25 s to travel the same distance as the length of the table.

Calculate the length of the table.

Use the equation:

distance travelled = speed × time

_____

_____

_____

_____

Length of table = _____ m

**(2)**

(c) A table tennis ball should only be used if it bounces to at least 75% of the height it was dropped from.

A manufacturer tested a table tennis ball.

The table shows the results.

| **Height ball was dropped from in cm** | **Height of bounce in cm** |
|---|---|
| 30.0 | 25.1 |

Determine whether the ball can be used.

Use the data from the table above.

_____

_____

_____

_____

_____

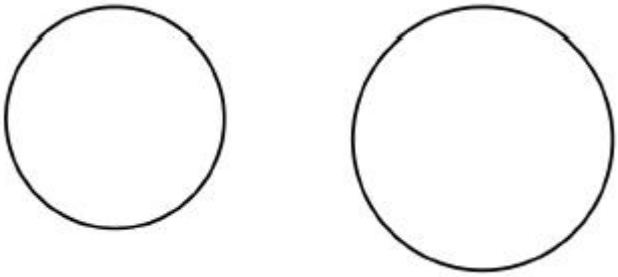
_____

**(3)**

(d) **Figure 2** shows two table tennis balls.

The balls are different sizes but have the same mass.

**Figure 2**



Both balls were dropped onto the table from the same height.

After they were dropped, the resultant force on the smaller ball was greater than the resultant force on the larger ball.

Explain why.

_____

_____

_____

_____

**(2)**

**(Total 8 marks)**