Surname	Initial(s)
Signature	

Paper Reference(s)

5010 5046

Edexcel GCSE

Additional Science (5010)

Physics (5046)

P1b – Topics 11 and 12

Foundation and Higher Tier

Friday 19 June 2009 – Morning

Time: 20 minutes

Materials required for examination	**Items included with question papers**
Multiple Choice Answer Sheet HB pencil, eraser and calculator	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.

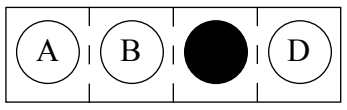
Foundation tier candidates: answer questions 1 – 24.
Higher tier candidates: answer questions 17 – 40.
All candidates are to answer questions 17 – 24.

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.

Testing times

1. Which part of the electromagnetic spectrum is used to detect broken bones?

A X-rays
B infrared
C ultraviolet
D microwaves

2. Endoscopes contain optical fibres which transmit light round curves using

A magnifying mirrors
B microwave energies
C total internal refraction
D total internal reflection

3. Pregnant women have their fetus scanned using

A infrared waves
B ultrasound waves
C ultraviolet waves
D X-rays

4. Which of these could be a longitudinal wave?

A a microwave
B a seismic wave
C an X-ray
D an ultraviolet wave

Galaxies

A galaxy is a group of stars.

5. Our galaxy is called

A the Solar System
B the Milky Way
C the Universe
D the asteroids

6. Which of these is bigger than our galaxy?

A the Universe
B the asteroids
C the Moon
D the Sun

7. The waves that travel between galaxies must be

A transverse
B longitudinal
C both longitudinal and transverse waves
D sound waves

8. Which of these is true for visible light and radio waves as they travel between galaxies?

A Light travels slower than radio waves
B Light always travels faster than radio waves
C Light and radio waves travel at the same speed
D Light sometimes travels faster than radio waves

9. The distance between the Earth and the Sun is 150 000 000 km.
The average distance between stars in a galaxy is

A less than 150 000 000 km
B between 150 000 000 km and 200 000 000 km
C between 200 000 000 km and 250 000 000 km
D more than 250 000 000 km

10. Which of these is true?

A People have always known that galaxies exist
B A galaxy is an imaginary pattern of a few stars in the sky
C A high speed collision between two galaxies caused the Big Bang
D People once thought that some galaxies were just a single star

Mobile phones

Some people say mobile phones are a danger to health.

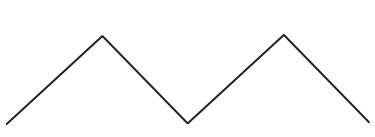
11. The radiation used in mobile phones is thought to be dangerous because it can be

A reflected by the brain
B refracted by the brain
C absorbed by the brain
D transmitted by the brain

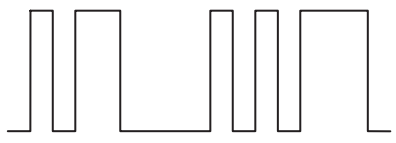
12. Mobile phones use

A microwaves
B seismic waves
C ultrasound radiation
D ultraviolet radiation

13. Mobile phones use digital signals.
Which of these is a digital signal?



A



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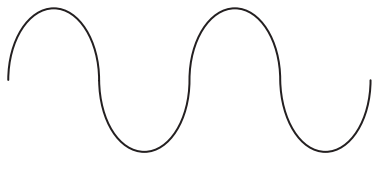

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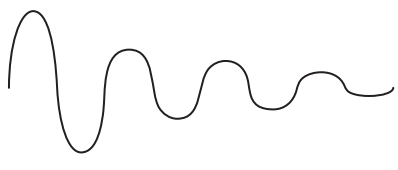


D

Stars

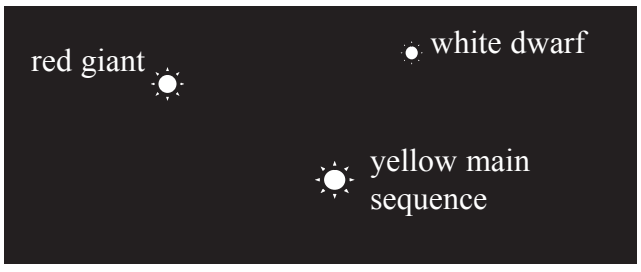
14. Most scientists think that all stellar material originally came from

A a black hole
B outer space
C the Big Bang
D a white dwarf

15. A star which is much more massive than our Sun could become

A a nebula
B a red dwarf
C a neutron star
D a white hole

16. The photograph shows three stars in the sky which have masses about the same as our Sun.



The white dwarf star could become

A blue
B red
C yellow
D black

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.

About the Sun

17. People have always studied stars using

A radio waves
B visible light waves
C gamma waves
D microwaves

Use this information to answer questions 18 and 19.

William Herschel was worried about the harmful effects of the Sun's rays.

Herschel

- found that part of the spectrum gave a lot of light but little heat
- found that other parts gave a lot of heat but little light
- noticed an increasing trend in the heating effects from violet to red
- investigated whether the trend continued further
- found that just outside the visible region the heating effect was even greater

He had discovered a new invisible type of radiation.

18. Herschel discovered invisible radiation because he

A investigated various colours of light
B noticed that the heating effects were not equally divided
C noticed a trend in the effects of different colours
D investigated to see if the trend continued further

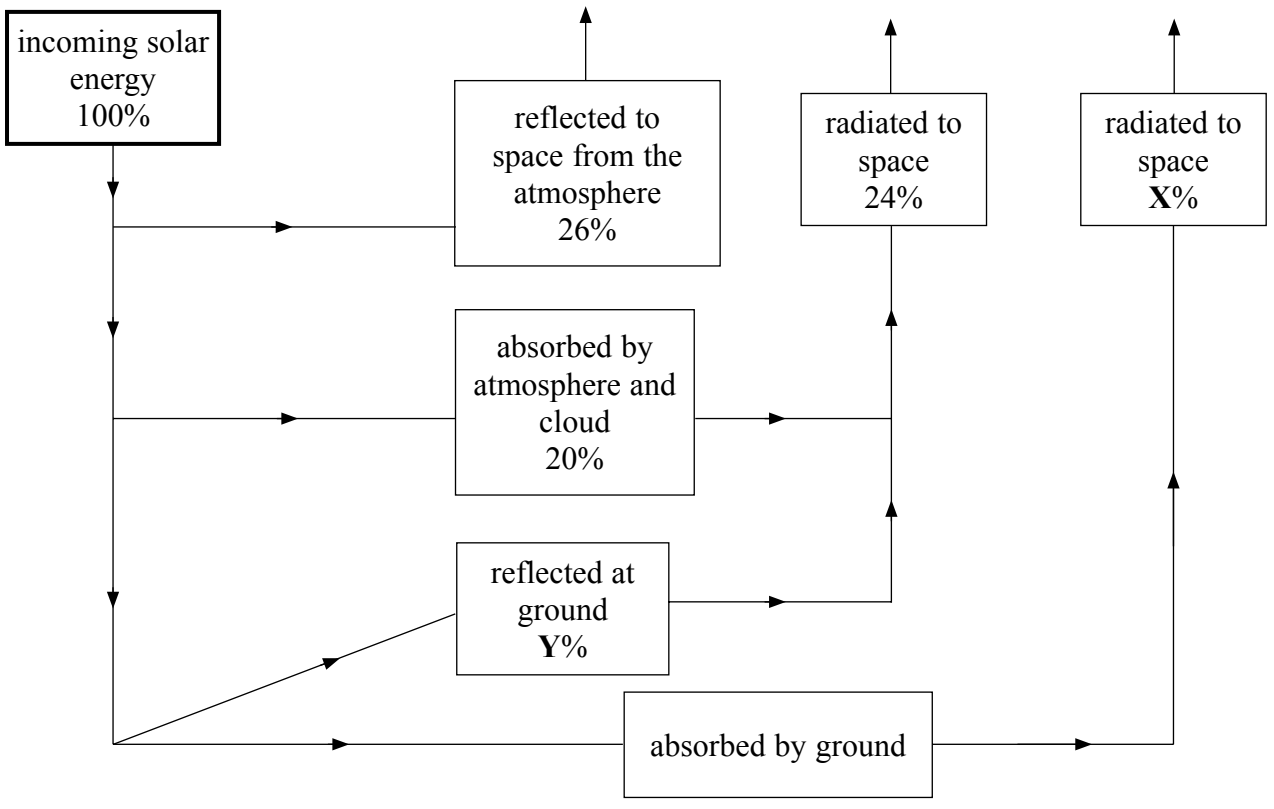
19. Which of these did Herschel discover?

A microwaves
B infrared waves
C ultrasound waves
D X-ray waves

Radiation from Space

Use this information to answer questions 20 and 21.

The diagram shows what happens to solar energy striking the Earth's upper atmosphere.



20. The Earth generally sends to space the same amount of energy that it receives.
This means its temperature stays constant.
Under these conditions, what is the value of **X** (the percentage radiated to space from the ground)?

A 50
B 54
C 74
D 100

21. The percentage of energy reflected at the ground (**Y**%) is

A 4%
B 50%
C 70%
D 100%

Life and living

Use this information to help you answer questions 22 and 23.

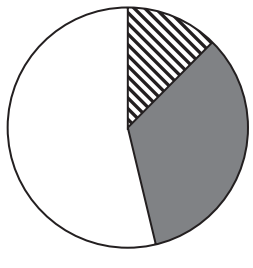
100 people were asked “What do you think unidentified flying objects (UFOs) are?”.
The table gives the results.

answers	number
wrong identification of a common object	36
people telling lies	58
alien spacecraft	11

22. Why does the number of answers **not** add up to 100?

A Surveys are always less than 100%
B Only one answer is bigger than 50
C Some people gave more than one answer
D Some people gave a wrong answer

23. Alan drew this chart of the results



Which of the keys below is correct?

A

- people telling lies
- wrong identification of a common object
- alien spacecraft

B

- alien spacecraft
- people telling lies
- wrong identification of a common object

C

- people telling lies
- alien spacecraft
- wrong identification of a common object

D

- wrong identification of a common object
- people telling lies
- alien spacecraft

24. John and Anne discuss water and the possibility of life on another planet.

John: Life as we know it is certain if there is liquid water there.

Anne: Life as we know it is impossible if there is no liquid water there.

Who is correct?

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

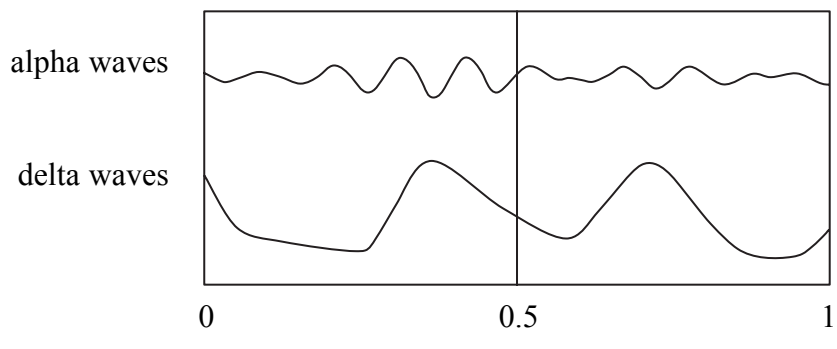
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

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.

Brain waves

The diagram shows two types of brain wave.



25. Which row of the table correctly compares alpha and delta waves?

	the amplitude of alpha is	**the frequency of alpha is**
A	smaller	higher
B	larger	higher
C	smaller	lower
D	larger	lower

26. The frequency of alpha waves is about

A 0.1 Hz
B 1 Hz
C 10 Hz
D 100 Hz

Lift off

The picture shows a space shuttle lifting off.

27. The thrust from the rocket engine is caused by hot gases.
Which row of the table correctly explains this thrust after lift-off?

	the rocket pushes	**the hot gases push**
A	on the Earth	on the rocket
B	on the gases	on the Earth
C	on the Earth	on the Earth
D	on the gases	on the rocket

28. force = mass × acceleration

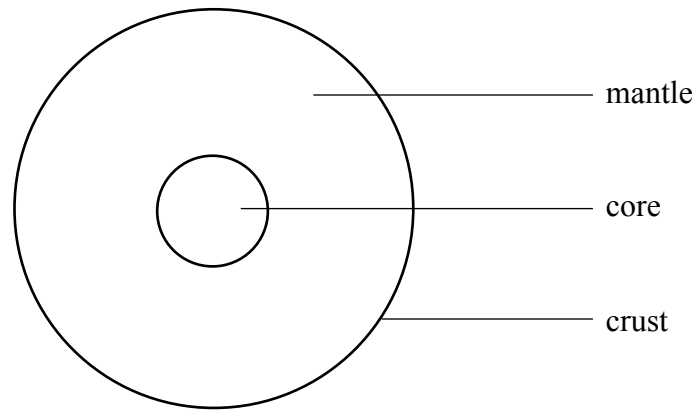
Which of these is the equation used to calculate the acceleration of the rocket at lift off ?

A $W = T + ma$
B $T - W = ma$
C $T = W - ma$
D $W - T = ma$

key
m mass of rocket
W weight of rocket
T thrust from the rocket engine
a acceleration of rocket

Down to Earth

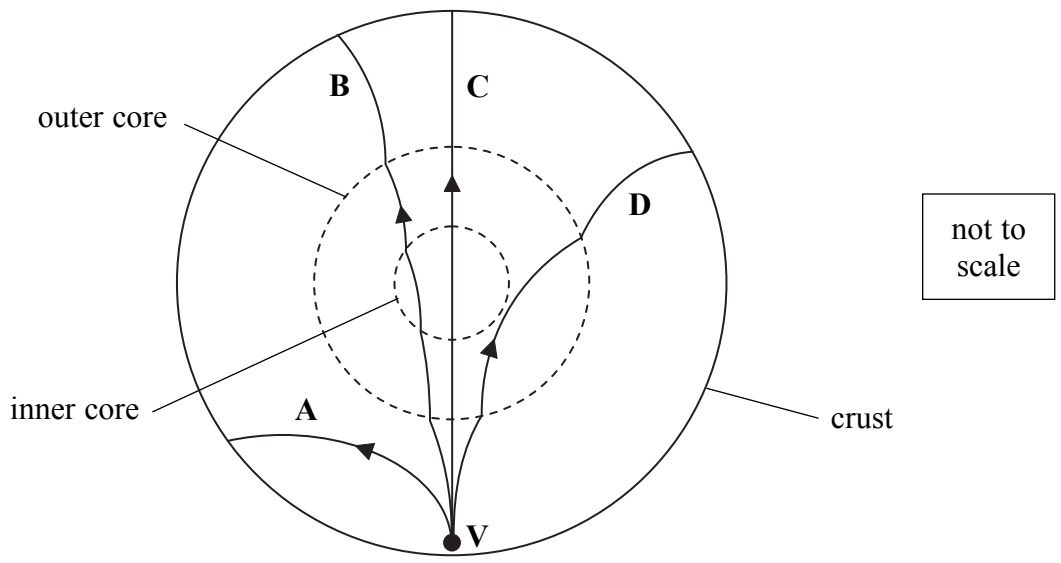
People study the inside of the Earth using earthquakes.



29. Through which parts of the Earth do longitudinal (P) waves travel?

A core only
B crust and mantle only
C mantle and core only
D crust, mantle and core

30. The diagram shows some waves passing through the Earth from an earthquake at **V**.



Which of the paths shown can be taken by transverse waves?

31. speed = frequency × wavelength

An earthquake wave has a wavelength of 3 m when it travels at 12 km/s.
What is its frequency?

A 4 Hz
B 36 Hz
C 4 000 Hz
D 36 000 Hz

32. speed = distance / time

A seismic wave travels vertically downwards from the Earth's surface to the boundary between the mantle and the outer core.
The reflected wave is detected after 1000 s.
The wave's average speed is 6 km/s.
How deep is the mantle outer core boundary?

A (1000 × 6) km

B $\left[\frac{1000 \times 6}{2}\right]$ km

C $\left[\frac{1000 \times 2}{6}\right]$ km

D $\frac{1000}{6}$ km

33. Many seismic waves follow curved paths because

A their speed remains constant
B their speed changes
C they are longitudinal
D they are transverse

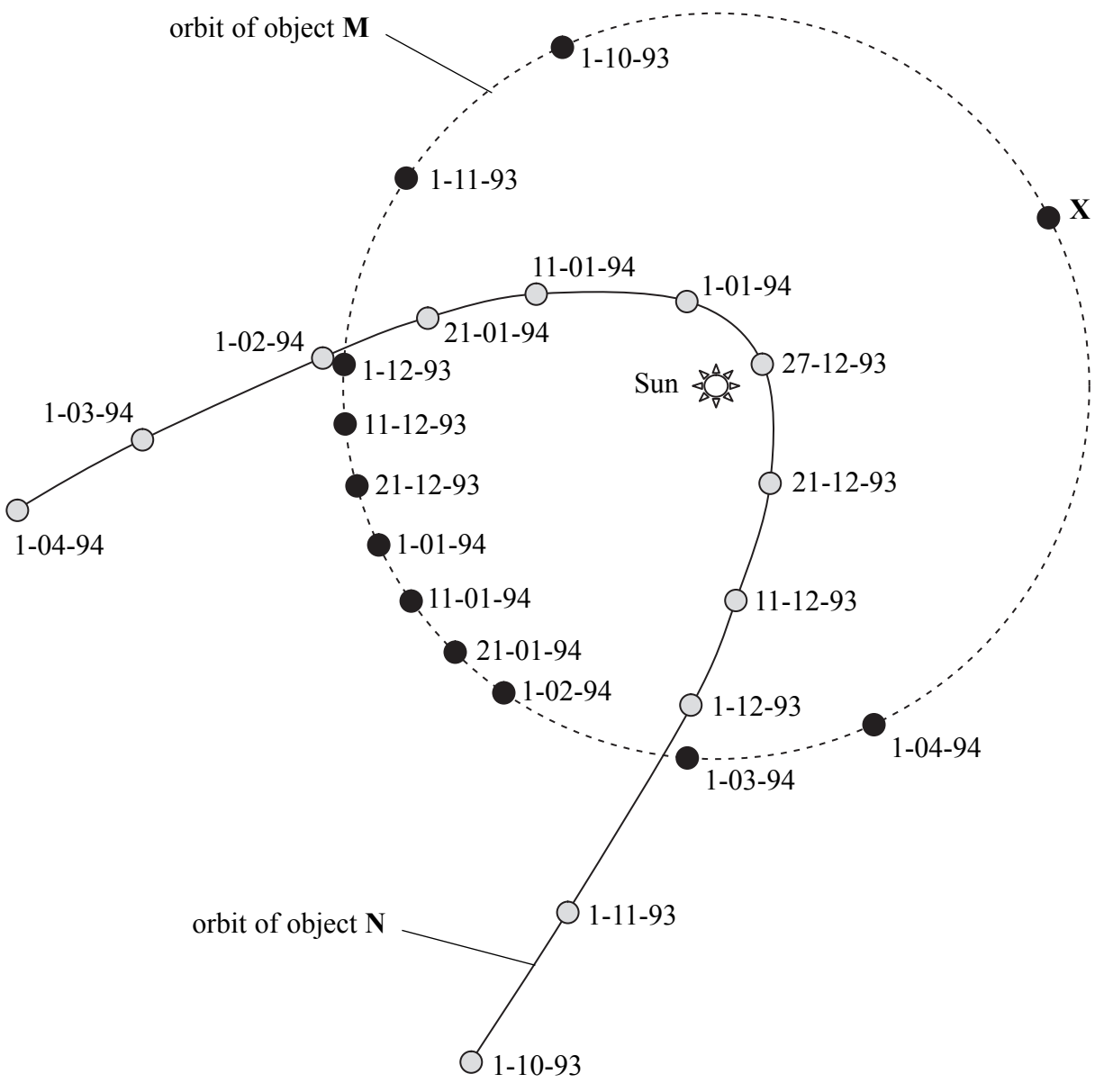
34. It is difficult to predict earthquakes because

A they often occur in remote places
B new rock is constantly being formed
C scientists do not have enough data about the structure of the Earth
D earthquakes often happen at the boundary between mantle and core

Part of the Solar System

Use this information to answer questions 35 to 40.

Two objects, **M** and **N**, orbit the Sun.
The diagram shows their positions on various dates in 1993 and 1994.



35. The two objects **M** and **N** could be

A a planet and a comet
B an asteroid and a planet
C an asteroid and a moon
D a comet and a star

36. At what date was **M** at position **X**?

A 1-07-93
B 1-05-94
C 1-09-94
D 27-12-94

37. On which of these dates were **M** and **N** closest together?

A 1-12-93
B 21-12-93
C 11-01-94
D 1-02-94

38. Which of these is correct?

A **N** moves slower than **M** when **N** is nearest the Sun
B **M** increases in speed in December
C **M** moves fastest when it is nearest **N**
D **N** moves fastest when it is nearest the Sun

39. John wanted to show changes in the speed of object **N**.
He would illustrate the changes best by showing its orbit

A by a dot every month
B by a dot every week
C by a dot every hour
D by a continuous line

40. Which row of the table is correct?

	temperatures will change most on	**because its distance from the Sun**
A	**M**	is constant
B	**N**	is constant
C	**M**	changes
D	**N**	changes

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

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