AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.5.4.2.1

Newton's First Law

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**3**
Available paper years	**2018–2024**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

6.5.4.2.1 Newton's First Law

Answer 01 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	its acceleration would decrease to zero the resultant force on it would decrease to zero		1 1	AO3 6.5.4.2.2
07.2	any **one** from: • move the second light gate closer to the first • shorten the string length	allow use a taller table	1	AO3 6.5.4.2.2
07.3		each mistake and its correction may be given in any order		AO3 6.5.4.2.2
	1.26667 (m/s^2) (is wrong)	allow (mean value calculated at) 0.20 (N)	1	
	give value to 2 significant figures	allow give value to 1 decimal place allow 1.3 (m/s^2)	1	
	6.7 (m/s^2) (is wrong)	allow (mean value calculated at) 0.98 (N) allow test 2 for 0.98 (N) or 7.2 is an anomaly	1	
	discard the anomalous result and recalculate the mean	allow repeat the anomalous test result and re-calculate the mean allow 6.4 (m/s^2)	1	
07.4	(resultant) force is directly proportional to acceleration	allow the larger the (resultant) force, the greater the acceleration allow positive correlation between (resultant) force and acceleration allow mass / weight (of the holder) for (resultant) force	1	AO3 6.5.4.2.2

6.5.4.2.1 Newton's First Law

Answer 01 · Mark scheme

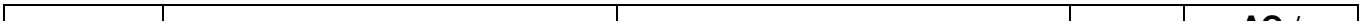
June 2018 | 8464/P/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5	all points correctly plotted within ½ small square curved line of best fit	allow **1** mark for 3 or 4 points correctly plotted	2 1	AO2 6.5.4.2.2
07.6	inversely proportional	allow as mass increases, acceleration decreases	1	AO3 6.5.4.2.2
Total			**12**	

6.5.4.2.1 Newton's First Law

Answer 01 · Mark scheme

June 2018 | 8464/P/2F | Original Q7



6.5.4.2.1 Newton's First Law

Answer 02 · Mark scheme

June 2019 | 8464/P/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
04.1	(thinking distance) will double any correct pair of points from graph eg (200,6) and (400,12)	 allow graph shows direct proportionality (after 200 ms) allow **1** mark for thinking distance increases with supporting data.	1 1	AO3 6.5.4.3.2	E
04.2	(most) people cannot react any quicker than 200 ms		1	AO1 6.5.4.3.2	E
04.3	there is variation in the measurements	allow the data is not very precise allow lots of random error ignore references to accuracy / reliability / average	1	AO3 6.5.4.3.2	E
04.4	(258+265+302+248+327) / 5 280 (ms)	an answer of 280 gains **2** marks	1 1	AO2 6.5.4.3.2	E
04.5	8.4 (m)	allow 7.9 (m) to 8.9 (m) allow ecf from **04.4**	1	AO2 6.5.4.3.2	E
04.6	any **two** from: • (material of) road surface • condition of the tyres • speed of the car • wet / icy road surface • gradient of road • mass / weight of the car	 Ignore any reference to brakes	2	AO1 6.5.4.3.3	
04.7	work done = force × distance (along the line of action of the force)	allow W = F s allow any correct re-arrangement	1	AO1 6.5.2	

6.5.4.2.1 Newton's First Law

Answer 02 · Mark scheme

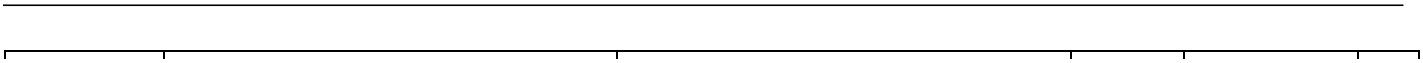
June 2019 | 8464/P/2F | Original Q4

04.8	F = 6000 N W = 6000 × 75 W = 450 000 (J)	an answer of 450 000 scores 3 marks allow a correct substitution using an incorrectly / not converted value of F allow a correct calculation using an incorrectly / not converted value of F	1 1 1	AO2 6.5.2	
Total			**13**		

6.5.4.2.1 Newton's First Law

Answer 02 · Mark scheme

June 2019 | 8464/P/2F | Original Q4



6.5.4.2.1 Newton's First Law

Answer 03 · Mark scheme

June 2024 | 8464/P/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	gravitational force		1	AO1 6.5.4.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	air resistance		1	AO1 6.5.4.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	450 (N)		1	AO2 6.5.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	0 N		1	AO1 6.5.4.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	terminal velocity		1	AO1 6.5.4.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	20 (s)	allow an answer in the range 18 to 21 (s)	1	AO2 6.5.4.1.5

6.5.4.2.1 Newton's First Law

Answer 03 · Mark scheme

June 2024 | 8464/P/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	46 (m/s)		1	AO2 6.5.4.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	$s = 3.6 \times 25$ 90 (m)		1 1	AO2 6.5.4.1.2

Total Question 1	**9**

6.5.4.2.1 Newton's First Law

Answer 03 · Examiner comments

June 2024 | 8464/P/2F | Original Q1

Question 1 (low demand)

01.1 This was a very accessible opening question with over 95% of students correctly selecting gravitational force as the force that causes the skydiver to accelerate.

01.2 This was more demanding but still nearly 90% of students correctly selected air resistance.

01.3 Half of students determined the resultant force acting on the skydiver correctly. The majority of students that do so just multiplied the two numbers together rather than subtracting them.

01.4 This question was not as well answered with approximately 40% of students knowing that the resultant force at constant velocity was zero. The most popular incorrect answer was 600 N.

01.5 Approximately 50% of students knew that the constant velocity reached by the skydiver is called terminal velocity. The most common incorrect answer was average velocity.

01.6 Students found reading the time off the graph quite challenging. Because it is difficult to judge when the line becomes horizontal, a wide range of values was allowed. This meant that even though most did not write 20 seconds, 40% of students did get the mark.

01.7 Approximately 40% of students correctly gave the constant velocity as 46 m/s. As there was no tolerance on this question, the common incorrect answer of 45 did not get the mark.

01.8 This simple calculation was very well answered. Over 90% of students correctly substituted into the equation and the vast majority went on to calculate the distance correctly. A small number of students did not get the second mark as they either did not have a calculator, or their calculator displayed the answer as a fraction.