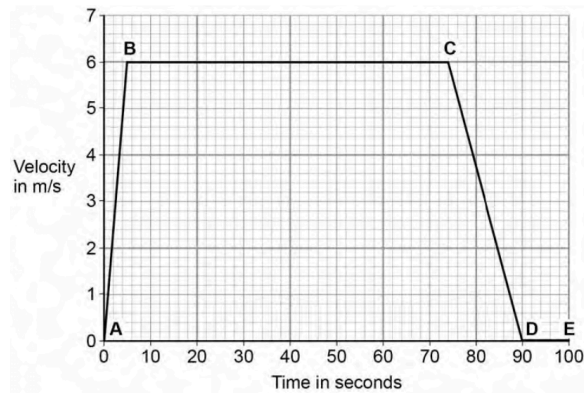


Q1. (2018)

A woman cycled along a straight flat road.

Figure 1 shows how the woman's velocity changed with time.

Figure 1



a)

Between points **A** and **B** the woman was accelerating.

0 1 . 4 Use **Figure 1** to determine the total time for which she was accelerating.

[1 mark]

Time = _____ s

b)

0 1 . 5 Use **Figure 1** to determine her increase in velocity between points **A** and **B**.

[1 mark]

Increase in velocity = _____ m/s

c)

0 1 . 6 Calculate her acceleration between points **A** and **B**.

Use the equation:

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

[2 marks]

Acceleration = _____ m/s²

Q2. (2018)

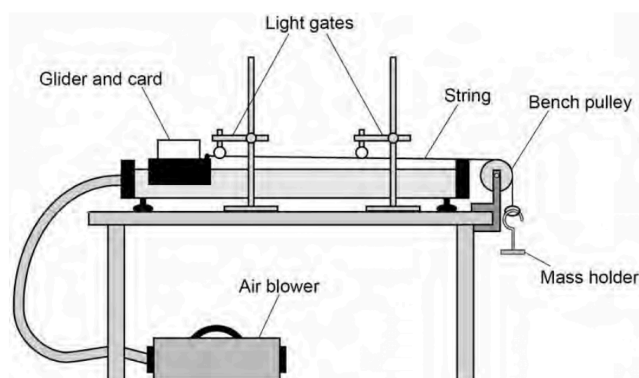
07

A student investigated acceleration using gliders, an air track and light gates.

The air track reduces friction between the glider and the track to zero.

Figure 11 shows the apparatus.

Figure 11



The glider was released from rest and moved along the track.

The mass holder hit the ground before the card passed through the second light gate.

a)

07.2

The mass holder should **not** hit the ground before the card passes through the second light gate.

Suggest **one** way that the student could stop this happening.

[1 mark]

b)

The student increased the resultant force acting on the glider by adding more masses to the mass holder.

She calculated the acceleration of the glider for each resultant force.

Each test was done three times.

Table 2 shows the results.

Table 2

Resultant force in N	Acceleration in m/s^2			Mean acceleration in m/s^2
	Test 1	Test 2	Test 3	
0.20	1.3	1.2	1.3	1.26667
0.39	2.6	2.5	2.6	2.6
0.59	3.8	3.8	3.9	3.8
0.78	5.1	5.1	5.1	5.1
0.98	6.4	7.2	6.4	6.7

0 7 . 3 The student made **two** mistakes in the mean acceleration column.

Identify the mistakes the student made.

Suggest how each mistake can be corrected.

[4 marks]

Mistake _____

Correction _____

Mistake _____

Correction _____

Q3. (2019)

0 6

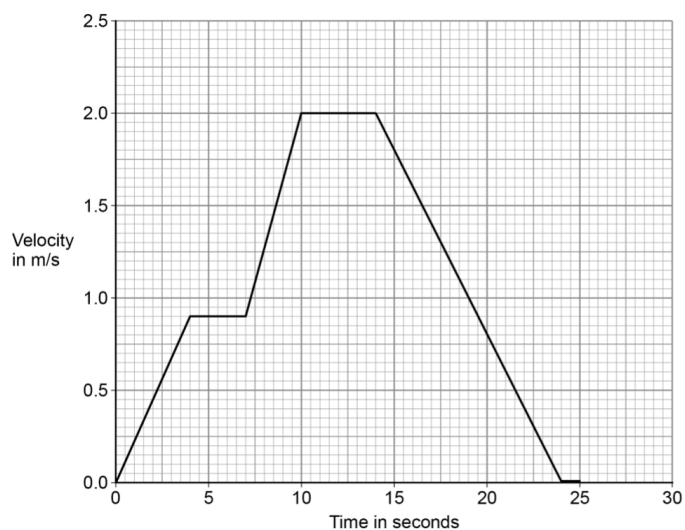
Figure 9 shows a runner using a smart watch and a mobile phone to monitor her run.

Figure 9



Figure 10 is a velocity–time graph for part of the runner's warm-up.

Figure 10



a)

- 0 6 . 1** Determine the total time for which the velocity of the runner was increasing. **[2 marks]**

Time = _____ s

b)

- 0 6 . 2** Determine the deceleration of the runner. **[2 marks]**

Deceleration = _____ m/s^2

Q4. (2020)

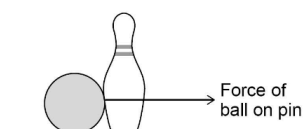
- 0 1** **Figure 1** shows a girl bowling a ball along a ten-pin bowling lane.

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 . 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:

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

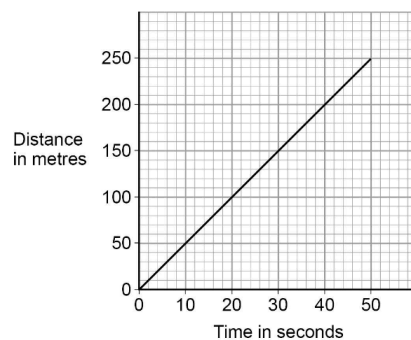
[2 marks]

Q5. (2020)

0 4

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

Figure 5



0 4 . 1

The gradient of the distance-time graph gives the speed of the bicycle.

Determine the speed of the bicycle.

[2 marks]

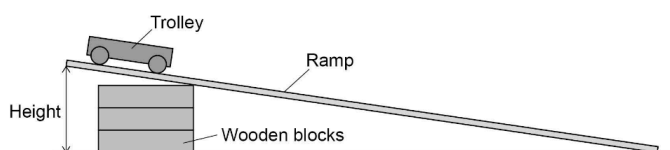
Q6. (2020)

0 7

A student investigated how the height of a ramp affects the acceleration of a trolley down the ramp.

Figure 11 shows some of the equipment used.

Figure 11



a)

0 7 . 1

Plan an investigation to determine how the height of the ramp affects the acceleration of the trolley.

[6 marks]

b)

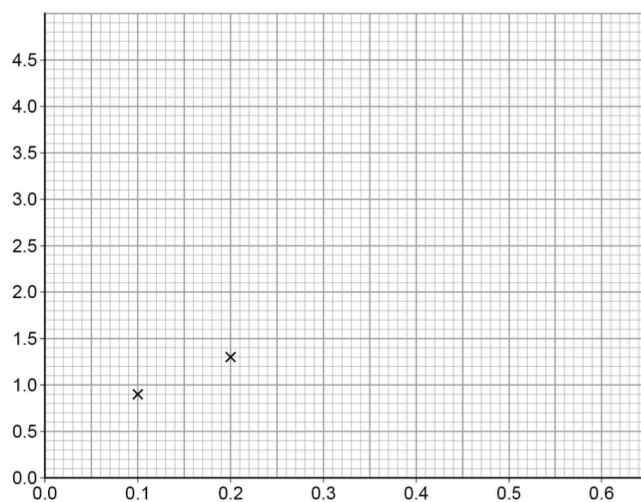
Table 2 shows the results.

Table 2

Height of ramp in metres	0.1	0.2	0.3	0.4	0.5	0.6
Acceleration in m/s^2	0.9	1.3	2.1	3.2	3.9	4.3

The first two results have been plotted on Figure 12.

Figure 12



0 7 . 2 Complete Figure 12.

You should:

- label the axes
- plot the remaining results from Table 2
- draw a line of best fit.

[4 marks]

Q7. (2021)

0 7

Professional rugby players wear a tracking device that measures their velocity and acceleration.

Figure 9 shows a player wearing a tracking device.

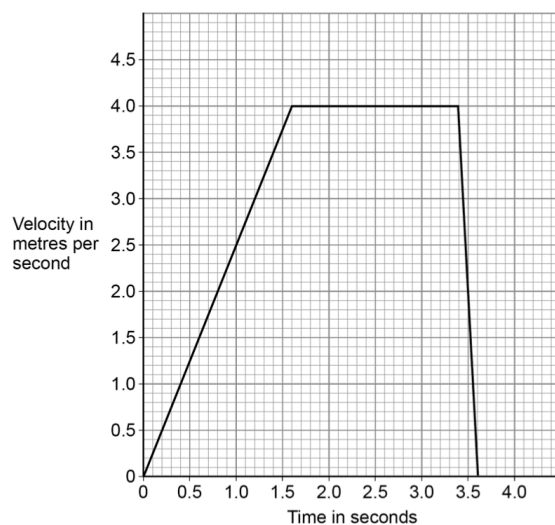
The player is tackling another player who is running with the ball.

Figure 9



Figure 10 shows a velocity–time graph for the player running with the ball.

Figure 10



a)

0 7 . 3 Determine the acceleration of the player between 0 and 1.6 s.

[2 marks]

b)

0 7 . 4 Describe the motion of the player between 3.4 s and 3.6 s.

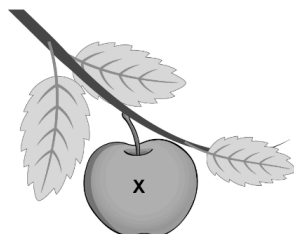
[1 mark]

Q8. (2022)

0 3 . Figure 4 shows an apple hanging from a tree.

The X marks the centre of mass of the apple.

Figure 4



0 3 . 5 The acceleration of the apple is 9.8 m/s^2

The velocity of the apple changes from 0 to 4.9 m/s

Calculate the time taken for the apple to fall to the ground.

Use the equation:

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

[2 marks]

Q9. (2022)

0 5 . 6 A car accelerates at 5.0 m/s^2 over a distance of 45 m

initial velocity of the car = 0 m/s

Calculate the final velocity of the car.

Use the Physics Equations Sheet.

Give your answer to 2 significant figures.

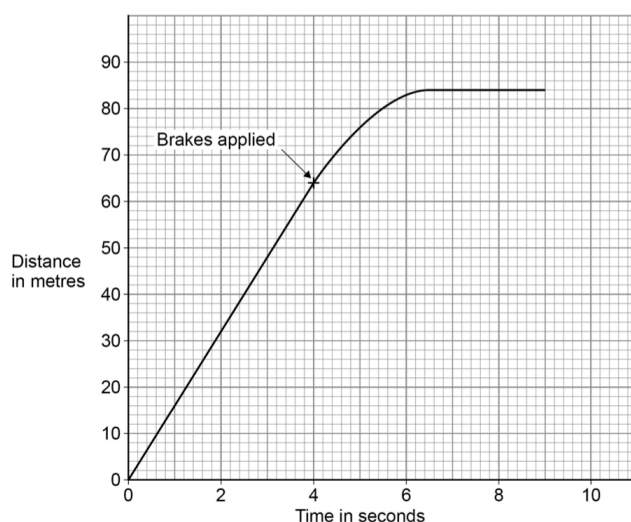
[4 marks]

Q10. (2023)

0 2 A car contains a device called a black box. The black box records the distance travelled and the time taken for each journey.

Figure 3 shows the distance–time graph for part of a journey.

Figure 3



0 2 . 1 Which feature of Figure 3 shows that the car travels at a constant speed for the first 4 seconds?

[1 mark]

Tick (✓) **one** box.

The line becomes horizontal.

☐

The line goes through the origin.

☐

The line is straight.

☐

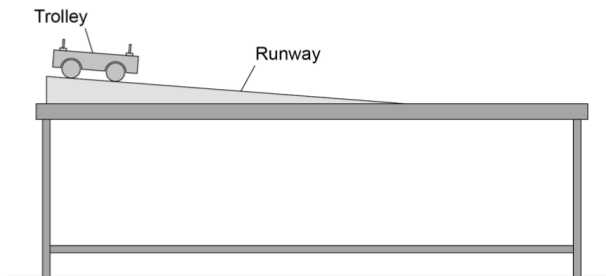
Q11. (2023)

0 7

A student investigated how the acceleration of a trolley is affected by the force acting on the trolley.

Figure 16 shows some of the equipment used.

Figure 16



0 7 . 1

Describe a method the student could use.

Your answer should include any extra equipment needed.

[6 marks]

Q12. (2024)

0 1

Figure 1 shows a skydiver jumping from an aeroplane.

The skydiver is accelerating downwards.

Figure 1

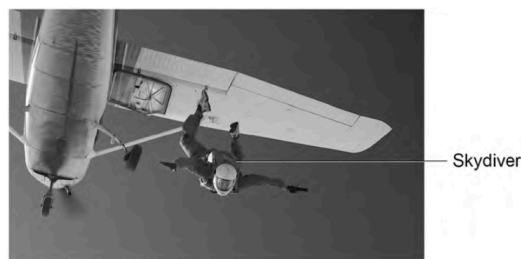


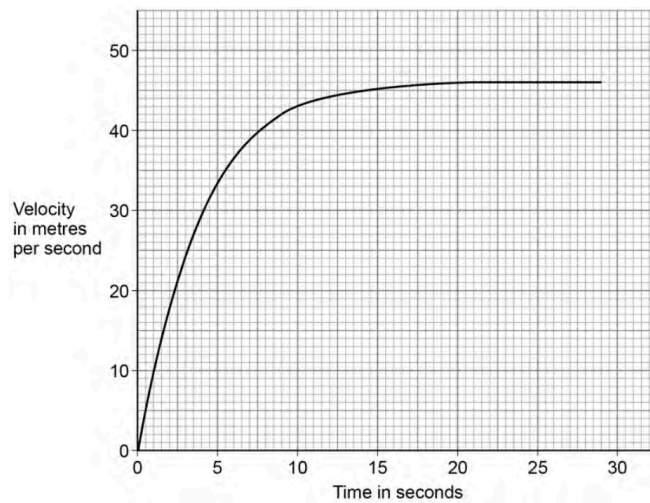
Figure 2 shows the two forces acting on the skydiver a few seconds after jumping from the aeroplane.

Figure 2



Figure 3 shows a velocity–time graph for the skydiver.

Figure 3



a)

0 1 . 6 How many seconds did the skydiver accelerate for?

Use Figure 3.

[1 mark]

_____ s

b)

0 1 . 7 What was the constant velocity of the skydiver?

Use Figure 3.

[1 mark]

_____ m/s