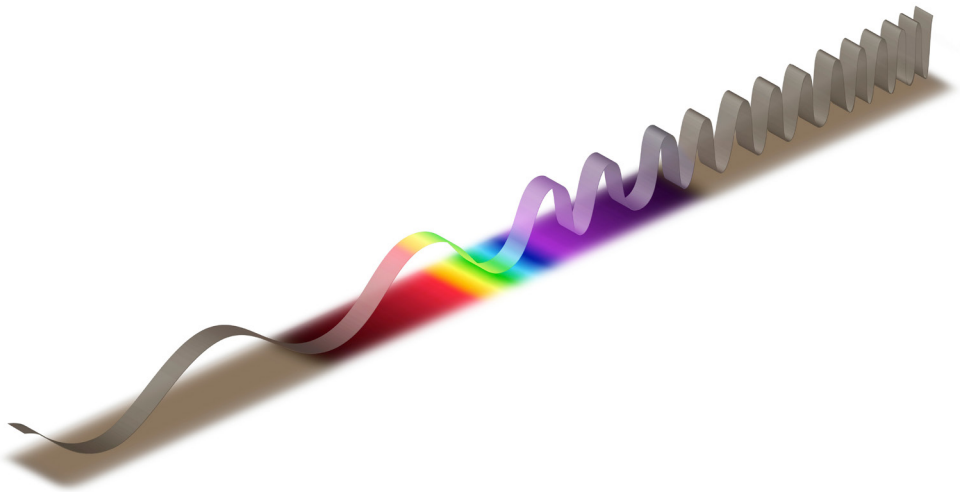
Cambridge Assessment International Education

Space Physics Practice Questions

Cambridge IGCSE™

Physics 0625

To accompany the revised syllabus for examination from 2023.



Version 1

Cambridge Pathway

Contents

Introduction

The purpose of this booklet is to provide additional practice questions and answers for the Space Physics topic which has been introduced into Cambridge IGCSE Physics (0625) for first assessment in 2023.

Practice questions have been provided to exemplify a range of types of questions which could appear in examinations.

The answers and a typical mark scheme are also provided.

Other support materials are available on the School Support Hub
https://schoolsupporthub.cambridgeinternational.org

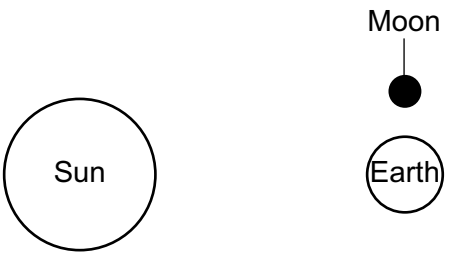
Paper 1 example questions

1 The diagrams represent the positions of the Earth, the Sun and the Moon at different times of the Moon's cycle.

Which diagram represents the position of the Moon when a full Moon is seen from the Earth?

A

B



C

D

NOT TO SCALE

2 Which row correctly describes the nature of Mars and the nature of Saturn?

	Mars	Saturn
A	gaseous	gaseous
B	gaseous	rocky
C	rocky	gaseous
D	rocky	rocky

3 Which type of force keeps the planets in orbit around the Sun?

A electrostatic

B frictional

C gravitational

D magnetic

4 Which distance is the largest?

A the diameter of Neptune's orbit

B the diameter of the Sun

C the distance between the Earth and the Sun

D the distance between the Sun and the next nearest star, Proxima Centauri

Paper 1 example questions mark scheme

Question	Answer	Marks
1	A	**1**
2	C	**1**
3	C	**1**
4	D	**1**

Paper 2 example questions

1 Which statement is correct?

A A light-year is the time it takes for light from the Sun to reach the Earth.

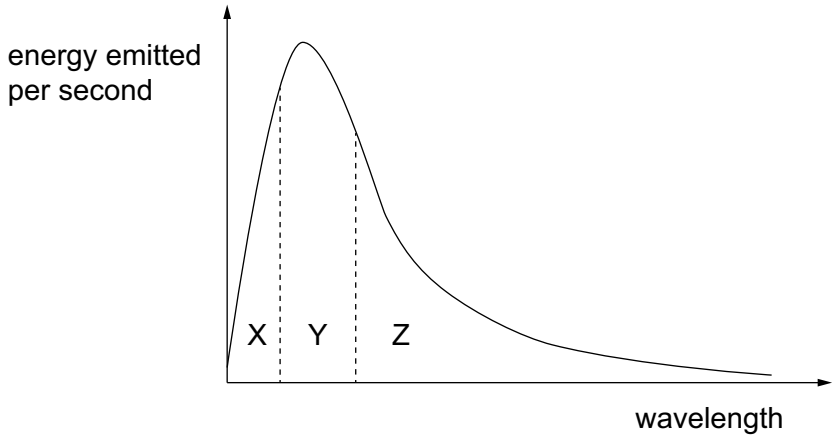
B The planets move around the Sun in circular orbits.

C The Sun consists mostly of helium.

D The Sun contains most of the mass of the Solar System.

2 The Sun emits electromagnetic radiation.

The graph shows the energy emitted per second for a range of different wavelengths.



Which row gives the types of radiation found in each region?

	region X	region Y	region Z
A	infrared	ultraviolet	visible light
B	infrared	visible light	ultraviolet
C	ultraviolet	visible light	infrared
D	visible light	ultraviolet	infrared

3 A distant star explodes as a supernova.

Which statement is **not** correct?

A The exploding supernova forms a planetary nebula.

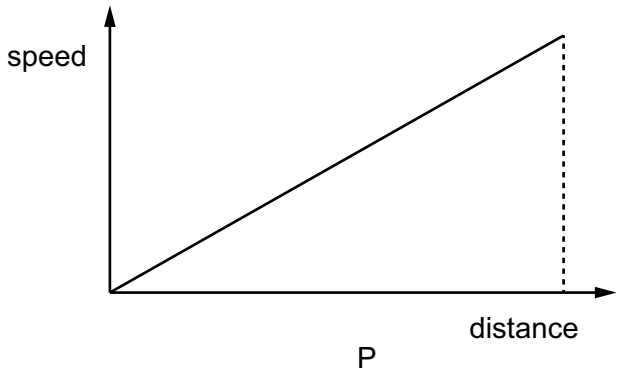
B The distant star is large when compared with the Sun.

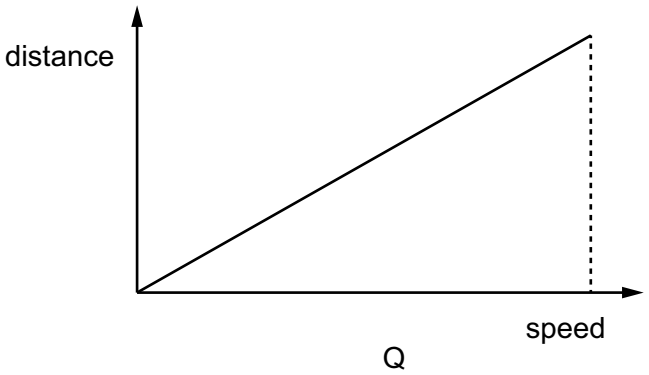
C The supernova releases heavy elements into space.

D The supernova leaves behind a neutron star or a black hole.

4 Distant galaxies are moving away from the Earth at very high speeds.

Graph P and graph Q show how the speed of these distant galaxies changes as their distance from the Earth increases.





In which row are the statements about the Hubble constant and about the age of the Universe correct?

	Hubble constant	age of the Universe
A	gradient of the line in graph P	area under the line in graph Q
B	gradient of the line in graph P	gradient of the line in graph Q
C	gradient of the line in graph Q	area under the line in graph P
D	gradient of the line in graph Q	gradient of the line in graph P

[Turn over

Paper 2 example questions mark scheme

Question	Answer	Marks
1	D	**1**
2	C	**1**
3	A	**1**
4	B	**1**

Paper 3 example questions

1 **(a)** State the name of the force that keeps the Earth in orbit around the Sun.

..... [1]

(b) State how many days it takes the Earth to complete one orbit of the Sun.

time for one orbit of the Sun = ... days [1]

(c) Explain why the Sun appears to move across the sky each day.

.....

..... [2]

[Total: 4]

2 **(a)** Complete the sentences about objects in our Solar System.

Planets, minor planets and ..... orbit the Sun.

The objects that orbit planets are called ..... .
[2]

(b) Compare the structure and the size of the four inner planets with those of the four outer planets of our Solar System.

inner planets .....

.....

outer planets .....

.....
[3]

[Total: 5]

3 **(a)** State the names of the **two** main elements found in the Sun.

..... [2]

(b) The Sun is one of many billions of stars that make up our galaxy.

Complete the following sentence about our galaxy.

Our galaxy is named the ..... . [1]

(c) The distance of Mars from the Sun is 2.4×10^{11} m. The speed of light is 3.0×10^{8} m / s.

Calculate the time for light from the Sun to reach Mars.

time for light to reach Mars = ... s [3]

[Total: 6]

Generic Marking Principles

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Science-Specific Marking Principles

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2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	<u>'List rule' guidance</u> For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

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7	Guidance for chemical equations Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme. State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Mark categories

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o.w.t.t.e.	'or words to that effect'
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Paper 3 example questions mark scheme

Question	Answer	Marks
1(a)	gravitational (force / attraction)	**B1**
1(b)	365 (days)	**B1**
1(c)	Earth rotates (on its axis)	**B1**
	once every 24 hours	**B1**

Question	Answer	Marks
2(a)	asteroids **OR** comets	**B1**
	moons, **Accept** satellites	**B1**
2(b)	(*inner planets*) rocky	**B1**
	(*outer planets*) gaseous (giants)	**B1**
	inner (four) planets smaller than the outer (four) planets **OR** outer (four) planets larger than the inner (four) planets	**B1**

Question	Answer	Marks
3(a)	hydrogen	**B1**
	helium	**B1**
3(b)	Milky Way	**B1**
3(c)	speed = $\frac{\text{distance}}{\text{time}}$ **OR** (time =) $\frac{\text{distance}}{\text{speed}}$	**C1**
	(time =) $\frac{2.4 \times 10^{11}}{3.0 \times 10^{8}}$	**C1**
	8.0×10^{2} **OR** 800 (s)	**A1**

Paper 4 example questions

1 Fig. 1.1 shows the orbit of a comet around the Sun. X, Y, P and Q are different positions on this orbit.

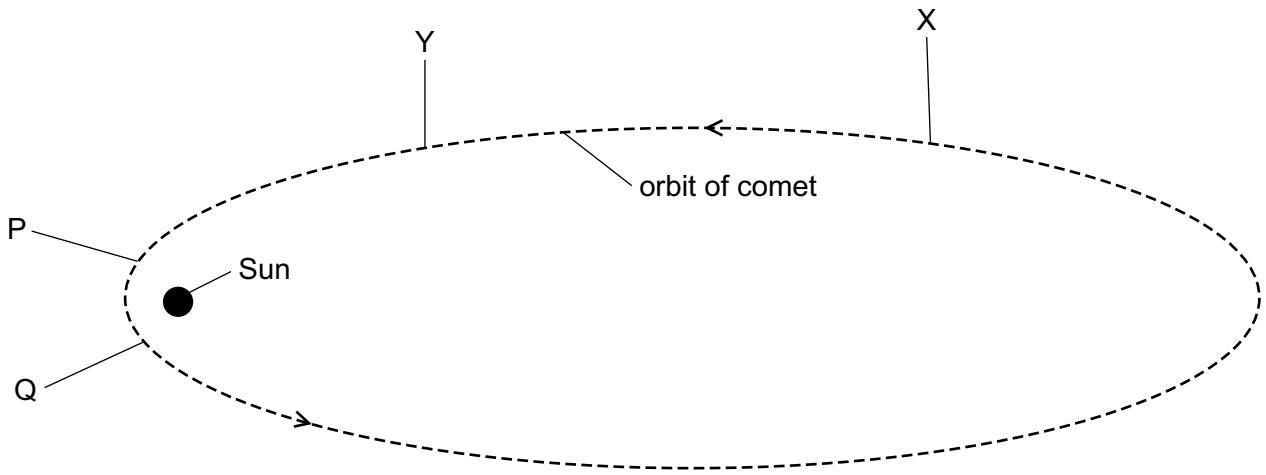


Fig. 1.1

(a) (i) State how the speed of the comet changes as it moves from X to Y.

..... [1]

(ii) Explain, in terms of energy transfer, your answer to **(a)(i)**.

.....

.....

.....

..... [3]

(b) The shape of the orbit of the comet from P to Q is circular, with the Sun at its centre.

State and explain the changes, if any, in the speed and in the velocity of the comet as it moves from P to Q.

speed .....

.....

velocity .....

.....

[4]

[Total: 8]

2 **(a)** Explain why the Moon is visible from the Earth.

.....

..... [2]

(b) Fig. 2.1 shows some of the phases of the Moon as seen from the Earth.

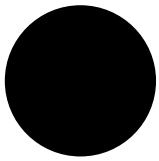
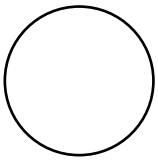
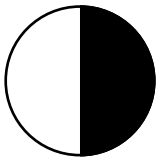
day 0	day 7	day 14	day 22	day 29
new Moon 		full Moon 		

Fig. 2.1

(i) On Fig. 2.1, draw the phases of the Moon for day 7 and for day 29. [2]

(ii) State what the phases of the Moon indicate about the motion of the Moon.

.....

.....

..... [2]

(c) The average radius of the Moon's orbit is 3.84×10^5 km. The Moon's average orbital speed is 1025 m / s.

Calculate the time period for the Moon to complete one orbit of the Earth.

time for one orbit = ... [3]

[Total: 9]

3 **(a)** Light from glowing hydrogen in distant galaxies is redshifted.

(i) Describe what is meant by the redshift of light.

.....

.....

..... [2]

(ii) State what can be deduced from the redshift of light from glowing hydrogen in a distant galaxy.

.....

.....

..... [2]

(b) **(i)** State **one** method for estimating the distance d of a distant galaxy from the Earth.

..... [1]

(ii) Explain how, according to the Big Bang Theory, $\frac{1}{H_0}$ represents the age of the Universe.

.....

.....

.....

..... [3]

[Total: 8]

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Paper 4 example questions mark scheme

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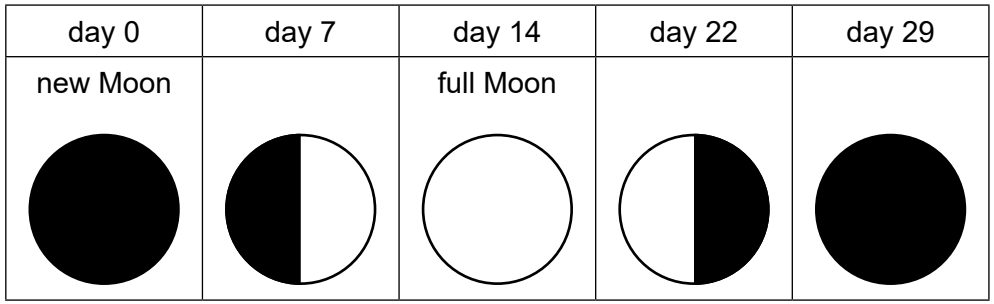
1(a)(i)	(from X to Y) speed of comet increases	**B1**
1(a)(ii)	(as the) comet moves closer to Sun	**B1**
	energy in gravitational potential store of comet decreases	**B1**
	(and) energy in kinetic store of comet increases	**B1**
1(b)	(speed) is constant	**B1**
	as the distance from the Sun is constant	**B1**
	(velocity) is (constantly) changing	**B1**
	as the direction of motion (of the comet) is (always) changing	**B1**

Question	Answer	Marks
2(a)	light from the Sun is reflected	**B1**
	from the Moon's surface	**B1**
2(b)(i)		
	day 7 correct	**B1**
	day 29 correct	**B1**
2(b)(ii)	the Moon orbits the Earth	**B1**
	the duration of the Moon's orbit is (approximately) one month / 27–30 days	**B1**

Question	Answer	Marks
2(c)	3.84×10^8 seen **OR** any correct conversion between km and m	**C1**
	$v = \frac{2\pi r}{T}$ **OR** $(T =) \frac{2\pi r}{v}$ **OR** $(T =) \frac{(2\pi \times 3.84 \times 10^8)}{1025}$ **OR** $\frac{24.127 \times 10^8}{1025}$	**C1**
	$(T =) 2.35 \times 10^6$ s	**A1**

Question	Answer	Marks
3(a)(i)	mention of wavelength of observed light being different to that emitted by the distant galaxy	**B1**
	wavelength of observed light is <u>longer</u> than that emitted	**B1**
3(a)(ii)	the (distant) galaxy is moving away from the Earth / our galaxy	**B1**
	its velocity (of recession) from Earth (can be calculated by comparing the wavelengths)	**B1**
3(b)(i)	using the brightness of a supernova in the (distant) galaxy	**B1**
3(b)(ii)	according to the Big Bang Theory, all galaxies / matter originated from one point (and time) in space	**B1**
	if the distance a galaxy has travelled (from when it was in contact with the Milky Way galaxy) is *d* and the speed it has been moving at is *v*	**B1**
	the time it has been moving = $\frac{d}{v}$ / (the equation is) $\frac{d}{v} = \frac{1}{H_0}$ **and** this is the time from the Big Bang / start of the Universe	**B1**

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