

Motion

Q1.(2018)

B ✓

Q2.(2018)

B ✓

Q3.a(2018)

Distance: ruler / tape measure / metre stick ✓	2	1.2	
Time: stopclock / stopwatch / phone timer / light gates ✓		1.2	IGNORE just datalogger IGNORE just timer

Q3.b(2018)

(average speed) = distance ÷ time / divide the distance by the time / AW ✓	1	1.2	ALLOW correct symbol equation $s \div t$ or $d \div t$
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Q3.c(2018)

FIRST CHECK THE ANSWER ON THE ANSWER LINE If answer = 0.60 (m/s) award 3 marks	3		If there is no answer on the answer line, check the table
(speed) = distance ÷ time or $1.2 \div 2.0$ ✓		1.2	ALLOW correct symbol equation $s \div t$ or $d \div t$
= 0.6 (m/s) ✓		2.1	IGNORE triangle style equations
= 0.60 (m/s) (to 2 sig figs) ✓		2.1	

Q3.d(2018)

Yes - because the 30°/biggest angle has the fastest speed OR the 30°/biggest angle has a faster speed than 10° or 20° OR A ✓	1	3.2a	Judgement must be linked to correct explanation using data IGNORE just bigger angle has faster speed OR A IGNORE just as angle increases the speed increases OR A
OR No - because the 20°/middle angle has the slowest speed OR the 10°/smallest angle does not have the lowest speed OR the 20°/middle angle has a slower speed than the 10° OR A ✓			

Q3.e(2018)

No repeats (have been taken) ✓	3	3.3a	ALLOW idea that no averages have been calculated
Take more readings (for each angle) ✓		3.3b	
Calculate average ✓		3.3b	
OR			
Only three angles (of ramp) have been used ✓		3.3a	ALLOW example(s) of extra angle(s) less than 90°
(Do the experiment with) extra angle(s) ✓		3.3b	
Less than 90° ✓		3.3b	
OR			
It is difficult to measure the time (accurately) ✓		3.3a	ALLOW ideas about human error in timing / reaction time
Use light gates (and data logging equipment) ✓		3.3b	
At start and end of the ramp / to start and stop the timer ✓		3.3b	
OR			
It is difficult to measure the time (accurately) ✓		3.3a	ALLOW ideas about human error in timing /
Make a video of the experiment ✓		3.3b	reaction time
With a stopwatch visible ✓		3.3b	
OR			
Distance is not long enough ✓		3.3a	
Use a longer distance ✓		3.3b	
Measure the time (over the longer distance) ✓		3.3b	

Q4.(2019)

B

Q5.(2019)

B

Q6.(2019)

D

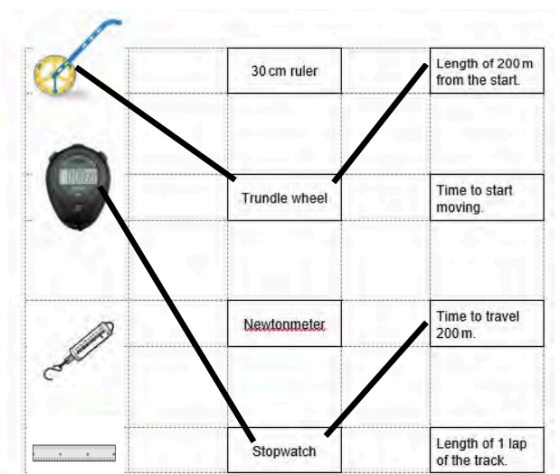
Q7.(2020)

B

Q8.(2020)

B

Q9.a(2020)



3

3 × 1.2

4 lines correct = ✓✓✓✓
3 lines correct = ✓✓✓
2 lines correct = ✓✓

DO NOT ALLOW more than one line to or from a correct picture / name of apparatus / quantity

IGNORE lines from or to newtonmeter / ruler

Q9.b(2020)

Units omitted in try 3 / AW ✓

1

1.2

ALLOW in try 3 not put time in seconds/s / no s / what it/time is measured in
IGNORE mention of decimal places/significant figures

Q9.c(2020)

First result should be to 1 dp / AW ✓

1

1.2

IGNORE mention of significant figures

Q9.d(2020)

(31 + 31.2) = 31.1 (s) ✓

1

1.2

IGNORE inclusion of try 3 (10.1) when calculating mean

Q9.e(2020)

Any one from:

Discard anomaly / repeat time 3 ✓

Repeat the time measurements (until they are similar so results are repeatable) ✓

Use light gates / video camera ✓

Make sure stopwatch zeroed ✓

1

3.3b

ALLOW idea of another person taking measurements / do more sets of readings/times

ALLOW idea of controlled conditions e.g. weather conditions

Q9.f(2020)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 5 (m/s) award 3 marks

3

1.2
2 × 2.1

Rearrange equation: (s =) d / t ✓

(s =) 200 / 40 ✓

(s =) 5 (m/s) ✓

ALLOW words or symbols $v = s / t$

Q10.(2021)

D ✓

Q11.a(2021)

Distance (= 36 + 36 + 18) = 90 m ✓

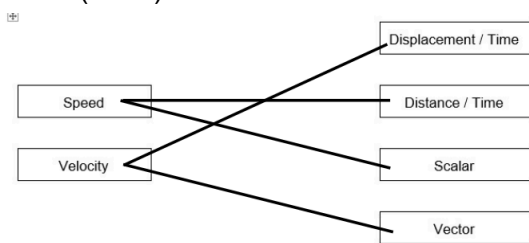
Displacement = 18 m / Displacement = shortest distance between 2 points (in a certain direction) / AW ✓

2

2 × 3.1b

ALLOW one option identified as 90m and the other option as 18m for 1 mark.

Q11.b(2021)



2

2 × 1.1

All 4 correct = ✓✓
Any 2 or 3 correct ✓

DO NOT ALLOW contradictory lines, e.g. lines from speed to vector and scalar

Q11.c(2021)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 2 (m / s²) award 2 marks

2

(Acceleration =) 4(- 0) / 2 ✓
(Acceleration =) 2 (m / s²) ✓

Q11.d(2021)

Constant speed/velocity ✓

1

1.2

ALLOW uniform speed/velocity or steady speed/velocity

Q11.e(2021)

Any diagonal line from the origin with a gradient less steep than the line for student B. ✓

1

2.2

ALLOW curved or straight lines with gradient less than the line for student B.
IGNORE other lines unless contradictory
ALLOW any length of line

Q12.(2022)

A ✓

Q13.a(2022)

100 (m) ✓

Q13.b(2022)

A and D ✓

1	1.1	Both answers needed for 1 mark DO NOT ALLOW any extra boxes ticked ALLOW e.g. circling or underlining of letters but ticks in boxes take precedence
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Q13.c(2022)

Straight line / constant gradient ✓

1	1.1	ALLOW constant slope/incline ALLOW steady for constant IGNORE positive correlation
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Q13.d(2022)

2 (s) ✓

Q13.e(2022)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 5 (m/s) award 3 marks

Speed = distance ÷ time ✓

Speed = 10 ÷ 2 ✓

Speed = 5 (m / s) ✓

3		
1.2	1.2	ALLOW symbol equation
2.1	2.1	ALLOW 2 ÷ 0.4 or 4 ÷ 0.8 or 6 ÷ 1.2 or 8 ÷ 1.6
2.1	2.1	

Q14.(2023)

D

Q15.a(2023)

40 (s) ✓

Q15.b(2023)

70 (s) ✓

1	2.2	ALLOW 68 (s) to 72 (s)
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Q15.c(2023)

First check the answer on answer line
If answer = 0.94 (m / s) award 4 marks

Rearrange: (Speed =) distance ÷ time ✓

(Speed =) 150 ÷ 160 ✓

(Speed =) 0.9375 ✓

(Speed =) 0.94 (m / s) (2sf) ✓

4

1.2

ALLOW equation in words or symbols
ALLOW incorrect values for distance ÷ time for this mark only if it is clear that the equation has been rearranged correctly using these values

2.1

ALLOW (148 to 152) ÷ 160

2.1

ALLOW 0.925 to 0.95

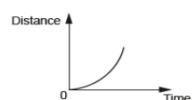
1.2

ALLOW 0.93 or 0.95
ALLOW this mark for evidence of an incorrect answer (correctly rounded) to two significant figures

If no marks scored **ALLOW** 150 and 160 seen for 1 mark

Q15.d(2023)

3rd box ticked ✓



1

1.1

If more than one box ticked = 0 marks

Q15.e(2023)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 0.4 (m / s²) award 2 marks

(Acceleration =) 1.2 ÷ 3 ✓

(Acceleration =) 0.4 (m / s²) ✓

Q15.f(2023)

Normal contact force ✓

1

1.1

If more than one box ticked = 0 marks

Q16.a(2023)

4

2

1

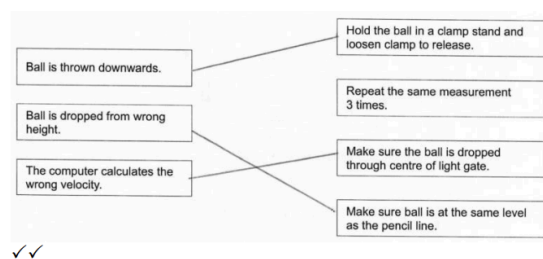
5

3

✓

1

Q16.b(2023)



2

2 × 3.3b

All 3 correct = 2 marks
1 or 2 correct = 1 mark

If **two** lines from **one** source of error and **one** is incorrect = 0 marks for that source of error

Q16.c(2023)

Diameter of ball / width of ball / length of ball ✓

1

3.3a

ALLOW size of ball
IGNORE height of ball / height it was dropped from / distance ball dropped from / distance ball travelled / distance of the ball
DO NOT ALLOW other quantities e.g., acceleration / velocity / speed / time / mass

Q16.d(2023)

First check the answer on answer line
If answer = 9.6 (m / s²) award 3 marks

(Acceleration =) $\frac{(\text{final velocity})^2 - (\text{initial velocity})^2}{2 \times \text{distance}}$

OR

(Acceleration =) $\frac{7.2^2 - 0}{2 \times 2.7}$

OR

(Acceleration =) $\frac{7.2^2}{2 \times 2.7}$ ✓

(Acceleration =) $\frac{51.84}{5.4}$ ✓

(Acceleration =) 9.6 (m / s²) ✓

3

1.2

ALLOW substitution into unrearranged equation e.g., $7.2^2 - 0 = 2 \times a \times 2.7$ or $7.2^2 = 2 \times a \times 2.7$

2 × 2.1

If no other marks awarded **ALLOW** for 1 mark any of the following numbers seen: 51.84 or 51.8 or 5.4

Q17.(2024)

B

Q18.(2024)

B

Q19.(2024)

If only change in velocity or change in resultant force described, then mark capped at L2 and 3 marks.

<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Detailed description of how the velocity of the block changes AND Detailed description of how the resultant force on the block changes</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Clear description of how the velocity of the block changes AND Clear description of how the resultant force on the block changes</p> <p>OR Detailed description of how the velocity of the block changes AND Basic description of how the resultant force on the block changes</p> <p>OR Basic description of how the velocity of the block changes AND Detailed description of how the resultant force on the block changes</p>	<p>6</p>	<p>2 × 2.2 2 × 3.1a 2 × 3.2b</p>	<p>AO2.2 Applies knowledge and understanding of velocity-time graphs</p> <ul style="list-style-type: none"> • Gradient gives acceleration • AB moving at uniform/steady/constant velocity/speed • BC decelerating / constant deceleration / slowing down • CD not moving / stationary / stopped / zero/constant velocity/speed • DE accelerating / constant acceleration / speeding up • Value of deceleration greater than the value of acceleration <p>AO3 Analyses information and ideas to interpret the graph and draw conclusions about forces</p> <ul style="list-style-type: none"> • Between A and B balanced forces • Between B and C unbalanced forces / there is a resultant force • Between C and D balanced forces • Between D and E unbalanced forces / there is a resultant force • Between A and B upward force = downward force / weight = tension / resultant force = 0 • Between B and C upward force < downward force / weight < tension / there is resultant force downwards
<p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Basic description of how the velocity of the block changes OR Basic description of how the resultant force on the block changes</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit.</i></p>			<ul style="list-style-type: none"> • Between C and D upward force = downward force / weight = tension / resultant force = 0 • Between D and E upward force > downward force / weight > tension / there is resultant force upwards

<p>First check the answer on the answer line If answer = 20 (m / s) award 4 marks</p> <p>(Distance =) 300 (m) AND (time =) 15 (s) ✓</p> <p>Rearrange (speed =) distance ÷ time ✓</p> <p>(s =) $300 \div 15$ ✓</p> <p>(s =) 20 (m / s) ✓</p>	4		<p>2.2 IGNORE other values stated unless these values have been used in a calculation ALLOW 15×300 for 1 mark unless other values have been used in a calculation</p> <p>1.2 ALLOW $v = s \div t$ / $(s =) d \div t$ ALLOW 1 mark for multiple readings of $(d \div t)$ from the graph e.g. $200 \div 5$ and $100 \div 10$ ALLOW any distance ÷ any time for 1 mark</p> <p>2.1 DO NOT ALLOW this mark if calculations with other values are seen</p> <p>2.1 DO NOT ALLOW this mark, unless written on the answer line, if calculations with other values are seen.</p>
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