

Surname	Initial(s)
Signature	

Paper Reference(s)

5010 5046

Edexcel GCSE

Science (5010)

Physics (5046)

P1b – Topics 11 and 12

Foundation and Higher Tier

Tuesday 15 November 2011 – Morning

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

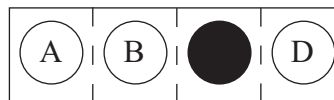
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Space

1. The Solar System is part of
 - A the Earth
 - B the Sun
 - C a galaxy
 - D a planet

2. Which of these is most likely to collide with the Earth?
 - A a supernova
 - B a black hole
 - C a comet
 - D a moon

3. Stars are formed when clouds of dust and gas are pulled together by
 - A electrostatic forces
 - B the force of gravity
 - C the force of friction
 - D magnetic forces

4. The Milky Way consists of
 - A a few stars
 - B billions of stars
 - C a few galaxies
 - D billions of galaxies

Use this information to answer questions 5 and 6.

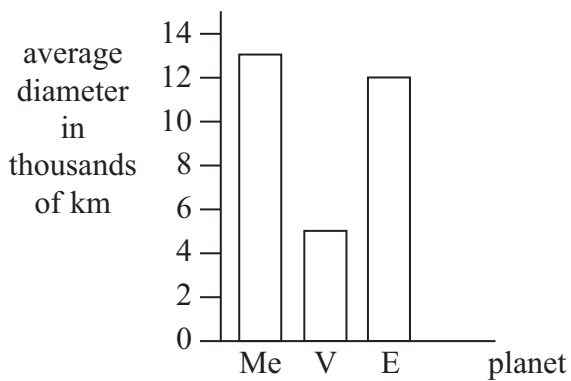
The table gives information about three planets.

	Mercury	Venus	Earth
average distance from the Sun (millions of km)	58	108	150
average diameter (thousands of km)	4.9	12.1	12.8

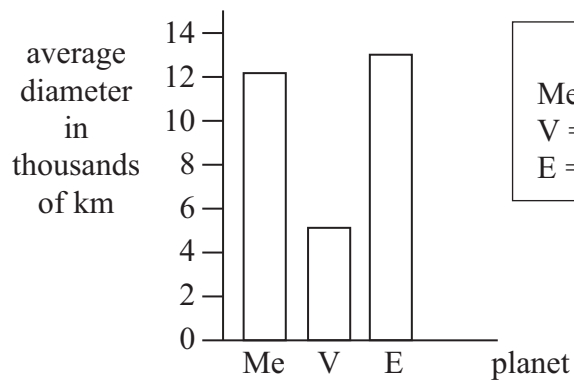
5. The average distance from the Sun to Earth is

- A 150 km
- B 150 thousand km
- C 150 million km
- D 150 thousand million km

6. Which bar chart correctly shows the average diameter of the planets?

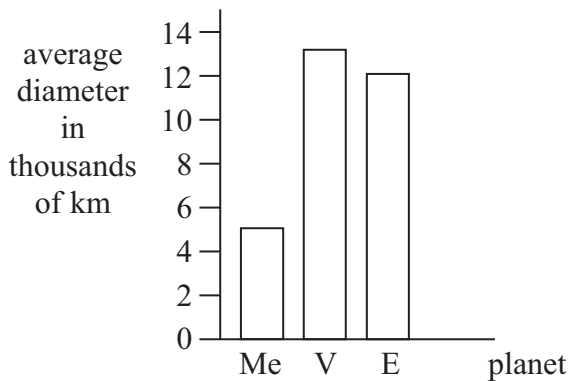


A

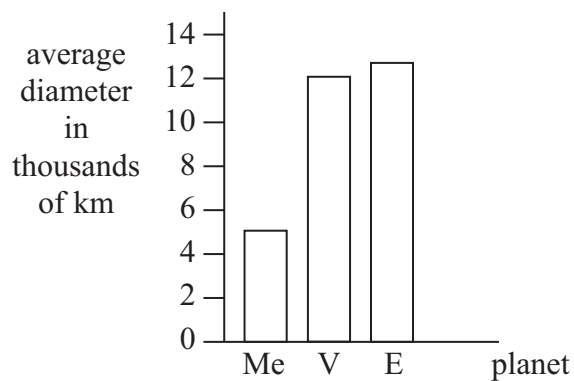


B

key
 Me = Mercury
 V = Venus
 E = Earth



C



D

Uses of waves

7. One use of microwaves is to monitor
- A rain storms
 - B bone fractures
 - C skin burns
 - D unborn babies
8. Fishing boats use sonar to locate shoals of fish.
Sonar is scanning by
- A reflection
 - B transmission
 - C absorption
 - D refraction
9. Which of these uses fluorescence to check whether bank notes are genuine?
- A gamma-rays
 - B X-rays
 - C ultraviolet
 - D ultrasound

Use this information to answer questions 10 and 11.

An article about the use of wi-fi networks in schools stated that

- exposure to radiation from wi-fi is about a million times smaller than the agreed safe level
- a student using a mobile phone receives about half the agreed safe level
- sitting for a whole year in a classroom with a wi-fi network is as dangerous as using a mobile phone for 20 minutes
- the strength of FM radio and TV signals are the same as a classroom wi-fi network
- if wi-fi is banned for safety reasons, FM radio and TV should also be banned.

10. According to the article, a student sitting in a classroom with a wi-fi network for a year

- A has a 0 per cent chance of being affected by radiation
- B has the same exposure to radiation as using a mobile phone for a year
- C has a 50 per cent chance of being affected by radiation
- D has the same exposure to radiation as using a mobile phone for 20 minutes

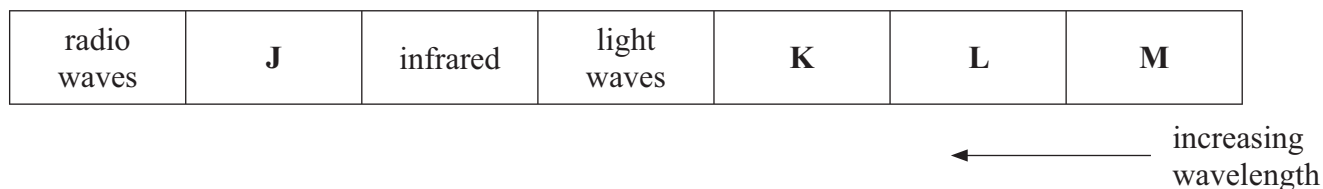
11. According to the article, which of these has the same strength signal as a wi-fi network in a classroom?

- A a signal 20 million times the agreed safe level
- B a signal half the agreed safe level
- C FM radio and TV signals
- D a mobile phone signal

Electromagnetic spectrum

Use this information to answer questions 12 to 14.

The chart represents the electromagnetic spectrum.
Some parts have been named.



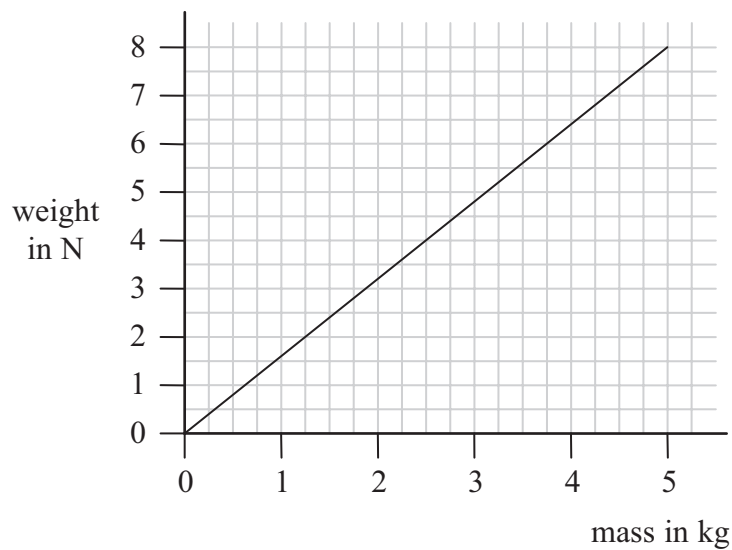
12. The part of the electromagnetic spectrum labelled **M** is
- A microwaves
 - B ultrasound waves
 - C gamma rays
 - D ultraviolet rays
13. Radio waves, infrared waves and light waves are used for communications.
Which other part of the electromagnetic spectrum is used for communications?
- A **J**
 - B **K**
 - C **L**
 - D **M**
14. All parts of the electromagnetic spectrum
- A have the same wavelength
 - B have the same frequency
 - C are longitudinal waves
 - D are transverse waves

The Moon

15. An astronaut on the Moon holds a hammer.
He lets go of the hammer.
The hammer will

- A float upwards into space
- B float at the same height above the surface
- C fall with constant speed to the Moon's surface
- D fall with increasing speed to the Moon's surface

16. The graph shows how the mass and weight of objects on the Moon are related.



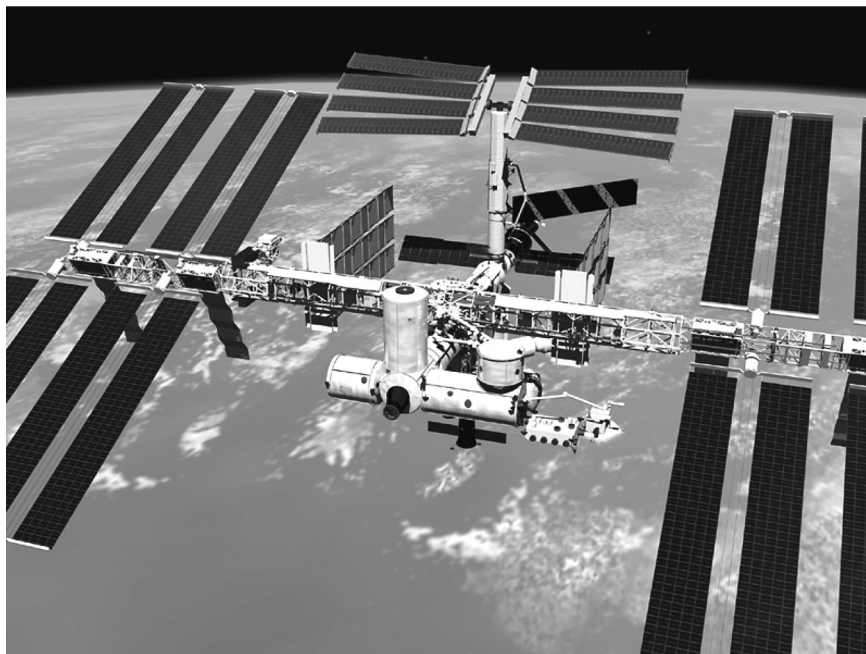
Which of these is correct?

- A a 5 kg mass weighs 8 N on the Moon
- B a 5 kg mass weighs 5 N on the Moon
- C a 5 N mass weighs 8 kg on the Moon
- D a 5 N mass weighs 5 kg on the Moon

Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.

Space tourists

The photograph shows the International Space Station.



17. Which row of the table is correct for the conditions in space near to this station?

	temperature	gravitational field strength
A	lower than on Earth	lower than on Earth
B	higher than on Earth	lower than on Earth
C	higher than on Earth	higher than on Earth
D	lower than on Earth	higher than on Earth

18. One of the problems of long space flights is muscle wastage.
Astronauts reduce muscle wastage by

- A** breathing pure oxygen
- B** using an exercise machine
- C** sleeping for at least 10 hours each day
- D** keeping their feet pointed towards the Earth

Mass and weight

19. Two students discuss mass and weight.

The mass of an object does not depend on gravity.

Paul

The weight of an object is proportional to atmospheric pressure.

John

Who is correct?

- A Paul only
- B John only
- C both Paul and John
- D neither

- 20.

$$\text{weight} = \text{mass} \times \text{gravitational field strength} \quad W = mg$$

The gravitational field strength on Mars is 3.7 N/kg.

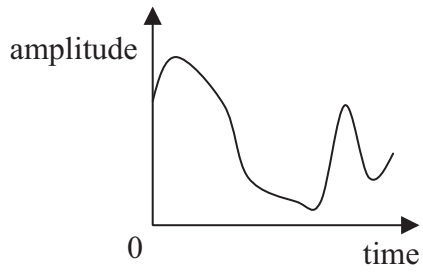
A rock has a mass of 2 kg.

The weight of the rock on Mars is

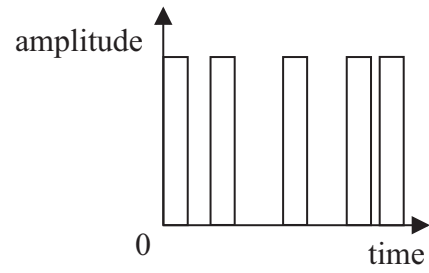
- A zero
- B 1.85 N
- C 3.7 N
- D 7.4 N

Analysing waves

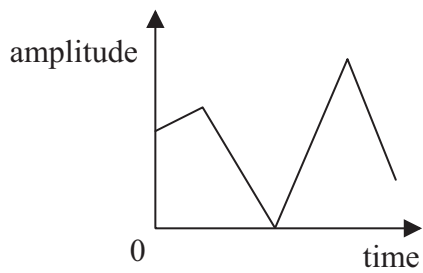
21. Which of these shows a digital signal?



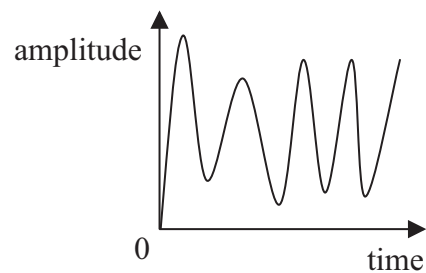
A



B

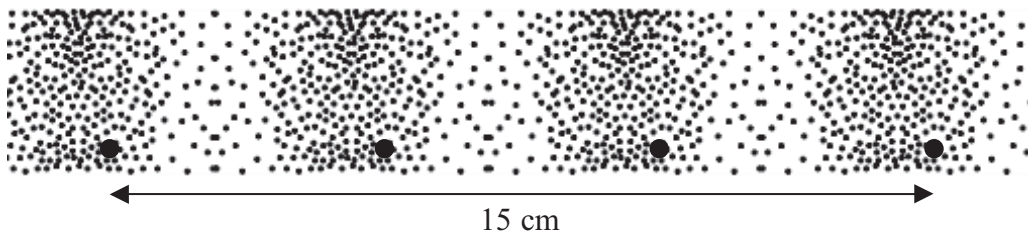


C



D

22. The diagram represents a longitudinal wave.

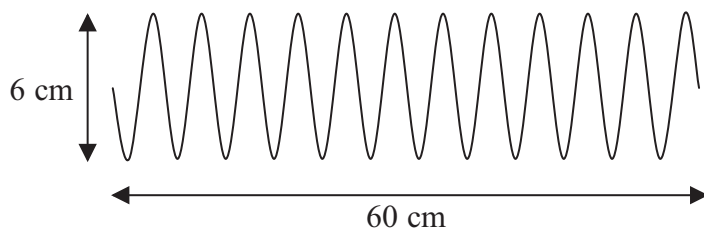


The wavelength of the wave is about

- A** 45 cm
- B** 18 cm
- C** 5 cm
- D** 4 cm

Use this information to answer questions 23 and 24.

The diagram shows the waves sent out by a source in a time of 3 seconds.



23.

$\text{speed} = \text{distance} \div \text{time}$

The speed of the waves is

- A 180 cm/s
- B 20 cm/s
- C 18 cm/s
- D 2 cm/s

24. The frequency of the waves is

- A 4 Hz
- B 5 Hz
- C 12 Hz
- D 720 Hz

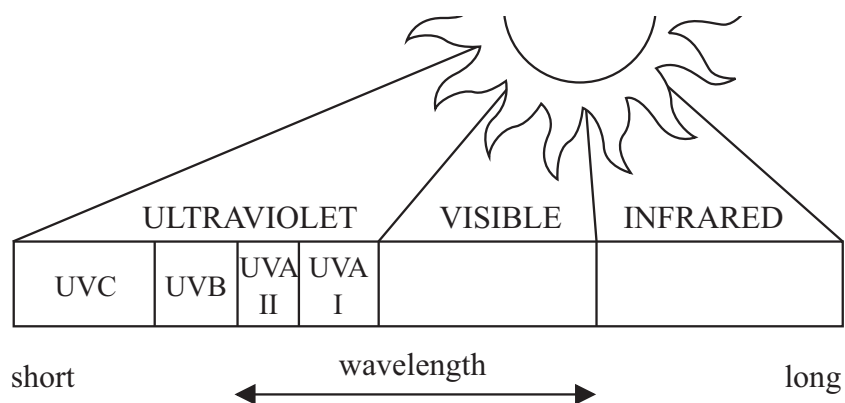
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.

Ultraviolet radiation

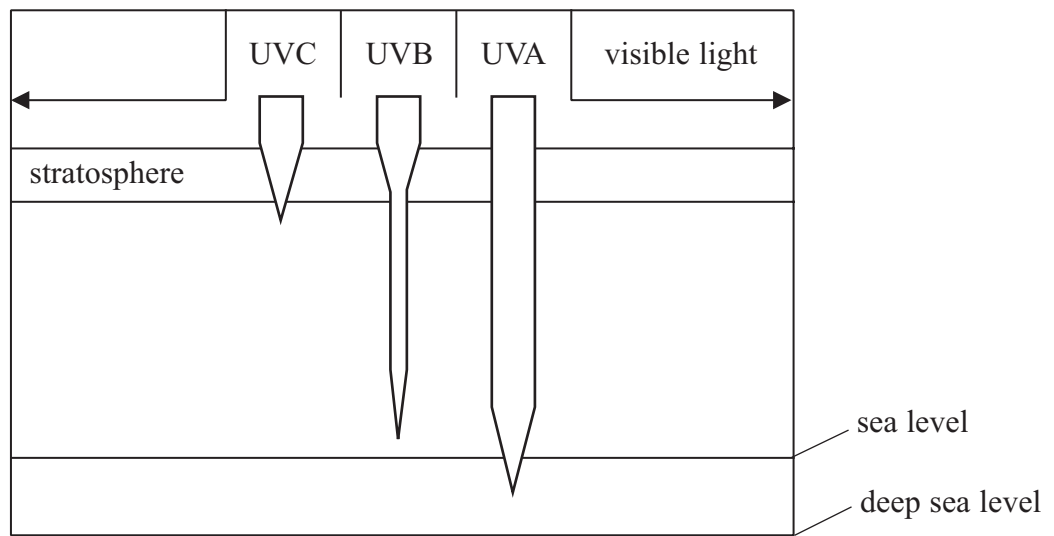
25. Four types of ultraviolet radiation (UV) are shown in the chart.



Which row of the table is correct for UVA I compared to other types of ultraviolet radiation?

	wavelength	frequency
A	shortest	lowest
B	shortest	highest
C	longest	highest
D	longest	lowest

26. In the diagram below, the width of each arrow represents how much UV radiation penetrates the Earth's atmosphere and oceans.



Some students discuss the diagram.
One of them makes an incorrect statement.

UVC does not reach the Earth's surface.

Aisha

Some UVB is absorbed in the stratosphere, but it still penetrates deep into the atmosphere.

Ben

You cannot get overexposed to UVA if you are covered in water.

Carl

The higher you are, the greater the danger from UV radiation.

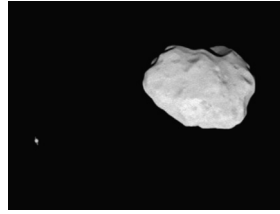
Dean

Who has **not** made a correct statement?

- A Aisha
- B Ben
- C Carl
- D Dean

Space exploration

This photograph was taken by the Rosetta spacecraft as it flew past an asteroid.

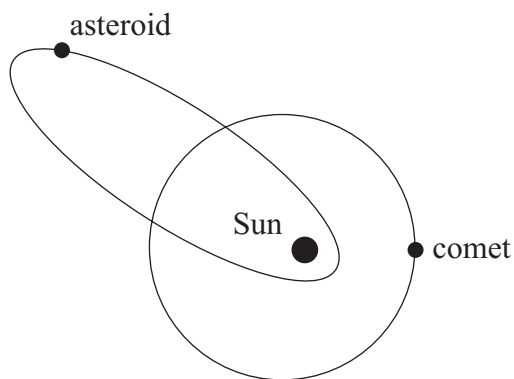


The Rosetta spacecraft is designed to land on a comet and collect data about how the Solar System was formed.

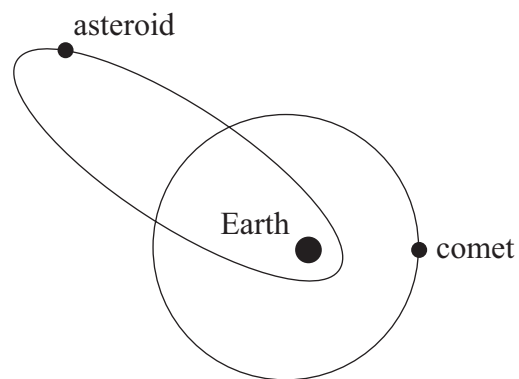
27. Which of these statements is correct?

- A data from the comet will prove how the Solar System was formed
- B scientists have already proved how the Solar System was formed
- C scientists will soon prove how the Solar System was formed
- D scientists are not sure how the Solar System was formed

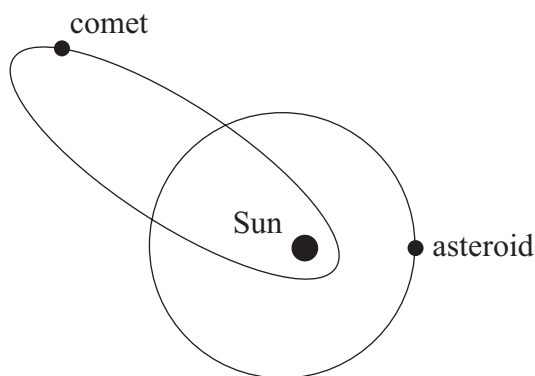
28. Which of these correctly shows the orbit of an asteroid and a comet?



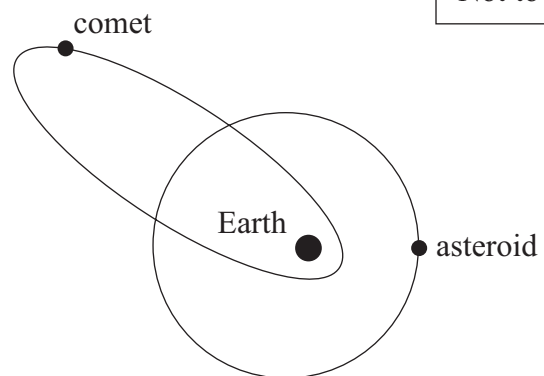
A



B



C

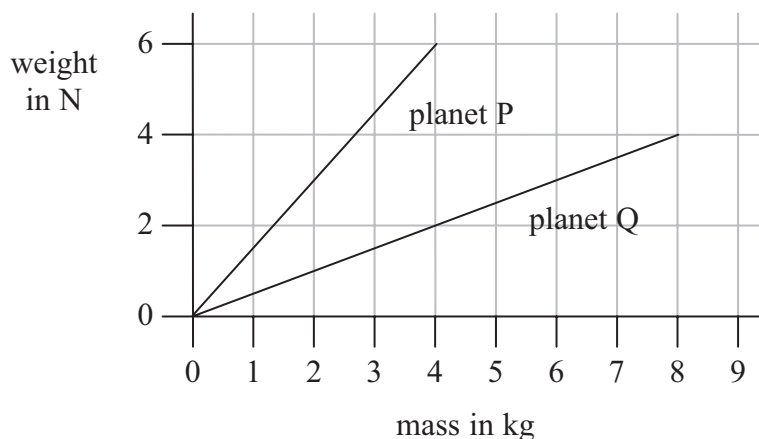


D

Not to scale

Gravitational field strength

The graph shows the relationship between weight and mass on two planets, **P** and **Q**.



29. An object has a weight of 3 N on planet **P**.
What is the weight of the object on planet **Q**?

- A** 1 N
- B** 2 N
- C** 4 N
- D** 6 N

30. weight = mass \times gravitational field strength $W = mg$

The gravitational field strength for planet **Q** is

- A** 32 N/kg
- B** 2 N/kg
- C** 1.5 N/kg
- D** 0.5 N/kg

Space and rockets

31. Which row of the table is correct for a black hole?

	gravitational field strength	amount of light escaping from a black hole
A	very high	very high
B	zero	very high
C	zero	zero
D	very high	zero

32. Which of these gives the correct order for stages in the life cycle of a star like our Sun?
- A main sequence → protostar → black dwarf → red giant → white dwarf
 - B protostar → red giant → main sequence → white dwarf → black dwarf
 - C protostar → main sequence → red giant → white dwarf → black dwarf
 - D protostar → main sequence → red giant → black dwarf → white dwarf

Use this information to answer questions 33 and 34.

A spacecraft is between the Earth and the Moon.
Its rocket engine starts up.

33. Which row of the table will give the biggest reaction force on the rocket engine?

	energy per second from burning fuel	speed of hot gases leaving the rocket engine
A	high	high
B	high	low
C	low	high
D	low	low

- 34.

force = mass × acceleration

The resultant force on the spacecraft is 1000 N.
The mass of the spacecraft is 2000 kg.

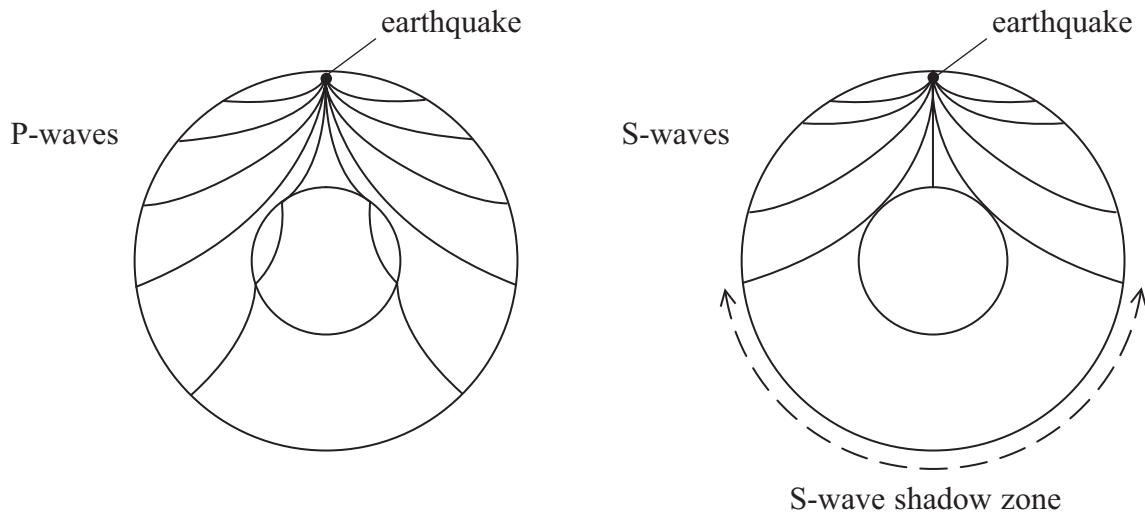
What is the acceleration of the spacecraft?

- A 0.5 m/s²
- B 2 m/s²
- C 5 m/s²
- D 2 000 000 m/s²

Earthquakes and seismic waves

Use this information to answer Questions 35 and 36.

The diagram shows the paths through the Earth of P-waves and S-waves after an earthquake.



35. Many of the paths are curved.
This is because
- A the density of the Earth changes
 - B seismic waves are transverse
 - C tectonic plates are moving
 - D the Earth's core is liquid
36. On the opposite side of the Earth to the earthquake
- P-waves from the earthquake can be detected
 - S-waves from the earthquake can **not** be detected

The accepted explanation for these observations is that

- A the centre of the Earth is filled with water
- B the centre of the Earth is metallic
- C there is a layer of gas deep in the Earth
- D there is a layer of liquid deep in the Earth

37.

$$\text{speed} = \text{distance} \div \text{time}$$

An explosion on the Earth's surface produces seismic waves. One of these waves has an average speed of 8 km/s. The wave is reflected from a depth of 8000 m.

The time between the explosion and when the reflected wave first reaches the surface is

- A 2000 s
- B 1000 s
- C 2 s
- D 1 s

Electromagnetic waves

38. Two students discuss electromagnetic waves.

In a vacuum, radio waves travel at about 95% of the speed of light.

Keri

All electromagnetic waves are transverse waves.

Liam

Who is correct?

- A Keri only
- B Liam only
- C both Keri and Liam
- D neither

39. Some samples of living cells are exposed to four different X-rays for the same length of time. For which row of the table will the X-rays cause most damage to living cells?

	wavelength of X-rays	energy of X-rays
A	shortest	2 mJ
B	longest	2 mJ
C	shortest	2 J
D	longest	2 J

40.

$\text{speed} = \text{frequency} \times \text{wavelength}$
--

An X-ray has a speed of 3×10^8 m/s.
The frequency of the X-ray is 6×10^{16} Hz.
What is the wavelength of the X-ray?

- A 5×10^{-33} m
- B 5×10^{-9} m
- C 2×10^8 m
- D 2×10^{24} m

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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