

Physics on the Move

Q1.(2018)

B ✓

Q2.(2018)

Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.

Level 3 (5–6 marks)

Describes in detail the different ways the cars come to a stop using ideas about thinking and braking.
AND

Draws detailed conclusions from the graph about why the cars take different times to stop.

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 (3–4 marks)

Describes the different ways the cars come to a stop using ideas about thinking and braking.
AND

Draws conclusions from the graph about why the cars take different times to stop.

There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.

Level 1 (1–2 marks)

Describes the different ways the cars come to a stop using ideas about thinking and/or braking.
OR

Draws conclusions from graph about why the cars take different times to stop.

There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.

0 marks

No response or no response worthy of credit.

6

2 x 1.1
2 x 2.1
1 x 3.2a
1 x 3.2b

AO1.1 Demonstrates knowledge and understanding of thinking, braking and stopping distance

- Thinking distance is the time to starting to apply the brakes from the driver seeing the red light
- Braking distance is the distance travelled while the force of brake is applied
- Stopping distance is the total distance the car travels from the driver seeing the red light until the car is stationary
- stopping distance = $bd + td$

AO2.1 Applies knowledge and understanding of thinking, braking and stopping distance in relation to the details in the graph

- deceleration of B > deceleration of A / AW
- because slope of graph B > slope of graph A / slope of graph B steeper / AW
- thinking time for A < thinking time for B / AW
- braking time for A > braking time for B / AW

AO3.2b Analyses information to make judgements and draw detailed conclusions from graph

- reaction time of driver B > driver A / AW
- Driver B may have been drinking / may be ill / may be old / distracted
- braking time for B < braking time for A / AW
- Driver A may be driving in wet / ice / with worn tyres / worn brakes / with a heavier car

Q3.(2019)

D ✓

Q4.(2019)

B ✓

Q5.a(2019)

Protractor ✓ (Metre) ruler / tape measure ✓	2	2 × 3.3a	IGNORE metre stick
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Q5.b(2019)

Any two from: take repeat readings ✓ ensure car starts from same point each time / AW ✓ ensure car travels in straight line / AW ✓ use same car each time / same mass / AW keeping surface the same/AW ✓	2	2 × 3.3b	DO NOT ALLOW take averages ALLOW release in same manner IGNORE use same angle
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Q5.c(2019)

Both points correctly plotted to within ± 1 square ✓ Curve of best fit drawn ✓	2	2 × 2.2	DO NOT ALLOW straight lines/multiple line/breaks in line
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Q5.d(2019)

As angle increases, stopping distance increases ✓ Line becomes more curved/ gradient decreases / increase rapid at first / increase slows at higher angles / AW ✓	2	2 × 3.1a	ALLOW positive correlation
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Q5.e(2019)

35 / 36 / 37(cm) ✓	1	2.2	ALLOW any reasonable value taken from an interpolation of the candidate's line.
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Q5.f(2019)

Largest range of distances / biggest difference between the 2 distances / AW ✓	1	3.1b	ALLOW 'values not very close compared to others'
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Q5.g(2019)

Thermal ✓ Kinetic ✓	2	2 × 2.1	DO NOT ALLOW Heat Answers must be in the correct order
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Q6.(2020)

C

Q7.(2020)

A

Q8.(2020)

D

Q9.(2020)

B

Q10.(2021)

A

Q11.(2021)

C

Q12.a(2021)

Distance taken to stop after the driver presses the brakes
/ AW ✓

Q12.b(2021)

12 (m)

Q12.c(2021)

(Idea of) Energy is transferred / moved between stores /
AW✓

(Idea of) Energy before = Energy after / No energy is
"lost" / AW ✓

1
1

2 × 2.1

ALLOW the energy transferred from the kinetic
(store) to the thermal (store) AW ✓

ALLOW the energy transferred from the kinetic
store to the thermal store is equal / AW ✓✓

Q13.(2021)

Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.

Level 3 (5–6 marks)

Describes a detailed method **AND** explains how the method works. Suggests a way to produce accurate and precise results.

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 (3–4 marks)

Describes a method **AND either** explains how the method works **OR** suggests a way to produce accurate and precise results.

There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.

Level 1 (1–2 marks)

Describes a basic method to determine reaction time **OR** explains how the method works **OR** gives a way to produce accurate or reliable results.

There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.

0 marks

No response or no response worthy of credit.

6

2 × 1.2
3 × 3.3a
1 × 3.3b

AO1.2: Demonstrate knowledge and understanding of how to measure reaction time:

- Idea that reaction time is how long it takes a person to react to a stimulus / AW
- Idea that the mark on the ruler / point where ruler caught estimates reaction time

AO3a: Analyses information to develop a method to determine reaction time:

- 1st person holds the ruler between fingers
- 2nd person drops the ruler
- 1st person catches it between fingers
- Distance from bottom of ruler to fingers measured

AO3b: Analyse information to produce accurate and precise results:

- Students used repeat readings
- Students should calculate a mean
- Students dropped ruler without any warning
- Students varied the time before dropping the ruler
- Students made sure ruler was vertical / correct way up each time
- Actual results are precise as they are close together / tightly clustered / AW
- Student starts with hand at 0 cm

Q14.(2022)

A ✓

Q15.(2022)

A ✓

Q16.a(2022)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 14 (m) award 3 marks

84000 = 6000 × distance ✓

(Distance =) 84000 / 6000 ✓

(Distance =) 14 (m) ✓

3

1.2

2.1

2.1

ALLOW Correct rearrangement of word equation for 1 mark
Distance = work done/force

Q16.b(2022)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 0.75 (no units) award 2 marks

(Efficiency =) $6000 / 8000$ ✓

(Efficiency =) 0.75 ✓

2

2 × 2.1

IGNORE units
ALLOW 75% for 2 marks

Q17.(2023)

D

Q18.a(2023)

(Constant) deceleration ✓

1

1.1

ALLOW slowing down/velocity decreasing/
negative acceleration
DO NOT ALLOW decelerate at constant speed

Q18.b(2023)

Thinking distance ✓

1

2.2

3rd tick box

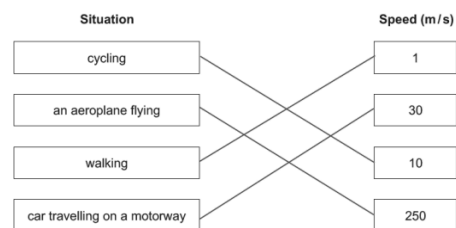
Q18.c(2023)

First check the answer on answer line
If answer = 12 (m) award 2 marks

(distance =) 20×0.6 ✓

(distance =) 12 (m) ✓

Q19.(2023)



2

2 × 1.1

4 lines correct = 2 marks
2/3 lines correct = 1 mark

Q20.a(2023)

2.82 (m / s²) ✓

Q20.b(2023)

First check the answer on answer line
If answer = 2.38 (m / s²) award 2 marks

2

2 × 3.1a

Extrapolation of graph to 1400kg between 2.3 and 2.44 ✓

2.38 (m / s²) ✓

ALLOW range 2.36 to 2.42

Q21.(2023)

First check the answer on answer line
If answer = 3500 (N) award 2 marks

2

Force = work done ÷ distance

OR

(Force =) 140 000 ÷ 40 ✓

(Force =) 3500 (N) ✓

1.2

ALLOW 140000 = Force x 40 For 1 mark

2.1

Q22.(2024)

C

Q23.(2024)

B

Q24.(2024)

B