Do not write outside the box

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.

0 1 . 1 Velocity is a vector.

Which statement describes a vector?

[1 mark]

Tick (✓) **one** box.

Vectors have direction only. ☐

Vectors have magnitude and direction. ☐

Vectors have magnitude only. ☐

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0 1 . 2 Why does the velocity of the ball decrease as the ball travels along the lane?

[1 mark]

Tick (✓) **one** box.

The force of gravity slows the ball down. ☐

There are no forces acting on the ball. ☐

There is a resultant force acting on the ball. ☐

0 1 . 3 The ball travels along the lane at an average speed of 4.5 m/s

It takes the ball 4.0 seconds to travel the length of the lane.

Calculate the length of the lane.

Use the equation:

distance travelled = speed × time

[2 marks]

Length of the lane = _____ m

Question 1 continues on the next page

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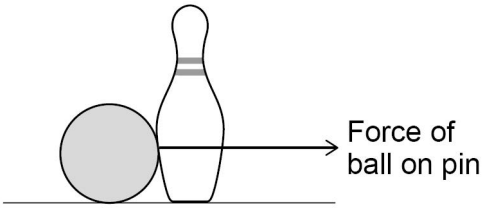
Figure 2 shows the ball hitting one of the pins.

Figure 2



0 1 . 4 Draw an arrow on **Figure 2** to show the force of the pin on the ball.

[2 marks]

0 1 . 5 The velocity of the pin changes from 0 to 12 m/s

It takes 0.15 seconds for the velocity to change.

Calculate the acceleration of the pin.

Use the equation:

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

[2 marks]

Acceleration = _____ m/s^2

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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 _____ .

11

Turn over for the next question

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	vectors have magnitude and direction		1	AO1 6.5.4.1.3
01.2	there is a resultant force acting on the ball		1	AO1 6.5.4.2.1
01.3	length of lane = 4.5 × 4.0 length of lane = 18 (m)		1 1	AO2 6.5.4.1.3
01.4	arrow in opposite direction arrow same length drawn from the ball		1 1	AO1 6.5.4.2.3
01.5	$a = \frac{12 - 0}{0.15}$ $a = 80\ (m/s^2)$		1 1	AO2 6.5.4.1.3
01.6	increases stays the same increases		1 1 1	AO2 6.1.1.2 6.5.4.1.3
Total			**11**	