AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.5.2

Atmospheric pressure

Past-paper questions

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

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

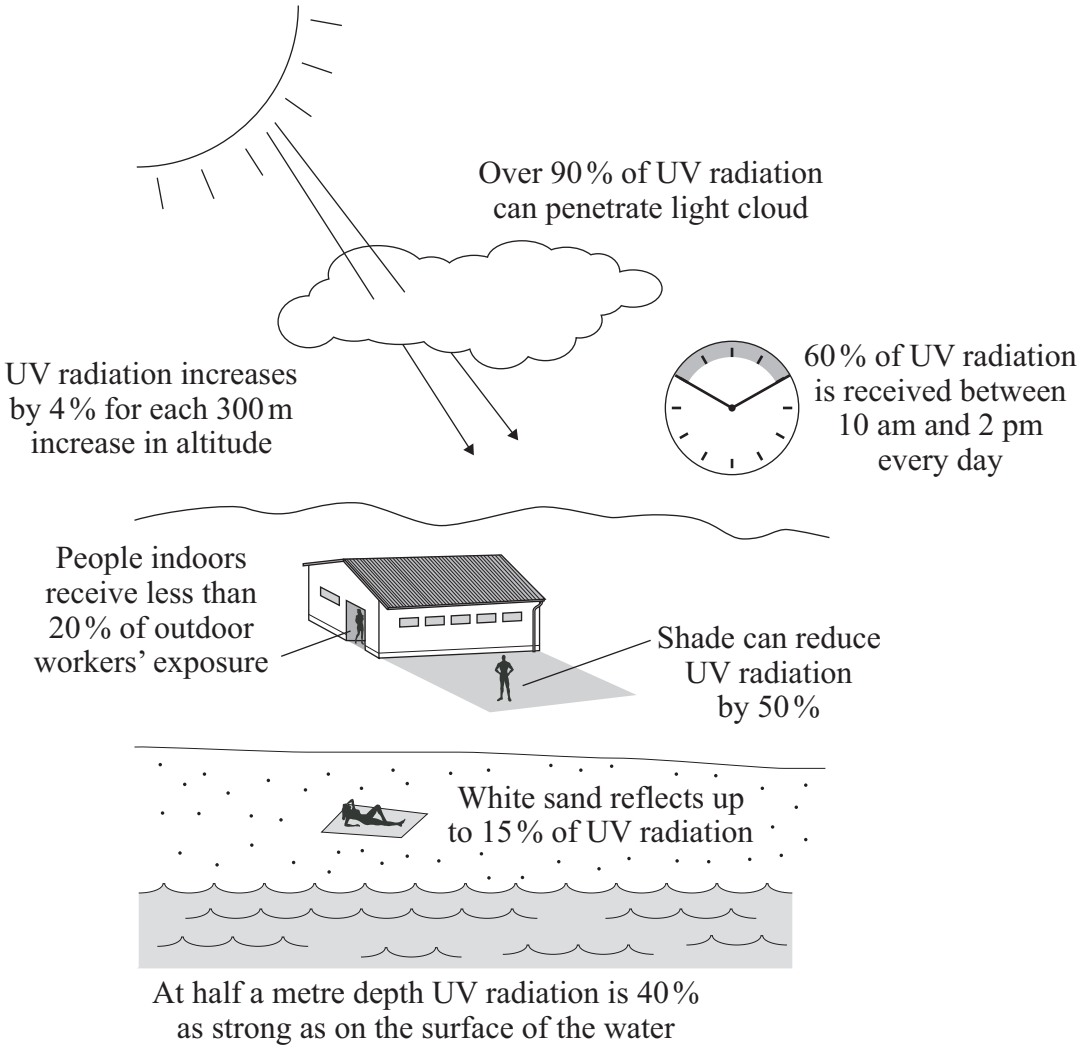
4.5.5.2 Atmospheric pressure

Question 01

November 2006 | PHY1B | Original Q9 | Legacy

QUESTION NINE

The diagram shows data about the reflection and absorption of ultraviolet (UV) radiation from the Sun. Excess exposure to UV radiation causes a variety of medical conditions including skin cancer.



Use information in the diagram to help you to answer the questions.

9A Compared with open fields at sea level, we would expect the UV radiation exposure at an altitude of 900 m to be increased by approximately . . .

1 4 %

2 12 %

3 30 %

4 36 %

4.5.5.2 Atmospheric pressure

Question 01 · continued

9B What valid conclusion can be drawn from the information in the diagram?

1 More outdoor workers than indoor workers will develop skin cancer.

2 Outdoor workers are more likely than indoor workers to develop skin cancer.

3 Twice as many outdoor workers as indoor workers will develop skin cancer.

4 Working in the shade eliminates all risk of skin cancer caused by exposure to UV radiation.

9C Which of the following situations gives the **least** exposure to UV radiation?

1 in the shade between 3 pm and 4 pm on a cloudless day

2 in the shade between 3 pm and 4 pm on a cloudy day

3 on a beach between 1 pm and 2 pm on a cloudless day

4 on a beach between 1 pm and 2 pm on a cloudy day

9D Which one of the following is correct?

1 Outdoor swimming reduces the health risk due to UV radiation exposure equally over all parts of the body.

2 Mountain climbers have an increased risk of skin damage due to UV radiation exposure but to a smaller area of the body than swimmers.

3 There is no UV radiation in daylight on a cloudy day.

4 Working indoors eliminates exposure to UV radiation.

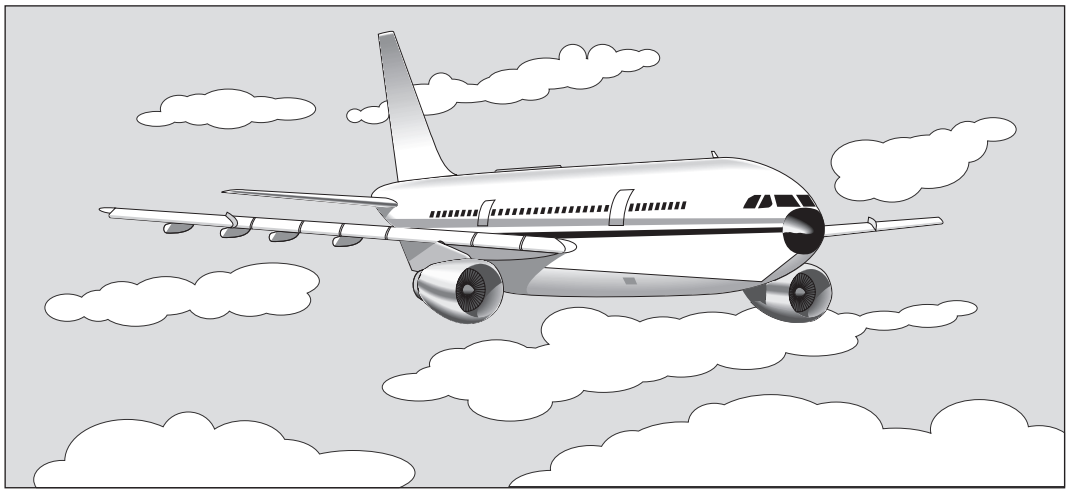
END OF TEST

4.5.5.2 Atmospheric pressure

Question 02

March 2007 | PHY1B | Original Q9 | Legacy

QUESTION NINE



Everyone is exposed to some nuclear radiation.

Aircrews are exposed to extra nuclear radiation because they spend long periods of time at high altitudes. The doses they receive can be measured in millisieverts (mSv).

The average dose of extra nuclear radiation for cabin crew is 2 mSv per year. A pregnant member of crew will be given a flight schedule of work to avoid a dose higher than 1 mSv per year.

Here is a table of doses per flight from London to various destinations.

Destination	Flight time (h)	Dose (mSv)
Kiev	4	0.018
Los Angeles	13	0.069
Madrid	2	0.010
New York	7	0.042
Paris	1	0.004
Rome	3	0.014
Tokyo	14	0.078

Question 02 · continued

9A In order to compare the flight data, it must have been collected under controlled conditions.

Which is the most important factor to control?

1 air temperature

2 altitude

3 wind speed

4 colour of the aircraft

9B The connection, in the given data, between flight time and dose is . . .

1 longer flight, higher dose.

2 longer flight, lower dose.

3 shorter flight, higher dose.

4 that there is no connection.

9C The flight time to Dallas is 10 hours.

The most likely dose of radiation which a member of the air crew receives is . . .

1 0.045 mSv

2 0.050 mSv

3 0.055 mSv

4 0.065 mSv

9D How many times can a pregnant crew member fly **return** from London to Madrid before she has received 1 mSv of radiation?

1 20 times

2 40 times

3 50 times

4 100 times

END OF TEST

4.5.5.2 Atmospheric pressure

Question 03

2 (a) Thousands of artificial satellites are now in orbit around the Earth. A student used the Internet to collect information about four of them.

The table shows the data that the student collected.

Satellite	Altitude (= height above the surface of the Earth) in kilometres	Period of orbit in hours
A	300	1.5
B	850	1.7
C	20 000	12.0
D	36 000	24.0

2 (a) (i) What conclusion, on the relationship between the altitude of a satellite and its period of its orbit, can the student come to from this data?

.....

.....

(1 mark)

2 (a) (ii) Any conclusion from the data in the table may not be valid for all satellites.

Give **two** reasons.

1 .....

.....

2 .....

.....

(2 marks)

2 (b) The Moon is the Earth's only natural satellite.

Explain how the Moon stays in a nearly circular orbit around the Earth.

.....

.....

.....

(2 marks)

Question 2 continues on the next page

4.5.5.2 Atmospheric pressure

Question 03 · continued

for mark

2 (c) Two students see a film in which people on a spaceship hear an explosion on another spaceship.

The students think that this is not possible. What scientific evidence supports their opinion?

.....

.....

(1 mark)

2 (d) Some people say that space should not be explored.

Do you agree with them? Explain your answer.

.....

.....

.....

(2 marks)

8

4.5.5.2 Atmospheric pressure

Question 04

March 2009 | PHY1BP | Original Q8 | Legacy

QUESTION EIGHT

Airline pilots and people who live at high altitude have an increased exposure to radiation from space.

Scientists measured the annual radiation dose received by people who lived at different altitudes. They repeated the experiment two more times and obtained the following results.

	Annual radiation dose in mSv		
Height above sea level in metres	**First time**	**Second time**	**Third time**
1000	2.9	3.0	2.9
2000	4.44	4.54	4.57
3000	5.90	5.78	6.01
4000	7.46	7.49	7.51

1 millisievert (mSv) is a unit of radiation dose

The scientists also investigated the exposure due to air travel. They found that pilots receive a radiation dose of 0.10 mSv for every 100 hours of flight.

8A Which is the least precise set of results?

1 1000 m

2 2000 m

3 3000 m

4 4000 m

8B Airline pilots should not receive an annual radiation dose of more than 6 mSv.

A pilot should restrict his flying hours because an annual exposure to radiation of more than 6 mSv produces . . .

1 a reduced level of long-term concentration.

2 an increased risk of developing visual impairments.

3 reduced levels of oxygen to the brain.

4 an increased risk of damage to body tissues.

4.5.5.2 Atmospheric pressure

Question 04 · continued

8C A pilot who lives in Switzerland at a height of 2000 m should restrict his annual flying hours to about . . .

1 500 hours.

2 1500 hours.

3 2500 hours.

4 6000 hours.

8D A pilot averages 1000 hours of flying a year.

The maximum altitude at which he could safely live is . . .

1 1000 m.

2 2000 m.

3 3000 m.

4 4000 m.

4.5.5.2 Atmospheric pressure

Question 05

November 2009 | PHY1BP | Original Q9 | Legacy

QUESTION NINE

Visible light from space can be gathered and focused by optical telescopes.

9A Optical telescopes used to observe objects in space are limited because they can only be used . . .

1 as ground-based telescopes.

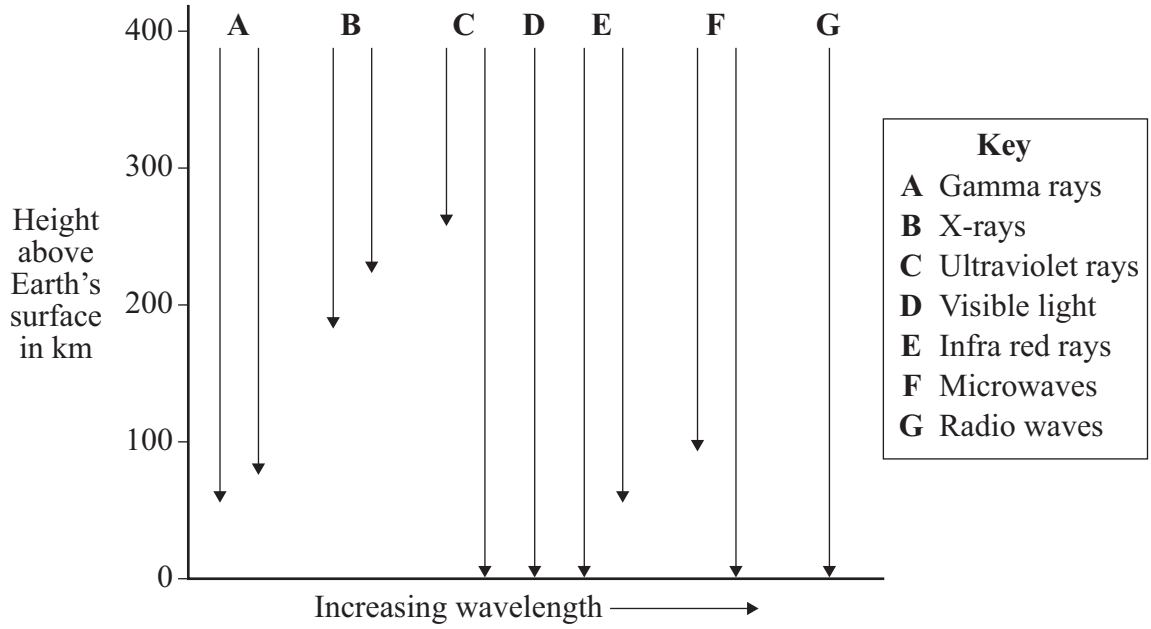
2 at night.

3 to observe a small region of the electromagnetic spectrum.

4 to observe one region of the sky.

The diagram shows how far electromagnetic waves can penetrate the Earth's atmosphere.

Where two arrows are shown for a type of electromagnetic radiation, longer and shorter waves penetrate the atmosphere to different depths.



9B Radio telescopes are sited on the ground.

This is because radio waves . . .

1 are emitted by many stars.

2 can penetrate the atmosphere.

3 have a shorter wavelength than microwaves.

4 have more energy than infra red waves.

4.5.5.2 Atmospheric pressure

9C The types of radiation collected by four telescopes, **M**, **N**, **P** and **Q**, are given in the table.

Telescope	Radiation collected
M	infra red waves
N	gamma rays
P	X-rays
Q	microwaves

Which telescopes could be operated from an aircraft flying at an altitude of 12 km?

1 **M** and **N**

2 **N** and **P**

3 **P** and **Q**

4 **Q** and **M**

9D What is the minimum height above the Earth for a satellite to be able to use telescope **P**?

1 50 km

2 70 km

3 180 km

4 250 km

END OF TEST

4.5.5.2 Atmospheric pressure

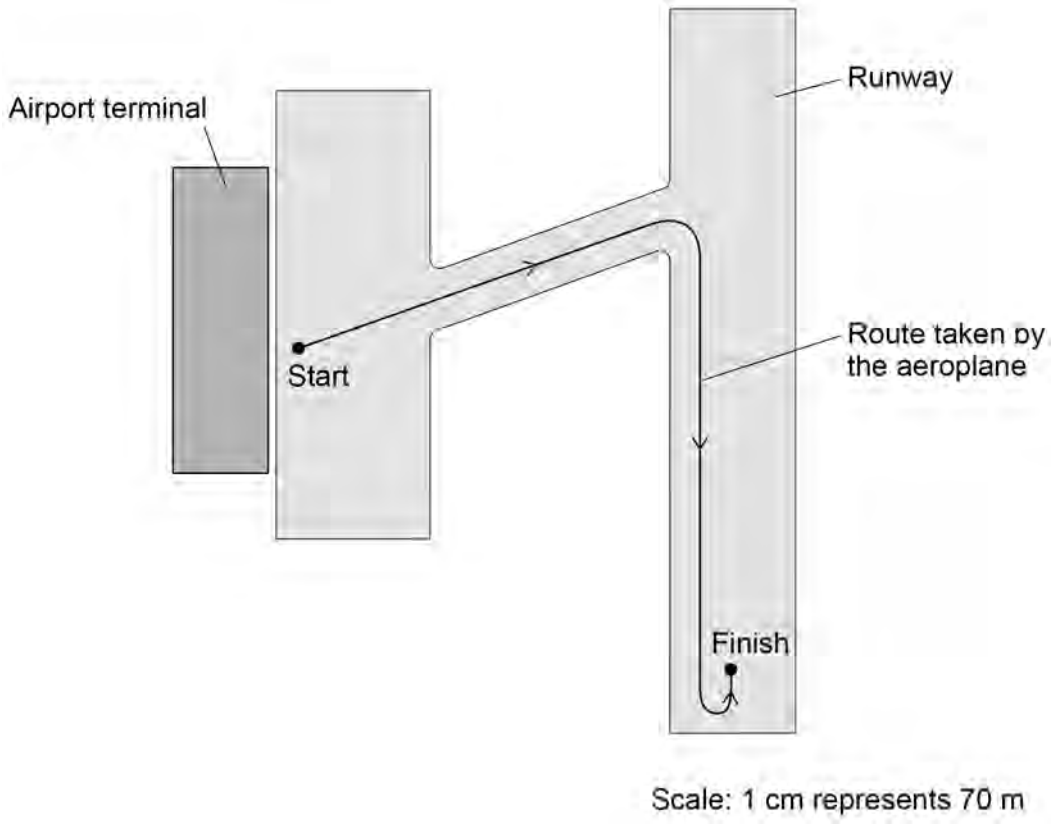
Question 06

June 2023 | 8463/2H | Original Q2

0 2 **Figure 3** shows the route an aeroplane takes as it travels from an airport terminal to the runway.

Figure 3 has been drawn to scale.

Figure 3



0 2 . 1 Determine the magnitude of the aeroplane's displacement from the start point to the finish point on **Figure 3**.

[2 marks]

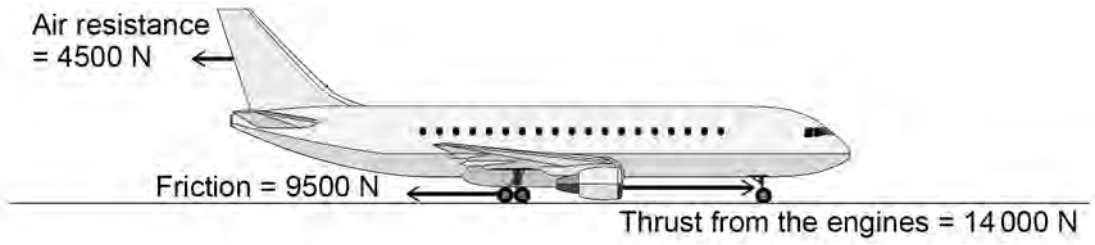
Displacement = _____ m

4.5.5.2 Atmospheric pressure

Question 06 · continued

Figure 4 shows the direction of the horizontal forces acting on the aeroplane as it moves in a straight line towards the runway.

Figure 4



0 2 . 2 Determine the magnitude of the resultant horizontal force on the aeroplane.

[1 mark]

Resultant horizontal force = _____ N

0 2 . 3 Describe the motion of the aeroplane as it moves towards the runway.

[1 mark]

0 2 . 4 Air resistance and friction are contact forces.

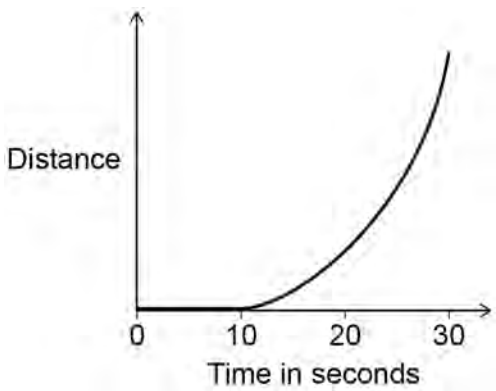
Give **one** other example of a contact force.

[1 mark]

0 2 . 5 The aeroplane stops for a short time and then accelerates along the runway.

Figure 5 shows a distance–time sketch-graph for this stage of the journey.

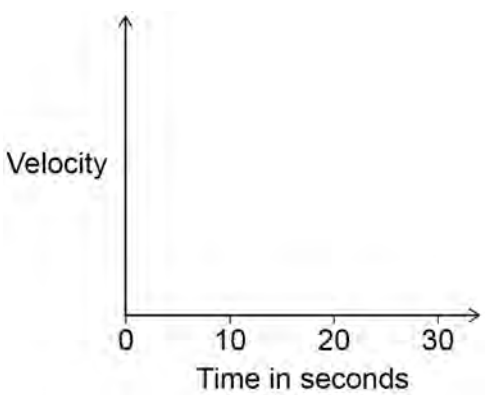
Figure 5



Draw the velocity–time sketch-graph for this stage of the journey on **Figure 6**.

[2 marks]

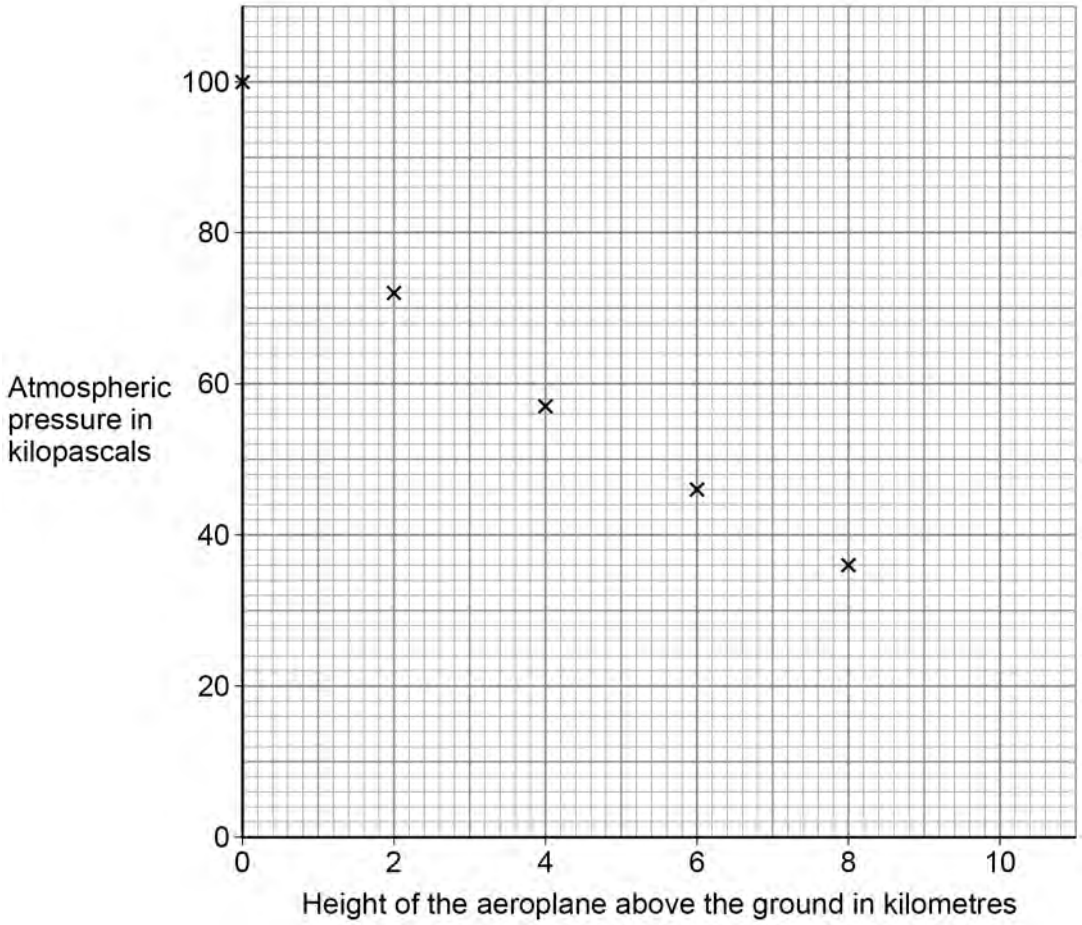
Figure 6



0 2 . 6 The aeroplane takes off from the runway, so its height above the ground increases.

Figure 7 shows how atmospheric pressure varies with the height of the aeroplane above the ground.

Figure 7



Estimate the atmospheric pressure when the height of the aeroplane above the ground is 10 km.

[2 marks]

Atmospheric pressure = _____ kPa

Question 2 continues on the next page

4.5.5.2 Atmospheric pressure

Question 06 · continued

0 2 . 7 What happens to the air surrounding the aeroplane as the height of the aeroplane above the ground increases?

[1 mark]

Tick (✓) **one** box.

- The average density of the air above the aeroplane decreases. ☐
- The mass of air above the aeroplane increases. ☐
- The temperature of the air increases. ☐
- The volume of air below the aeroplane decreases. ☐

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4.5.5.2 Atmospheric pressure

Question 07

June 2025 | 8463/2H | Original Q5

0 5 In a world record attempt, a skydiver jumped from a height of 40 km above the Earth.

0 5 . 1 **Figure 6** shows an incomplete free-body diagram for the skydiver a few seconds after the start of the jump.

Figure 6



The skydiver has not reached terminal velocity.

Complete the free-body diagram in **Figure 6**.

[2 marks]

0 5 . 2 During the first 2.5 minutes the mean acceleration of the skydiver was 0.64 m/s^2.

The initial velocity of the skydiver was 0 m/s.

Calculate the velocity of the skydiver 2.5 minutes after the start of the jump.

Use the Physics Equations Sheet.

[4 marks]

Velocity = _____ m/s

Question 5 continues on the next page

4.5.5.2 Atmospheric pressure

Question 07 · continued

0 5 . 3 The skydiver accelerated until reaching terminal velocity.

Explain why the skydiver reached terminal velocity.

[4 marks]

0 5 . 4 Explain why the atmospheric pressure acting on the skydiver increased as the skydiver fell.

[2 marks]

4.5.5.2 Atmospheric pressure

Question 07 · continued

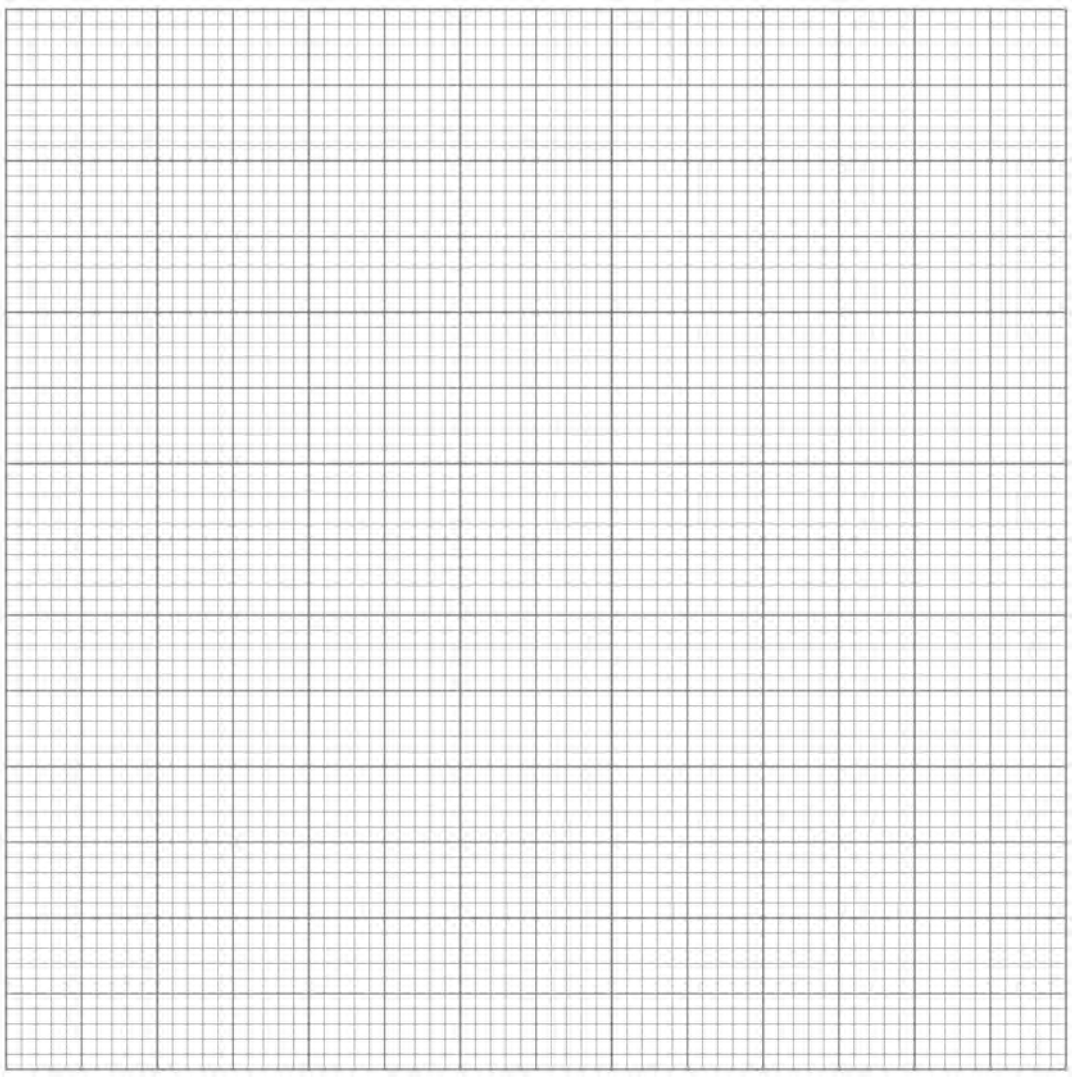
0 5 . 5 The skydiver opened his parachute.

A few seconds after opening the parachute, the resultant vertical force on the skydiver was 240 N upwards.

The wind caused a resultant horizontal force of 200 N to the left on the skydiver.

Draw a vector diagram to determine the resultant force on the skydiver.

[4 marks]



Magnitude of resultant force = _____ N

Angle to vertical of resultant force = _____ degrees

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