

Surname	Initial(s)
Signature	

Paper Reference(s)

5010 5046

Edexcel GCSE

Science (5010)

Physics (5046)

P1b – Topics 11 and 12

Foundation and Higher Tier

Monday 10 March 2008 – 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.

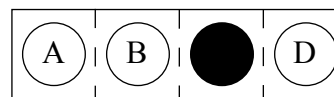
Before the test begins:

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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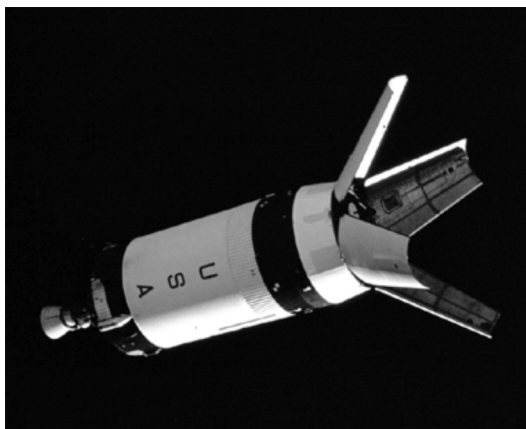
Turn over

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

Trip through space

Several space rockets have travelled to parts of the Solar System.



1. How many stars are in the Solar System?
A none
B one
C thousands
D millions

2. The Solar System is part of
A an asteroid
B a comet
C a star
D a galaxy

3. The object most likely to collide with the planet Jupiter is
A a comet
B a nebula
C a galaxy
D a red giant star

4. In space, half way between Earth and Mars, there is

- A no atmosphere
- B a high temperature
- C a strong gravity
- D no radiation

Use this information to answer questions 5 to 7.

The chart shows the electromagnetic spectrum.
Some of the sections have been named.
Others have been shown as letters.

gamma rays	P	Q	visible light rays	infrared waves	R	S
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5. Section **P** should be named

- A water waves
- B seismic waves
- C ultrasound waves
- D X-rays

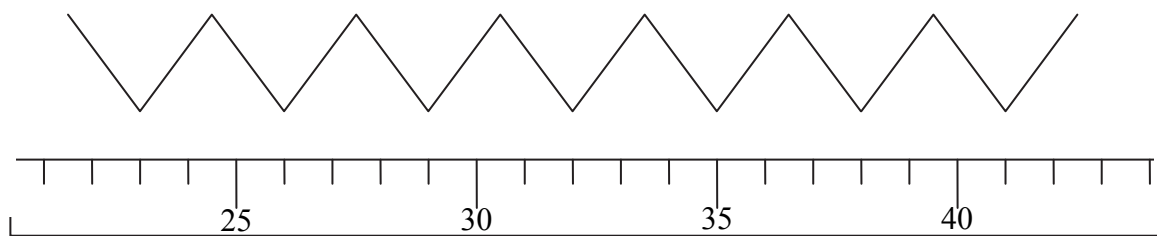
6. Infrared waves are used in cooking.
Cooking is also done using waves from section

- A **P**
- B **Q**
- C **R**
- D **S**

7. Which of these is used in hospitals to scan by absorption?

- A radio waves
- B visible light rays
- C ultraviolet waves
- D X-rays

8. The diagram shows part of a wave and a ruler.
The ruler is marked in cm.



The wavelength of the wave is

- A 1.5 cm
- B 3 cm
- C 6 cm
- D 12 cm

Star Trek

Star Trek is a TV programme about space explorers who meet aliens (extraterrestrial life).



9. The space explorers see a star that has become a supernova.
The next stage in the evolution of this star could be
- A a nebula
 - B a galaxy
 - C a black hole
 - D a red giant
10. Which of these methods is **not** a helpful way of trying to detect aliens?
- A sending men to the Moon
 - B searching for radiowave patterns from space
 - C sending probes to planets
 - D sending out radio waves

11. The television programme 'Star Trek' shows different aliens in each episode. Faiza and Eric are discussing Star Trek.

Scientists have proved that aliens do exist.

Faiza

Aliens must exist because you can see them in every episode of Star Trek.

Eric

Who is correct?

- A Faiza only
- B Eric only
- C both Faiza and Eric
- D neither

- 12.

$$W = mg$$

where W is weight, m is mass and g is **either** acceleration of free fall
or gravitational field strength

On a given planet, g is 3 m/s^2 (or 3 N/kg).
John picks up a 2 kg rock on this planet.
How much does the rock weigh on the planet?

- A 2 kg
- B 6 kg
- C 6 N
- D 60 N

Anne's hospital appointment

Anne has to go to the hospital for some tests.

Use this information to answer questions 13 and 14.

The doctor wants to look inside Anne's stomach.
He uses a device with a flexible tube that goes down Anne's throat.
Light shines down the tube and the doctor looks at the light as it returns.

13. The device uses
- A scanning by absorption
 - B scanning by emission
 - C scanning by reflection
 - D scanning by fluorescence

14. The tube contains
- A optical fibres
 - B X-ray tubes
 - C an infrared sensor
 - D a synthesiser

15. Anne also has an ultrasound scan.
Which row of the table is correct for these two tests?

	in ultrasound scans	the tube in Anne's throat causes
A	waves pass through body tissue	less discomfort than having an ultrasound scan
B	waves do not pass through body tissue	less discomfort than having an ultrasound scan
C	waves do not pass through body tissue	more discomfort than having an ultrasound scan
D	waves pass through body tissue	more discomfort than having an ultrasound scan

16. Anne is pregnant.
Pregnant women should have X-rays only in emergencies.
An X-ray is dangerous because it can
- A heat up the skin
 - B heat up the foetus
 - C destroy cells
 - D kill the foetus

**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.**

Catching criminals



Police in helicopters can use a special camera to track a person in the dark.

17. The electromagnetic radiation which the camera detects is
- A infrared
 - B microwave
 - C ultraviolet
 - D X-ray
18. The electromagnetic radiation which the camera detects is produced because the person is
- A hot
 - B charged
 - C vibrating
 - D noisy
19. This process of imaging people who produce radiation is called
- A scanning by absorption
 - B scanning by emission
 - C scanning by reflection
 - D scanning by refraction

20. The pilot communicates with his base using digital radio signals.
Which of these is a digital signal?



A



B



C



D

Rockets and gravity

A rocket takes off from the Earth's surface.



21. Gases come out from the back of the rocket.
The action of these gases accelerating backwards
- A** slows the rocket down
 - B** pulls on the vacuum of space
 - C** pushes the rocket forwards
 - D** reacts against the Earth to move the rocket

22.

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

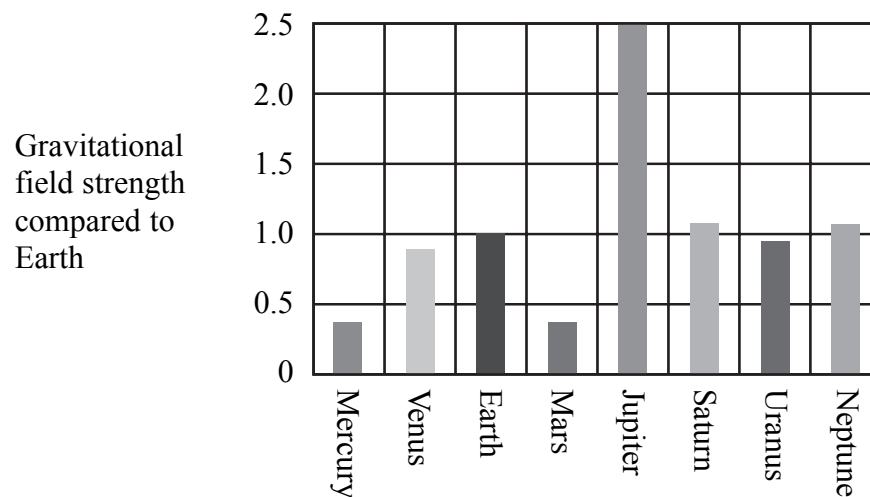
After some time, the rocket reaches a place where there is no gravitational force on it.
The mass of the rocket is 2 000 000 kg.

What force would now be needed to produce an acceleration of 4 m/s²?

- A 4/(2 000 000) N
- B 500 000 N
- C 8 000 000 N
- D 32 000 000 N

Use this information to answer questions 23 and 24.

The chart shows the gravitational field strength of each planet on a scale where the field strength of the Earth is 1 unit.



23.

Which of these statements is correct?

- A A 1 kg mass would weigh more on Venus than on Neptune
- B A 1 kg mass would weigh more on Earth than on Uranus
- C A 1 kg mass would weigh more on Mercury than on Saturn
- D A 1 kg mass would weigh more on Mars than on Jupiter

24.

On Earth, the actual gravitational field strength is 10 N/kg.
The gravitational field strength on Mars is about

- A 0.04 N/kg
- B 0.4 N/kg
- C 4 N/kg
- D 40 N/kg

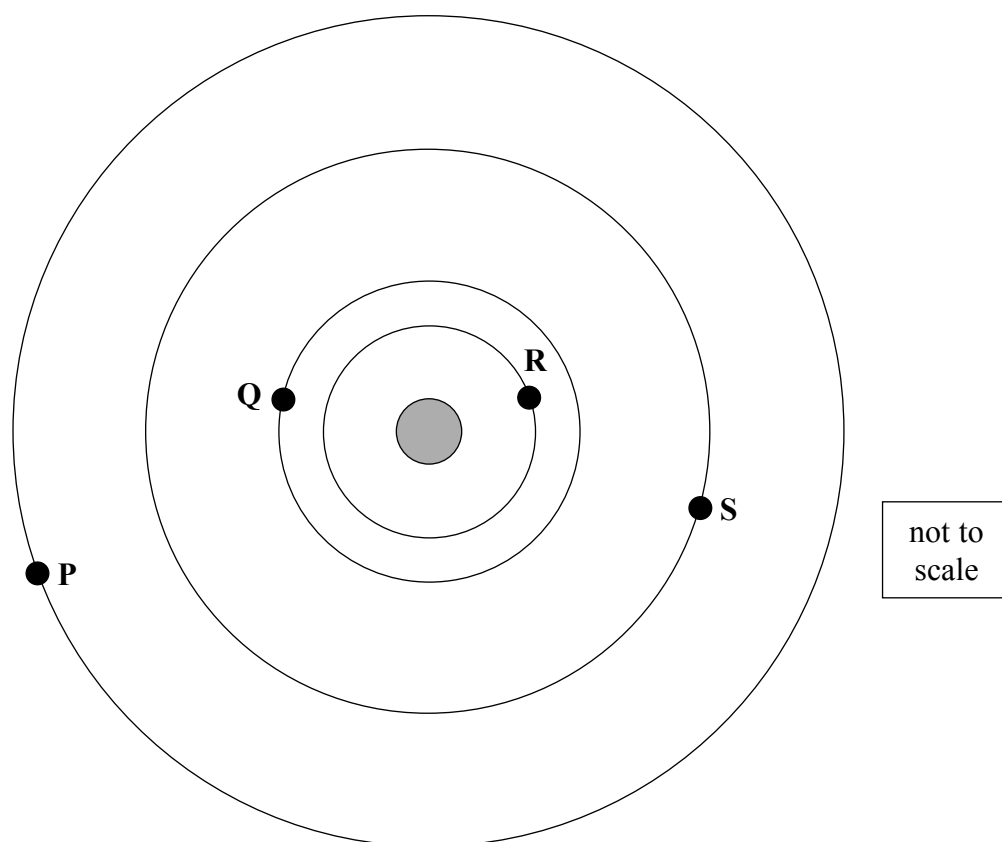
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

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.**

Planets and stars

The diagram shows four planets orbiting a star.



25. This combination of planets and a star is most like
- A a galaxy
 - B a nebula
 - C the Solar System
 - D the Milky Way
26. John knows that planets nearer the star orbit at higher speed. During the time that it takes planet P to complete one orbit,
- A planet Q will have made more orbits than R
 - B planet Q will have made fewer orbits than S
 - C planet R will have made more orbits than P
 - D planet S will have made fewer orbits than P

27. For life to exist on a planet, it must be warm enough.
Which row of the table shows conditions where a planet would be **least likely** to be warm enough?

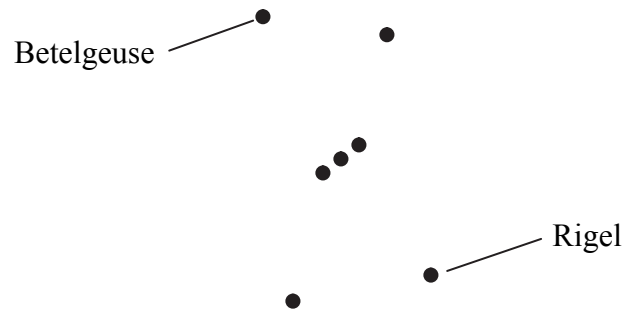
	star is	planet distance from star is
A	brighter than the Sun	further than Jupiter is from the Sun
B	dimmer than the Sun	further than Jupiter is from the Sun
C	brighter than the Sun	same distance as Jupiter is from the Sun
D	dimmer than the Sun	closer than Jupiter is to the Sun

28. Planet **P** is 200 million kilometres from the star and planet **R** is 50 million kilometres from the star.
Which row of the table shows the smallest and largest distances between planet **P** and planet **R**?

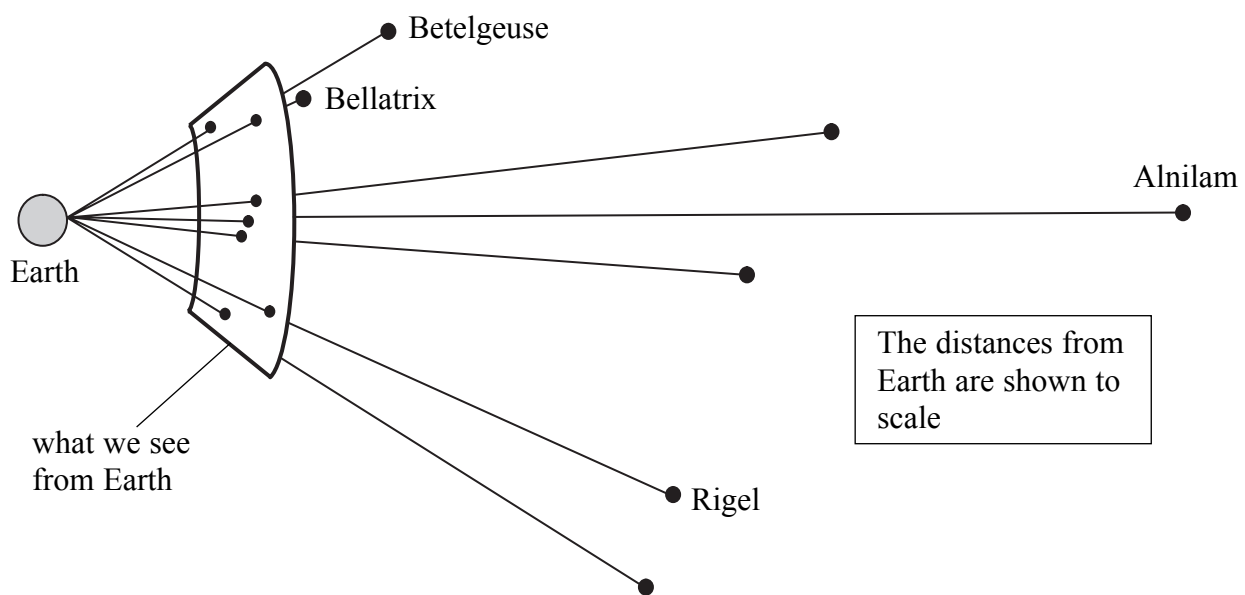
	smallest distance between planets P and R (million km)	largest distance between planets P and R (million km)
A	50	150
B	150	150
C	50	250
D	150	250

The constellation Orion

A constellation is a group of stars that appear together in the sky and form a pattern. The diagram shows the main stars in the constellation Orion as we see them from Earth.



The stars in the constellation are at very different distances from Earth. Bellatrix is nearest to Earth and Alnilam is furthest away.



29. Imagine that Alnilam and Bellatrix both appear to us to be the same brightness. Which row of the table **cannot** be true?

	Alnilam is	Alnilam is
A	bigger than Bellatrix	brighter than Bellatrix
B	bigger than Bellatrix	dimmer than Bellatrix
C	smaller than Bellatrix	brighter than Bellatrix
D	smaller than Bellatrix	dimmer than Bellatrix

30. Imagine that X-ray signals and infrared signals are sent from Alnilam and from Bellatrix at the same time.
Which statement is correct?
- A Both the X-ray and the infrared signals from Bellatrix will arrive at the same time
 - B The X-ray signal from Alnilam could reach Earth before the infrared from Bellatrix
 - C The infrared signal from Alnilam could reach Earth before the X-rays from Bellatrix
 - D Scientists do not have enough information from which to predict

31.

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

Rigel is a distance of 773 light years from Earth.
One light year is the distance light travels in one year.
Light travels at 300 000 000 m/s (3×10^8 m/s).
One year = 31 600 000 s (3.16×10^7 s).
The distance from Earth to Rigel is about

- A 3.9×10^4 m
 - B 2.3×10^{10} m
 - C 8.3×10^{14} m
 - D 7.3×10^{18} m
32. Four students are trying to find if there is any intelligent life in the constellation Orion.
Which student best understands how to find evidence for intelligent life?

Observe if one star is brighter than another.

A

See if a star evolves from a red giant into a black dwarf.

B

Find a star which is bigger than our Sun

C

Look for patterns in the signals crossing space.

D

Earthquakes and Tsunamis

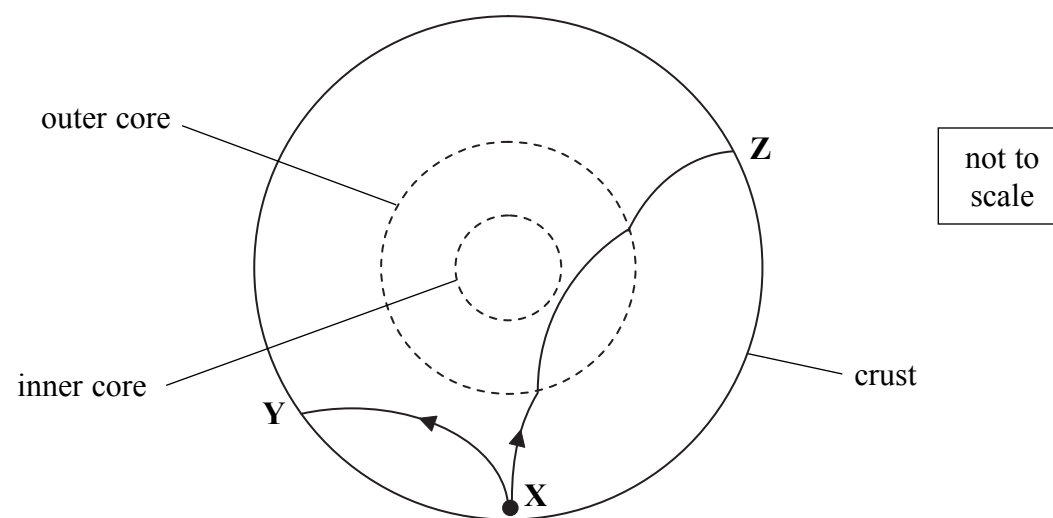
33. It is difficult to predict tsunamis because
- A sea levels are rising unpredictably
 - B earthquakes occur at random
 - C the oceans contain an uncertain amount of water
 - D the polar icecaps are melting at different rates

Use this information to answer questions 34 and 35.

The table gives the speeds of two types of earthquake wave at different depths.

depth (km)	speed of longitudinal waves (km/s)	speed of transverse waves (km/s)
0	7	3
500	9	4
1000	11	6
2500	13	7
2900	14	7
3000	7	0
4000	10	0
5000	11	0
6000	12	0

34. An earthquake happens at position **X** as shown on the diagram.
The paths of two waves reaching **Y** and **Z** are also shown.



Which row of the table is correct?

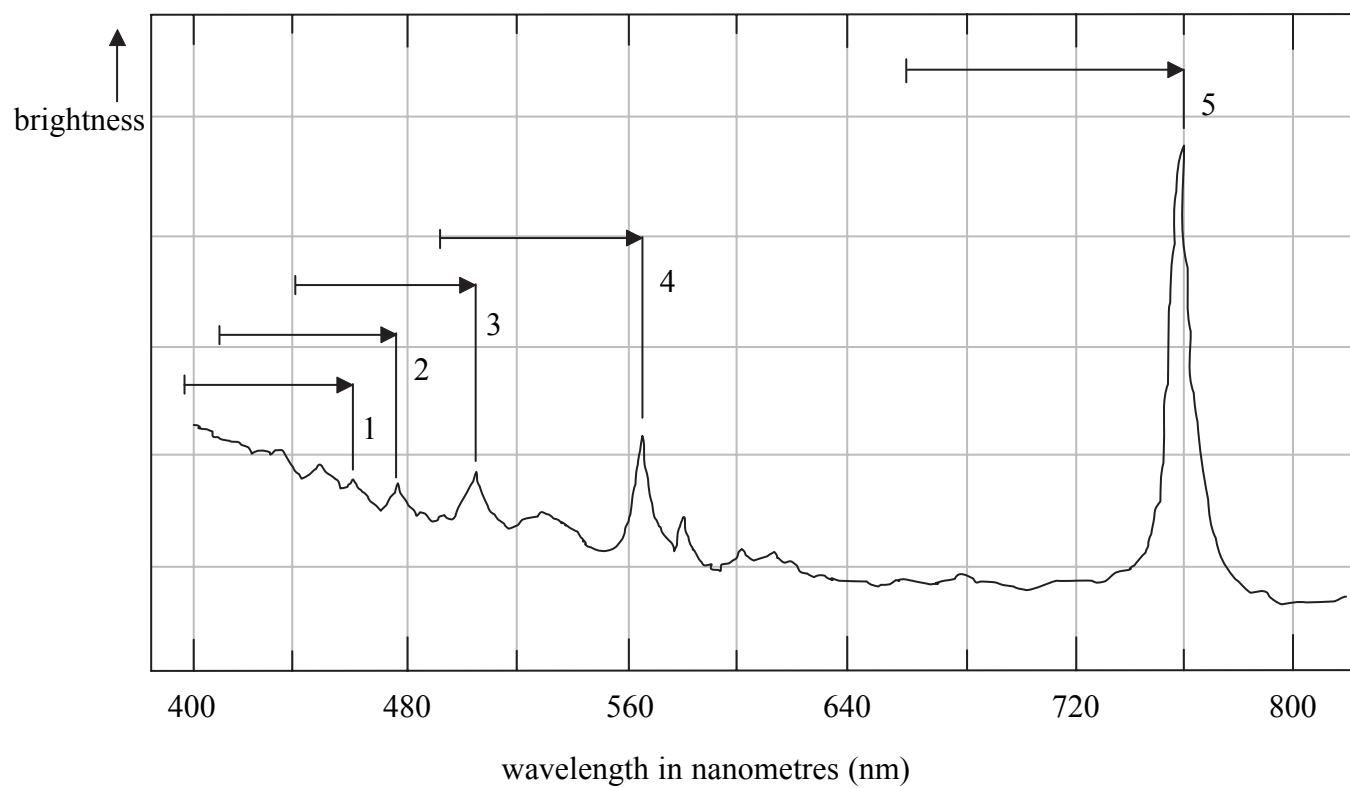
	types of waves reaching Y	types of waves reaching Z
A	transverse only	longitudinal only
B	longitudinal only	transverse and longitudinal
C	transverse and longitudinal	transverse and longitudinal
D	transverse and longitudinal	longitudinal only

35. The radius of the Earth is 6370 km.
The radius of the **inner** core could possibly be

- A** 2000 km
- B** 3600 km
- C** 4500 km
- D** 5000 km

Star gazing

The graph shows the spectrum of light from a star.
Peaks of light are emitted at the wavelengths marked 1, 2, 3, 4 and 5.
The amounts of red shift for these wavelengths are shown by the length of each arrow.



36.

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

The wavelength for the highest peak is 760 nm (7.6×10^{-7} m).

Light travels at 300 000 000 m/s (3×10^8 m/s).

The frequency of these light waves is given by

- A $(7.6 \times 10^{-7}) \div (3 \times 10^8)$ Hz
- B $3 \div 7.6$ Hz
- C $7.6 \div 3$ Hz
- D $(3 \times 10^8) \div (7.6 \times 10^{-7})$ Hz

37. The amount of red shift for the highest peak is about

- A 100 nm
- B 660 nm
- C 700 nm
- D 760 nm

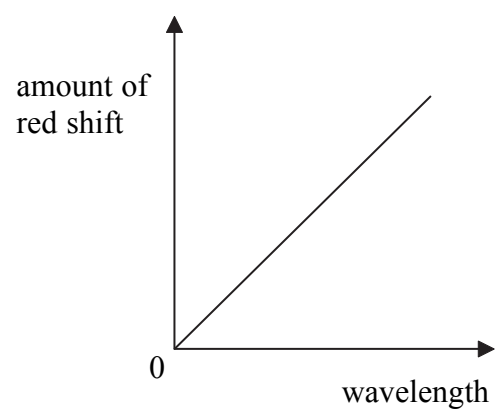
38. Red shift gives evidence for

- A the formation of the Solar System
- B the Steady State Universe
- C the Big Bang theory of the Universe
- D the existence of more than one galaxy

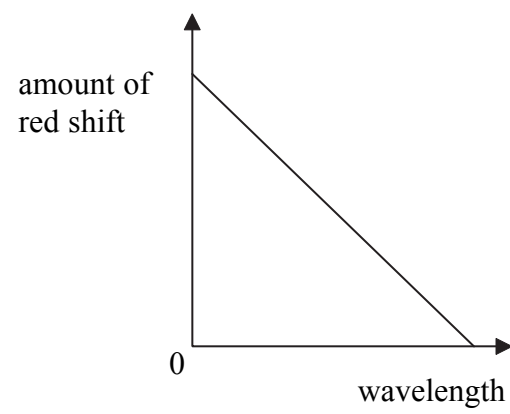
39. The graph on the opposite page shows that

- A longer wavelengths, in general, have higher brightness
- B longer wavelengths have a larger red shift
- C the red shift is proportional to the distance to the Earth
- D the brightness at the longest wavelength shown is more than the brightness at the shortest wavelength

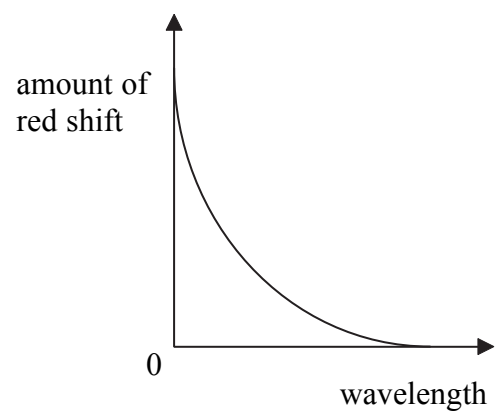
40. Which graph best shows the data?



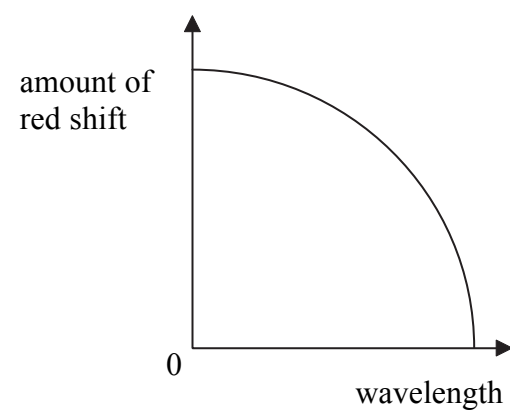
A



B



C



D

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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