

Surname	Initial(s)
Signature	

Paper Reference(s)

5010

Edexcel GCSE

Science

Physics P1b

Topic 11: Now You See it, Now You Don't

Topic 12: Space and its Mysteries

Foundation and Higher Tiers

Monday 25 June 2007 – 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.

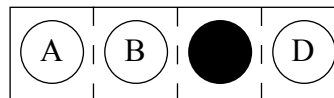
Before the test begins:

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.**

Jim's kitchen

1. Jim's electric toaster changes bread into toast using

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

2. Jim has a microwave oven in his kitchen.



Which part of the electromagnetic spectrum, below, represents microwave radiation?

gamma	A	B	visible	C	D	radio
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3. While in the kitchen with his mother, Jim listens to music.
At the same time, his mother listens to the news on the radio.
Both can hear clearly because Jim's mp3 player is

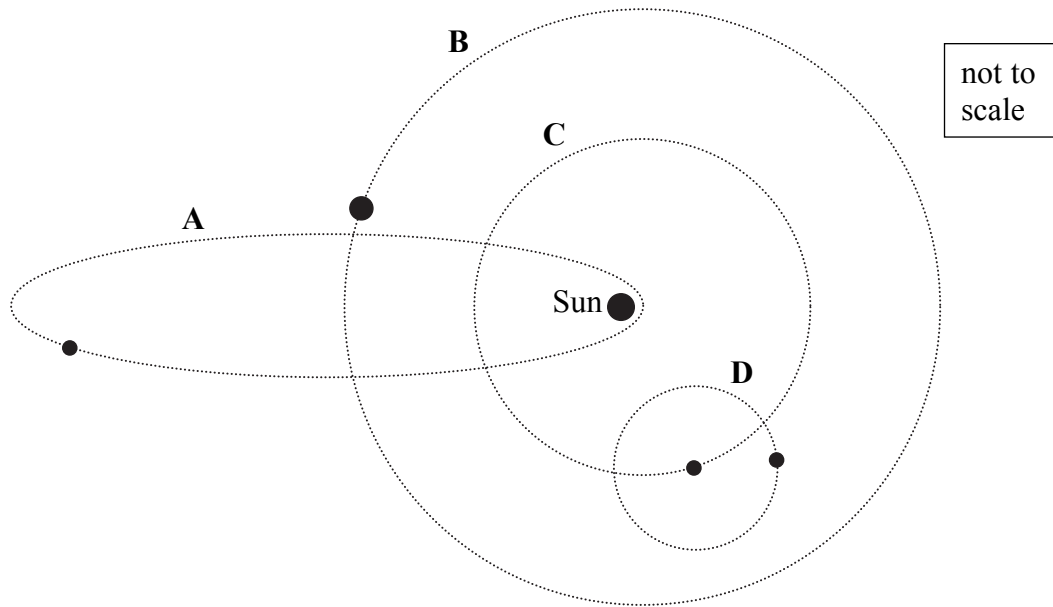
- A low frequency
- B low wavelength
- C connected to earphones
- D digital

4. After Jim has finished in the kitchen he lies on a sun bed for a few minutes.
The sun bed tans him using

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

John's 'Book of Space'

John has a book about space.
In it he sees this picture showing some orbits.

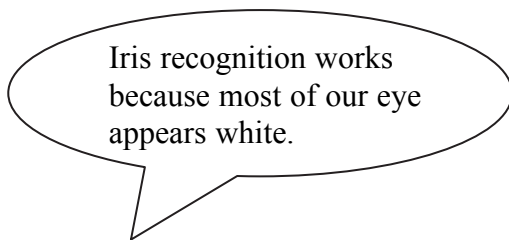


5. Which orbit is that of a comet?
6. The risk of a comet hitting a planet increases
- A if the comet is moving faster
 - B if the planet is bigger
 - C if the comet is cooler
 - D if the planet has no moons
7. John reads about the Milky Way.
The book correctly describes the Milky Way as
- A a solar system
 - B an asteroid
 - C a galaxy
 - D a Universe
8. John reads some information about aliens.
The book correctly states that
- A scientists know aliens exist
 - B scientists know there are no aliens
 - C scientists do not yet know if aliens exist
 - D scientists know they will never find aliens

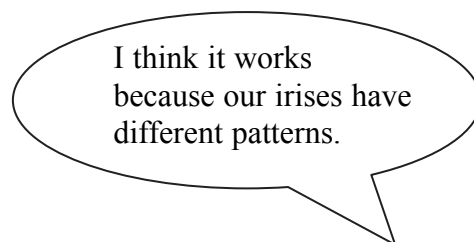
Crime stoppers

Asif and Mary visit the police station. They see some of the methods used to fight crime.

9. First they see how scanning is used to detect forged bank notes. This works because the genuine bank notes have special inks added that
- A reflect ultraviolet rays
 - B reflect X-rays
 - C absorb ultraviolet rays and emit visible light rays
 - D absorb X-rays and emit visible light rays
10. Next they are shown how an alarm is set off when a sensor receives radiation from an intruder. The sensor works because
- A the intruder absorbs infrared radiation
 - B the intruder emits infrared radiation
 - C the intruder absorbs ultraviolet radiation
 - D the intruder emits ultraviolet radiation
11. Asif and Mary discuss iris recognition.



Asif



Mary

Who is correct?

- A Asif only
 - B Mary only
 - C both Asif and Mary
 - D neither
12. Asif and Mary hear the siren on a police car. The sound waves from the siren are
- A longitudinal
 - B transverse
 - C electromagnetic
 - D ultrasonic

Space tourists

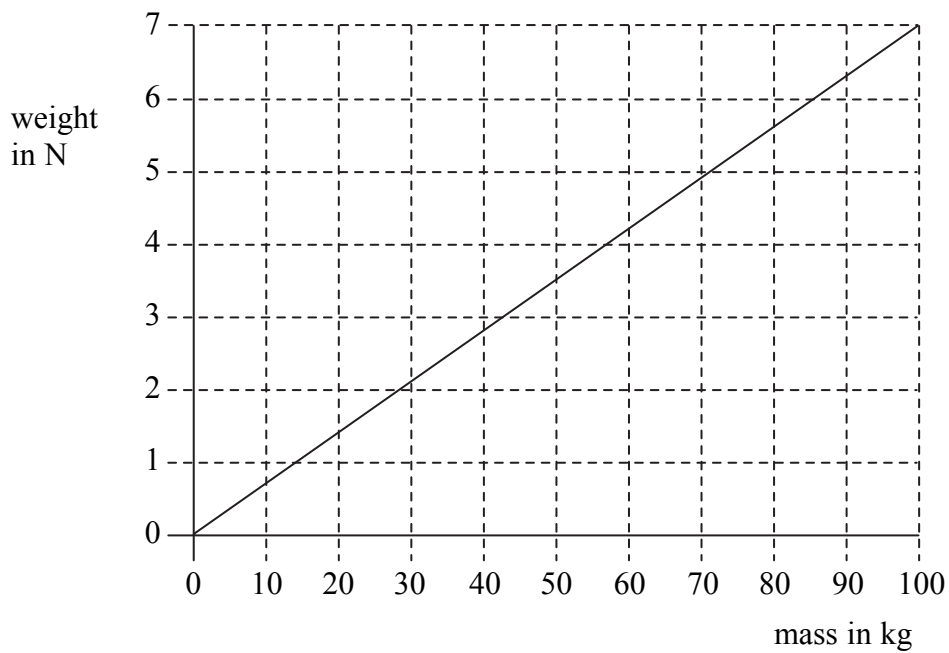
People are now paying several millions of pounds to travel in to space.
They are not scientists but are curious to see what it is like in space.



Source: www.nasa.gov

13. In space the tourists' spacecraft will **not** have
- A a controlled temperature
 - B artificial gravity
 - C a supply of air
 - D a shield against radiation
14. How can the tourists keep their heart muscles strong in space?
- A by avoiding radiation
 - B by exercising regularly
 - C by wearing a space suit
 - D by breathing pure oxygen
15. The tourists may see an asteroid.
An asteroid is in orbit around
- A a star
 - B a planet
 - C a comet
 - D a galaxy

16. The graph shows the weight, on Pluto, of objects of different masses.



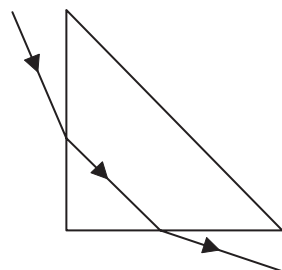
On Pluto, an object of mass 40 kg weighs about

- A 2.8 kg
- B 2.8 N
- C 28 kg
- D 28 N

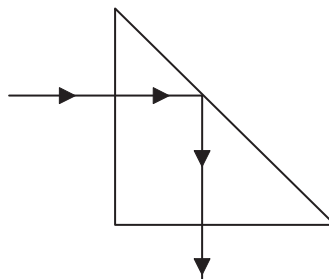
Higher tier candidates start at question 17 and answer questions 17 to 40.
 Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.

Optical fibres

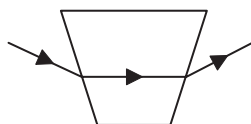
17. In which of these is the light changing direction for the same reason that it does in an optical fibre?



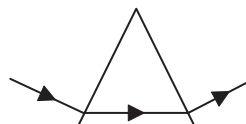
A



B



C



D

18. The name of the process that occurs in the optical fibre is

- A** total internal reflection
- B** total external reflection
- C** total internal refraction
- D** total external refraction

19. The wave passing down the optical fibre is

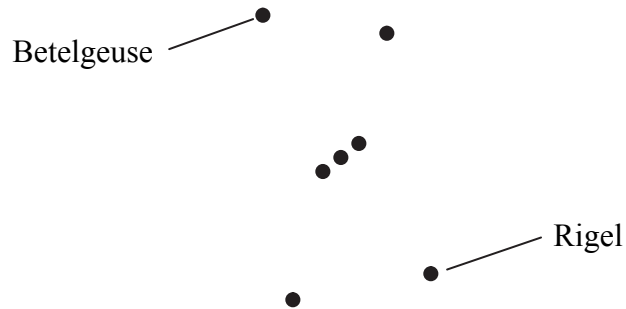
- A** seismic
- B** ultrasonic
- C** transverse
- D** longitudinal

20. Which row of the table is correct for optical fibres?

	the fibres	the light can transfer
A	must be kept in a straight line	energy and information over long distances
B	can be bent around a corner	mass and energy over long distances
C	must be kept in a straight line	mass and energy over long distances
D	can be bent around a corner	energy and information over long distances

The constellation Orion

The diagram shows the main stars in the constellation Orion.



This is a group of stars that appear together in the sky and form a pattern.

21. Betelgeuse is a red supergiant star.
Later in its evolution it may become
- A a blue giant
 - B a neutron star
 - C a nebula
 - D a main sequence star
22. The gravitational field strength near Betelgeuse would be measured in
- A N
 - B kg
 - C kg/N
 - D N/kg

Use this information to answer questions 23 and 24.

The table shows the distances between four of the stars in Orion and the Earth and their relative brightness numbers.

Note: The brighter the star as we see it, the **smaller** the relative brightness number.

name of star	approximate distance from Earth in light years	relative brightness number
Rigel	775	0.1
Betelgeuse	500	0.4
Bellatrix	240	1.6
Mintaka	800	2.2

23. Which of these statements is correct?

- A Mintaka looks brighter than Bellatrix
- B Rigel is furthest from Earth
- C Betelgeuse looks brighter than the most distant star mentioned in the table
- D The star which is 500 light years from us has a relative brightness number of 2.2

24. Four students made comments about the data.

The brighter the star we see from Earth, the nearer it is.

Anne

The star which is closest to us appears brightest.

Boris

Doubling the distance halves the brightness.

Carlos

The star which is furthest from us appears dimmest.

Dilys

Which student drew a correct conclusion from this data?

- A Anne
- B Boris
- C Carlos
- D Dilys

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.**

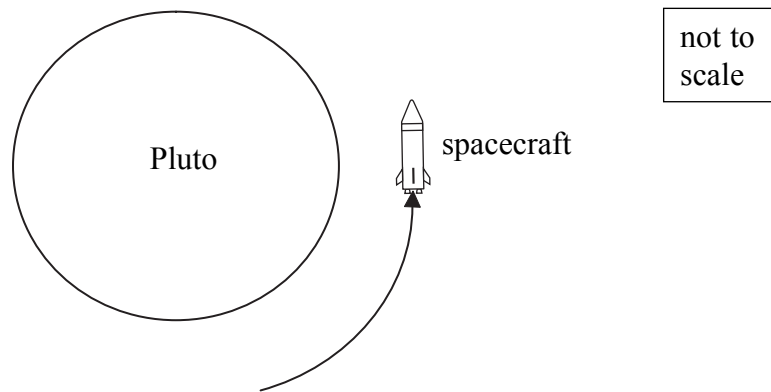
25. Use the diagram on page 8 and the table on page 9 to decide which of these conclusions is correct.
- A Rigel must be exactly 25 light years from Mintaka
 - B Rigel cannot be less than 25 light years from Mintaka
 - C Rigel might be less than 25 light years from Mintaka
 - D Rigel cannot be more than 25 light years from Mintaka
26. Carlos checked several sites on the Internet to find the distance between Earth and Rigel. He found values between 775 light years and 1400 light years. The values are different because
- A they were made at different times
 - B Rigel is gradually moving away from Earth
 - C the Internet is not reliable
 - D scientists are not measuring carefully enough
27. A star emits waves of visible, infrared and ultraviolet radiation. In what order would you expect the waves to arrive at the Earth?
- A visible before the infrared
 - B infrared before ultraviolet
 - C ultraviolet before visible
 - D all at the same time
28. speed = frequency \times wavelength
- Dilys measures the wavelength λ of one frequency f of light from a star. Which of these relationships should Dilys use to find the frequency of this wave?
- A $v = \frac{f}{\lambda}$
 - B $v = \frac{\lambda}{f}$
 - C $f = \frac{v}{\lambda}$
 - D $f = \frac{\lambda}{v}$

Around Pluto

29. A spacecraft has a mass of 20 000 kg and a weight of 200 000 N. It is launched from a base on Earth. At take-off, the rocket's thrust is 1 000 000 N. What is the acceleration at take-off?

- A $\frac{800\,000}{200\,000} \text{ m/s}^2$
 B $\frac{1\,000\,000}{200\,000} \text{ m/s}^2$
 C $\frac{800\,000}{20\,000} \text{ m/s}^2$
 D $\frac{1\,000\,000}{20\,000} \text{ m/s}^2$

30. The diagram shows the spacecraft's direction of movement after it has gone into orbit around Pluto.



For this position of the spacecraft, which row of the table is correct if it is to slow down?

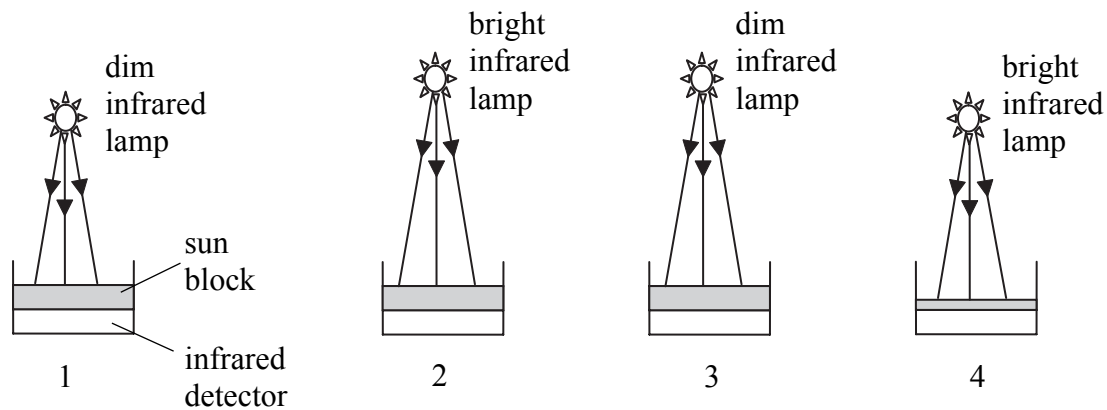
	direction of force of gravity	direction of gases from spacecraft
A	↓	↑
B	←	↓
C	↓	↓
D	←	↑

31. Cameras inside the spacecraft photograph Pluto.
Pluto was originally called a planet.
Now it has been renamed as only one of several Dwarf Planets.
A change of name of this importance could only be decided by
- A the discoverer
 - B the Astronomer Royal
 - C the Members of Parliament
 - D a conference of astronomers

Testing sun block

Use this information to answer questions 32, 33 and 34.

Mike has been reading about skin cancer.
The book says that a thick layer of sun block cream (sunscreen) helps to prevent skin cancer.
He decides to investigate a sun block cream.
He sets up the four arrangements shown.



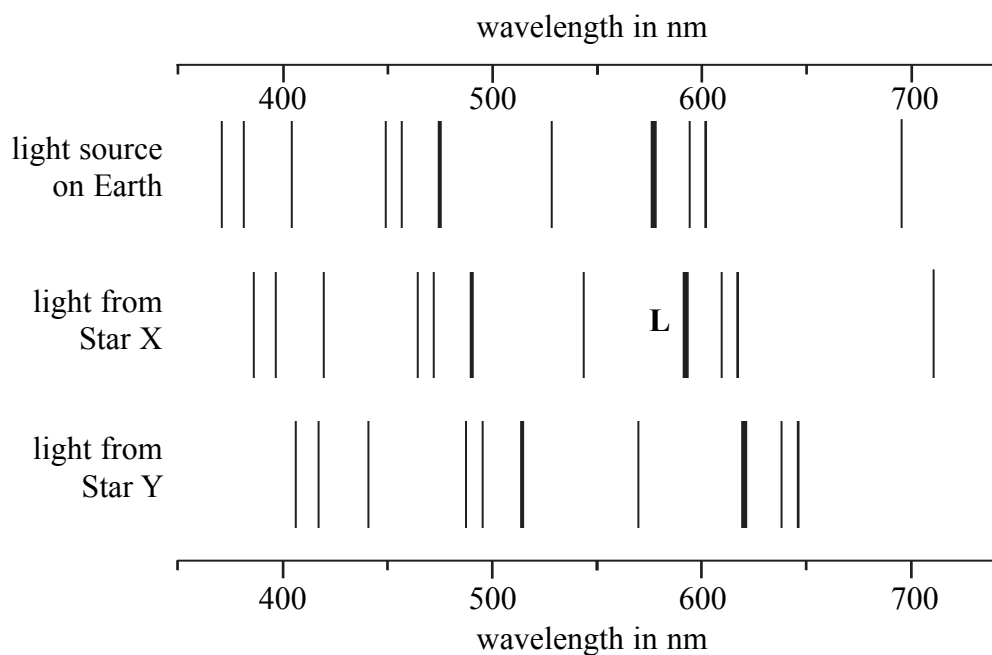
32. Which arrangement should give the biggest reading on the infrared detector?
- A 1
 - B 2
 - C 3
 - D 4
33. Which pair of arrangements would give information about the effect of distance from the lamp?
- A 1 and 2
 - B 1 and 3
 - C 2 and 4
 - D 3 and 4

34. Mike's investigation is not valid because
- A he uses two different distances
 - B he uses two different thicknesses
 - C the radiation from the lamps has the wrong frequency
 - D too many variables are changed in the experiment

Starlight

Use this information to answer questions 35, 36 and 37.

The diagrams show the line spectra from a light source on Earth and from two stars.
(Note: 1 nanometre (nm) is the same as 1×10^{-9} m)



35. The wavelength of the line marked **L** in the spectrum from Star X is about
- A 5.9×10^{-7} m
 - B 5.9×10^{-9} m
 - C 6.1×10^{-7} m
 - D 6.1×10^{-9} m
36. Astronomers cannot measure the wavelength of line marked **L** very accurately because
- A the line is moving
 - B the line is so thick
 - C the star is speeding up
 - D the star is slowing down

37. Two students, Ifor and Mary, drew a conclusion from this data.

Star X is moving away from Star Y but towards the Earth.

Ifor

Star Y is moving away from Star X and away from the Earth.

Mary

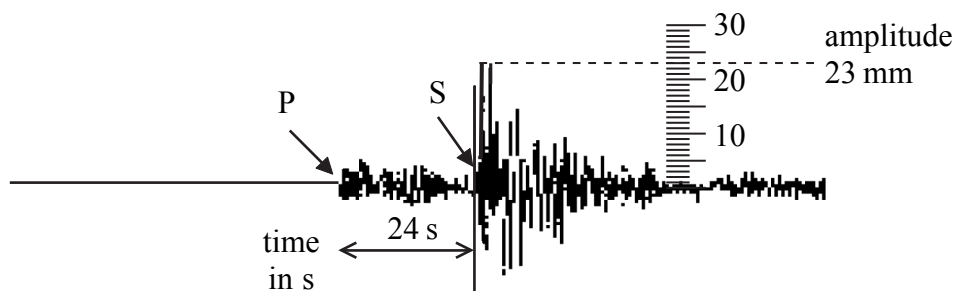
Who is correct?

- A Ifor only
- B Mary only
- C both Ifor and Mary
- D neither

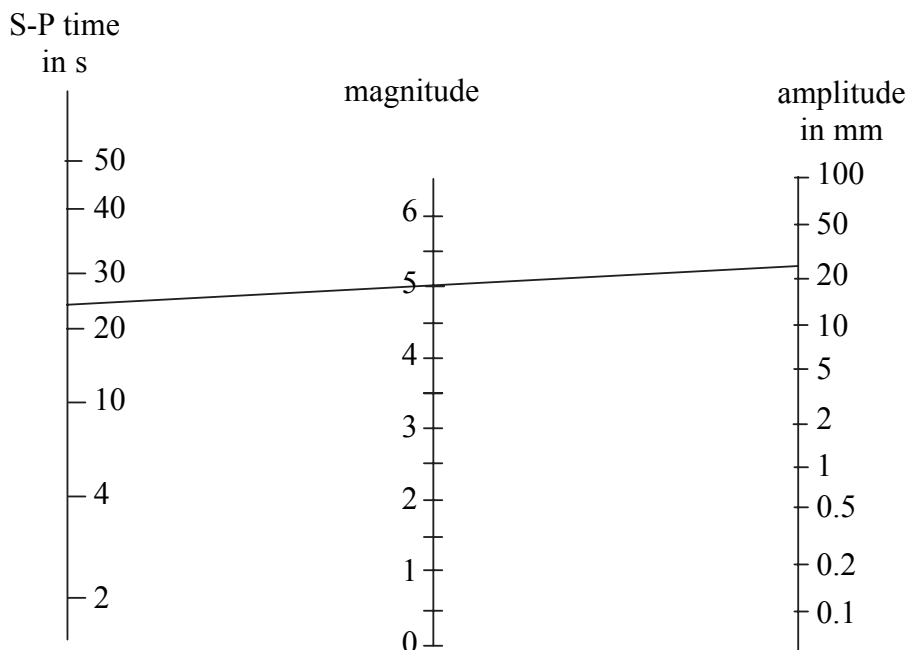
Magnitude of an earthquake

Use this information to answer questions 38, 39 and 40.

The diagram shows the P and S waves received at a seismic research station. The amplitude of the S wave is 23 mm and the time between the arrival of P and S waves (S-P time) is 24 s.

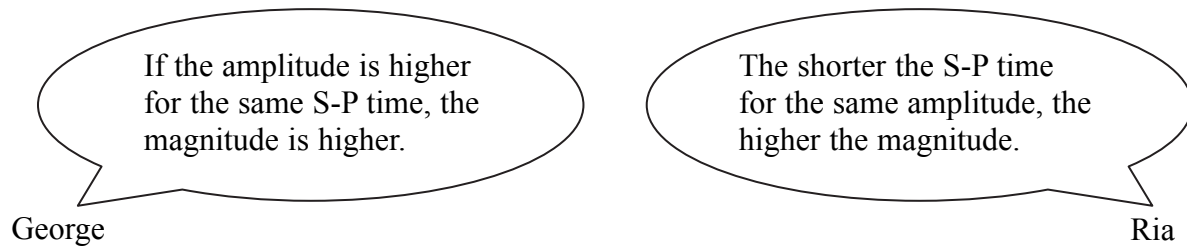


The chart below shows how to find the magnitude of the earthquake on the Richter scale. The S-P time value and the maximum S wave amplitude are joined. Then the magnitude is read from the middle scale. In this example, the magnitude is 5.



38. The time between the arrival of the first P wave and the first S wave at the detector depends on
- A the time between the P and S waves being sent out
 - B the distance between the places where the P and S waves are sent out
 - C the distance between the earthquake and the detector
 - D the time it takes the scientists to travel from detector to the earthquake

39. The seismologists were discussing this.



Who is correct?

- A George only
 - B Ria only
 - C both George and Ria
 - D neither
40. The magnitude of an earthquake which has an S-P time of 30 s and an amplitude of 5 mm is about
- A 3.8
 - B 4.5
 - C 5.2
 - D 5.5

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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