Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 3 (Physics)
Foundation Tier

GSS31

[GSS31]

FRIDAY 13 NOVEMBER 2015, 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	

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Marks	Remark

1 **(a)** The photograph below shows some electrical appliances found in the home.

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(i) Name **two** appliances, shown in the photograph, that are used to produce heat.

1. _____

2. _____ [2]

(ii) Name the main type of energy a radio is designed to produce.

_____ [1]

(b) Appliances are connected to the mains with 3-pin plugs. Using lines, match each wire with its correct colour.

Wire	Colour
neutral	green/yellow
live	brown
earth	blue

[2]

(c) Some safety features of a 3-pin plug are:

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Marks	Remark

fuse : earth wire : plastic cover : cable grip

Which safety feature:

(i) prevents too much current flowing to the appliance?

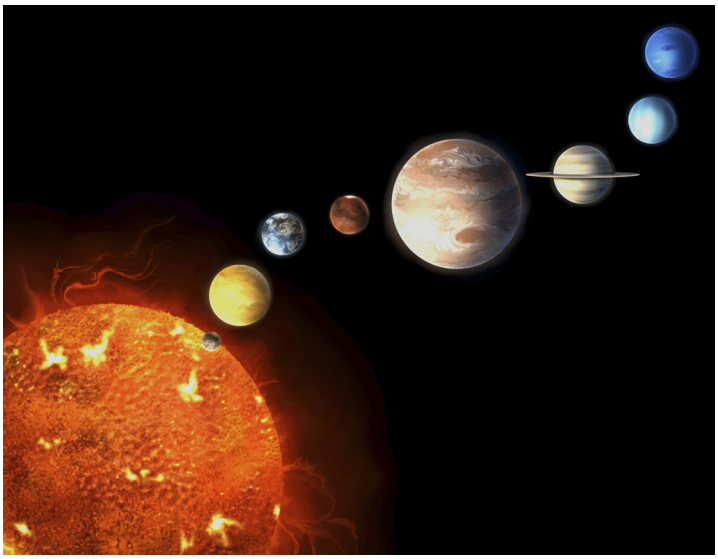
_____ [1]

(ii) helps protect users when handling the plug?

_____ [1]

Examiner Only	
Marks	Remark

2 The image below shows our Solar System.



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(a) Place the following objects in order of size starting with the smallest.

planet **moon** **asteroid** **star**

smallest _____

_____

_____

_____ [2]

(b) The table below contains information about five planets in our Solar System.

Planet	Distance from Sun/ million km	Diameter (size)/ km	Gravity/ N/kg
Mercury	58	4900	4
Venus	108	12 000	9
Earth	150	12 750	10
Jupiter	778	143 000	26
Saturn	1429	120 000	11

Using the table Mary made the following statement:

"As distance from the Sun increases, gravity increases."

(i) Explain how the data shows that gravity does **not** depend on distance from the Sun.

_____

_____ [1]

(ii) Gravity actually depends on the size of the planet.
Complete the following sentence to show this relationship.

As the size of the planets _____

_____ [1]

(c) What effect will increasing distance from the Sun have on the temperature of a planet?

_____

_____ [1]

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Marks	Remark

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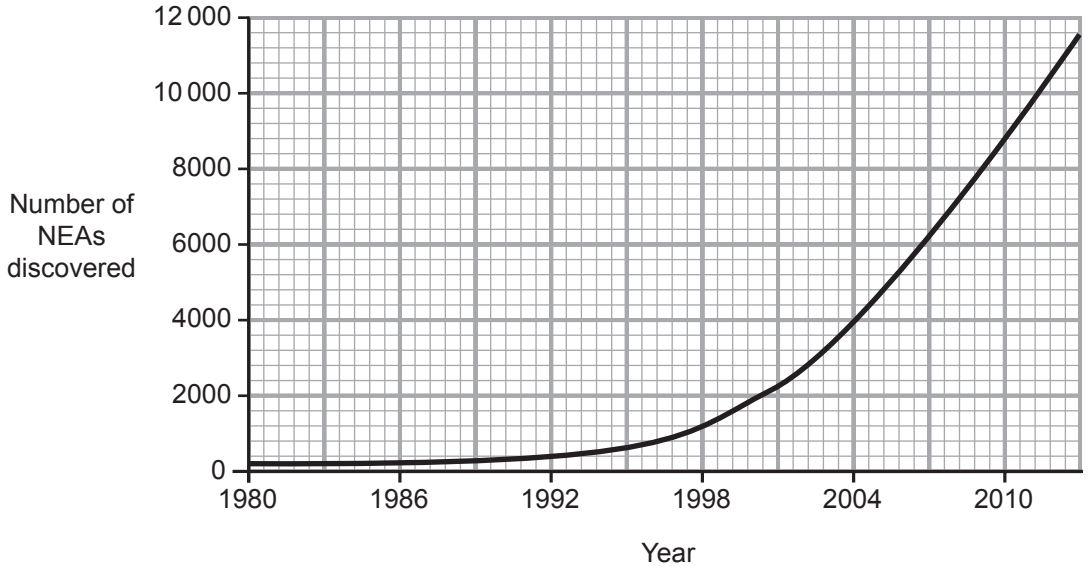
Marks	Remark

(d) The graph below gives information about the number of Near-Earth asteroids (NEAs) discovered since 1980.



© Alan B. Chamberlin (JPL) NASA/ http://neo.jpl.nasa.gov/stats/

(i) How many NEAs had been discovered by 2010?

Answer _____ [1]

(ii) State the trend shown by this information.

_____

_____ [1]

(iii) Scientists are interested in NEAs because they may hit the Earth. Explain fully what could happen if a large asteroid struck the Earth.

_____

_____

_____ [2]

3 **(a)** The table below shows the features of five sound waves.

Wave	Wavelength/ m	Frequency/ Hz	Speed/ m/s
A	33.00	10	330
B	17.50	20	330
C	11.00		
D	8.75	40	330
E	5.50	60	330

(i) Complete the table above to give the frequency and speed of wave **C**. [2]

(ii) Which wave (**A**, **B**, **C**, **D** or **E**) cannot be heard by humans?

Answer _____ [1]

(iii) Which equation below is used to calculate the speed of a wave?

Circle the correct answer.

speed = wavelength + frequency

speed = wavelength − frequency

speed = wavelength × frequency [1]

(b) Sounds above 20 kHz also cannot be heard by humans.
What name is given to these sounds?

_____ [1]

(c) What do all waves carry as they move from one place to another?

_____ [1]

Examiner Only

Marks	Remark

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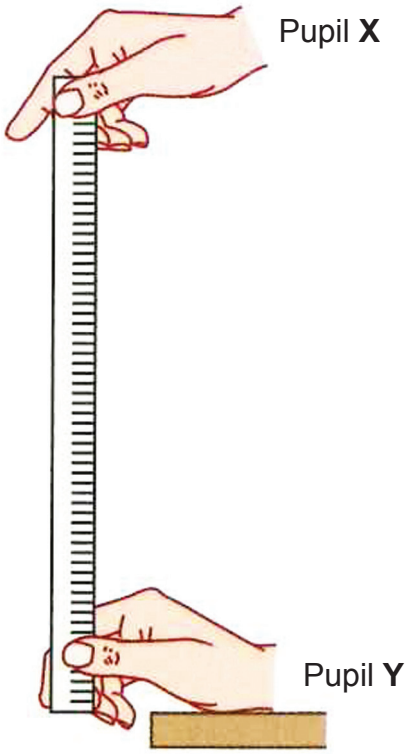
Marks	Remark

4 **(a)** The diagram below shows how speed of reaction can be investigated.



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(i) Describe fully how this equipment can be used to find which pupil (**X** or **Y**) has the faster reactions.

_____

_____

_____

_____

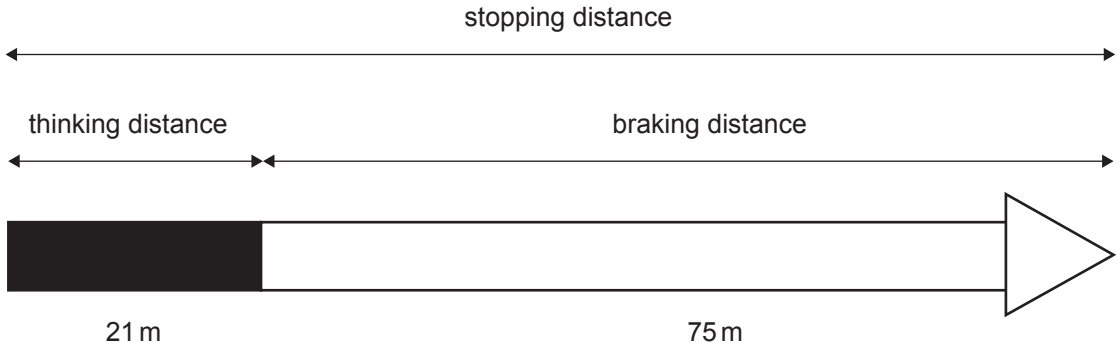
_____ [3]

(ii) Give **one** way that these pupils can make sure their results are reliable.

_____

_____ [1]

(b) The diagram below shows the stopping distance for a car travelling at 70 mph.



(i) Which distance (stopping, thinking or braking) is **not** affected by speed of reaction?

_____ [1]

(ii) Calculate the stopping distance at 70 mph.

Answer _____ m [1]

(iii) These distances are for a dry road. What effect, if any, will a wet road have on braking distance?

_____ [1]

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Marks	Remark

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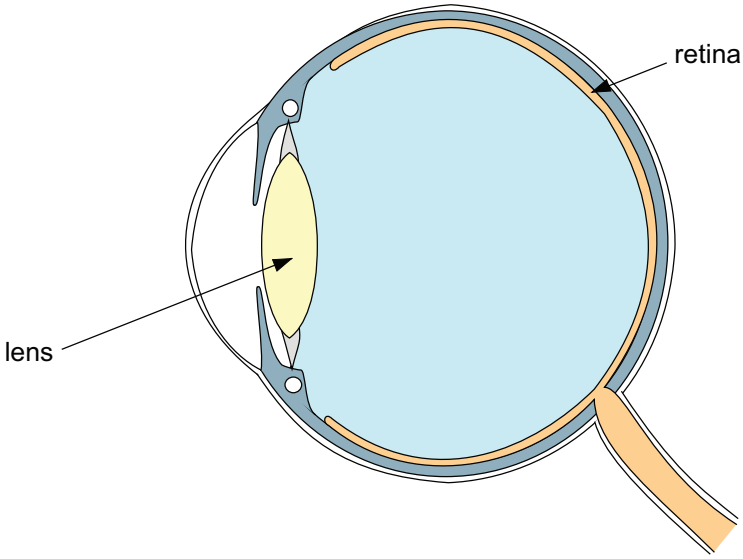
Marks	Remark

5 The diagram below shows the human eye.



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(a) Explain fully the function of the lens in the eye.

_____

_____

_____ [2]

(b) Complete the following sentences.

Choose from:

convex **close** **concave** **far**

John is short sighted. He can see _____ objects clearly but _____ objects appear blurry.

Short sight can be corrected using a _____ lens. [2]

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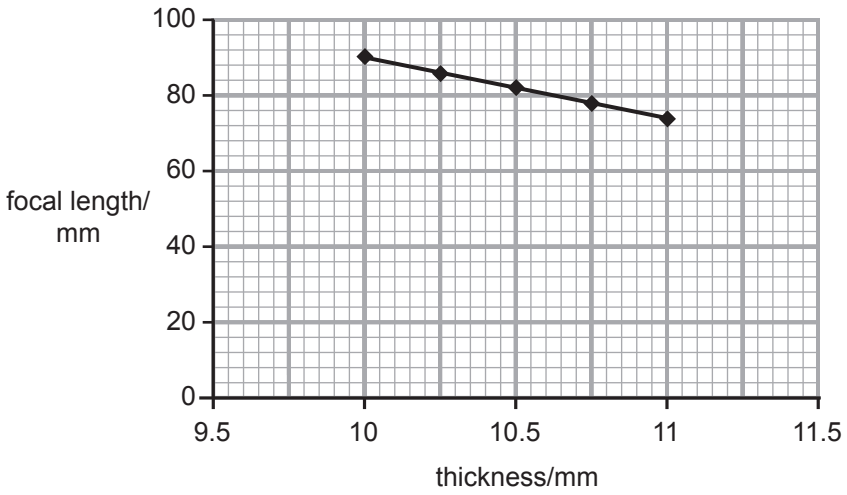
Marks	Remark

(c) The graph below shows how the thickness of a convex lens affects the distance between the lens and the point at which it focuses (focal length).



(i) Describe the trend shown in the graph.

_____

_____ [1]

(ii) What will be the focal length of a lens with a thickness of 11.5 mm?

Answer _____ mm [1]

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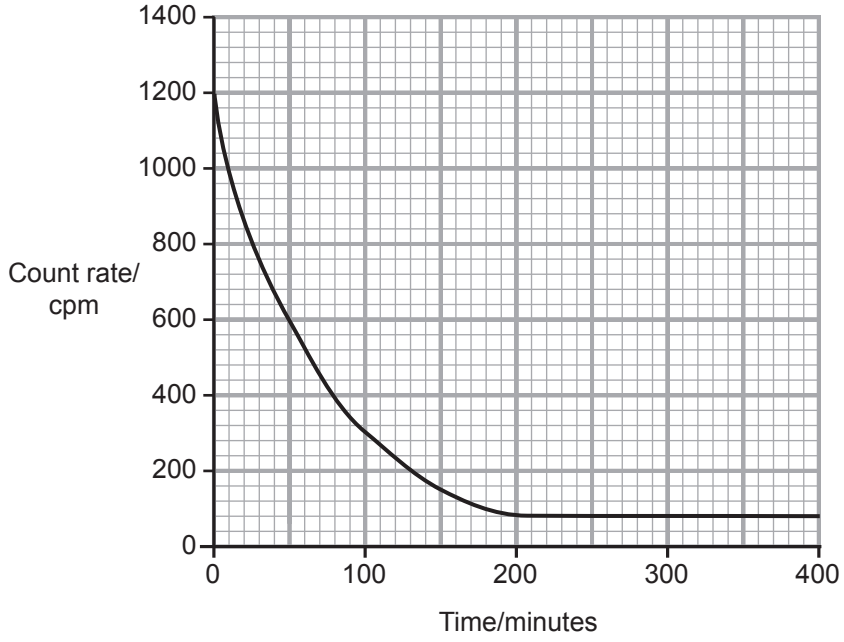
Marks	Remark

6 **(a)** The atoms of radioactive isotopes have unstable nuclei that disintegrate emitting radiation.

Name the **two** types of particle found in the nucleus of an atom.

_____ and _____ [2]

(b) The graph below shows how the count rate of a radioactive isotope changes with time.



(i) What is the count rate at 100 minutes?

Answer _____ cpm [1]

(ii) Suggest the value of background radiation.

Answer _____ cpm [1]

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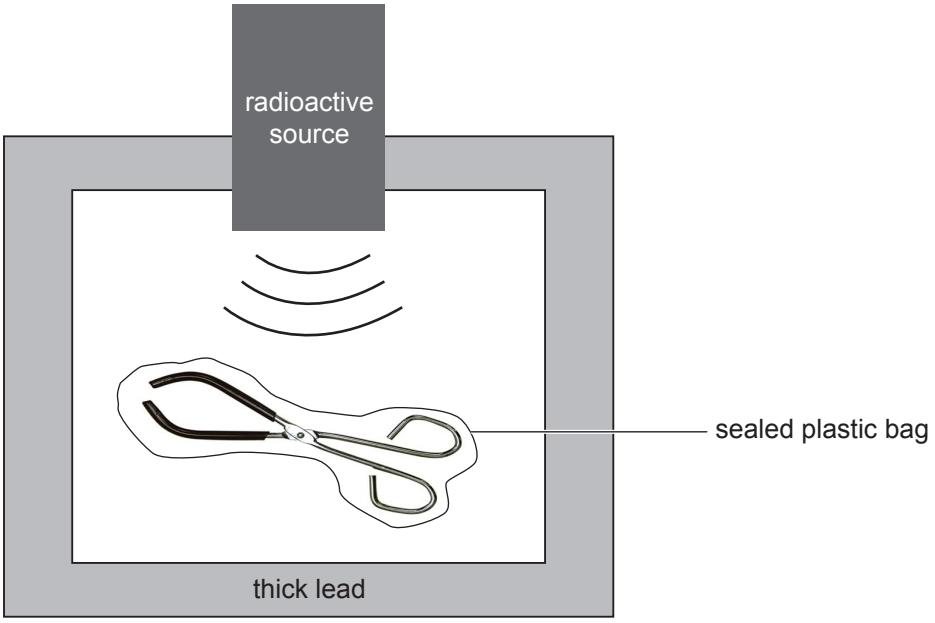
Marks	Remark

(c) After operations in hospitals the surgical instruments need to be sterilised as shown in the diagram below.



(i) Name the type of radiation used to sterilise surgical instruments.

Answer _____ [1]

(ii) Explain fully why it is necessary to use the radioactive source inside thick lead.

_____

_____

_____ [2]

(iii) Fruit can also be treated with radiation before being transported long distances.

Explain fully why this is done and how it benefits shopkeepers.

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

7 **(a)** The table below shows the results of an investigation into the effect of the mass of a car on fuel consumption.

Car mass/kg	Fuel consumption/mpg
1000	70
1100	67
1200	64
1300	61
1400	58
1500	55

(i) State **two** things that the investigators must do to make this a fair test.

1. _____

_____

2. _____

_____ [2]

(ii) Explain how fuel consumption can be used as a measure of efficiency.

_____

_____ [1]

(iii) How can car manufacturers use the trend in these results to design more efficient cars?

_____

_____ [1]

(b) Petrol and diesel come from fossil fuels. Describe fully how fossil fuels are formed.

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Marks	Remark

_____

_____

_____

_____ [3]

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Marks	Remark

8 **(a)** Modern Christmas tree lights use a parallel circuit. Explain why parallel circuits are better than series circuits.

Your answer should include:

- how bulbs are connected in each circuit
- the amount of current flowing through bulbs in each circuit
- **one** disadvantage with parallel circuits.

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

[6]

(b) Power NI use meter readings to calculate household electricity bills.
A meter shows the number of units used.
Each unit costs 15p.

Use the meter readings below to calculate the electricity bill for a house.

5 3 1 0 5	5 3 8 2 7
Previous reading 3 months ago	Present reading

(Show your working out.)

Answer _____ [2]

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THIS IS THE END OF THE QUESTION PAPER

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