AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.5.1.1

Scalar and vector quantities

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**4**
Available paper years	**2018–2025**

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.

6.5.1.1 Scalar and vector quantities

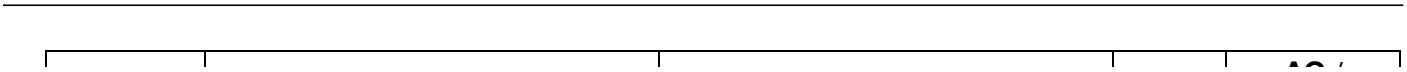
Answer 01 · Mark scheme June 2018 | 8464/P/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	distance		1	AO1 6.5.1.1
01.2	BC		1	AO3 6.5.4.1.5
01.3	DE		1	AO3 6.5.4.1.5
01.4	5.0 (s)	allow 5 (s)	1	AO2 6.5.4.1.5
01.5	6.0 (m/s)	allow 6 (m/s)	1	AO2 6.5.4.1.5
01.6	6.0 / 5.0 = 1.2 (m/s^2)	an answer of 1.2 scores **2** marks allow ecf from questions **01.4** and **01.5**	1 1	AO2 6.5.4.1.5
01.7	about four times faster		1	AO2 6.5.4.1.2
Total			**8**	

6.5.1.1 Scalar and vector quantities

Answer 01 · Mark scheme

June 2018 | 8464/P/2F | Original Q1



6.5.1.1 Scalar and vector quantities

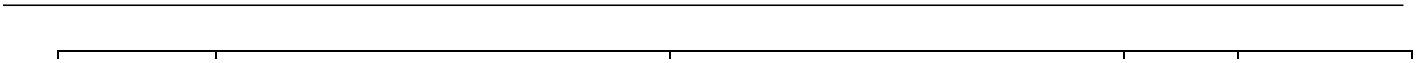
Answer 02 · Mark scheme November 2020 | 8464/P/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	vectors have magnitude and direction		1	AO1 6.5.4.1.3
01.2	there is a resultant force acting on the ball		1	AO1 6.5.4.2.1
01.3	length of lane = 4.5 × 4.0 length of lane = 18 (m)		1 1	AO2 6.5.4.1.3
01.4	arrow in opposite direction arrow same length drawn from the ball		1 1	AO1 6.5.4.2.3
01.5	$a = \frac{12 - 0}{0.15}$ $a = 80\ (m/s^2)$		1 1	AO2 6.5.4.1.3
01.6	increases stays the same increases		1 1 1	AO2 6.1.1.2 6.5.4.1.3
Total			**11**	

6.5.1.1 Scalar and vector quantities

Answer 02 · Mark scheme

November 2020 | 8464/P/2F | Original Q1



6.5.1.1 Scalar and vector quantities

Answer 03 · Mark scheme November 2021 | 8464/P/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	a quantity with both magnitude and direction		1	AO1 6.5.1.1
07.2	displacement		1	AO1 6.5.4.1.1
07.3	gradient = $\frac{(4-0)}{(1.6-0)}$ acceleration = 2.5 m/s^2	 allow use of a = Δv / t	1 1	AO2 6.5.4.1.5
07.4	constant deceleration	allow large deceleration allow decelerates to a stop	1	AO2 6.5.4.1.5
07.5	resultant force = mass × acceleration **or** F = ma	allow force = mass × acceleration	1	AO1 6.5.4.2.2
07.6	1800 = m × 25 m = $\frac{1800}{25}$ m = 72 (kg)		1 1 1	AO2 6.5.4.2.2
07.7	performance can be monitored during the game	allow do not have to wait until the end of the game to download data	1	AO3 6.6.2.4
Total			**10**	

6.5.1.1 Scalar and vector quantities

Answer 04 · Mark scheme

June 2025 | 8464/P/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	distance travelled = 3.0 × 20	both marks may be awarded if a length in the range 2.9 to 3.1 cm is used	1	AO3 6.5.4.1.1
	distance travelled = 60 (m)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	weight = 15 × 9.8		1	AO2 6.5.1.3
	weight = 147 (N)	allow weight = 150 (N)	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	the line has a constant gradient	allow the line is straight do **not** accept directly proportional	1	AO2 6.5.4.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	distance travelled = $\frac{4500}{250}$		1	AO2 6.5.2
	distance travelled = 18 (m)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	total distance travelled is greater than the displacement		1	AO1 6.5.4.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	distance has magnitude only		1	AO1 6.5.1.1 6.5.4.1.1

6.5.1.1 Scalar and vector quantities

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	total distance = 158 (km)	allow **1** mark for 56, 40 and 62 read from graph allow **1** mark for a total distance calculated using two correct values and one incorrect value from the bar chart	2	AO3 6.5.4.1.4

Total Question 3	**11**

6.5.1.1 Scalar and vector quantities

Answer 03 · Examiner comments

November 2021 | 8464/P/2F | Original Q7

Question 7 (standard demand)

07.1 75% of students knew that a vector was a quantity with both magnitude and direction.

07.2 30% of students knew that displacement was the vector.

07.3 Approximately 10% of students were able to determine the acceleration from the graph.

07.4 Nearly 20% of students were able to describe the motion of the player. Of those that were unable to and scored no marks, most gave answers such as ‘the motion decreased’.

07.5 Just under 50% of students correctly recalled the equation.

07.6 This standard demand calculation was reasonably well answered. Nearly 75% were able to substitute into the correctly rearranged equation, and the vast majority of those went on to correctly evaluate the answer and score full marks.

07.7 Nearly 20% of students wrote a reasonable suggestion that the data could be analysed during the game. Many of the incorrect answers suggested that the data could be analysed after the game.

6.5.1.1 Scalar and vector quantities

Answer 03 · Examiner comments

November 2021 | 8464/P/2F | Original Q7

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

6.5.1.1 Scalar and vector quantities

Answer 04 · Examiner comments June 2025 | 8464/P/2F | Original Q3

Question 3 (Low demand)

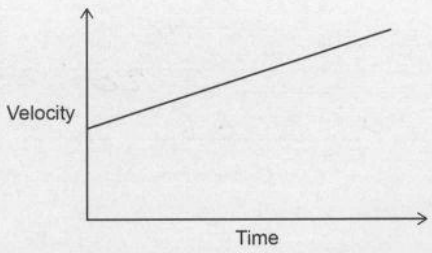
03.1 Almost two thirds of students were able to interpret the scale on the diagram and arrive at a correct answer.
Some students calculated the correct distance but then contradicted this by multiplying their answer by 20, which prevented them from scoring any marks.

03.2 The majority of students answered this calculation correctly. A small proportion of students decided that the unit for mass should be grams and ended up with an answer that was too large by a factor of a thousand, so were unable to gain one of the marks.

03.3 Only about 4 in 10 students were able to state that gradient was constant or that the line was straight, to gain the mark. Some students struggled to express the idea of a constant gradient, giving answers such as 'the line is straight and moves at a constant speed', or just giving a description of acceleration instead of referring to the graph.

0 3 . 3 **Figure 6** shows a velocity–time graph for a downhill part of the journey.

Figure 6



The gradient of the graph represents acceleration.

How does **Figure 6** show that the acceleration was constant?

[1 mark]

A straight line with a constant velocity

A proportion of incorrect answers were contradictory, by stating that the straight line had a constant velocity or a constant speed.

03.4 About 90% of students correctly calculated the distance travelled.

03.5 Nearly two thirds of students were able to identify how distance compared with displacement for the cyclist.

03.6 Only about a third of students selected the correct reason for distance being a scalar quantity.

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6.5.1.1 Scalar and vector quantities

Answer 04 · Examiner comments June 2025 | 8464/P/2F | Original Q3

3.7 About three quarters of students correctly determined the total distance travelled by the cyclist. Incorrect answers were often caused by misinterpreting the scale on the graph and reading, for example, 53 km instead of 56 km for the distance travelled on the Monday.