Topical Past Paper Worksheets

Edexcel International GCSE Physics (4PH1)

[Paper 1P]

Exam Series: January 2017 - May 2023

Format Type B:
Each question is followed by its answer scheme

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Introduction

Each Topical Past Paper Questions Workbook contains a comprehensive collection of hundreds of questions and corresponding answer schemes, presented in worksheet format. The questions are carefully arranged according to their respective chapters and topics, which align with the latest IGCSE or AS/A Level subject content. Here are the key features of these resources:

1. The workbook covers a wide range of topics, which are organized according to the latest syllabus content for Edexcel IGCSE or A Level exams.
2. Each topic includes numerous questions, allowing students to practice and reinforce their understanding of key concepts and skills.
3. The questions are accompanied by detailed answer schemes, which provide clear explanations and guidance for students to improve their performance.
4. The workbook's format is user-friendly, with worksheets that are easy to read and navigate.
5. This workbook is an ideal resource for students who want to familiarize themselves with the types of questions that may appear in their exams and to develop their problem-solving and analytical skills.

Overall, Topical Past Paper Questions Workbooks are a valuable tool for students preparing for IGCSE or A Level exams, providing them with the opportunity to practice and refine their knowledge and skills in a structured and comprehensive manner. To provide a clearer description of this book's specifications, here are some key details:

- Title: Edexcel IGCSE Physics (4PH1) Paper 1P Topical Past Papers
- Subtitle: Exam Practice Worksheets With Answer Scheme
- Examination board: Pearson Edexcel
- Subject code: 4PH1
- Years covered: January 2017 - May 2023
- Paper: 1P
- Number of pages: 923
- Number of questions: 279

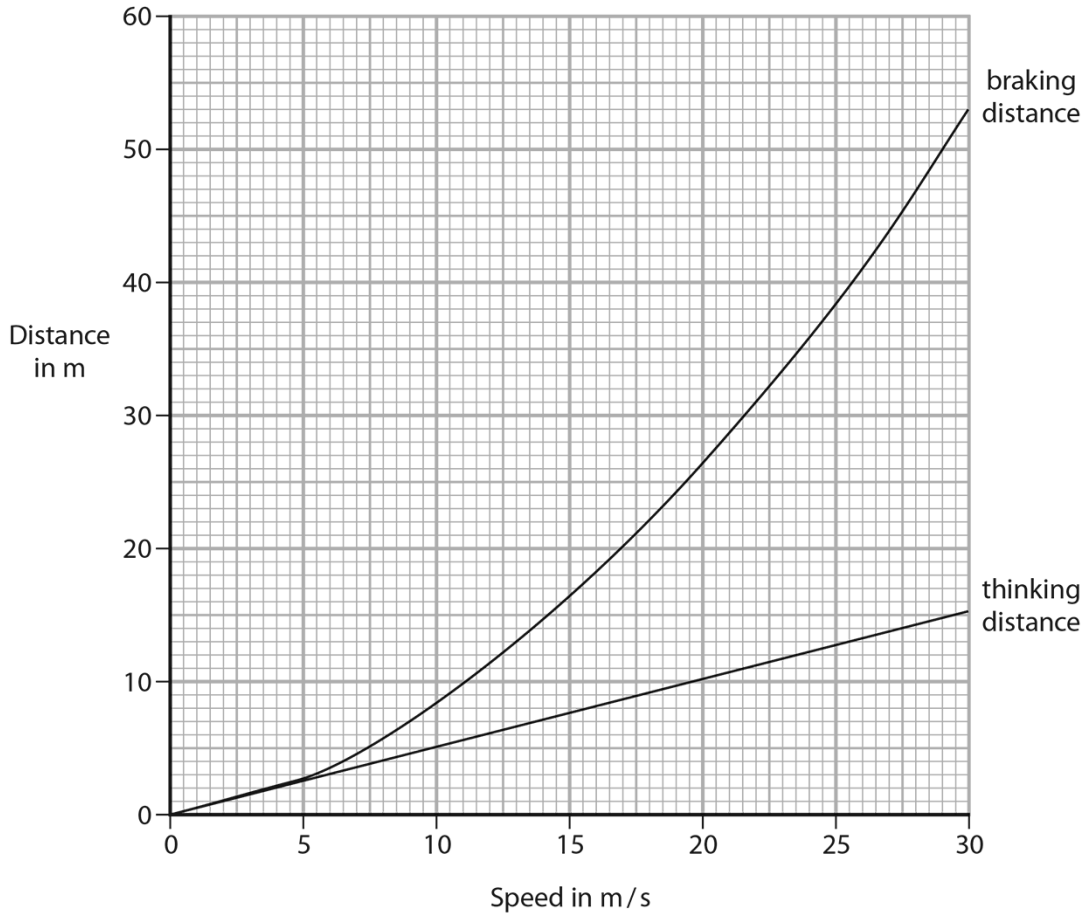
Contents

Chapter 1

Forces and motion

1. 4ph1_1p_que_20230114 Q: 5

The graph shows how the thinking distance and the braking distance vary with the speed of a car.



(a) Which of these does **not** affect thinking distance?

(1)

- ☒ **A** alcohol consumed by the driver
- ☒ **B** condition of the road
- ☒ **C** speed of the car
- ☒ **D** tiredness of the driver

(b) Which of these would increase the braking distance of the car?

(1)

- ☒ **A** faster reaction time of driver
- ☒ **B** ice on the road
- ☒ **C** more powerful brakes
- ☒ **D** tyres with more grip

(c) Determine the stopping distance of the car when the speed of the car is 20 m / s.

(3)

stopping distance = ... m

(d) (i) State the formula linking average speed, distance moved and time taken.

(1)

(ii) Determine the reaction time of the driver of the car.

(3)

reaction time = ... s

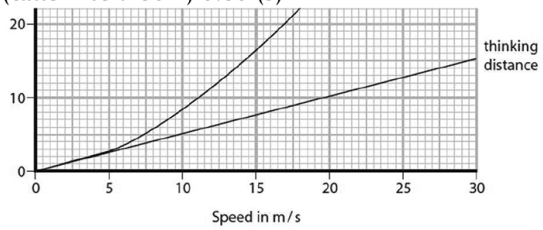
(e) Calculate the mean braking acceleration of the car as it brakes to a stop from an initial speed of 30 m / s.

(4)

acceleration = ... m/s^2

(Total for Question 5 = 13 marks)

Answer:

Question number	Answer	Notes	Marks
(a)	B (condition of the road); A is incorrect because consumption of alcohol increases reaction time C is incorrect because thinking distance is determined by speed D is incorrect because tiredness increases reaction time		1
(b)	B (ice on the road); A is incorrect because reaction time does not affect braking distance C is incorrect because more powerful brakes would decrease the braking distance D is incorrect because tyres with more grip would decrease the braking distance		1
(c)	idea that stopping distance = thinking distance + braking distance; correct reading of either distance; correct evaluation; e.g. stopping distance = thinking distance + braking distance thinking distance = 10.0 m / braking distance = 26.5 m stopping distance = (10.0 + 26.5) = 36.5 (m)	stated or implied allow 26.0-27.0 (m) for braking distance allow 10.0-10.5 (m) for thinking distance allow 36.0-37.5 (m)	3
(d) (i)	(average) speed = distance (moved) / time (taken);	allow standard symbols and rearrangements e.g. t = s / v allow s or d for distance allow v or s for speed	1
(ii)	suitable pair of readings taken from graph; rearrangement of formula; evaluation; e.g. thinking distance = 15 m when speed = 30 m/s time = distance / speed (time = 15 / 30 =) 0.50 (s)  	i.e. (30,15), (20,10), (10,5) etc. allow any answer in range 0.40-0.60 (s)	3

(e)	correct braking distance reading from graph; substitution into $v^2 = u^2 + 2 \times a \times s$; rearrangement; evaluation; e.g. braking distance = 53 m $0^2 = 30^2 + [2 \times a \times 53]$ a = (-)900 / 106 (a =) (-)8.5 (m/s^2)	allow 53 seen anywhere in working final answer of 6.6 (m/s^2) (using stopping distance instead of braking distance) scores 3 marks final answer of 30 (m/s^2) (using thinking distance instead of braking distance) scores 3 marks allow 52-53 m allow 8.49-8.65	4

Total for question 5 = 13 marks

2. 4ph1_1p_que_20230526 Q: 10

A student investigates how the time taken for a ball to roll down a slope changes with the distance from the bottom of the slope.

This is the student's method.

- place a ball on the slope 10 cm from the bottom of the slope
- release the ball and start a stopwatch
- stop the stopwatch when the ball arrives at the bottom of the slope
- record the time taken for the ball to roll down the slope
- repeat for different distances from the bottom of the slope

(a) Complete the table by placing a tick (✓) to show which variables are the independent, dependent and control variables in this investigation.

(4)

	Independent	**Dependent**	**Control**
Surface of slope			
Angle of slope			
Distance travelled			
Time taken			

(b) The table shows the student's results.

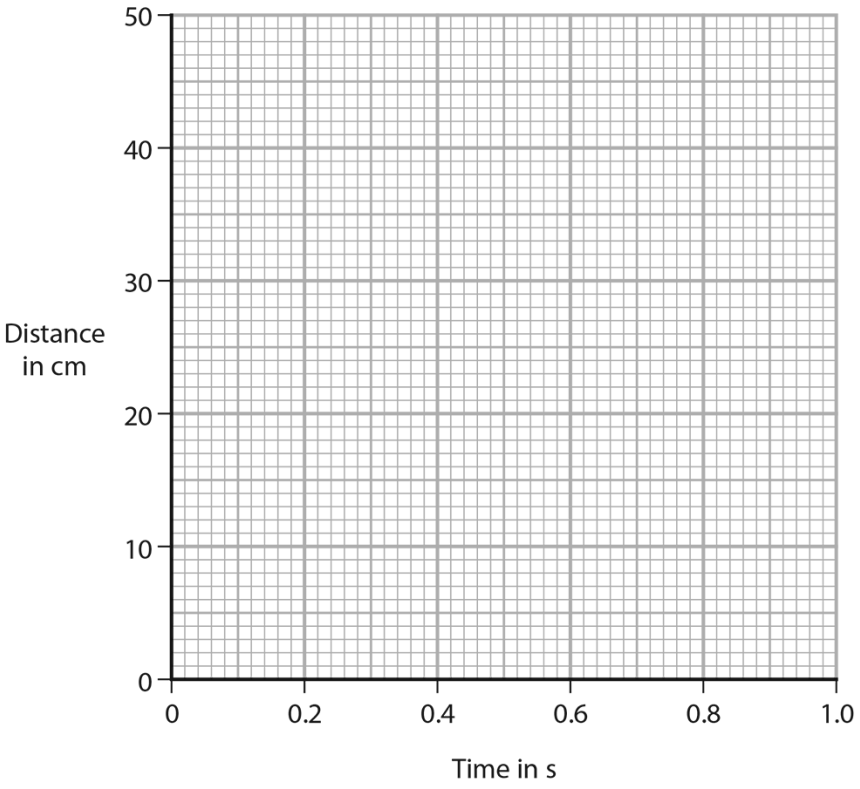
Distance travelled in cm	**Time taken in s**
10	0.41
20	0.58
30	0.71
40	0.82
50	0.91

(i) Plot the student's data on the grid.

(1)

(ii) Draw a best fit curve.

(1)



(iii) The student concludes that the results obey this relationship

$$\text{distance} \div (\text{time}^2) = \text{constant}$$

Use the student's data to deduce whether the student's results support this conclusion.

(4)

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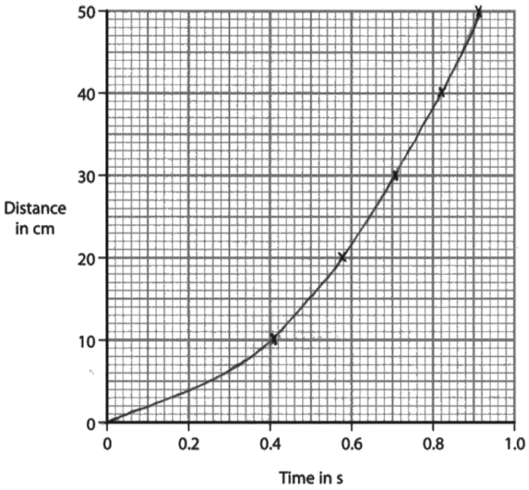
(Total for Question 10 = 10 marks)

Answer:

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(a)</td><td>one mark for each correct row;;;;
<table><tr><th></th><th>Independent</th><th>Dependent</th><th>Control</th></tr><tr><td>Surface of slope</td><td></td><td></td><td>✓</td></tr><tr><td>Angle of slope</td><td></td><td></td><td>✓</td></tr><tr><td>Distance travelled</td><td>✓</td><td></td><td></td></tr><tr><td>Time taken</td><td></td><td>✓</td><td></td></tr></table></td><td>reject mark for row if more than one tick</td><td>4</td></tr>
<tr><td>(b) (i)</td><td>all points correct;
 
</td><td>within ½ small square</td><td>1</td></tr>
<tr><td>(ii)</td><td>curve goes through all points;</td><td>judge by eye
ignore curve before first data point</td><td>1</td></tr>
<tr><td>(iii)</td><td>constant correctly calculated for one row of table;
constant correctly calculated for another row of table;

statement/expression comparing constants;

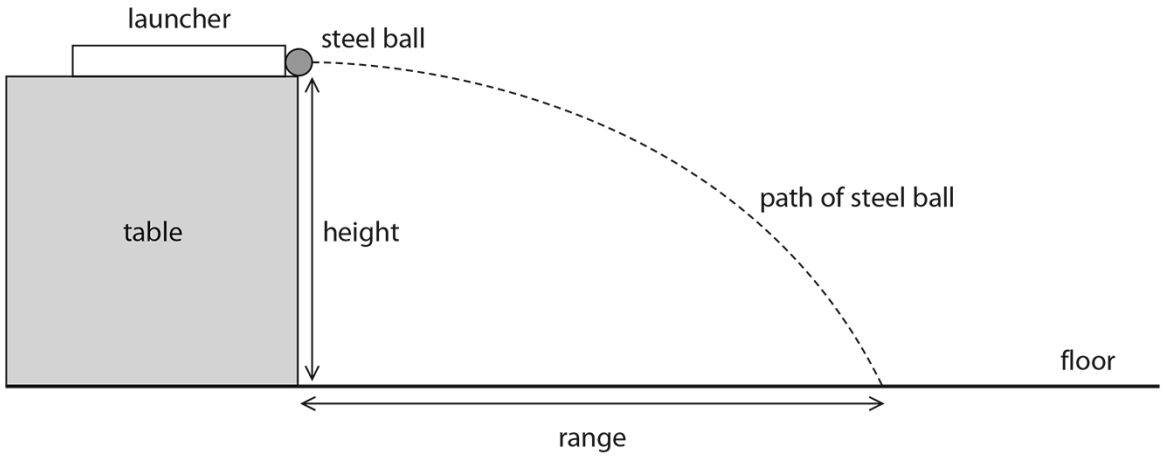
consistent conclusion about relationship based on comparison of constants;</td><td><table><tr><th>Distance in cm</th><th>Time in s</th><th>Constant</th></tr><tr><td>10</td><td>0.41</td><td>59.49</td></tr><tr><td>20</td><td>0.58</td><td>59.45</td></tr><tr><td>30</td><td>0.71</td><td>59.51</td></tr><tr><td>40</td><td>0.82</td><td>59.49</td></tr><tr><td>50</td><td>0.91</td><td>60.38</td></tr></table>allow even if comparison suggests the constants are not equal
DOP</td><td>4</td></tr>
</table>

Total for Question 10 = 10 marks

3. 4ph1_1p_que_20220610 Q: 11

A steel ball is fired from a launcher on an adjustable table.

A student investigates how the range of the steel ball varies with the height of the table.



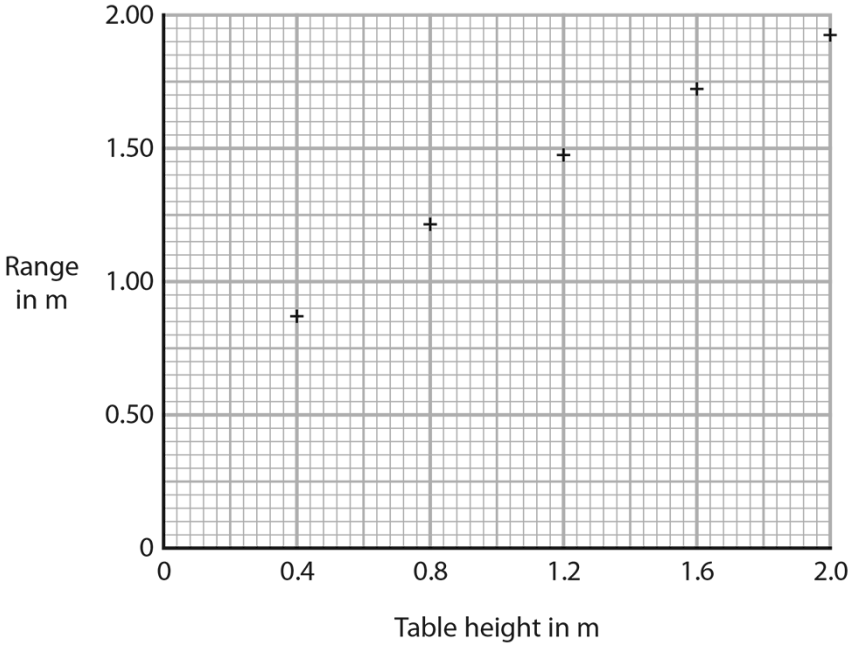
(a) Describe a method for the student's investigation.

Your answer should include details of

- the variables in the investigation
- how the investigation will be valid (a fair test)
- how the range will be measured accurately

(6)

(b) The graph shows the student's results.



(i) Draw the curve of best fit.

(1)

(ii) Estimate what the height of the table would be when the range of the projectile is 0.60 m.

(1)

height = ... m

(iii) Justify why the student has plotted a line graph rather than a bar chart.

(1)

.....

.....

.....

(iv) The range of the projectile is related to the table height by this formula

$$\text{range} = \text{launch speed} \times \sqrt{\frac{\text{table height}}{5}}$$

Using data from the graph, show that the launch speed of the projectile is approximately 3 m / s.

(4)

launch speed = ... m / s

(Total for Question 11 = 13 marks)

Answer:

Question number		Answer	Notes	Marks
(a)		any two from: MP1. height is <u>independent variable</u>; MP2. at least five different heights tested; MP3. range is <u>dependent variable</u>; with any two from: MP4. one control variable named; MP5. second control variable named; MP6. idea of repeating process at each height to find mean; AND: MP7. ruler used to measure height / range; MP8. suitable method to see where ball lands;	 e.g. launch speed/launch force, angle of launch, same ball allow repeating process at each height to identify anomalies allow tape measure condone metre stick e.g. record video (and playback in slow motion) cover ball in paint, material on floor to show landing point etc.	6
(b)	(i)	smooth curve within one small square of data points;	ignore extrapolation of curve beyond the points take care the curve is not dot to dot straight lines	1
	(ii)	height reading consistent with curve of best fit;	allow 0.15-0.25 (m) allow ECF from (b)(i)	1
	(iii)	idea that (both) variables are continuous;	allow results/data are continuous	1
	(iv)	pair of readings taken from graph; substitution into given formula; rearrangement; evaluation to at least 1 decimal place; e.g. range = 1.92m when height = 2.0m $1.92 = \text{launch speed} \times \sqrt{\frac{2.0}{5}}$ launch speed = $1.92 / \sqrt{0.4}$ (launch speed =) 3.0 (m/s)	allow data points or readings taken from candidate's curve allow ECF from (b)(i) and (b)(ii) 3 marks max. for reverse argument e.g. using speed of 3 m/s to calculate height or range allow range 2.9-3.1 (m/s) unless ECF from (b)(i)	4

Total for Question 11 = 13 marks

4. 4PH1_1P_que_20210304 Q: 2

(a) A speed camera is positioned at the side of a road.

The camera measures the speed of a vehicle on the road to determine whether the vehicle is travelling too fast.

The camera takes two photographs of the vehicle 0.25 s apart.

The photographs are used to measure the distance travelled by the vehicle during this time.

(i) State the formula linking average speed, distance moved and time taken.

(1)

(ii) In the time between the two photographs, the car travels a distance of 6.5 m.

Calculate the average speed of the car.

(2)

average speed = ... m/s

(iii) The speed limit of the road is 80 kilometres per hour.

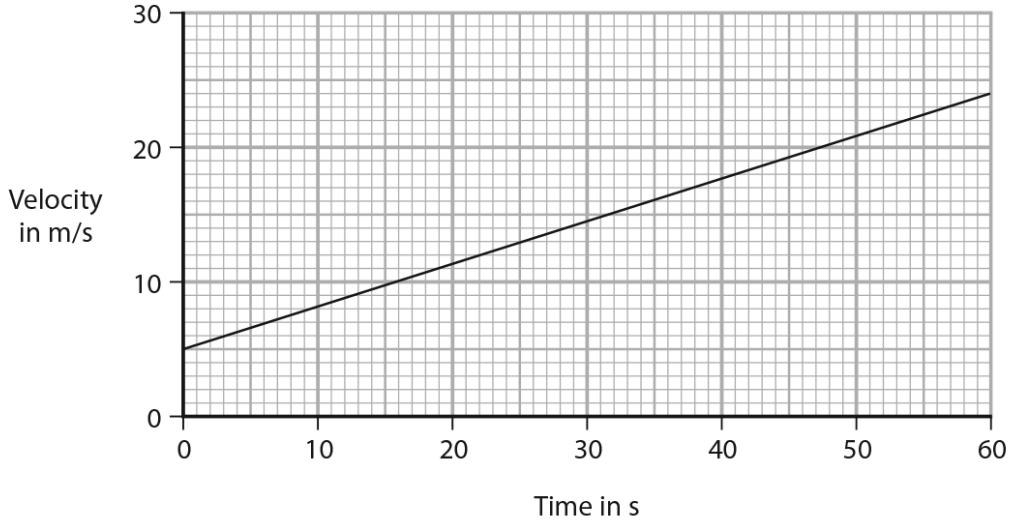
Determine whether the car is exceeding the speed limit.

(2)

.....

.....

(b) The velocity-time graph shows how the velocity of a lorry changes with time.



(i) Explain how the graph shows that the lorry has a constant acceleration.

(2)

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.....

(ii) State the formula linking acceleration, change in velocity and time taken.

(1)

(iii) Calculate the acceleration of the lorry.

(3)

acceleration = ... m/s^2

(Total for Question 2 = 11 marks)

Answer:

Question number	Answer	Notes	Marks
(a) (i)	(average) speed = distance (moved) / time (taken);	allow standard symbols and rearrangements e.g. v = s / t allow s for speed, d for distance	1
(ii)	substitution; evaluation; e.g. (speed =) 6.5 / 0.25 (speed =) 26 (m/s)		2
(iii)	correct conversion of EITHER m to km OR s to h; full conversion from m/s to km/h AND consistent conclusion;; e.g. 26 (m/s) = 0.026 (km/s) OR 26 (m/s) = 93600 (m/h) 94 (km/h) => too fast	allow ECF from (ii) allow ECF from (ii) allow conversion of km/h to m/s e.g. 80km/h = 22.2m/s allow 93.6 (km/h)	2
(b) (i)	acceleration is the gradient (of the graph); graph has a constant gradient;	 allow line on graph is straight	2
(ii)	acceleration = change in velocity / time;	allow standard symbols and rearrangements e.g. a = (v-u) / t, a = Δv / t	1
(iii)	correct reading of either two velocity values or time interval taken from graph; correct substitution into formula; evaluation; e.g. u = 5 (m/s), v = 24 (m/s) OR t = 60 (s) (a =) 24-5 / 60 (a =) 0.32 (m/s^2)	allow attempt at gradient calculation allow (v – u =) 19 seen allow range of 0.30-0.32	3

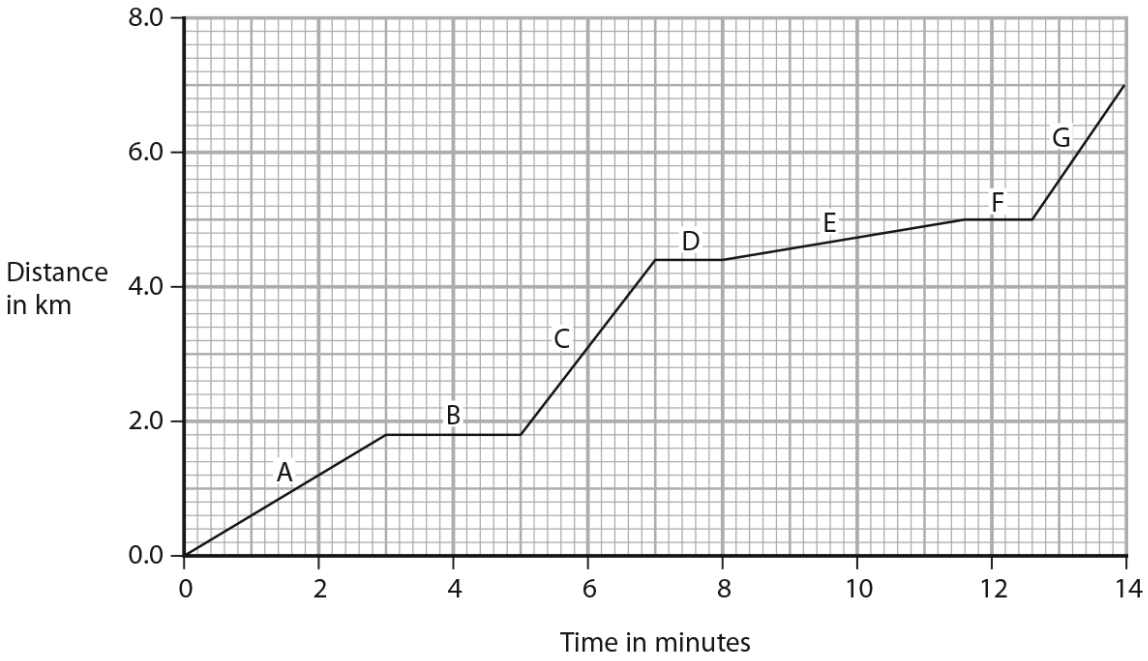
5. 4PH1_1P_que_20200305 Q: 5

A bus transports passengers.

© Mikbiz/Shutterstock

(a) The bus stops at certain points in its journey to let passengers get on or off the bus.

The distance-time graph shows part of the bus journey, with sections labelled A to G.



(i) Give the letters of the sections where the bus is stationary.

(1)

(ii) Calculate the speed of the bus during section C of the journey.

Give your answer in m / s.

(4)

speed = ... m / s

(iii) Explain what the graph shows about the speed of the bus in section E compared with the speed of the bus in section A.

(2)

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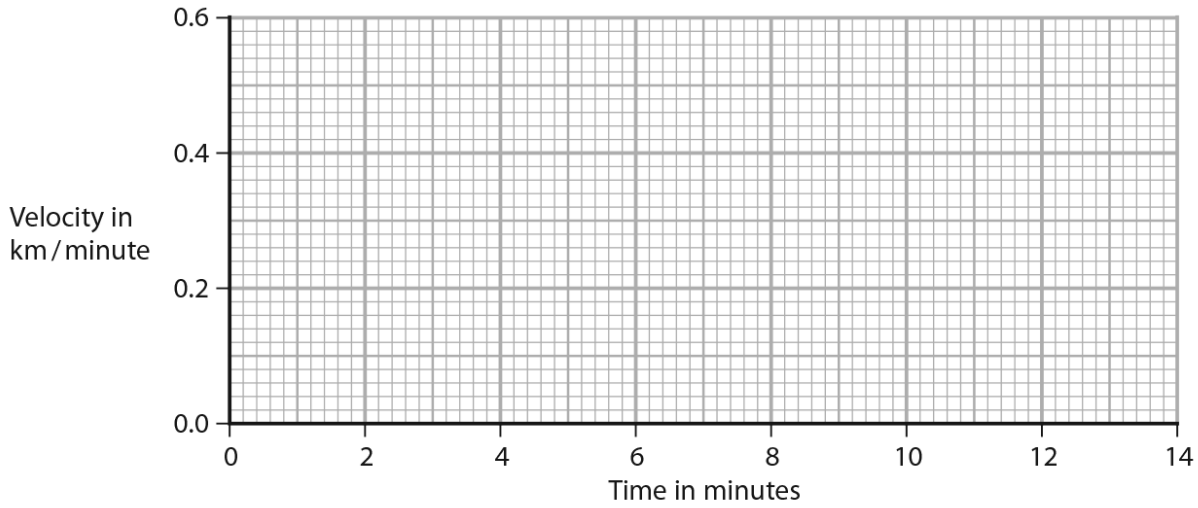
(b) Another bus travels a distance of 7.0 km in a time of 14 minutes.

This bus travels at a constant velocity.

Complete the velocity-time graph to show the motion of this bus.

(2)



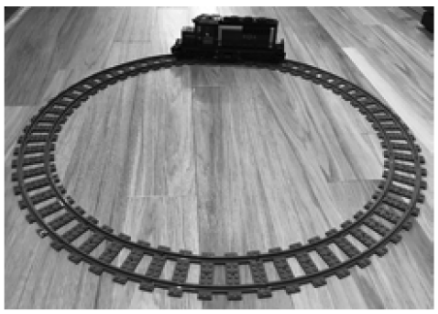
(Total for Question 5 = 9 marks)

Answer:

Question number	Answer	Notes	Marks
(a) (i)	B, D, F;	all required for the mark reject if additional sections listed	1
(ii)	use of speed = distance / time;	seen anywhere allow symbols allow attempt to find gradient of line	4
	correctly read time or distance from graph; conversion from minutes to seconds or km to m; correct evaluation;		
	e.g. v = s / t distance = 2.6 km or time = 2 minutes distance = 2600 m or time = 120 s (v =) 22 (m/s)	allow s = d / t allow 21.7, 21.6… (m/s) 0.0216…, 1300 = 3 marks 1.3 = 2 marks	
(iii)	idea that speed of bus is greater in section A; (because) line is steeper / gradient is larger / eq;		2
(b)	single horizontal line drawn; horizontal line drawn at 0.5 km/minute for some period of time in journey;	judge by eye line must extend the entire length of the time axis	2

6. 4PH0_1P_que_20190111 Q: 7

The photograph shows a toy train as it moves around a circular track.



A student wants to find the average speed of the toy train.

Describe a method that the student could use to find the average speed.

(5)

(Total for Question 7 = 5 marks)

Answer:

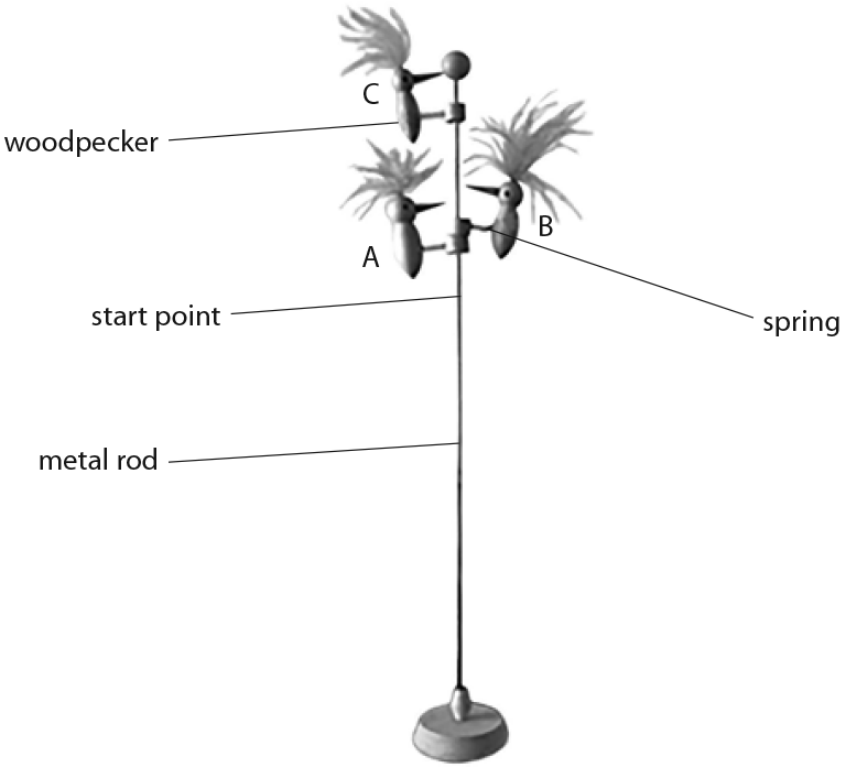
Question number	Answer	Notes	Marks
	any five from: MP1. determine / measure distance; MP2. determine / measure time; MP3. appropriate measuring instrument for distance OR time; MP4. use a suitable distance / count laps (of known length); MP5. repeat experiment and calculate average; MP6. use of speed = distance ÷ time; MP7. suitable experimental precaution e.g. reaction time considered, time from and to predetermined points;	 allow idea of measuring diameter/radius and calculating distance ignore 'human error' allow mark a start/finish point	5

7. 4PH0_1P_que_20170112 Q: 3

A student investigates a toy.

- the toy has three woodpeckers
- each woodpecker is attached to a wooden ring by a spring
- a metal rod passes through the wooden rings
- the woodpeckers have different masses
- the springs are identical

When a woodpecker is pulled back and released, it vibrates and moves down the rod.



(a) A student uses this method to investigate the toy.

- measure the mass of woodpecker A
- move woodpecker A to the start point and release it
- record the time it takes for woodpecker A to travel 20 cm
- repeat the test two more times

The student uses the same method for woodpeckers B and C.

The table shows the student's results.

Woodpecker	Mass in g	Time in s		
		test 1	test 2	test 3
A	11.2	11.8	11.1	10.8
B	8.3	3.1	5.4	5.5
C	5.9	8.5	9.0	8.7

(i) One of the time measurements in the table is anomalous.

Draw a circle around this anomalous measurement.

(1)

(ii) State the relationship between average speed, distance moved and time taken.

(1)

(iii) Calculate the average (mean) speed for woodpecker B.

(4)

average speed = ... cm/s

(iv) Explain what type of graph the student should use to present his data.

(2)

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(b) Before carrying out his investigation, the student made this prediction.

'The smaller the mass of the woodpecker, the faster it moves down the rod.'

Discuss whether the student's results support his prediction.

(3)

(Total for Question 3 = 11 marks)

Answer:

Question number		Answer	Notes	Marks
(a)	i	3.1 ONLY circled in the table;		1
	ii	(average) speed = distance (moved)/time (taken);	accept words or standard symbols	1
	iii	discards anomalous result; calculates mean time for B; substitution; evaluation; e.g. average time = 4.7 gets 1 marks average time = 5.5 gets 2 marks speed = 20/ 5.5 gets 3 marks =3.7 gets 4 marks	 allow 4.67 Allow 5.45 allow 20/5.45 Allow 3.67 answers which round to 4.3 get 3 marks	4
	iv	explanation including the following ideas EITHER bar chart; because woodpeckers are discrete / eq; OR mass is a continuous variable; therefore scatter-gram / eq;	 condone histogram DOP DOP allow line graph	2
b		discussion to include any 3 ideas from: MP1. there is no (discernible) pattern; MP2. supporting data quoted; MP3. discussion of why prediction is wrong/ C should be fastest; MP4. three data sets is insufficient to decide; MP5. need for further data to extend range of results;	no mark for unqualified 'yes' or 'no' results don't go in order/eq allow calculated speeds (cm/s) A= 1.8 B= 3.7 (4.3) C = 2.3 A heaviest,slowest; B middle, fastest; C lightest, middle ignore discussion of anomalies	3

8. 4ph1_1p_que_20230114 Q: 1

A material is stretched by applying an increasing load. The material shows elastic behaviour as it is stretched.

(a) Describe what is meant by elastic behaviour.

(2)

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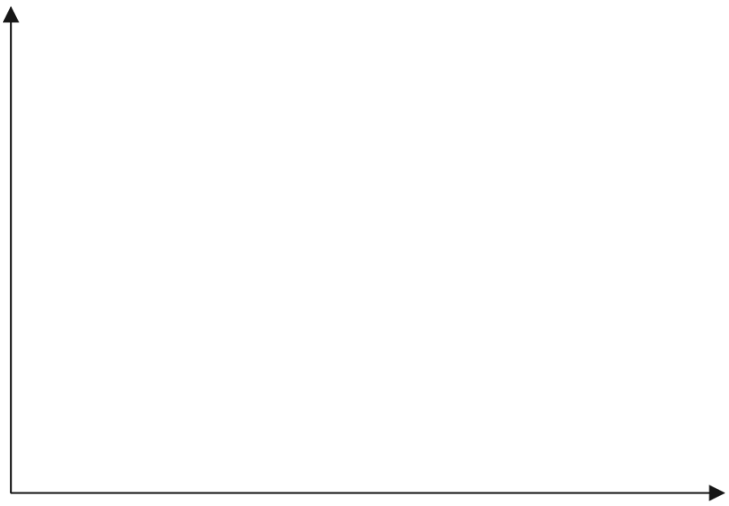
(b) The material obeys Hooke's law.

Sketch a graph for this material to show that it obeys Hooke's law as it is stretched.

You should label both axes with appropriate physical quantities.

(3)



(Total for Question 1 = 5 marks)

Answer:

Question number	Answer	Notes	Marks
(a)	idea that material returns to its original shape / length; when the load / force is removed;	 condone mass / weight for load	2
(b)	axes labelled “extension” and “load”/”force”; straight line of positive gradient drawn throughout; line passes through origin;	ignore units ignore orientation of axes judge by eye condone curve at end of line if clear indication that Hooke’s law does not apply for that part of the line e.g. limit of proportionality marked at end of straight section allow full marks for axes labelled “length” and “load”/”force” if line intersects length axis above zero	3

Total for question 1 = 5 marks

9. 4ph1_1pr_que_20230526 Q: 8

Diagram 1 shows a set of masses attached to a spring, which is suspended from a support.

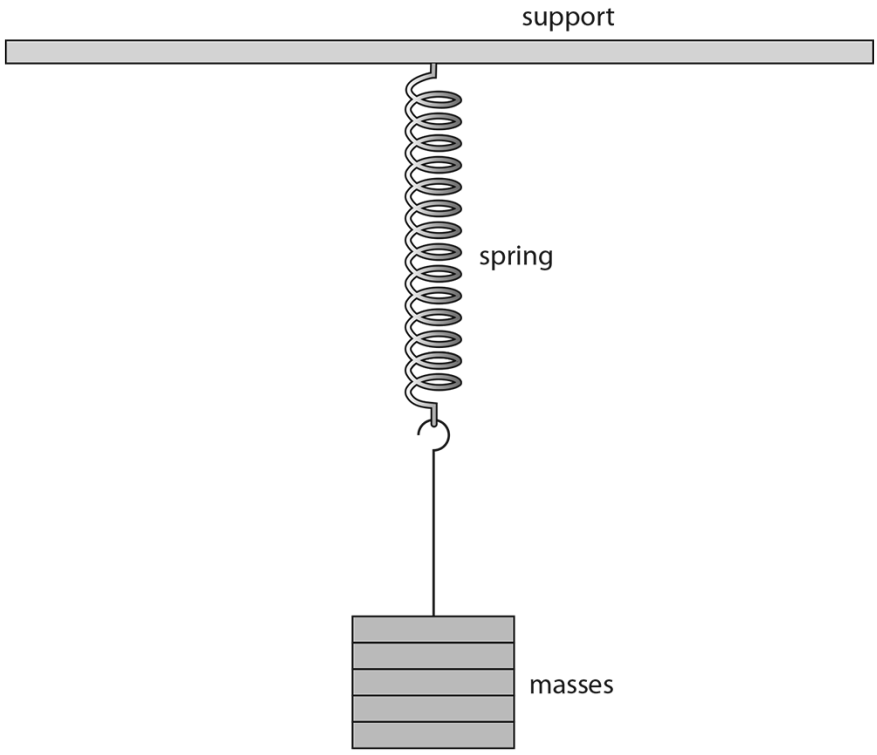


Diagram 1

(a) After the masses are added, the length of the spring is 14.6 cm.

The student measures the extension of the spring as 11.5 cm.

(i) Calculate the original length of the spring.

(1)

original length = ... cm

(ii) The student removes the masses and notices that the spring does **not** show elastic behaviour.

Predict a value for the new length of the spring after the masses have been removed.

(1)

new length of spring = ... cm

(b) The student puts the masses back on the spring.

The student then pulls the masses down and releases them.

The masses vibrate up and down in a vertical direction, as shown in diagram 2.

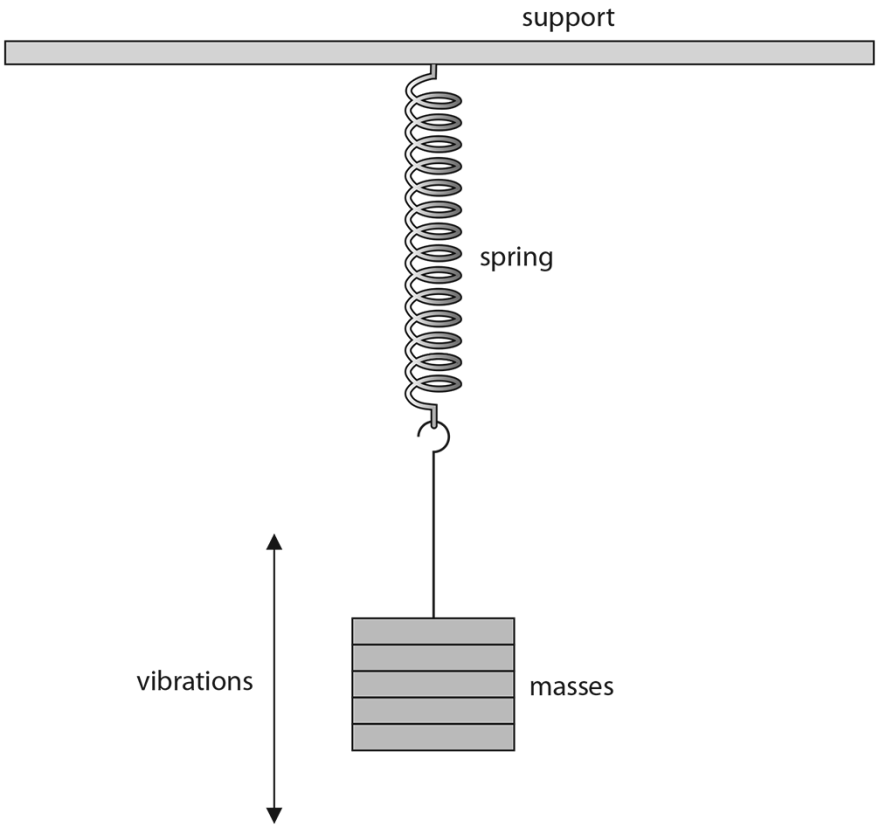
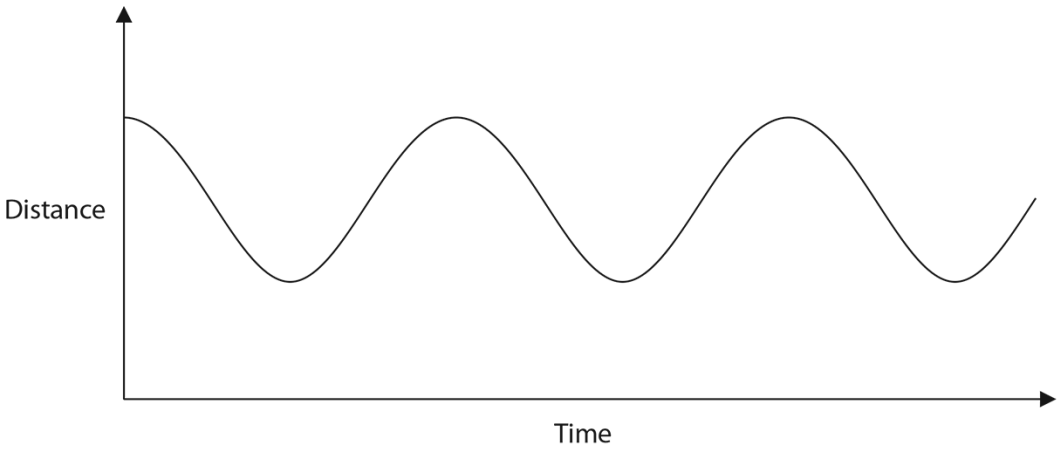


Diagram 2

The distance–time graph shows how the distance between the top of the masses and the support changes with time as the masses vibrate.



(i) Explain how the gradient of the graph shows that the masses accelerate as they vibrate.

(3)

(ii) Add crosses (×) to the distance–time graph to show all the times when the masses are not moving.

(2)

(Total for Question 8 = 7 marks)

Answer:

Question number		Answer	Notes	Marks
(a)	(i)	3.1 (cm);		1
	(ii)	any value above candidate's answer for (a)(i) up to and including 14.6cm;		1
(b)	(i)	idea that speed is the gradient/slope of the graph;		3
		gradient is not constant;	e.g. "it's a curve"/"it's not a straight line"	
		(therefore) speed is not constant;	allow description of how the speed is varying e.g. zero at turning points, maximum when steepest	
	(ii)	any cross drawn at a peak/trough on the curve;	reject if contradicted by a cross drawn in an incorrect place by eye	2
		crosses drawn at all three peaks and all three troughs;		

Total for Question 8 = 7 marks

10. 4PH1_1P_que_20220113 Q: 5

A driver of a car sees an obstruction in the road ahead and must stop the car.

(a) (i) State the formula linking average speed, distance travelled and time taken.

(1)

(ii) A car travels at 21 m / s.

The driver's reaction time is 0.14 seconds.

Calculate the distance travelled by the car during the driver's reaction time.

(2)

distance = ... m

(b) The car experiences a braking force of 7600 N.

The car has a mass of 1200 kg.

(i) State the formula linking force, mass and acceleration.

(1)

(ii) Calculate the acceleration of the car.

(2)

acceleration = ... m/s^2

(iii) Calculate the braking distance travelled as the speed of the car is reduced from 21 m / s to 0 m / s.

(3)

distance = ... m

(Total for Question 5 = 9 marks)

Answer:

Question number	Answer	Notes	Marks
(a) (i)	(average) speed = distance (travelled) ÷ time (taken);	allow standard symbols and rearrangements e.g. v = s / t allow s, d for distance condone s for speed	1
(ii)	substitution OR rearrangement; evaluation; e.g. 21 = distance / 0.14 OR s = v × t (distance =) 2.9 (m)	 allow 3, 2.94 (m)	2
(b) (i)	force = mass × acceleration;	allow standard symbols and rearrangements e.g. a = F / m	1
(ii)	substitution OR rearrangement; evaluation; e.g. 7600 = 1200 × a OR a = F / m (a =) (−)6.3 (m/s^2)	 allow 6.33… (m/s^2)	2
(iii)	substitution into $v^2 = u^2 + 2as$; rearrangement; evaluation; e.g. $0^2 = 21^2 + [2 \times (-)6.3 \times \text{distance}]$ distance = 441 / 12.6 distance = 35 (m)	ecf answer from (ii) allow 34.8…(m)	3