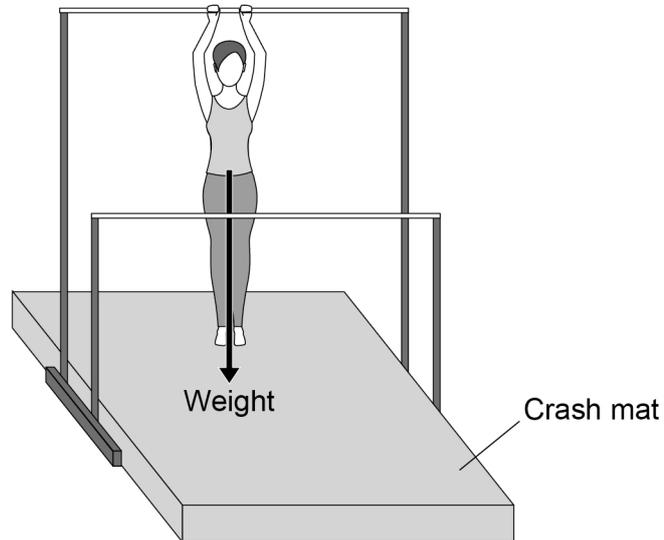


0 2

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

The equipment consists of two bars at different heights.

Figure 3



0 2 . 1

The gymnast exerts a downward force on the bar.

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

[1 mark]

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.



0 2 . 2 Why is the weight of the gymnast represented by an arrow?

[1 mark]

Tick (✓) **one** box.

Weight is a constant.

Weight is a scalar.

Weight is a unit.

Weight is a vector.

0 2 . 3 **Figure 3** shows the weight of the gymnast acting from a point.

What name is given to this point?

[1 mark]

Tick (✓) **one** box.

Centre of force

Centre of mass

Centre of tension

Centre of weight

Question 2 continues on the next page

Turn over ►



0 2 . 4

The gymnast has a mass of 45 kg

gravitational field strength = 9.8 N/kg

Calculate the weight of the gymnast.

Use the equation:

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

[2 marks]

Weight = _____ N

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]



0 2 . 6

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 marks]

11

Turn over for the next question

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
02.1	it is the same size as the downward force		1	AO2 6.5.4.3.2	A
02.2	weight is a vector		1	AO1 6.5.1.1	A
02.3	centre of mass		1	AO2 6.5.1.3	A
02.4	$W = 45 \times 9.8$ $W = 441 \text{ (N)}$	an answer of 441 (N) scores 2 marks	1	AO2 6.5.1.3	E
		allow 440 (N)	1		
02.5	Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		3–4	AO1 6.1.1.1	E
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.		1–2		
	No relevant content.		0		
	Indicative content <ul style="list-style-type: none"> • as height changes gravitational potential energy changes • gravitational potential energy decreases when moving to the lower bar • as speed changes kinetic energy changes • kinetic energy increases when moving to the lower bar • transfer from gravitational potential energy to kinetic energy as height decreases • the sum of the kinetic energy and gravitational potential energy is constant 				
02.6	reduces the force exerted	ignore impact	1	AO3 6.5.4.2.2	E
	the risk of injury to gymnast is reduced	allow so the gymnast does not get injured	1		
Total			11		