Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 3 (Physics)
Foundation Tier

GSS31

[GSS31]

FRIDAY 10 NOVEMBER 2017, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **8(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Remark

1 Sound and light are both waves.

(a) Complete the following sentences about sound waves.

Choose from:

energy **wavelength** **vibrates** **rises** **amplitude**

When any object _____ it produces a sound wave.

This wave then carries _____ from one place to another. [2]

The table below gives the speed of sound through a variety of materials.

Material	Speed/ m/s
water	1500
air	330
wood	4000
blood	1570
carbon dioxide	259
iron	5000

(b) Name the material that sound will take the **longest time** to travel through.

Answer _____ [1]

(c) What is meant by the term 'frequency of a wave'?

Circle the correct answer.

the distance between the same two points on a wave

the number of waves per second

the maximum height of a wave

[1]

(d) Complete the following sentence about the human audible range.

Choose from:

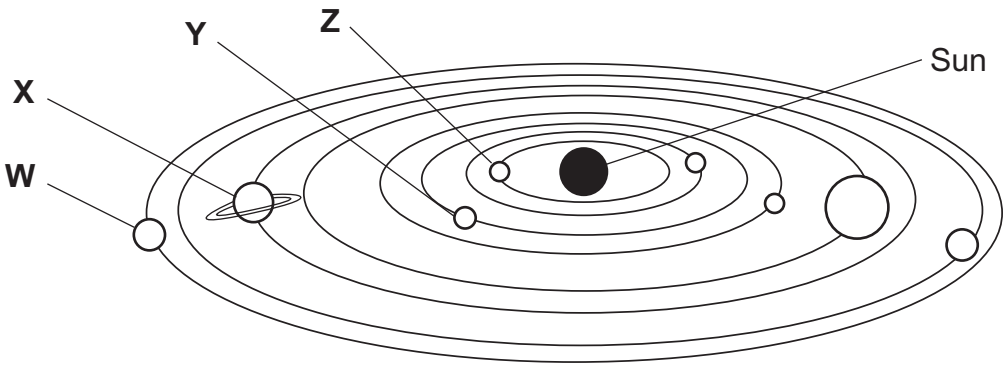
15 **20 000** **10** **15 000** **20** **10 000**

Humans can hear sounds within a frequency range from as low as _____ hertz up to _____ hertz. [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** The diagram below shows the heliocentric model of the Solar System.



Source: Principal Examiner

(i) Suggest which planet (**W**, **X**, **Y** or **Z**) will be the coldest.

Answer _____ [1]

(ii) Name the planet labelled **X** on the diagram.

Answer _____ [1]

(iii) A year is the length of time it takes for a planet to orbit the Sun. Suggest which planet (**W**, **X**, **Y** or **Z**) will have the shortest year.

Answer _____ [1]

(iv) Name the previous model of the Solar System which had the Earth at the centre.

Answer _____ [1]

(b) The table below gives information about the same person on three different planets.

Planet	Mass of person/ kg	Gravity/ N/kg	Weight of person/ N
Earth	60	10	600
Mars		4	
Jupiter	60	26	1560

Use the information given and the equation:

weight = mass × gravity

to complete the table. [2]

(c) Complete the following sentence to describe a unit of measurement used by astronomers.

Choose from:

time **day** **year** **distance** **month**

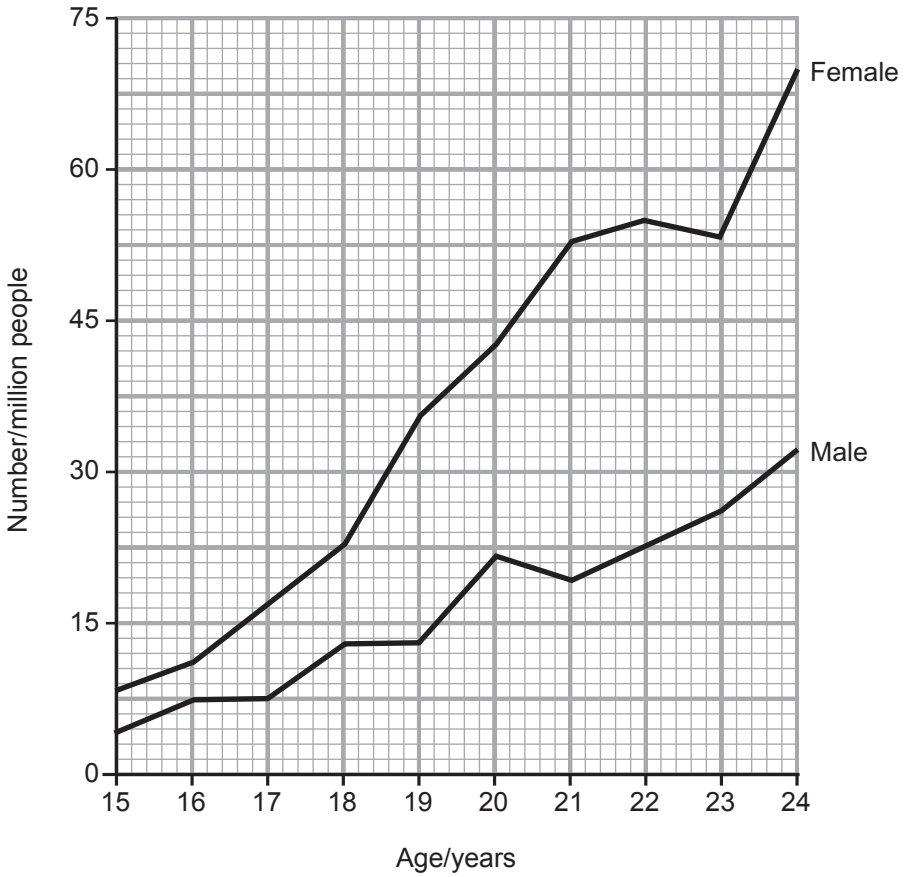
A light _____ is the _____ light travels in one year. [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 **(a)** The graph below shows the number of cases of skin cancer for young males and young females at different ages.



© Cancer Research UK. Cancer Statistics for the UK, Young people's cancers incidence statistics.

(i) Give **two** conclusions that can be made from this graph.

1. _____

_____

2. _____

_____ [2]

(ii) Fifty years ago there was less skin cancer in young people than there is today. Suggest **one** reason for this.

_____

_____ [1]

(iii) Suggest **one** way that young people can protect themselves against skin cancer.

_____

_____ [1]

(b) The electromagnetic spectrum contains seven wave types.

Examiner Only	
Marks	Remark

(i) Name the electromagnetic wave that:

1. can cause skin cancer.

_____

2. is used in mobile phone signals.

_____ [2]

(ii) Circle the **two** correct statements about all electromagnetic waves.

travel at different speeds in air

travel at the same speed in air

can all be seen

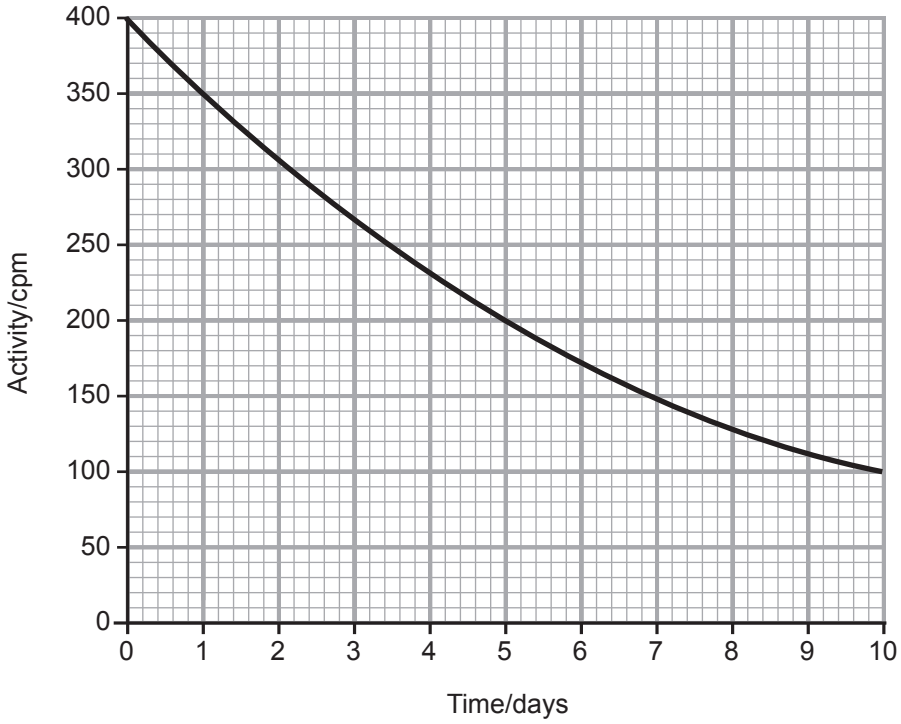
are all transverse waves

are all longitudinal waves

[2]

Examiner Only	
Marks	Remark

4 **(a)** The graph below shows how the activity of a radioactive source changes with time.



(i) Describe the trend shown by this graph.

_____

_____ [1]

(ii) What is the activity at 2 days?

Answer _____ cpm [1]

(iii) How long does it take for the activity to drop from 400 cpm to 200 cpm?

Answer _____ days [1]

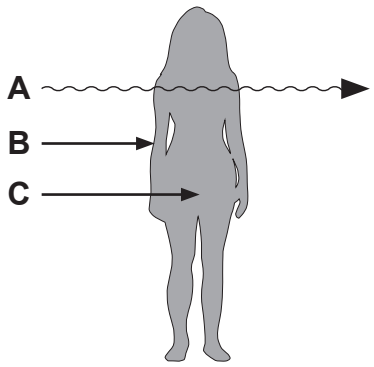
The table below shows the half-life of some radioactive sources.

Radioactive source	Half-life/days
Fermium-252	1.0
Erbium-160	1.2
Fermium-253	3.0
Manganese-52	5.0
Thulium-167	9.3

(iv) Use this information to suggest the name of the radioactive source used to produce the graph opposite.

Answer _____ [1]

(b) The diagram below shows the penetrating power of three types of radiation (**A**, **B** and **C**) through a human.



(i) Use this information to give the type of radiation (alpha, beta or gamma) represented by each letter.

A _____

B _____

C _____ [2]

(ii) Why is radiation dangerous to humans?

_____

_____ [1]

(iii) State and explain **one** use of ionising radiation in the food industry.

_____

_____

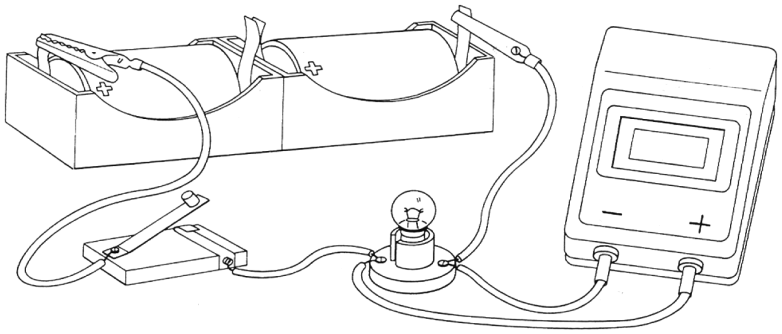
_____ [2]

Examiner Only

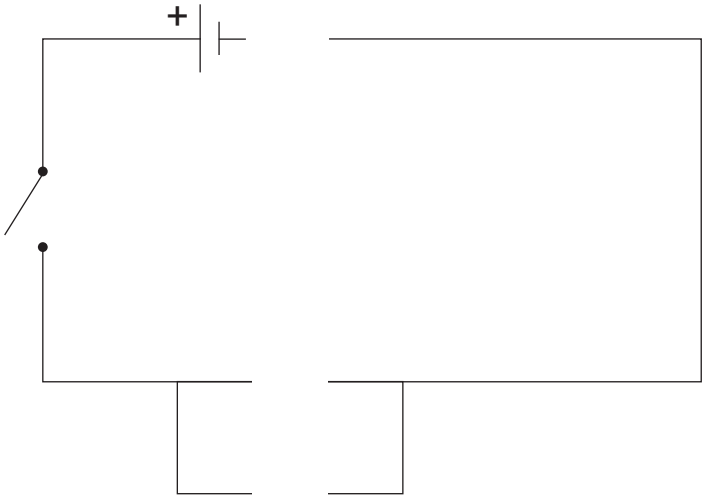
Marks	Remark

Examiner Only	
Marks	Remark

5 The diagram below shows a circuit containing **two** cells (batteries), a switch and a bulb. A meter is connected to measure the voltage across the bulb.

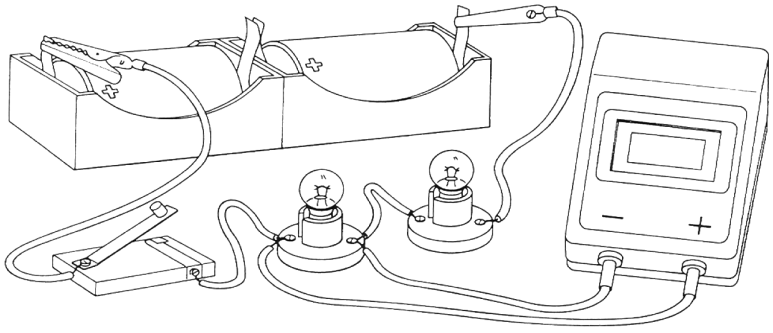


(a) Complete the diagram for this circuit by adding the correct symbols.



[3]

(b) An extra bulb was added to the circuit as shown in the diagram below.



(i) State the term that describes how these bulbs are connected.

_____ [1]

This investigation was continued until four bulbs were added.
The meter measured the voltage across the first bulb only each time a bulb was added.
The results are shown below.

Number of bulbs	Voltage across first bulb/V
1	3
2	1.5
3	1
4	0.75

(ii) Describe the trend shown by these results.

_____

_____ [1]

(iii) Suggest **one** other change that will occur as more bulbs are added to this circuit.

_____

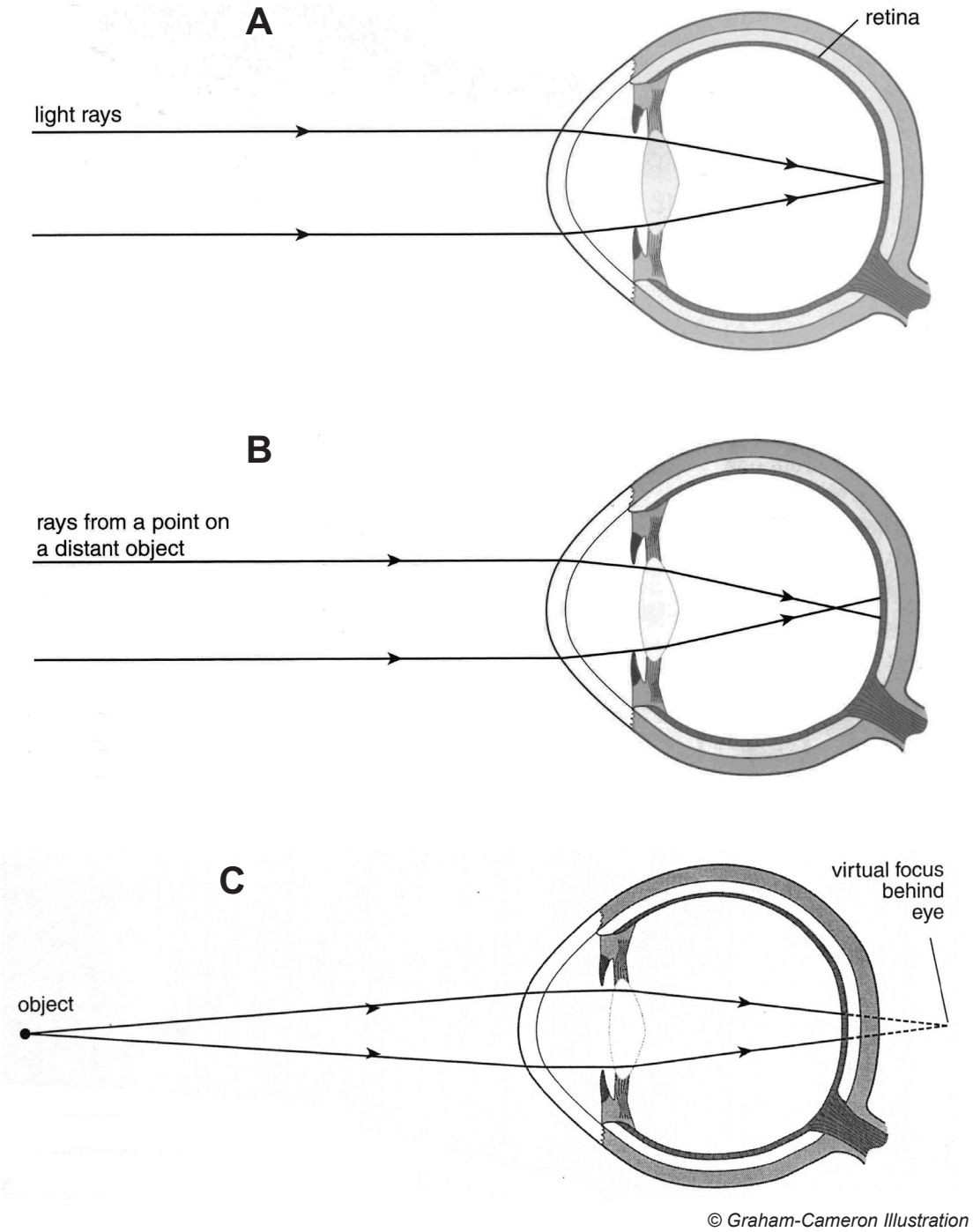
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** The diagrams below represent short, long and perfect sight but not in that order.



(i) Which diagram (**A**, **B** or **C**) shows short sight?

Answer _____ [1]

(ii) Explain fully the cause of short sight.

_____

_____

_____ [2]

(b) (i) Suggest the effect of short sight on a person's vision.

_____

_____ [1]

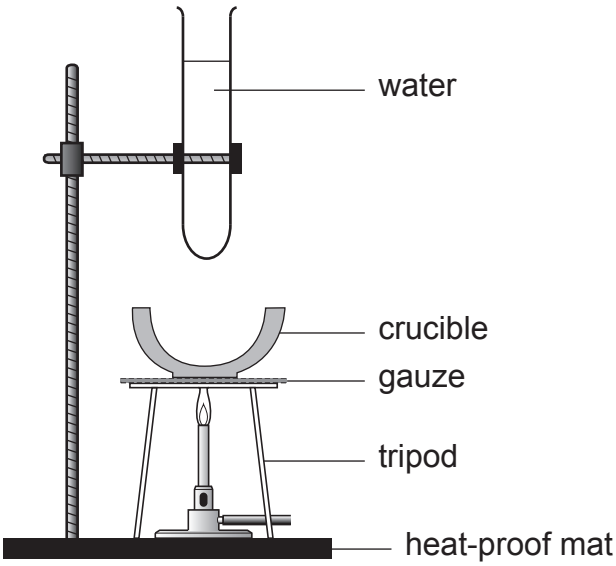
(ii) Name the type of lens required to correct short sight.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 **(a)** The diagram below shows the apparatus used in an experiment to compare four fuels.



Each fuel was burned in the crucible and the temperature rise of the water calculated.
The table below gives the results from the experiment.

Fuel	Temperature before/°C	Temperature after/°C	Temperature rise/°C
Coal	21	68	47
Oil	22	77	55
Lignite	20		42
Peat	22	60	

(i) Complete the table above. [2]

(ii) State **two** things that should have been done to ensure that the experiment was a fair test.

1. _____

_____

2. _____

_____ [2]

(iii) Oil is the most common fuel used in a power station to change water into steam. Use the information provided to explain why oil is the most suitable of these fuels.

_____

_____

_____

_____ [2]

(b) Describe fully how fossil fuels were formed.

_____

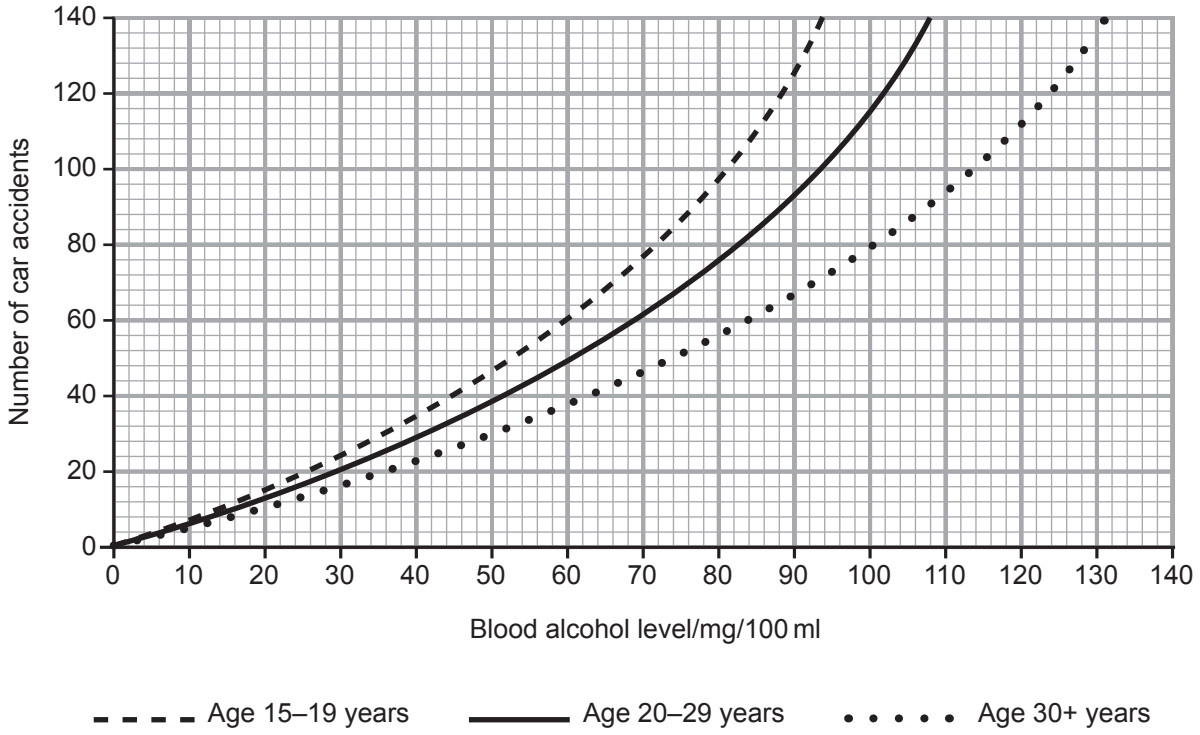
_____

_____

_____ [3]

Examiner Only	
Marks	Remark

8 The graph below shows the link between blood alcohol level and the number of car accidents for different age groups.



(a) Describe and explain the effect that alcohol has on the number of car accidents at different ages.

Your answer should include:
- evidence from the graph
- the effect alcohol has on the brain
- the effect alcohol has on the distance a vehicle takes to stop

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

Examiner Only	
Marks	Remark

Examiner Only

Marks	Remark

[6]

(b) The legal limit for a driver's blood alcohol level is 80 mg/100 ml.

(i) Calculate how many more car accidents an 18-year-old may have compared to a 40-year-old driving at the legal limit.

(Show your working out.)

Answer _____ [2]

(ii) Some people want the law changed so that it is illegal to drive with any alcohol in your blood. Suggest **one** argument against this.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER