

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 20 November 2009 – 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.

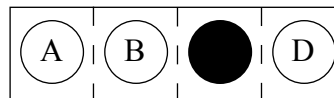
Before the test begins:

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.**

Waves

1. Which of these is used to detect forged banknotes?

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

2. Optical fibres can be used instead of wires.
Optical fibres are better because

- A signals can travel slower
- B much more information can be sent
- C signals can be sent through space
- D signals of lower frequency can be sent

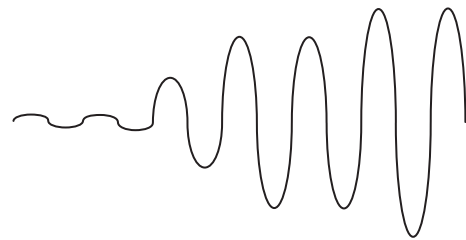
3. The temperature of different parts of the body can be monitored using scanning by

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

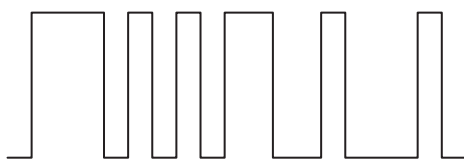
4. Which of these shows a digital signal?



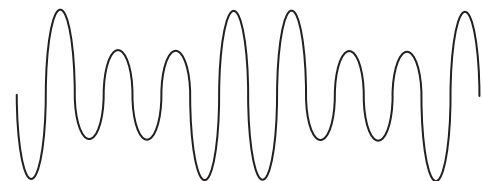
A



B



C

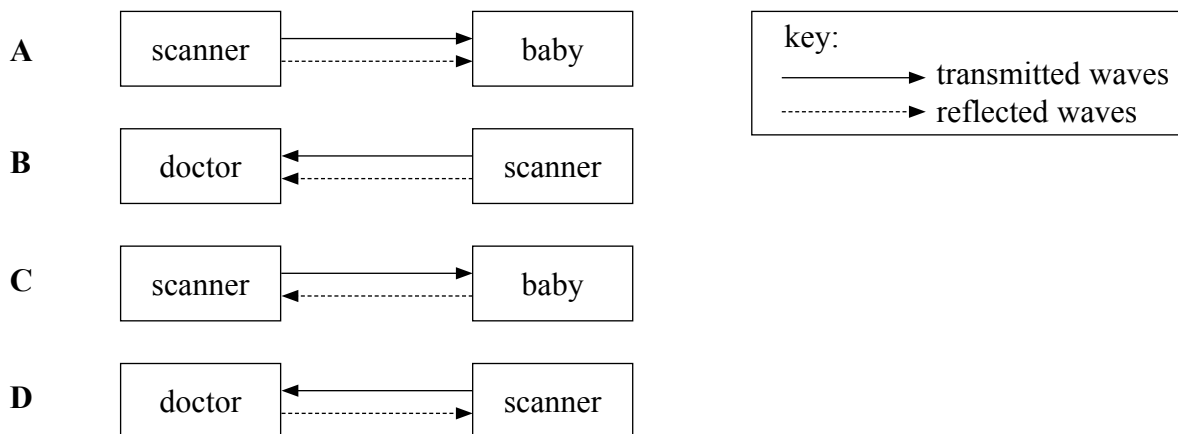


D

5. Digital signals are better than analogue signals for sending information.
This is because

- A digital signals have a higher frequency
- B digital signals are less affected by noise
- C digital signals travel faster through space
- D digital signals use newer technology

6. A doctor scans the fetus inside a pregnant woman.
Which of these best shows the movement of the waves?



7. A tsunami is a giant water wave.
Which of these is correct for a tsunami?

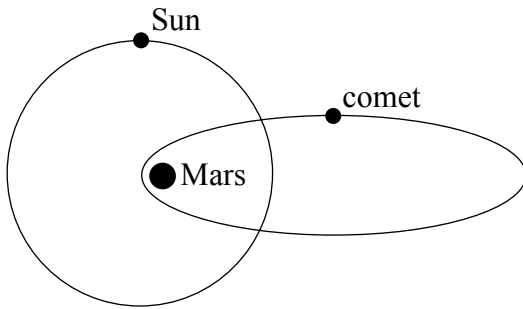
- A wave speed is measured in seconds
- B wave frequency is measured in seconds
- C wave amplitude is measured in metres
- D wavelength is measured in Hertz

8. Which of these waves is **always** transverse?

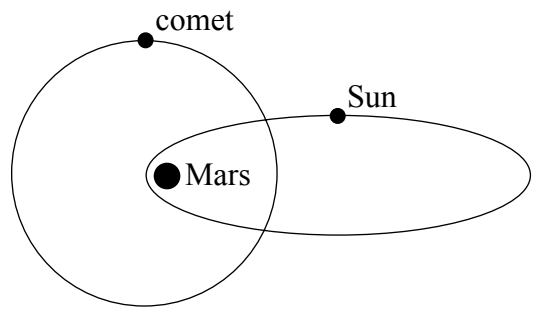
- A sound waves
- B electromagnetic waves
- C seismic waves
- D ultrasound waves

Life on planet Mars (and elsewhere)

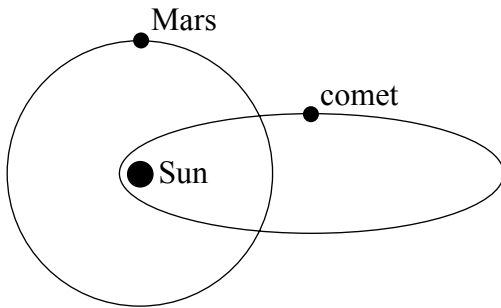
9. Which of these best shows the orbits of Mars and a comet?



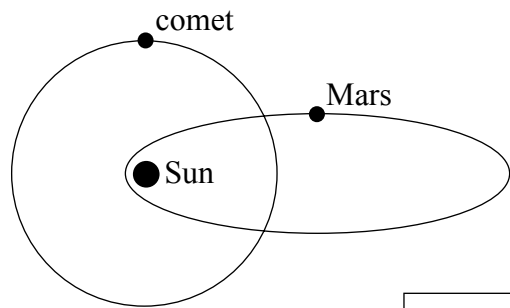
A



B



C



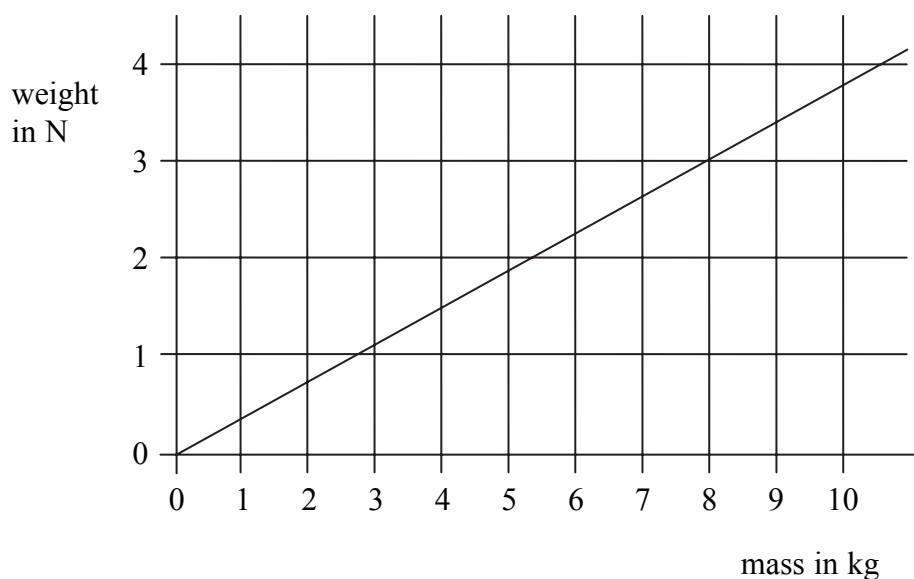
D

not to
scale

10. A space probe falls from space through the atmosphere of Mars. Which of these could stay the same as the probe falls?

- A the mass of the probe
- B the gravitational potential energy
- C the temperature of probe
- D the atmospheric pressure on the probe

11. The graph shows how the mass and weight of objects on Mars are related.



Which row of the table is correct?

	mass	weight
A	3 N	8 kg
B	3 kg	8 N
C	8 N	3 kg
D	8 kg	3 N

12. A rocket takes off towards Mars.
Which row of the table is correct one minute after lift off?

	Does the rocket have kinetic energy?	Does the rocket have gravitational potential energy?
A	yes	no
B	yes	yes
C	no	no
D	no	yes

13. Which of these is the unit of gravitational field strength?

- A** N
- B** kg
- C** kg/N
- D** N/kg

Use this information to answer questions 14 to 16.

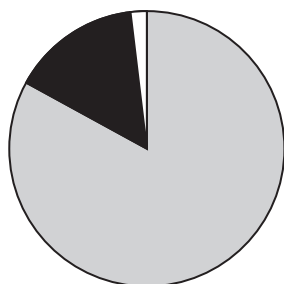
The table gives the percentages of the three main gases in the atmosphere of four planets.

planet	hydrogen	helium	methane
Jupiter	90	10	0.070
Saturn	96	3	0.4
Uranus	83	15	2.0
Neptune	80	19	1.5

14. The percentage of helium on Saturn is

- A 96
- B 10
- C 3
- D 0.4

15. The data for Uranus as a pie chart looks like this



Which of these is the correct key?

- helium
 - hydrogen
 - methane
- A**

- helium
 - methane
 - hydrogen
- B**

- hydrogen
 - helium
 - methane
- C**

- hydrogen
 - methane
 - helium
- D**

16. Which of these is **not** needed by astronauts on long space flights?

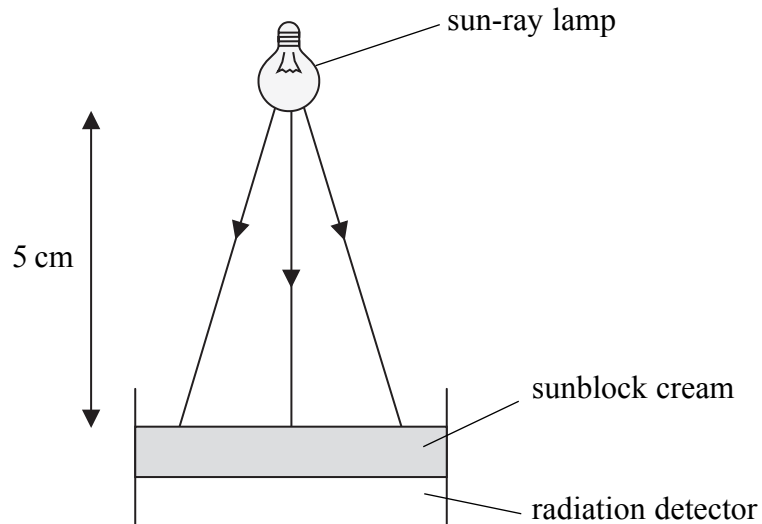
- A oxygen
- B carbon dioxide
- C radiation shield
- D exercise machine

**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.**

Investigating waves

Mehta and Carlos investigate how four different sunblock creams protect the skin by absorbing radiation.

Their apparatus is shown below.



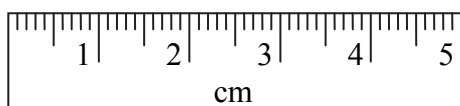
Their plan is

- to pass radiation through different types of sunblock cream
- to use the same depth of each cream
- to keep a constant distance between the lamp and the surface of the cream
- to use the same lamp at the same brightness
- to detect the amount of radiation passing through the cream

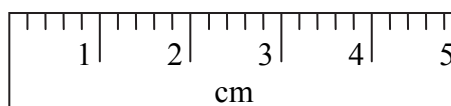
17. The radiation from the Sun that causes skin cancer is

- A ultrasound
- B ultraviolet
- C infrared
- D microwave

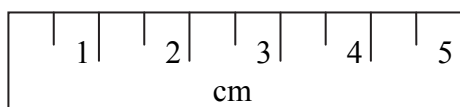
18. Which of these rulers would be best for measuring the depth of the sunblock cream?



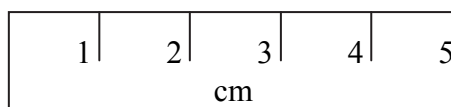
A



B



C



D

19. Which of these is the independent variable in this experiment?

- A the type of cream
- B the distance between lamp and cream
- C the brightness of the lamp
- D the depth of the cream

20. Mehta and Carlos discuss the validity of their experiment.

The experiment should be valid because we will average all the readings.

Mehta

Keeping all the control variables constant helps to make the experiment valid.

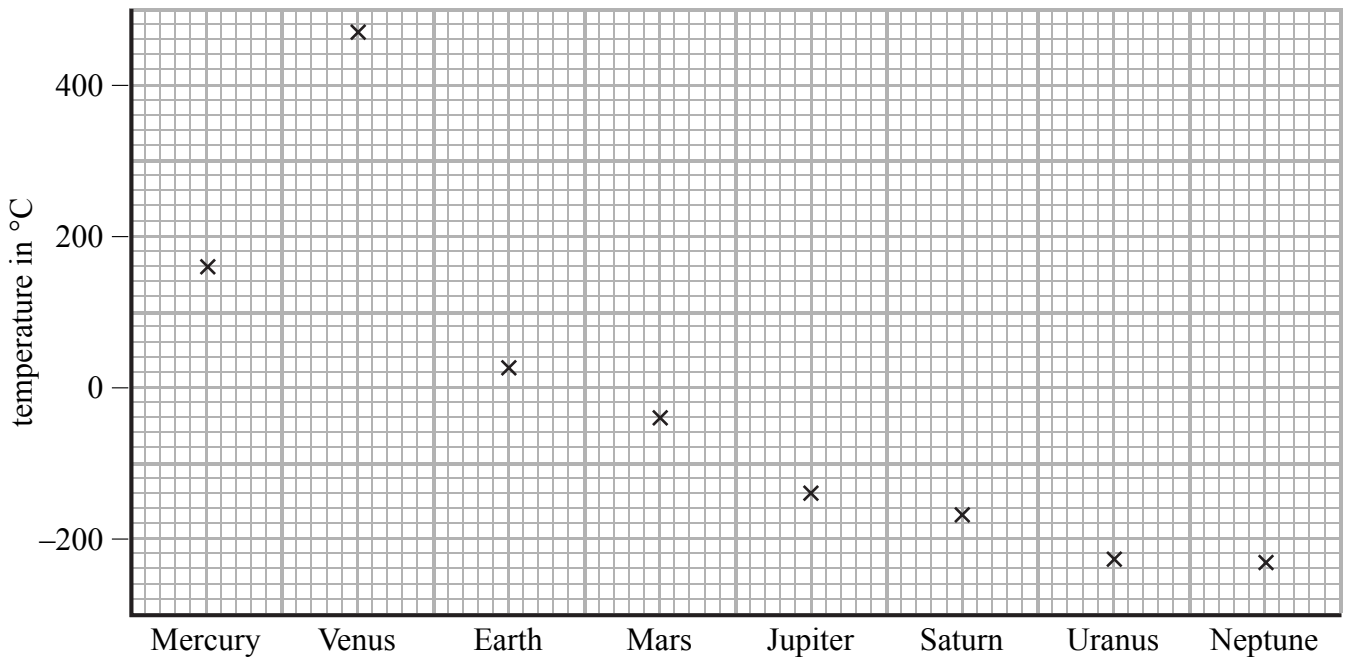
Carlos

Who is correct?

- A Mehta only
- B Carlos only
- C both Mehta and Carlos
- D neither

The planets

The chart shows the average temperature on the surface of the planets.
The planets are arranged in order of their distance from the Sun.



21. The average surface temperature of Saturn is about
- A 170°C
 - B 230°C
 - C -170°C
 - D -230°C
22. The temperature of one planet seems anomalous.
Perhaps the temperature shown for **Venus** is wrong.
From the pattern of results, the expected value for Venus would be about
- A -10°C
 - B 90°C
 - C 160°C
 - D 470°C
23. The temperature of one planet seems anomalous.
Perhaps the temperature shown for **Mercury** is wrong.
Assuming the temperature for Venus is correct, the pattern of results shows the expected value for Mercury would be about
- A 100°C
 - B 300°C
 - C 500°C
 - D 700°C

24. A scientist checks the results.
All the temperatures are correct.
Which of these facts explains the low temperature for Mercury?
- A Mercury spins very slowly
 - B Mercury has no atmosphere
 - C Mercury has no surface water
 - D Mercury has no moons

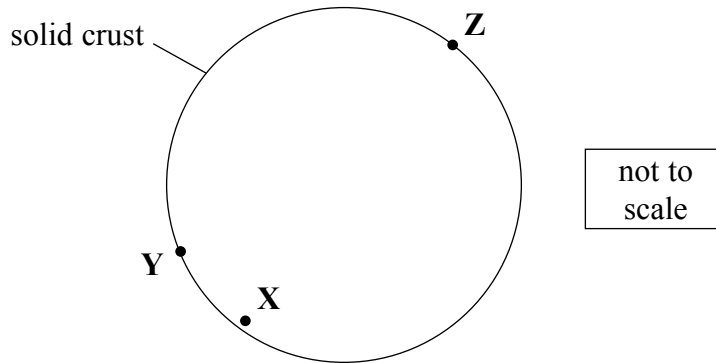
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

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.

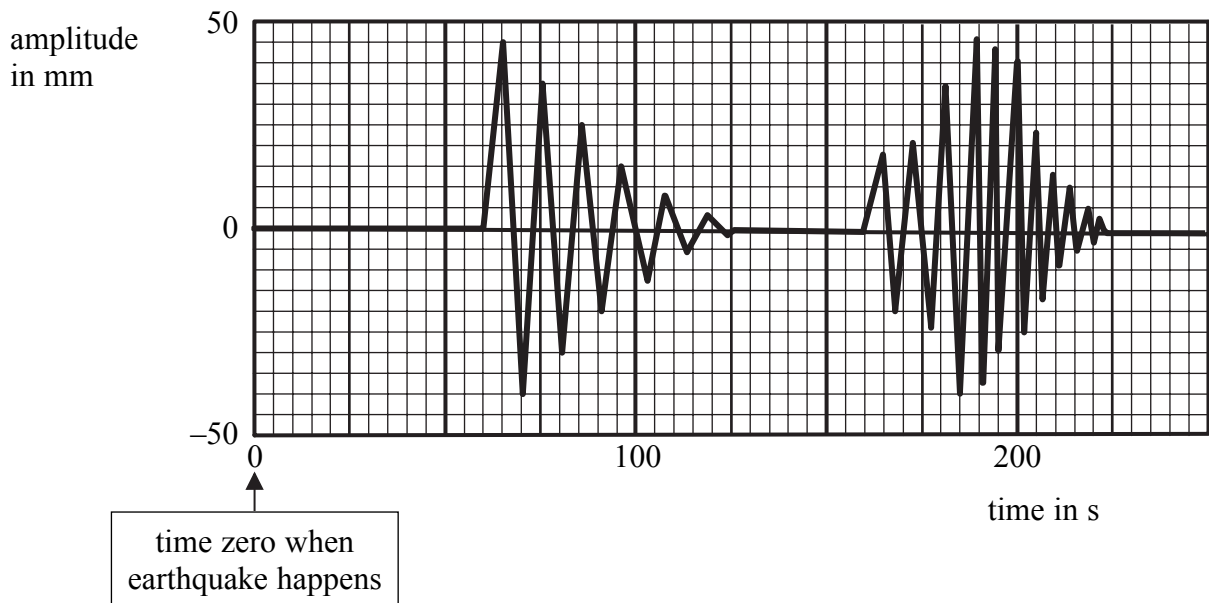
An earthquake

The diagram shows a section through the Earth.



An earthquake happens at point X.

The graph shows a seismometer trace for seismic waves detected at Y.



25. John says that

- only transverse (S) waves should arrive at Y
- only longitudinal (P) waves should arrive at Z

Why is John incorrect?

- A Longitudinal waves should also arrive at Y
- B Transverse waves should **not** arrive at Y
- C Longitudinal waves should **not** arrive at Z
- D Transverse waves should arrive at Z

26. What is the maximum amplitude of the first wave to arrive at Y?

- A 45 mm
- B 60 s
- C 85 mm
- D 125 s

27.

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

The seismometer is 480 km from the site of the earthquake.
What is the fastest possible average speed of the first wave?

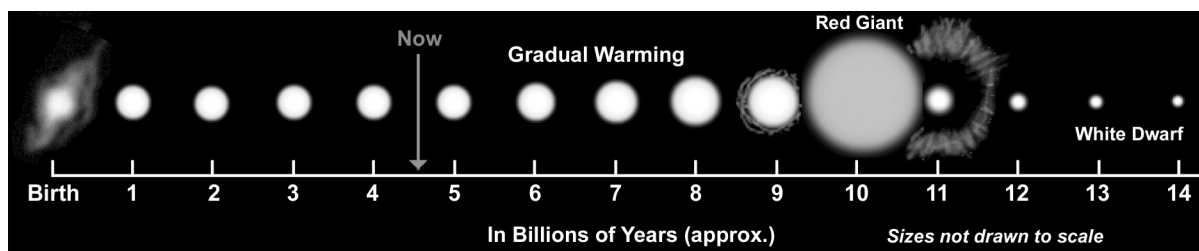
- A 0.008 km/s
- B 8 km/s
- C 28 800 km/s
- D 28 800 000 km/s

28. Point Z is 25 times further from the earthquake than point Y.
Waves from the earthquake, however, take more than 25 times as long to reach point Z.
This is because

- A the primary wave travels faster near the centre of the Earth
- B the primary wave is stopped by the core
- C the primary wave travels slower in liquids than in solids
- D the primary wave does not travel as fast as the secondary wave

Ageing stars

The chart shows stages in the evolution of yellow stars like our Sun.



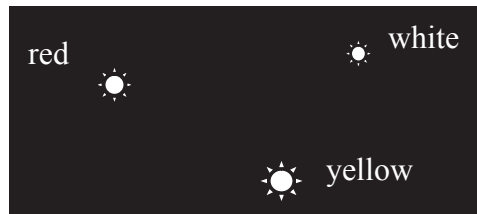
29. In about how many years from now will our Sun become a Red Giant?

- A 5 million years
- B 4.5 billion years
- C 5.0 billion years
- D 9.5 billion years

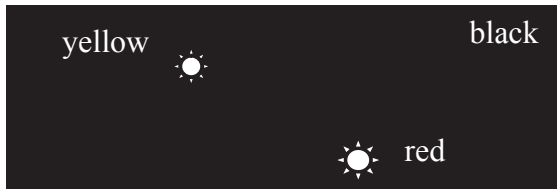
30. A star which is much more massive than our Sun could become

- A a proton star
- B a red dwarf
- C a neutron star
- D a white hole

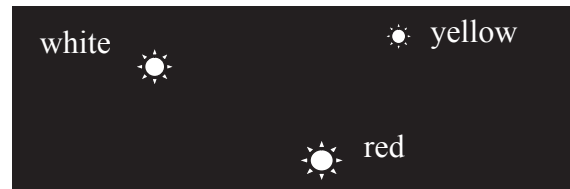
31. Three stars form a pattern in the sky.



Which of these could show the three stars in the future, if the pattern stays the same?



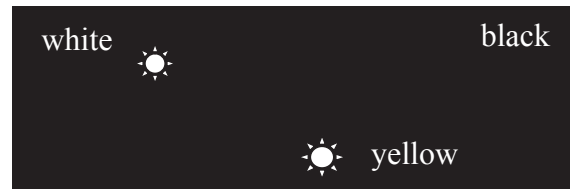
A



B

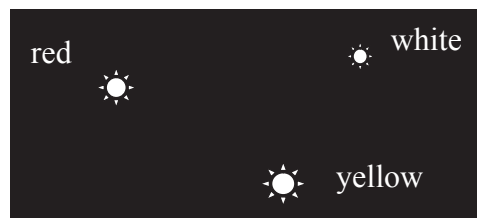


C



D

32. John and Anne discuss how this pattern of stars may change in the future.



The pattern may stay as a triangle but the triangle they make will probably become larger.

John

The pattern may change because the Sun is moving through space towards them.

Anne

Who is correct?

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

T-rays

There is now a camera that can ‘see’ weapons hidden under clothing from 25 metres. It is based on so-called ‘terahertz’, or T-ray, technology.

- The camera does not produce the invisible T-rays – it only receives them
- The camera ‘sees’ a person as a glowing shape
- T-rays can pass through clothing, paper and plastics
- T-rays cannot pass through metal or water

33. The human body produces T-rays.
T-rays are part of the electromagnetic spectrum.
Asif and Ben discuss T-rays.

T-rays travel through space slower than X-rays but faster than radio waves.

Asif

T-rays have a lower frequency than X-rays.

Ben

Who is correct?

- A** Asif only
B Ben only
C both Asif and Ben
D neither
34. The T-ray camera can ‘see’ a metal object because it scans by
- A** transmission
B absorption
C reflection
D refraction

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

The wavelength of T-rays is between 0.1 and 1 mm.
The speed of light is 300 000 000 m/s.
Which of the following is a T-ray frequency?

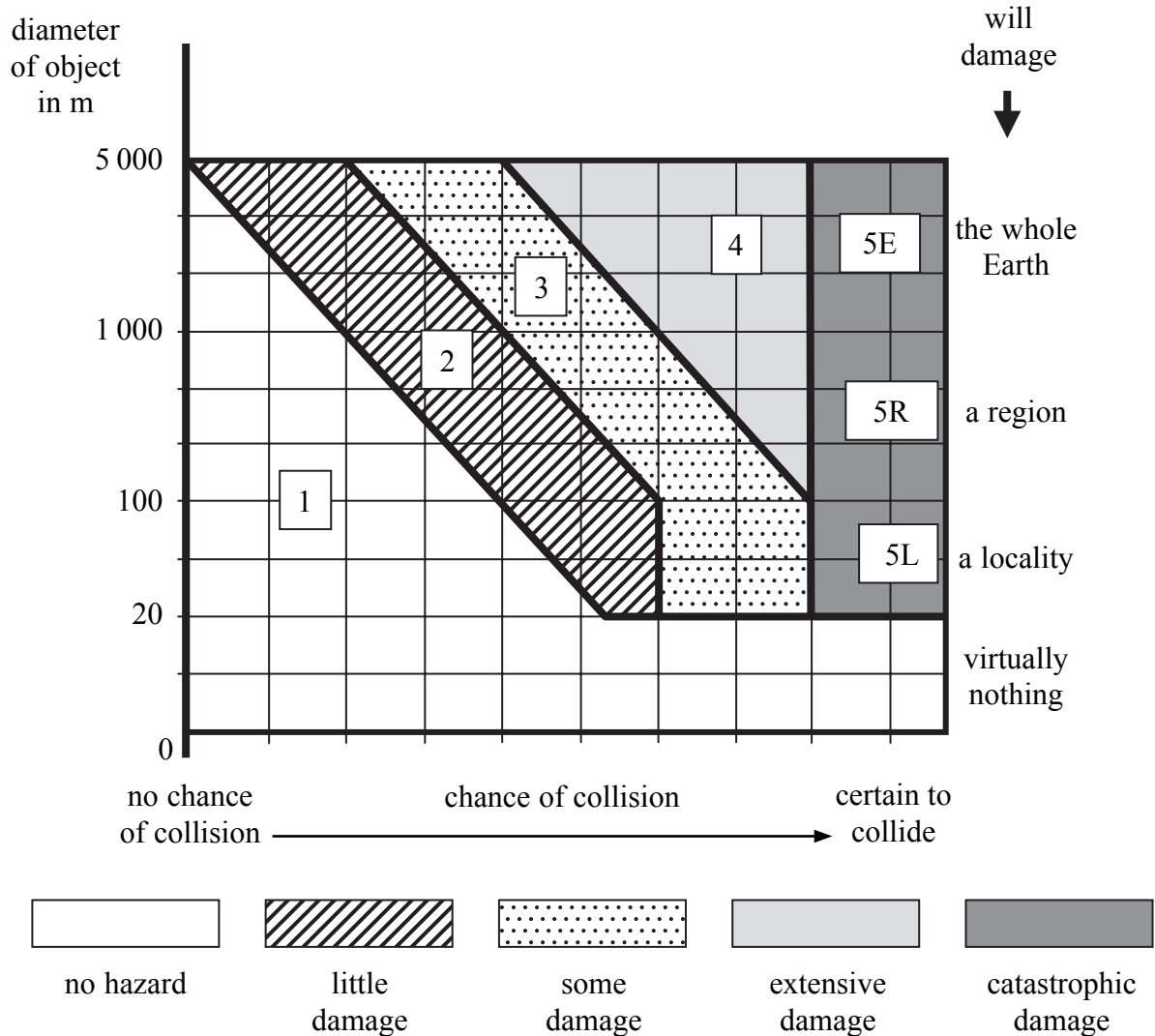
- A** 3 000 Hz
B 300 000 Hz
C 300 000 000 Hz
D 300 000 000 000 Hz

Comets, meteorites etc.

- 36.** A planet is more likely to be hit by a comet than by another planet.
This is because
- A** planets are bigger than comets
 - B** comets are bigger than planets
 - C** planets travel in very elliptical orbits
 - D** comets travel in very elliptical orbits
- 37.** Which of these is likely to be the result of an object from space striking the Earth?
- A** the Big Bang
 - B** a red shift
 - C** a tsunami
 - D** dark matter

Use this information to answer questions 38 to 40.

If an object like a comet or meteorite hits the Earth, it may cause damage. The potential for damage depends on the diameter of the object and the chance of collision. Anne found the chart below on the Internet. It shows the possible effect of a collision.



38. Which number on the chart corresponds to an object of diameter 100 m which causes some damage?

- A 1
- B 2
- C 3
- D 4

39. Which of these is the diameter of an object that could cause catastrophic damage to a 'region' of the Earth.
- A 5 000 m
 - B 500 m
 - C 50 m
 - D 5 m

40. John and Anne discuss some sections of the chart.

An object of diameter 4500 m may not be very dangerous if it is in the section marked 1.

John

Section 5L represents a more dangerous situation than section 4, even though it is for smaller objects, because there is more chance of collision.

Anne

Who is correct?

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

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

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