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 4 March 2011 – Morning

Time: 20 minutes

Materials required for examination
Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers
Nil

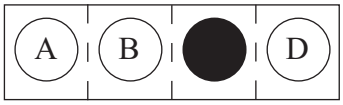
Instructions to Candidates

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.

Printer's Log. No.
P39007A

Turn over

W850/R1535/57570 1/1/1/1/

edexcel
advancing learning, changing lives

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

Stars, planets and moons

1. From the Earth, the Sun and the Moon look about the same size.
This is because the

A Sun is further away than the Moon
B Sun is nearer than the Moon
C Sun and the Moon are the same distance away
D Sun is hotter than the Moon

2. Which of these lists the objects in the correct order of size?

	smallest ⟶		**largest**
A	Sun	Moon	Earth
B	Sun	Earth	Moon
C	Moon	Earth	Sun
D	Moon	Sun	Earth

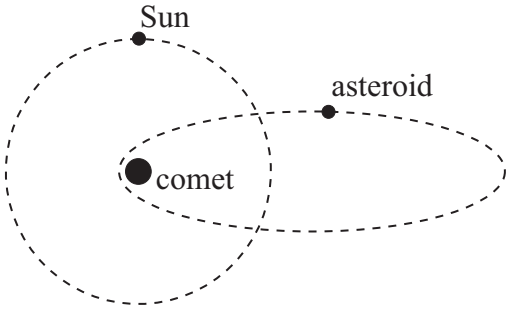
3. Stars are formed

A when galaxies collapse
B from the tails of comets
C from clouds of gas and dust
D when solar systems collapse

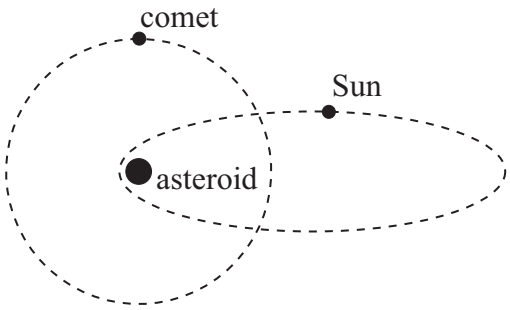
4. Which row of the table is correct for a 2 kg object?

	mass of object on Moon (kg)	**mass of object on Mars (kg)**
A	2	2
B	2	0
C	0	2
D	0	0

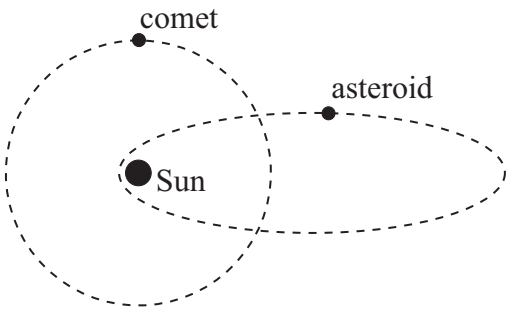
5. Which of these shows two correct orbits?



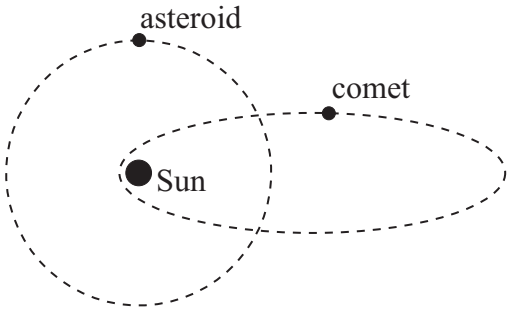
A



B



C



D

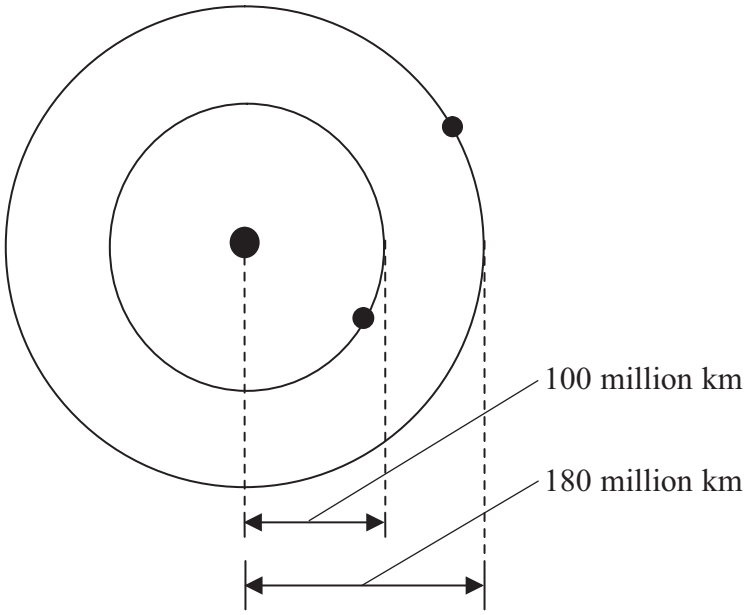
6. Our Sun is likely to end its life as

A a black hole
B a neutron star
C a black dwarf
D a nebula

7. Which of these questions has an answer that has been proved correct?

A Is there life on planets other than Earth?
B Can a plant grow on Mars?
C Can a person survive on the Moon?
D Are there red rocks on Jupiter?

8. Two planets are in orbit around a star.
The radius of each orbit is marked on the diagram.



The smallest distance apart of the two planets as they orbit will be

A 80 million km
B 100 million km
C 180 million km
D 280 million km

In the hospital

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

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

10. Some thermometers detect radiation coming from a patient's body. This process is

A scanning by reflection
B scanning by refraction
C scanning by absorption
D scanning by emission

11. Which of these can be used to measure the temperature of a patient?

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

12. Which of these can cause mutation of cells **deep** in the body?

A radio waves
B gamma waves
C microwaves
D ultraviolet waves

13. In optical fibres, light is

A totally externally refracted
B totally internally refracted
C totally externally reflected
D totally internally reflected

14. When a fetus is scanned, the image is usually produced because body tissue

A reflects X-rays
B reflects ultrasound
C emits X-rays
D emits ultrasound

15. Some devices in hospitals use digital signals.
Which of these represents a digital signal?

A

B

C

D

16. X-rays are produced in hospitals and X-rays also come from stars.
Hospital staff must be shielded from the X-rays produced in hospitals.
Nobody on Earth needs to be shielded from the X-rays that come from stars.

This is because, compared to X-rays from stars, X-rays of the same frequency produced in hospitals

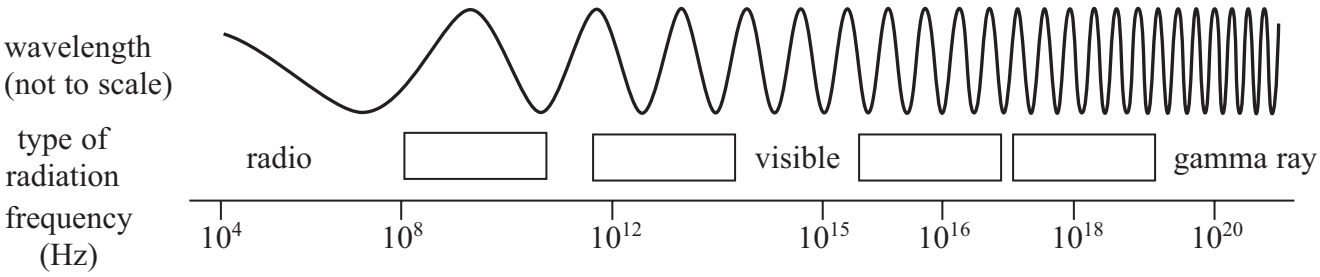
A travel faster
B have longer wavelength
C have shorter wavelength
D are received in greater amounts

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.

Infrared radiation

Use this information to answer questions 17 and 18.

The chart below gives information about seven parts of the electromagnetic spectrum.
Only three parts have been named.



17. Which of these is shown by the chart?

A as the wavelength becomes shorter, the frequency becomes higher
B as the wavelength becomes shorter, the frequency becomes lower
C as the frequency becomes higher, the wave speed becomes higher
D as the frequency becomes higher, the wave speed becomes lower

18. Which of these is a frequency for infrared radiation?

A 10^8 Hz
B 10^{12} Hz
C 10^{16} Hz
D 10^{18} Hz

19. Which of these is caused by too much infrared radiation?

A skin burns
B skin cancer
C mutation
D lung cancer

The Herschel space telescope

Use this information to answer questions 20 to 24

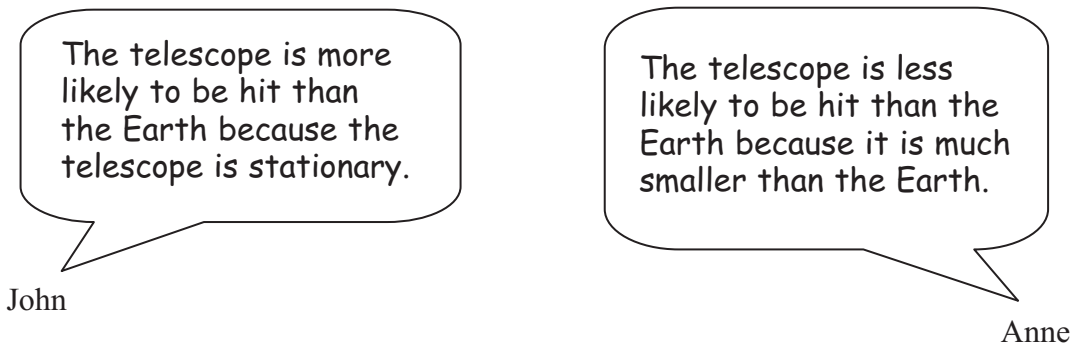
The Herschel space telescope was sent into orbit in 2009.

The telescope collects infrared light to investigate the Universe.

20. This telescope produces images of stars using

A scanning by emission
B scanning by reflection
C scanning by refraction
D scanning by transmission

21. John and Anne discuss the possibility of a comet hitting the telescope.



Who is correct?

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

22.

weight = mass × gravitational field strength

The telescope has a mass of 350 kg.
The gravitational field strength on the Earth is 10 N/kg.
What was the weight of the telescope on Earth?

A 0.029 N
B 0.29 N
C 35.0 N
D 3500 N

23.

force = mass × acceleration

In space, the telescope accelerates at 5 m/s^2.
The telescope has a mass of 350 kg.
What is the size of the force accelerating the telescope?

A 70 N
B 70 kg
C 1750 N
D 1750 kg

24. A small rocket engine is used to accelerate the telescope.
It accelerates because

A the Earth pushes on hot gases
B hot gases push on the Earth
C hot gases push on the vacuum of space
D hot gases push on the rocket engine

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.

Darkness and intelligence

25. Black holes

A give objects mass
B emit only black light
C have weight but no mass
D have a large gravitational field strength

26. Which of these statements is correct?

A scientists do not know what dark matter is
B scientists know that dark matter does not exist
C scientists have always known what dark matter is
D scientists have recently found out what dark matter is

27. Which of these describes SETI?

A SETI sends satellites to orbit other planets
B SETI sends probes to land on other planets
C SETI looks for patterns of stars in space
D SETI looks for patterns in waves from space

Tsunamis, earthquakes and waves

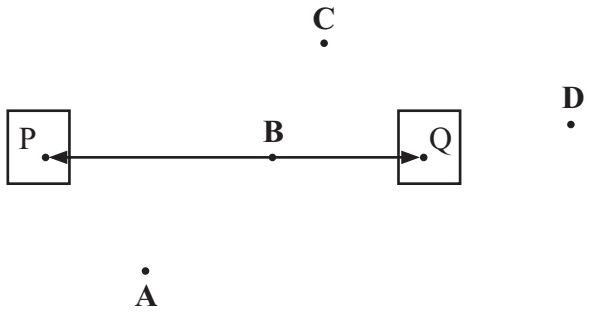
28. One reason why tsunamis are difficult to predict is that

A they cause volcanoes
B they create earthquakes
C there is not enough data about the Earth's crust
D much of the Earth's surface is covered in water

29. The Earth's crust and mantle are solid.
Its core contains liquid.
Which row of the table is correct for these parts of the Earth?

	longitudinal waves can pass through	**transverse waves can pass through**
A	crust and mantle	mantle and core
B	mantle and core	crust, mantle and core
C	crust, mantle and core	crust, mantle and core
D	crust, mantle and core	crust and mantle

30. Two earthquake stations, P and Q, detect earthquakes.
The stations are 500 km apart.
An earthquake happened 400 km from P and 200 km from Q.
This diagram is drawn to scale.



Which of the points **A**, **B**, **C** or **D** could be where the earthquake happened?

31.

speed = distance/time

A wave takes 480 s to travel vertically down from the Earth's surface to the core and back again.
Its average speed is 12 km/s.
How far down, in km, is the core?

A 0.0125
B 0.025
C 2880
D 5760

32. Which of these pairs of waves has the biggest difference in speed?

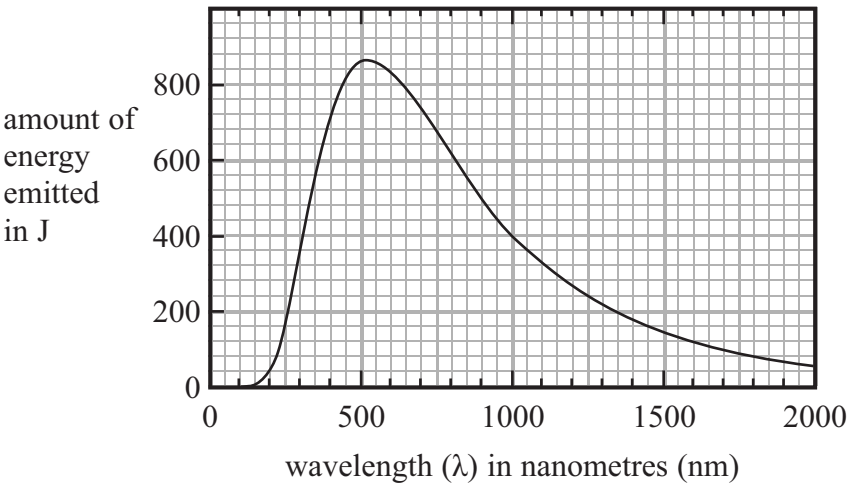
A microwaves and X-rays
B ultrasound and infrared
C gamma and radio
D visible and ultraviolet

33. Ultraviolet waves are more dangerous if they have a high frequency.
Which row of the table gives the conditions for ultraviolet waves to be most dangerous?

	amount of energy on each cm^2 of skin	**size of wavelength**
A	small	short
B	small	long
C	large	long
D	large	short

Hot objects

34. The graph shows the amount of energy emitted at different wavelengths from an object at high temperature.



The maximum amount of energy is emitted at about

A 180 nm
B 510 nm
C 870 nm
D 2000 nm

35.

speed = frequency × wavelength

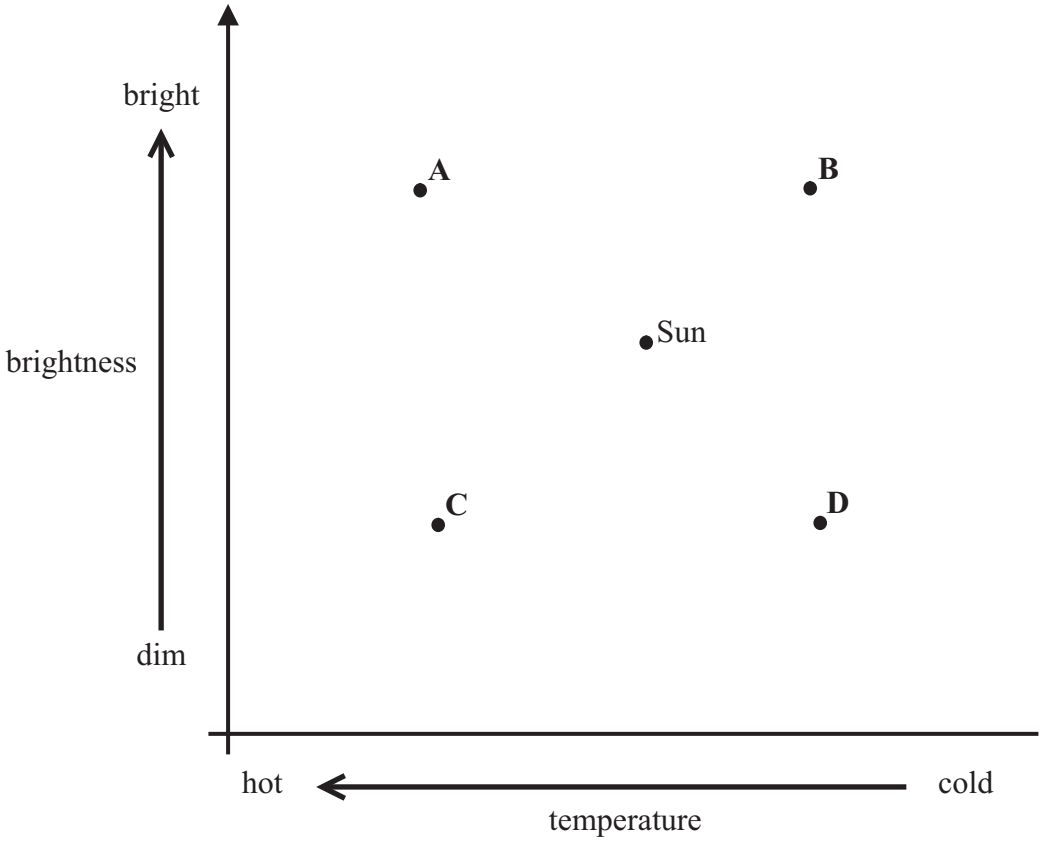
The speed of light is 300 000 000 m/s (3×10^8 m/s)
1 nm = 1 / 1 000 000 000 m (1×10^{-9} m).

The frequency of electromagnetic radiation corresponding to 1000 nm is

A 0.0003 Hz (3×10^{-4} Hz)
B 0.3 Hz (3×10^{-1} Hz)
C 300 000 000 000 000 Hz (3×10^{14} Hz)
D 300 000 000 000 000 000 Hz (3×10^{17} Hz)

Star diagrams

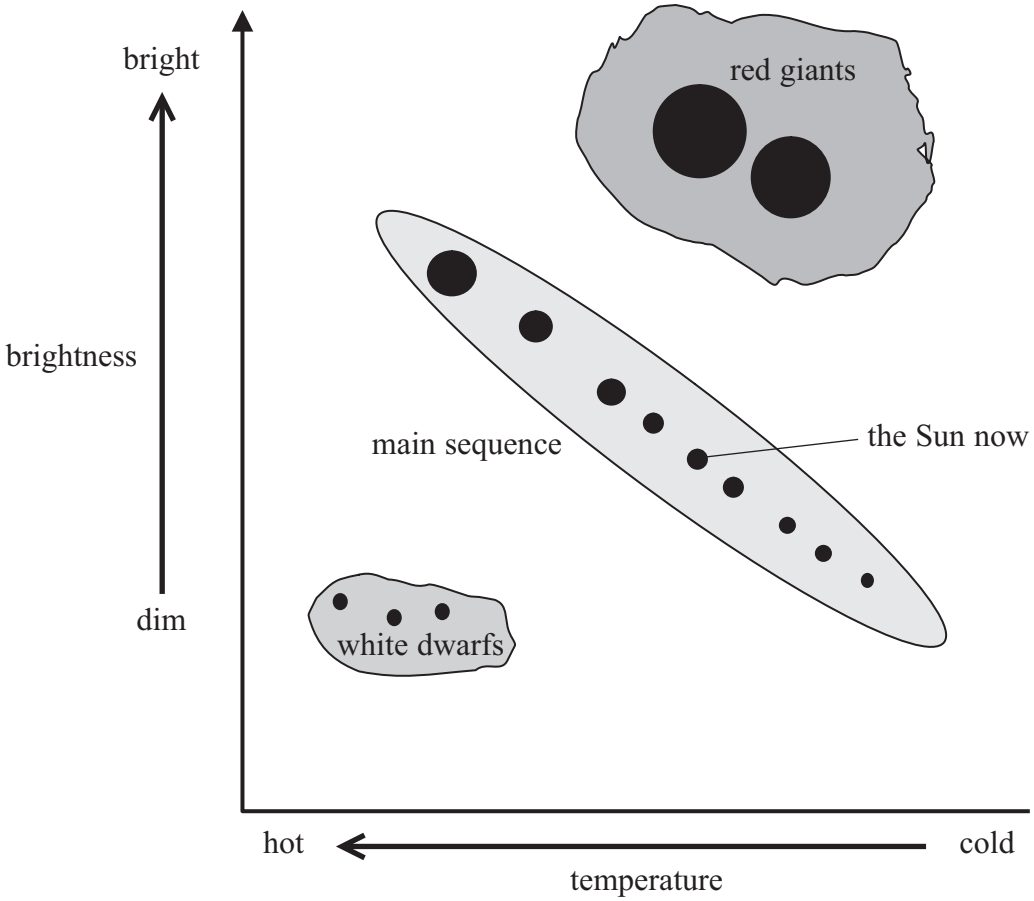
36. Astronomers draw diagrams like this to describe stars.
The diagram represents stars in terms of their temperature and brightness.



Which star **A**, **B**, **C** or **D** is colder and brighter than the Sun?

Use this information to answer questions 37 to 40.

The diagram below shows three groups of stars – red giants, main sequence and white dwarfs.
The Sun is an average main sequence star.
The size of the dot on the diagram indicates the relative size of the star only.



37. After the main sequence, the Sun next becomes

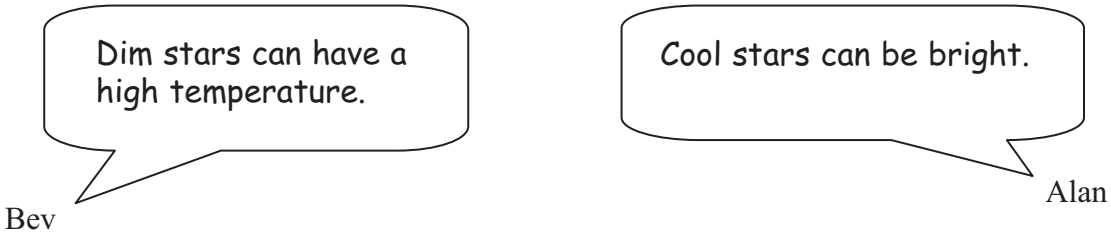
A brighter and bigger
B dimmer and bigger
C brighter and smaller
D dimmer and smaller

38. After a long time, a white dwarf will evolve towards a black dwarf and should be plotted in a new position.

Which of these arrows shows the direction from the old position to the new position?

A ↗
B ↘
C ↖
D ↙

39. Bev and Alan discuss the types of stars shown on the diagram.



From the data in the diagram, who is correct?

A Bev only
B Alan only
C both Bev and Alan
D neither

40. From the data in the diagram, which of these is correct for the main sequence stars?

A the hotter they are, the brighter they are
B the hotter they are, the dimmer they are
C the dimmer they are, the bigger they are
D the brighter they are, the smaller they are

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END