

Surname	Initial(s)
Signature	

Paper Reference(s)

5010 5046

Edexcel GCSE

Science (5010)

Physics (5046)

P1b – Topics 11 and 12

Foundation and Higher Tier

Friday 17 June 2011 – Afternoon

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.

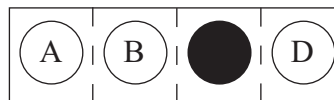
Before the test begins:

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.**

Waves in hospitals

1. A doctor does an ultrasound scan of a patient's eye.
Ultrasound waves are
- A seismic
 - B transverse
 - C longitudinal
 - D electromagnetic

Use this information to answer questions 2 and 3.

Scientists have designed a machine to detect people who have a higher temperature than normal.
The machine scans people as they walk past.

2. The waves used to scan for a high temperature are

- A microwaves
- B infrared waves
- C ultrasound waves
- D ultraviolet waves

3. The machine scans by

- A refraction
- B absorption
- C reflection
- D emission

4. A type of wave used for treating cancer is

- A infrared waves
- B ultraviolet waves
- C gamma waves
- D microwaves

5. X-rays are used to scan for broken bones.
This is scanning by

- A absorption
- B refraction
- C emission
- D reflection

6. Ultrasound waves are better than X-rays for scanning a fetus because X-rays
- A can damage cells
 - B travel more slowly
 - C have lower frequency
 - D have a longer wavelength

The Solar System

7. Which row of the table describes the orbits of an asteroid and a comet?

	an asteroid	a comet
A	orbits the Earth	orbits the Earth
B	orbits the Sun	orbits the Earth
C	orbits the Earth	orbits the Sun
D	orbits the Sun	orbits the Sun

8. There is an object in space between Earth and Mars.
Which of these is the same for the object there as it is on Earth?

- A atmospheric pressure
- B temperature
- C weight
- D mass

9. Our Sun is evolving.
It will next become

- A a white giant
- B a red giant
- C a blue dwarf
- D a black dwarf

10. John and Anne look at the same object in the sky.



Which row of the table is **not** possible?

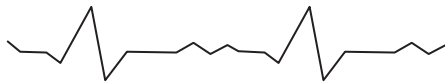
	John	Anne
A	correct	correct
B	incorrect	correct
C	correct	incorrect
D	incorrect	incorrect

In and out: on and off

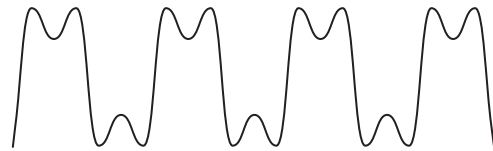
11. A dog has been given genes which make it glow.
This is called fluorescence.
Which row of the table is correct for fluorescence?

	radiation taken in	radiation given out
A	ultraviolet	visible
B	ultraviolet	infrared
C	infrared	visible
D	visible	infrared

12. Which of these is a digital signal?



A



B



C

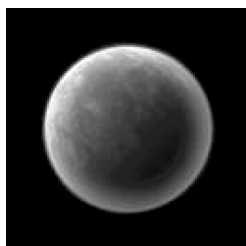


D

Galaxies

13. Our galaxy is called
- A** the Solar System
 - B** the Milky Way
 - C** the Universe
 - D** the asteroid belt

14. Which of these shows a galaxy?



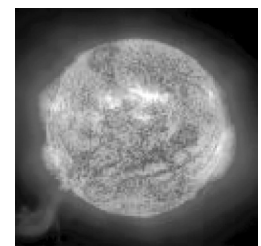
A



B



C



D

Use this information to help you answer questions 15 and 16.

Some astronomers ask non-astronomers to help them classify galaxies.
For each galaxy in turn, the astronomers

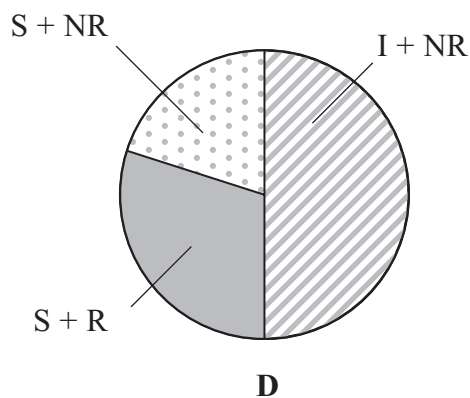
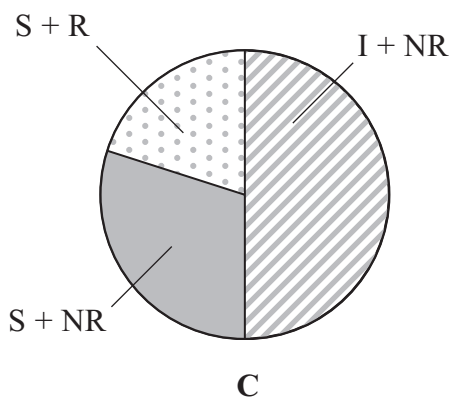
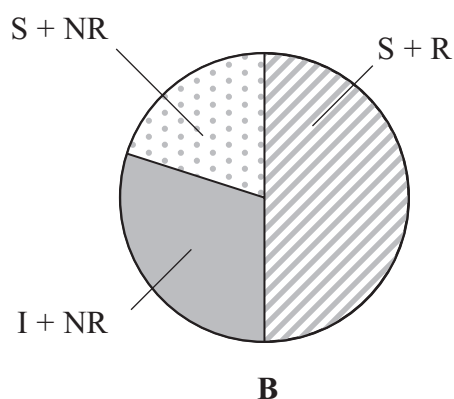
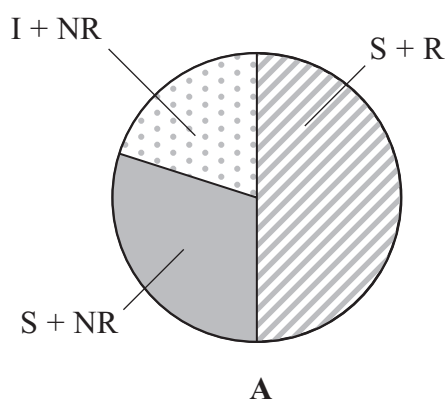
- show many people a photograph of it
- ask many people some questions about it
- analyse all the answers

15. Here are the results for one galaxy

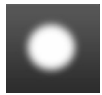
- 50% thought it was smooth and rounded
- 30% thought it was irregular and not rounded
- 20% thought it was smooth and not rounded

Which of these pie charts correctly shows these data?

key S + R = smooth and rounded I + NR = irregular and not rounded S + NR = smooth and not rounded



16. Here are descriptions of some types of galaxies.



rounded



oval-shaped

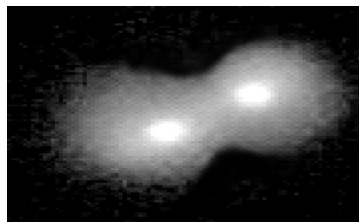


smooth

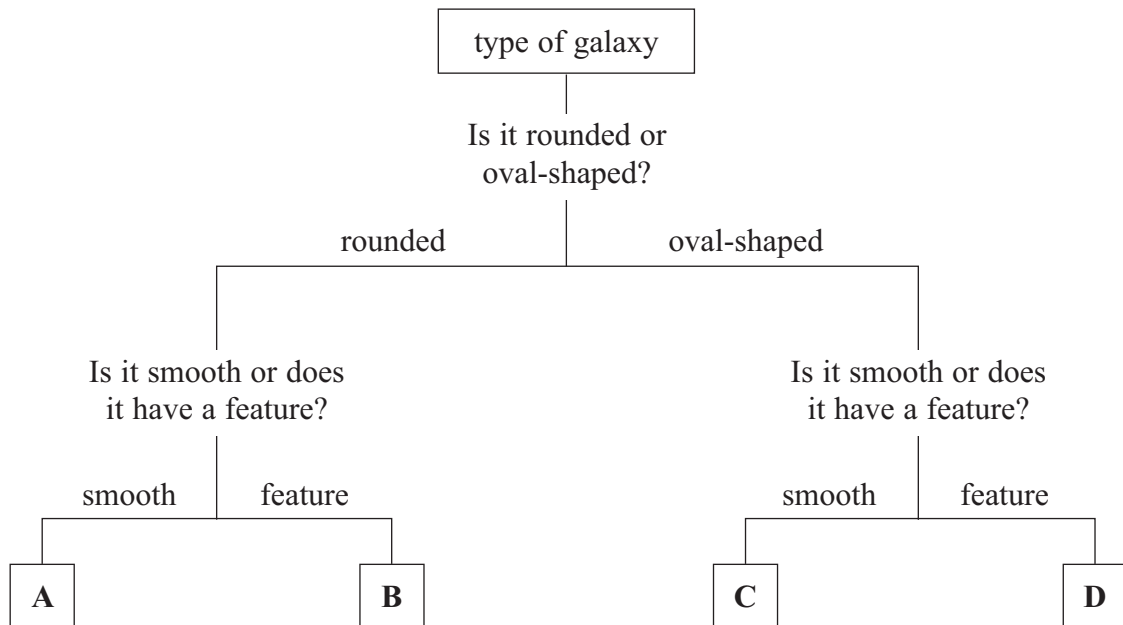


has a feature

John saw the photograph below of a single galaxy.



Identify this galaxy using the above descriptions and the key below.
Which type of galaxy is it?



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

Waves in action

17. One result of typing the slogan '5 a day' into an Internet search engine is

$$5 \text{ a day} = 5.78703704 \times 10^{-5} \text{ hertz}$$

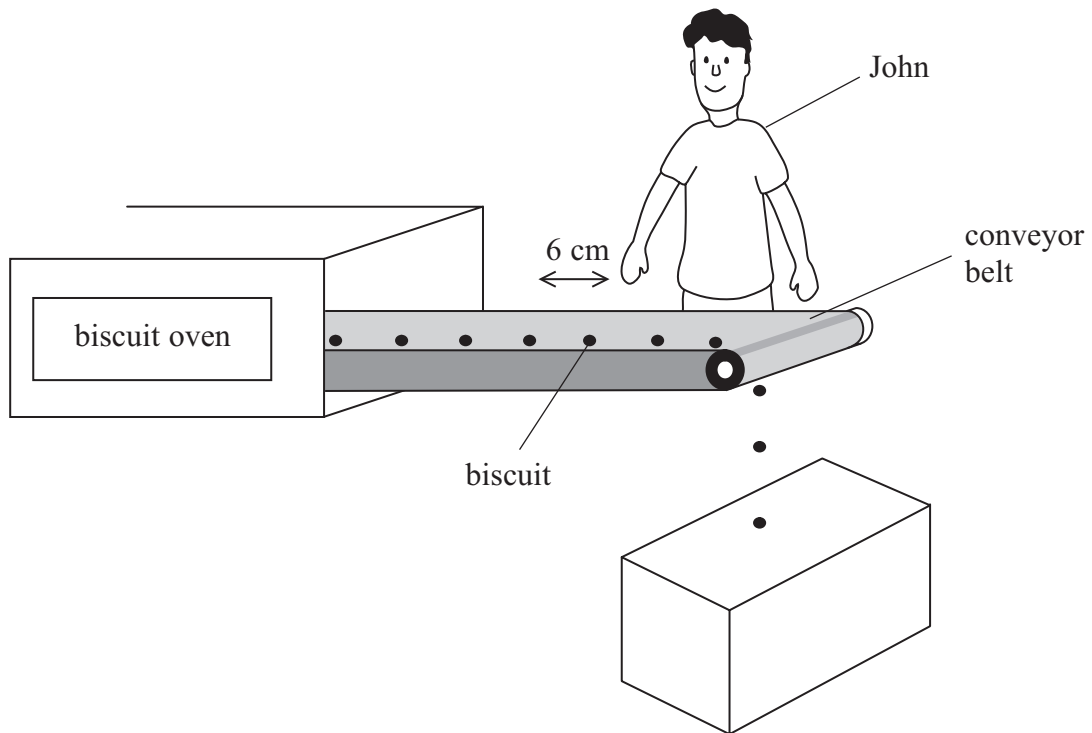
This treats the slogan as

- A a wavelength
 - B an amplitude
 - C a frequency
 - D a speed
18. Which of these is **not** used to collect data from stars?
- A visible light waves
 - B infrared waves
 - C ultraviolet waves
 - D ultrasound waves

19.

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

The diagram shows biscuits coming out of an oven on a conveyor belt. The biscuits are 6 cm apart.



John finds that five biscuits pass him every 10 seconds. The speed at which the biscuits are moving is

- A $\frac{5 \times 6}{10}$ cm/s
- B $\frac{6 \times 10}{5}$ cm/s
- C $\frac{10}{5 \times 6}$ cm/s
- D $5 \times 6 \times 10$ cm/s

Orion

Use this information to help you answer questions 20 to 22.

The table shows some data about stars found in the constellation Orion.

star	diameter (number of times bigger than Sun)	colour	distance from Earth (light years)	brightness (number of times brighter than the Sun)
Alnilam	26	blue	1300	375 000
Bellatrix	5.7	blue	240	4 000
Betelgeuse	936	red	640	135 000
Rigel	78	blue	773	40 000

20. Astrologers think these stars are in a close group.
Which of the following indicates that the stars do **not** form a close group?

- A the diameters
- B the colours
- C the distances from Earth
- D the brightnesses

21. Imagine that

- Alnilam emits an X-ray signal
- Bellatrix emits a microwave signal
- Betelgeuse emits an infrared signal
- Rigel emits a visible signal

The signals are all emitted at the same time.

From which star will the signal arrive first at a space telescope near the Earth?

- A Alnilam
- B Bellatrix
- C Betelgeuse
- D Rigel

22. John and Anne discuss ways of finding out if there is any intelligent life in the constellation Orion.

Look for patterns in the radiations crossing space from Orion.

John

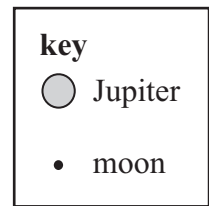
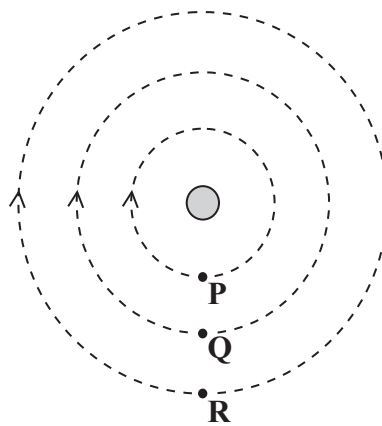
See if stars like our Sun develop into red giants.

Anne

Whose idea might be suitable?

- A John only
 - B Anne only
 - C both John and Anne
 - D neither
23. Imagine you are the same distance from some astronomical objects. Which of these would have the biggest gravitational pull on you?
- A a black dwarf
 - B a black hole
 - C a red giant
 - D a main sequence star

24. The diagram shows Jupiter and three of its moons.
The moons **P**, **Q** and **R** all orbit clockwise around the planet.

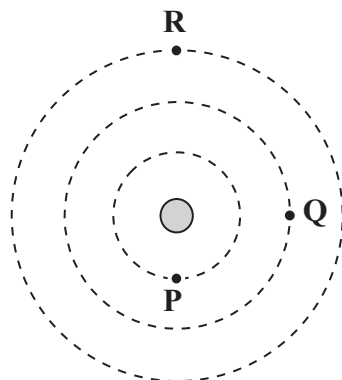


Not to Scale

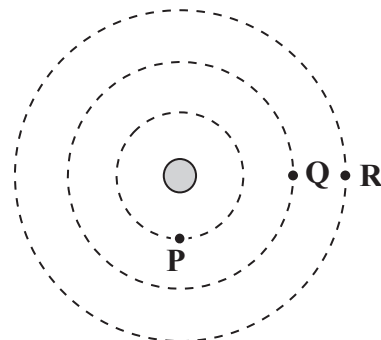
Q takes twice as long to complete an orbit as **P**.

R takes twice as long to complete an orbit as **Q**.

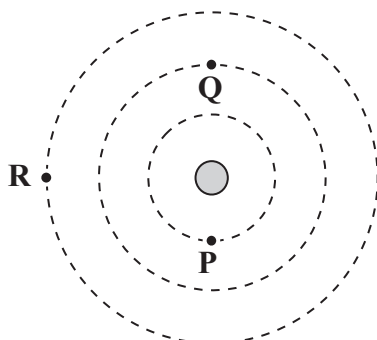
Which of these diagrams shows the positions of the moons after **P** has made three orbits?



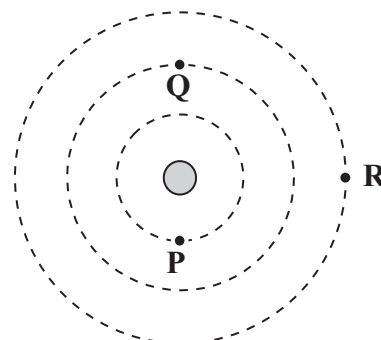
A



B



C



D

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.**

Gravity and rockets

25. The force of gravity on the surface of an asteroid is

- A zero
- B less than on the surface of Earth
- C the same as on the surface of Earth
- D more than on the surface of Earth

26.

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

On a moon, the gravitational field strength is 8 N/kg.
The weight of a 500 g mass on this moon is

- A 0.016 N
- B 4 N
- C 62.5 N
- D 4000 N

27. John and Anne discuss weight.

On Earth, the weight of an object is due to the air pressure.

John

If you were to travel from Earth to Mars your weight would continually become less and less.

Anne

Who is correct?

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

28. John sets off a firework rocket.
As it rises in the air, it accelerates.
The acceleration is due to the reaction from

- A sound energy
- B light energy
- C the Earth
- D hot gases

29.

$$\text{force} = \text{mass} \times \text{acceleration}$$

When the mass of the rocket is 0.05 kg, the force on it is 0.1 N.
What is its acceleration?

- A 2000 m/s²
- B 2 m/s²
- C 0.005 m/s²
- D 0.002 m/s²

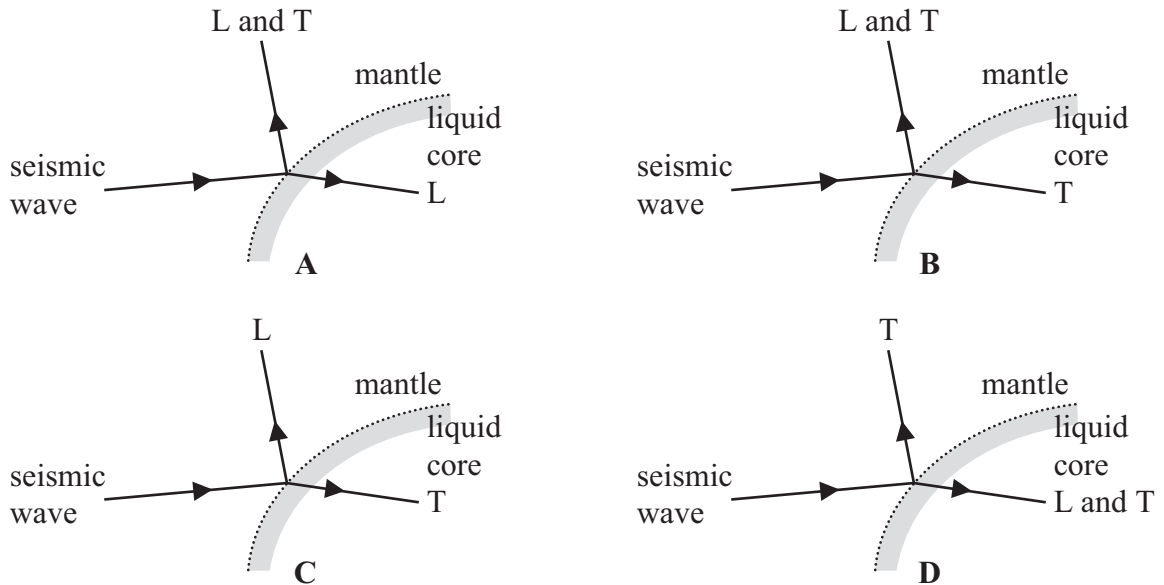
Seismic events

30. Seismic waves follow curved paths as they travel through the Earth because

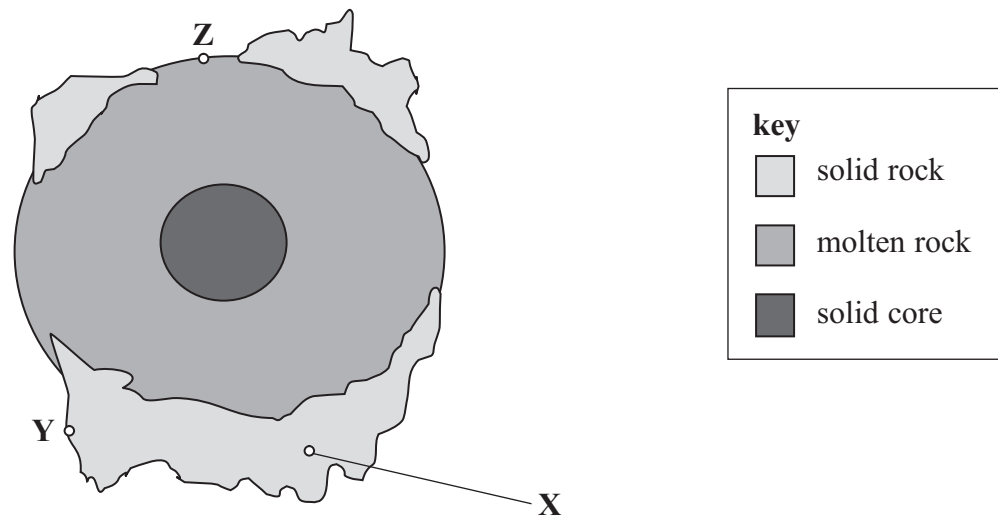
- A they are reflected at the different layers
- B chunks of solid rock get in their way
- C their speed changes with depth
- D they are longitudinal

31. Which of these diagrams correctly shows the seismic waves just before and just after striking the boundary between mantle and liquid core?

key
 L – longitudinal waves
 T – transverse waves



32. A science fiction book describes a planet where continents of solid rock float on molten rock.



Imagine that a seismic event (like an earthquake) occurs at point X on the planet. Which row of the table is correct for the waves arriving at Y and at Z?

	waves arriving at Y are	waves arriving at Z are
A	longitudinal and transverse	longitudinal only
B	longitudinal and transverse	transverse only
C	transverse only	longitudinal only
D	longitudinal only	transverse only

Using ultrasounds

Use this information to help you answer questions 33 and 34.

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

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

The speed of sound in air is 330 m/s.

John uses an ultrasonic device to find the length of a room.

The device contains an ultrasonic source and detector.

It is held touching one wall and is aimed at the other.

The signal travels from source to wall and back to detector in 0.036 s.

The device uses an ultrasound of frequency 30 kHz.

33. How long is the room?

- A 2.97 m
- B 5.94 m
- C 11.88 m
- D 23.76 m

34. What is the wavelength of the ultrasound the device uses?

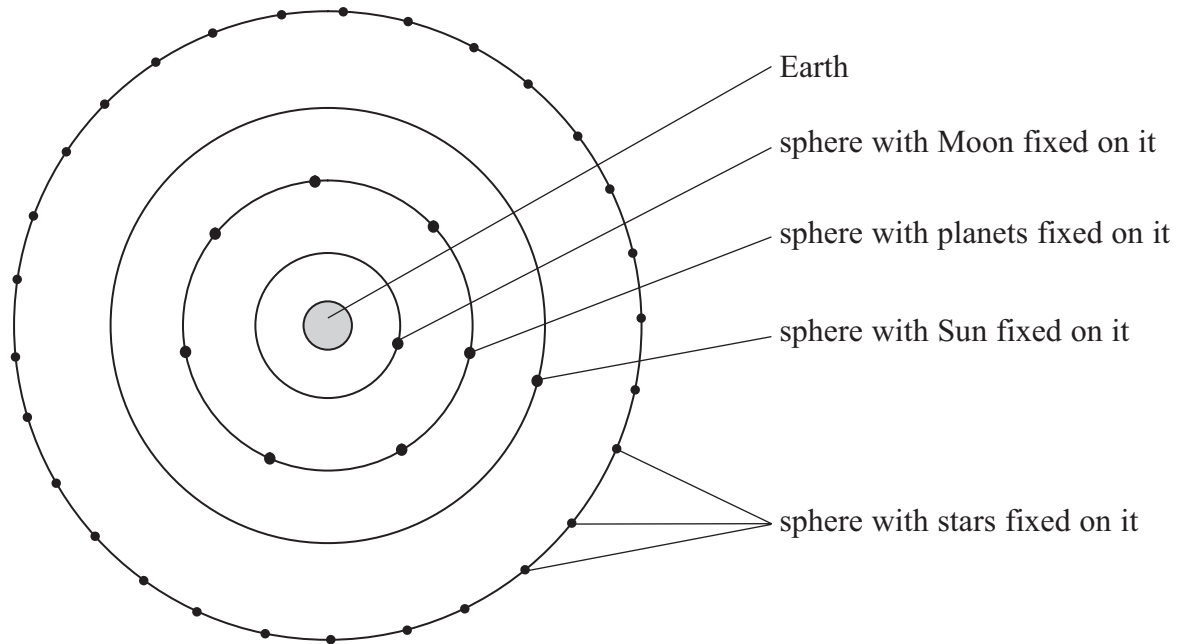
- A 0.011 m
- B 0.99 m
- C 11 m
- D 99 m

35. John hears a dog barking.
The sound waves from the dog are

- A analogue only
- B digital only
- C both analogue and digital
- D neither

Modelling the Universe

Many years ago, a man called Aristotle thought of a model of the Universe. The Earth was at the centre of several transparent spheres.



On this model,

- the Sun, Moon and planets are fixed on rotating spheres
- the stars are on a fixed sphere outside

36. The real planets move at different speeds to each other. The model could be changed to allow for this by

- A making the sphere with the planets rotate at different speeds
- B letting the planets move around within an oval-shaped orbit
- C moving the sphere with the planets to a greater distance from Earth
- D giving each planet its own sphere at a different distance from Earth

37. Aristotle did **not** include neutron stars in his model because

- A they are not charged
- B he thought they were not proper stars
- C they have only recently been identified
- D they have a greater gravitational field than black holes

38. Which of these provides experimental evidence to disprove Aristotle's model?
- A eclipses
 - B black holes
 - C the Big Bang
 - D red shift

Electromagnetic waves in action

39. Which row of the table gives the conditions for greatest potential danger from electromagnetic waves?

	wavelength	amplitude
A	longest	largest
B	longest	smallest
C	shortest	largest
D	shortest	smallest

40. John looked at the display screen of his calculator through a pair of sunglasses.



He then turned his head.



He could not now see the numbers.

He read that a similar effect happened with ultraviolet and infrared but not with ultrasound radiations.

He correctly predicted that it happened with one type of wave only.

The type of wave is likely to be

- A digital
- B analogue
- C longitudinal
- D transverse

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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