AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.5.2

Atmospheric pressure

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**7**
Available paper years	**2006–2025**

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.

4.5.5.2 Atmospheric pressure

Answer 01 · Mark scheme

November 2006 | PHY1B | Original Q9 | Legacy

Nine	**3**	**3**	**3**	**1**

4.5.5.2 Atmospheric pressure

Answer 01 · Mark scheme

PHY1B (Radiation and the Universe) Higher Tier

Question	Key		
One	**A**	bar	**3**
	B	categoric	**1**
	C	dependent	**2**
	D	reliable	**4**
Two	**A**	current	**3**
	B	energy	**2**
	C	frequency	**4**
	D	substance	**1**

	A	B	C	D
Three	**3**	**2**	**3**	**3**
Four	**3**	**3**	**3**	**1**
Five	**3**	**2**	**4**	**4**
Six	**4**	**4**	**1**	**1**
Seven	**2**	**1**	**2**	**2**
Eight	**4**	**4**	**4**	**2**
Nine	**2**	**2**	**2**	**2**

4.5.5.2 Atmospheric pressure

Answer 02 · Mark scheme

March 2007 | PHY1B | Original Q9 | Legacy

Nine	**4**	**4**	**3**	**3**

4.5.5.2 Atmospheric pressure

Answer 02 · Mark scheme

March 2007 | PHY1B | Original Q9 | Legacy

PHY1B (Radiation and the Universe) Higher Tier

Question	Key		
One	**A**	conclusion	**3**
	B	confidentiality	**4**
	C	control	**1**
	D	evidence	**2**
Two	**A**	gamma rays	**3**
	B	microwaves	**2**
	C	ultraviolet rays	**1**
	D	X-rays	**4**

	A	B	C	D
Three	**2**	**4**	**1**	**4**
Four	**4**	**4**	**3**	**3**
Five	**1**	**4**	**1**	**4**
Six	**3**	**4**	**4**	**2**
Seven	**2**	**4**	**3**	**4**
Eight	**4**	**1**	**1**	**1**
Nine	**2**	**1**	**3**	**3**

4.5.5.2 Atmospheric pressure

Answer 03 · Mark scheme June 2008 | PHY3H | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
(a)(i)	the higher the altitude the longer the period	**or** the converse **or** there is a positive correlation do **not** credit any reference to 'direct proportion' ignore references to speed / size of orbit allow the higher the altitude the longer it takes to orbit do **not** credit if ambiguity between distance and time	1
(a)(ii)	responses must refer to the (quality) of the data rather than comments on satellites any **two** from: • only four pairs (of results / data / evidence) • the data is (all) for low or high altitudes (with nothing in the middle) • conclusion only valid in the range (shown, of 300 ↔ 36 000 or 1.5 ↔24) • the Internet is not always a reliable source	**or** 'not enough / insufficient data	2
(b)	there is a **centripetal** force the force (for this) is provided by gravity / gravitational attraction between the Moon and the Earth	accept force towards centre / Earth **or** 'the Moon is accelerating towards the (centre of) Earth' accept 'caused by gravity'	1 1

Question 2 continues on the next page

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PHY3H

Question 2 continued

question	answers	extra information	mark
(c)	there is <u>empty</u> space / a vacuum	**or** no medium / particles / air / gas (to carry the sound / vibrations) do **not** accept any named gas **or** sound(s) do not travel through a vacuum	1
(d)	the response may be in agreement or disagreement or may support a 'balanced' argument **either** any general point with appropriate amplification for **2** marks **or** two general points **1** mark each	 eg costs a lot (1) the money could be spent on …(1) eg we may find new resources (1) eg we may contact aliens (1)	2
total			8

4.5.5.2 Atmospheric pressure

Answer 03 · Mark scheme June 2008 | PHY3H | Original Q2 | Legacy

PHY3H

Answer 04 · Mark scheme March 2009 | PHY1BP | Original Q8 | Legacy

Eight	**1**	**4**	**2**	**2**

Answer 05 · Mark scheme November 2009 | PHY1BP | Original Q9 | Legacy

Nine	**3**	**2**	**4**	**3**

4.5.5.2 Atmospheric pressure

Answer 06 · Mark scheme

June 2023 | 8463/2H | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	7.1 (cm) 497 (m)	allow 7.0 to 7.3 (cm) allow 70 × their incorrect measurement of displacement	1 1	AO2 4.5.6.1.1

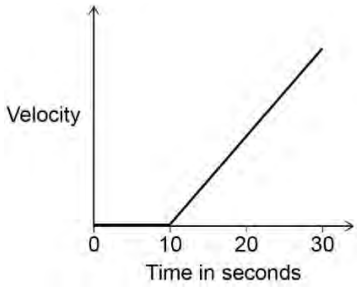
Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	0 (N)		1	AO2 4.5.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	constant velocity	allow constant speed (in a straight line) do **not** accept stationary allow constant acceleration if a **mathematical error** in 02.2 gives a non-zero value for resultant force	1	AO1 4.5.6.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	any **one** from: • tension • normal contact (force) • upthrust	allow lift, thrust and water resistance allow normal reaction (force) ignore drag	1	AO1 4.5.1.2

4.5.5.2 Atmospheric pressure

Answer 06 · Mark scheme

Question	Answers		Mark	AO / Spec. Ref.
02.5	horizontal line drawn to 10s along the *x*-axis		1	AO3 4.5.6.1.4
	line with a positive gradient starting from 10 s	allow an upward curving line with increasing gradient starting from 10 s  	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	line of best fit drawn and extrapolated to 10 km	do **not** accept a straight line	1	AO2 4.5.5.2
	28 (kPa)	allow 26 to 32 (kPa) allow a value correctly extrapolated from their line allow 2 marks for a correct mathematically extrapolated value	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	the average density of the air above the aeroplane decreases		1	AO3 4.5.5.2

Total Question 2	10

4.5.5.2 Atmospheric pressure

Answer 07 · Mark scheme

June 2025 | 8463/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	single arrow starting from dot, pointing vertically upwards and shorter than weight arrow		1	AO2
	labelled air resistance	allow drag	1	AO1
				4.5.1.4 4.5.6.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	2.5 minutes = 150 s	all subsequent marks may be awarded if time is incorrectly / not converted	1	AO2 4.5.6.1.5
	$0.64 = \frac{v-0}{150}$		1	
	$v = 0.64 \times 150$		1	
	$v = 96$ (m/s)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	(as the skydiver's velocity / speed increased) the air resistance increased	allow drag for air resistance throughout	1	AO1 4.5.6.1.5
	until the air resistance was equal to the weight of the sky diver (and in the opposite direction)		1	
	(so) the resultant force was zero		1	
	(so) the acceleration was zero (so the velocity was constant)		1	

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Answer 07 · Mark scheme

June 2025 | 8463/2H | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	greater weight of air above the skydiver as distance fallen increases and pressure = *F/A* (so pressure increases) **OR** the density of the air surrounding the skydiver increases as the skydiver falls (1) more frequent collisions of air particles with skydiver (so pressure increases) (1)	allow the mass / number of air molecules above the skydiver increases	1 1	AO1 4.5.5.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	triangle / parallelogram drawn with vertical line longer than horizontal line resultant force arrow in correct direction magnitude of resultant force in range 300 N to 320 N angle to vertical of resultant force in range 38 °– 42 °		1 1 1 1	AO2 AO2 AO3 AO3 4.5.1.4

Total Question 5	16

4.5.5.2 Atmospheric pressure

Answer 06 · Examiner comments June 2023 | 8463/2H | Original Q2

02.1

58% of students calculated the displacement correctly. Those who did not gain the mark simply measured the route taken by the aircraft and scaled that distance up, showing that many students do not appreciate the difference between displacement and distance.

02.2

82% of students successfully calculated the resultant force to be zero.

02.3

Having successfully calculated the resultant force to be zero, few students stated that the plane was moving at a constant speed. Many said it was stationary or accelerating, not appreciating the lack of resultant force.

02.4

Students did not appear to understand the concept of a contact force, often quoting gravity as one. In addition, they gave forces already quoted in the question as answers.

02.5

This was successfully done by the majority of students, with 64% correctly linking distance and velocity and drawing correct graphs.

02.6

The minority attempted to draw a smooth curve and extrapolate this to the 10km line. Those who did generally used the graph correctly, with 44% of students gaining both marks. A number of students misread the scale on the graph and quoted incorrect values from their line. It was common to see a straight line, which often allowed the award of 1 mark for a correct reading of the value.

02.7

84% of students knew that as the height of the aeroplane above the ground increased, the average density of the air decreased.

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Answer 07 · Examiner comments June 2025 | 8463/2H | Original Q5

5.1

Students answered this free-body diagram question well with just over 60 % gaining both marks. Some students failed to realise that the air resistance should be represented by a smaller arrow than the one given in the diagram. Some students had drawn the dot again with labels added to their dot. Other arrows were occasionally added stating 'gravity' alongside weight.

5.2

Just over 60% of the students completed this calculation correctly. Most students understood the need to convert minutes into seconds. However, some students took data from elsewhere in the question, instead of using that given in the stem of this question part.

5.3

Students answered this question well. They generally had a good understanding of how the skydiver reached terminal velocity and described that air resistance increased to become

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Answer 07 · Examiner comments June 2025 | 8463/2H | Original Q5

equal to the weight of the skydiver. A lot of the students were also correctly stating that the resultant force was zero.

5.4

There were two ways to explain why the atmospheric pressure changed as the sky diver fell. In both methods many students were awarded only one mark, often by giving both versions of the 1st mark point.
Method 1: Some students described more air above not referring to more weight of air. The second mark point was often missed as many students just stated so pressure increases, without referring to P=F/A.
Method 2: Many students correctly described that the density of the air increases, but the second mark point was often missed as students did not describe more ‘frequent’ collisions with the skydiver.

5.5

Only a small proportion of the students were able to draw a completely correct vector diagram and find the magnitude and direction of the resultant force. Most students were able to draw a triangle/parallelogram with the correct shape and orientation. The resultant force arrow head was often missing and when drawn was sometimes difficult to see. The magnitude was often correctly measured from the diagram or calculated. However, a significant number of the students measured the wrong angle.