AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.5.4.1.1

Distance and displacement

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2021–2021**

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.

6.5.4.1.1 Distance and displacement

Answer 01 · Mark scheme

November 2021 | 8464/P/1H | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	zero error	allow systematic error	1	AO1 6.3.1.1 RPA17
04.2	reset the balance to zero g	allow subtract the reading shown on the balance from the reading taken	1	AO1 6.3.1.1 RPA17
04.3	resolution	this answer only	1	AO1 6.3.1.1 RPA17
04.4	place the measuring cylinder on a horizontal surface view with eye in line with the level of the water	 allow read from the bottom of the meniscus	1 1	AO1 6.3.1.1 RPA17
04.5	add several coins to the measuring cylinder measure the change in the water level in the measuring cylinder divide by the number of coins added	allow a minimum of 5 coins if a number of coins is given	1 1 1	AO3 AO1 AO3 6.3.1.1 RPA17

6.5.4.1.1 Distance and displacement

Answer 01 · Mark scheme

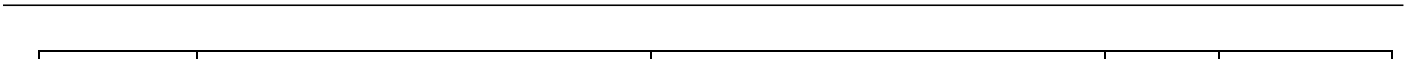
November 2021 | 8464/P/1H | Original Q4

04.6	$8.9 = \frac{3.6}{\text{area} \times 0.16}$	allow $8.9 = \frac{3.6}{\text{volume}}$	1	AO3
	$\text{area} = \frac{3.6}{8.9 \times 0.16}$	allow area = 2.5(28…) (cm^2)	1	AO3
	$\text{density} = \frac{3.6}{2.528 \times 0.17}$	allow $\frac{3.6}{\text{their calculated area} \times 0.17}$	1	AO3
	density = 8.37… (g/cm^3)	allow a correct calculation using their calculated area	1	AO3
	density = 8.4 g/cm^3	this mark can only be scored for a correct rounding of a value of density calculated using correct equations	1	AO2 6.3.1.1 RPA17
Total			**13**	

6.5.4.1.1 Distance and displacement

Answer 01 · Mark scheme

November 2021 | 8464/P/1H | Original Q4



6.5.4.1.1 Distance and displacement

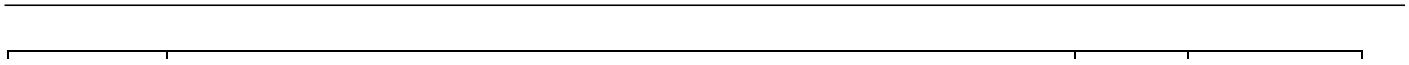
Answer 02 · Mark scheme

November 2021 | 8464/P/2H | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	a quantity with both magnitude and direction		1	AO1 6.5.1.1
02.2	displacement		1	AO1 6.5.4.1.1
02.3	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
02.4	constant deceleration	allow large deceleration allow decelerates to a stop	1	AO2 6.5.4.1.5
02.5	resultant force = mass × acceleration **or** F = ma	allow force = mass × acceleration	1	AO1 6.5.4.2.2
02.6	1800 = m × 25 m = $\frac{1800}{25}$ m = 72 (kg)		1 1 1	AO2 6.5.4.2.2
02.7	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**	

6.5.4.1.1 Distance and displacement

Answer 02 · Mark scheme November 2021 | 8464/P/2H | Original Q2



Answer 01 · Examiner comments November 2021 | 8464/P/1H | Original Q4

Question 04 (Standard/high demand)

04 This question was mainly set in the Required Practical Activity context of measuring density. The question as a whole was not well answered, and perhaps reflects the lack of practical experience for students during the pandemic lockdowns.

04.1 Many students did not name the type of error, but instead described the fact that the balance shouldn't read 4.2 g when there is nothing on top of it. Fewer than 1 in 5 students gained this mark.

04.2 Many students realised that they either needed to reset the balance before placing the cube on it, or subtract 4.2 g from each reading. A significant minority of students incorrectly suggested that a reading would only be correct if converted into kilograms.

04.3 The most common incorrect answer was for students to use the column headings in the table, and give the answer "length in mm". Identifying that the difference between the two readings was caused by differing resolutions of the equipment was successfully demonstrated by very few students.

04.4 The most common correct answer to this question was that the measuring cylinder should either be positioned vertically on placed on a level surface, with fewer students identifying that the reading should be taken from eye level. Roughly a fifth of students gained 2 marks, with around 50% gaining 1 mark.

04.5 While the mark scheme expected students to add coins to a partially filled measuring cylinder, a fair proportion of students used a displacement can and collected the overspill in a measuring cylinder. This approach could still gain full marks, but the idea of using multiple coins to find a large volume, and then dividing by the number of coins used, was rarely given in students answers. About 45% failed to score any marks on this question, and over a quarter of all students did not attempt to answer the question at all.

04.6 Some students attempted to find the cross sectional area of the disc used to make the old penny, but made mistakes in this part of the calculation. However, these students could still go on to gain up to 3 marks. Some students rounded their cross sectional area to 2.5 cm^2 and used this value to calculate a density of 8.5 g/cm^3 which gained them full marks. There was confusion amongst some students about 2 significant figures, with a small proportion of students instead giving their answer to 2 decimal places. Almost 1 in 10 students gained full marks, with nearly 20% gaining at least 3 marks. Many students, however, failed to make any headway with this high demand question, with around two thirds gaining no marks.

6.5.4.1.1 Distance and displacement

Answer 02 · Examiner comments November 2021 | 8464/P/2H | Original Q2

Question 2 (standard demand)

02.1 85% of students knew that a vector was a quantity with both magnitude and direction.

02.2 50% of students knew that displacement was the vector.

02.3 Approximately 40% of students were able to determine the acceleration from the graph.

02.4 Just over 35% of students were able to describe the motion of the player. Of those that were unable to and scored no marks, most wrote answers such as ‘the motion decreased’.

02.5 Just under 80% of students correctly recalled the equation.

02.6 This standard demand calculation was very well answered. Over 85% 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.

02.7 Nearly 25% 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.