AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE PHYSICS

F

Foundation Tier Unit Physics P3

Friday 16 June 2017 Morning Time allowed: 1 hour

Materials
For this paper you must have:
- a ruler
- a calculator
- the Physics Equations Sheet (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8(b) should be answered in continuous prose. In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

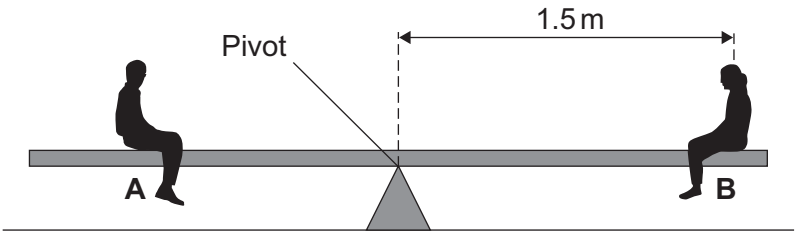
For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Answer **all** questions in the spaces provided.

1 Two children visit a playground.

1 (a) **Figure 1** shows the two children, **A** and **B**, sitting on a see-saw.

Figure 1



1 (a) (i) The weight of child **A** and the weight of child **B** each create a moment about the pivot.

What is meant by 'the moment of a force'?

[1 mark]

Tick (✓) **one** box.

the direction of the force ☐

the turning effect of the force ☐

the size of the force ☐

1 (a) (ii) The see-saw is balanced.

Use the correct answer from the box to complete the sentence.

[1 mark]

smaller than	**equal to**	**greater than**

The size of the moment of child **A** is _____ the size of the moment of child **B**.

1 (a) (iii) Child **B** has a weight of 400 N and is sitting 1.5 m from the pivot.

Calculate the moment of child **B** about the pivot.

Use the correct equation from the Physics Equations Sheet.

Choose the correct unit.

[3 marks]

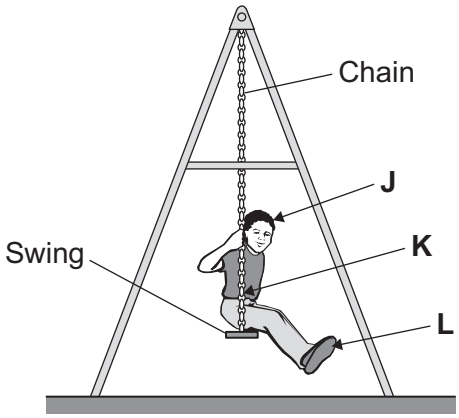
kilogram **newton-metre** **newton per metre**

Moment = _____ unit _____

Question 1 continues on the next page

1 (b) Child **A** now sits on a swing as shown in **Figure 2**. The swing is not moving.

Figure 2



Which arrow, **J**, **K** or **L**, points to the centre of mass of the child?

[1 mark]

Tick (✓) **one** box.

J ☐

K ☐

L ☐

1 (c) The child on the swing is now moving backwards and forwards like a pendulum. The frequency of the swing is 0.5 hertz.

Calculate the periodic time of the swing.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

_____

_____

Periodic time = _____ s

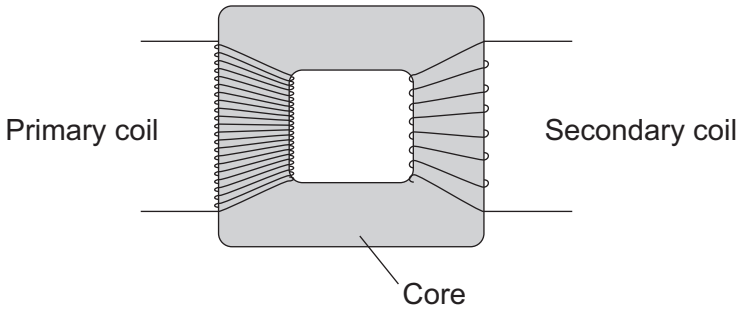
8

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

2 **Figure 3** shows a traditional transformer.

Figure 3



2 (a) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

greater than	**equal to**	**less than**

The potential difference across the secondary coil is _____

the potential difference across the primary coil.

2 (a) (ii) Give a reason for your answer to part **2 (a) (i)**.

[1 mark]

_____

_____

2 (b) What is the core of the transformer made from?

[1 mark]

_____

2 (c) What happens as the magnetic field in the core of the transformer changes?

[1 mark]

Tick (✓) **one** box.

The mass of the core increases. ☐

A potential difference is induced across the secondary coil. ☐

The temperature of the core decreases. ☐

2 (d) The power supply to the transformer is connected to the mains electricity supply.

What is the frequency of the mains electricity supply?

[1 mark]

Tick (✓) **one** box.

25 hertz ☐

50 hertz ☐

100 hertz ☐

2 (e) The power input of the transformer is 2 W. The transformer is 100% efficient.

State the power output of the transformer.

[1 mark]

_____

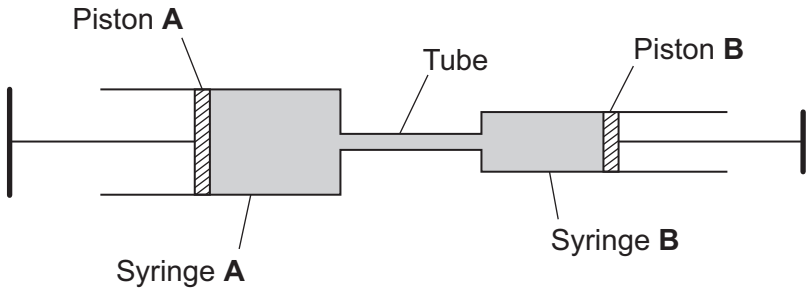
6

Turn over for the next question

3 A student made a hydraulic system using two syringes filled with water.

The syringes were joined with a tube, as shown in **Figure 4**.

Figure 4



3 (a) What property of water makes it suitable to use in a hydraulic system?

[1 mark]

Tick (✓) **one** box.

It is almost incompressible. ☐

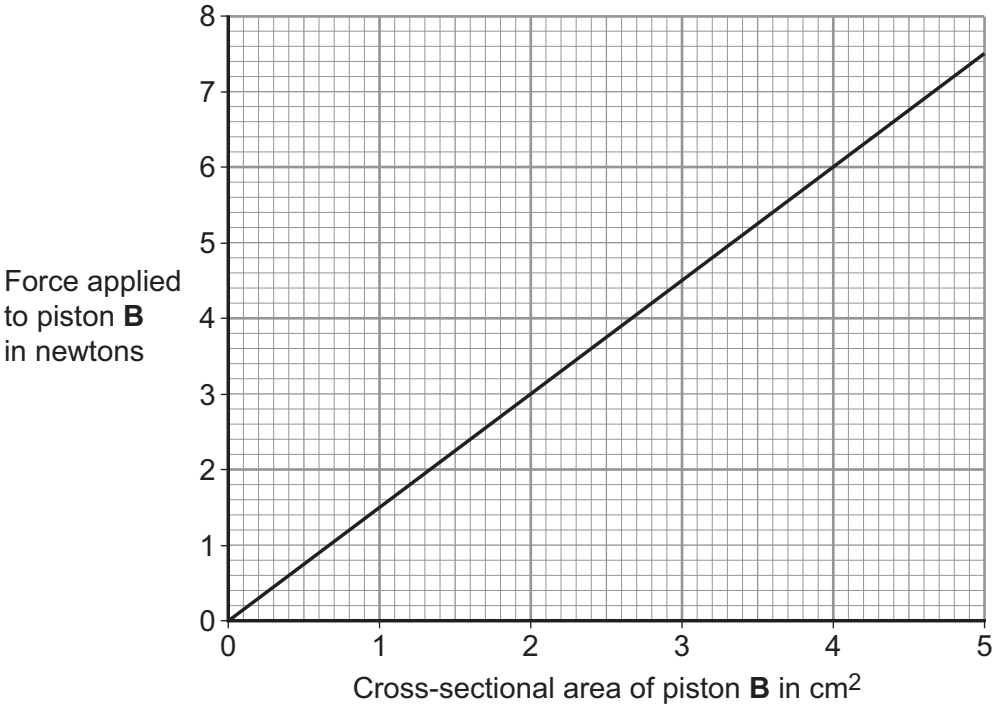
It is a poor electrical conductor. ☐

It is transparent. ☐

3 (b) The student investigated how changing the cross-sectional area of piston **B** affected the force needed to keep piston **B** moving at a constant rate.

The results are shown in **Figure 5**.

Figure 5



3 (b) (i) Describe the relationship between the cross-sectional area of piston **B** and the force applied to piston **B** shown in **Figure 5**.

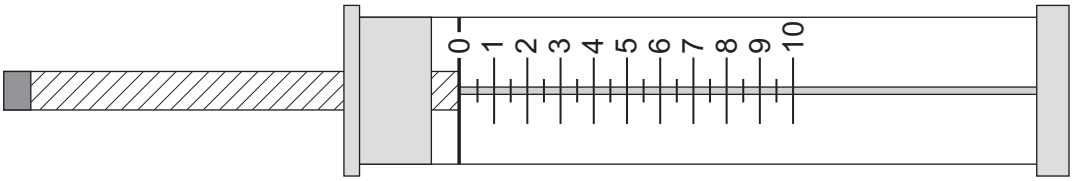
[2 marks]

Question 3 continues on the next page

3 (b) (ii) The student used a newton-meter to measure the force applied to piston **B**.

The newton-meter is shown in **Figure 6**.

Figure 6



What is the smallest change in force that can be measured with this newton-meter?

[1 mark]

Tick (✓) **one** box.

0.1 N ☐

0.5 N ☐

1 N ☐

4

4 (a) Ultrasound can be used to produce an image of an unborn baby.

4 (a) (i) What is ultrasound?

[1 mark]

_____

_____

4 (a) (ii) What happens to the ultrasound when it reaches the skin of an unborn baby?

[1 mark]

Tick (✓) **one** box.

It is all reflected and none is transmitted. ☐

Some is reflected and some is transmitted. ☐

None is reflected and it is all transmitted. ☐

4 (a) (iii) Give another medical use of ultrasound.

[1 mark]

Tick (✓) **one** box.

breaking up kidney stones ☐

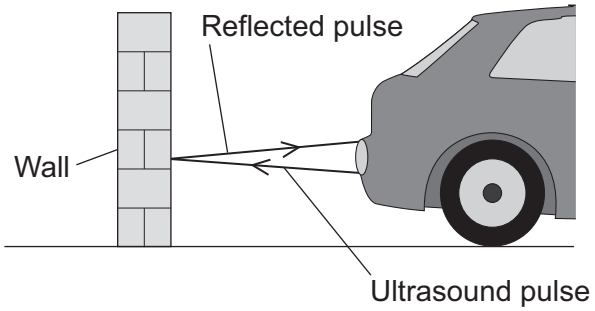
treating cancer ☐

destroying bacteria ☐

Question 4 continues on the next page

4 (b) A parking sensor on the back of a car emits an ultrasound pulse and receives the reflected pulse as shown in **Figure 7**.

Figure 7



Complete the sentence to describe how the time taken for the reflected pulse to return to the car changes as the car moves.

[1 mark]

As the car moves closer to the wall the reflected pulse takes _____ time to return to the car.

4 (c) The parking sensor emits an ultrasound pulse. The reflected pulse is received 0.006 seconds later.

The speed of ultrasound in air is 330 m/s.

Calculate the distance from the car to the wall.

Use the correct equation from the Physics Equations Sheet.

[3 marks]

_____

_____

_____

_____

Distance from the car to the wall = _____ m

4 (d) There are four parking sensors spaced equally along the back of the car.

Suggest **one** advantage of using four sensors instead of just using one sensor.

[1 mark]

_____

_____

8

Turn over for the next question

5 A student investigates how a lens forms an image of a light bulb.

The image is formed on a screen.

Figure 8 shows the apparatus used.

Figure 8

5 (a) (i) Name the process that occurs at the lens to make an image form on the screen.

[1 mark]

_____

5 (a) (ii) Use the correct answer from the box to complete the sentence.

[1 mark]

real	**upright**	**virtual**

Light arriving on the screen forms an image which is _____ .

5 (a) (iii) The student places an object 2.0 cm tall near to the lens. The image formed on the screen is 3.0 cm tall.

Calculate the magnification of the image.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

_____

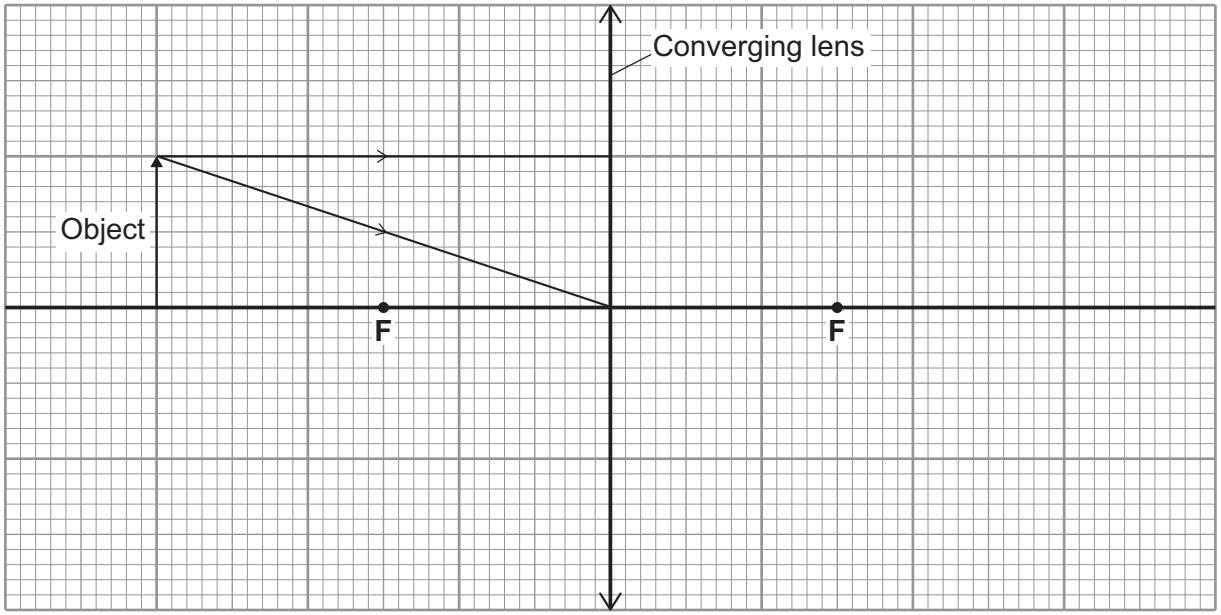
_____

Magnification = _____

5 (b) **Figure 9** shows a ray diagram of a converging (convex) lens with an object.

The diagram shows two rays of light leaving the object and reaching the lens.

Figure 9



5 (b) (i) Complete **Figure 9** to show how these two rays form an image.

[2 marks]

5 (b) (ii) Mark the position of the image with an arrow.

[1 mark]

5 (b) (iii) State the name of the two points labelled **F** on **Figure 9**.

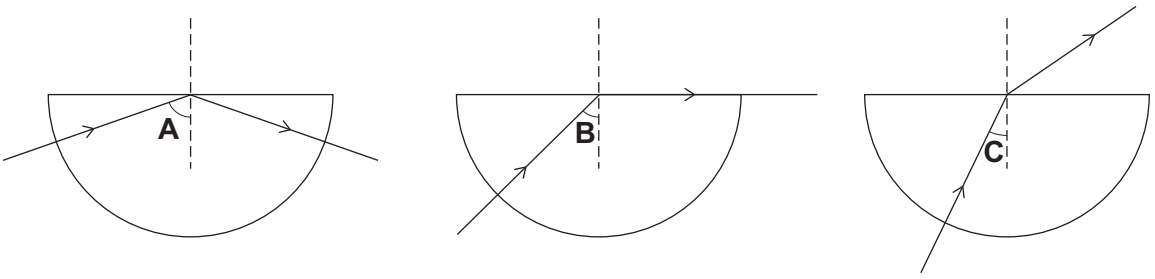
[1 mark]

Question 5 continues on the next page

5 (c) Another student investigates how light travels in a semi-circular glass block.

The student shines a ray of light into a semi-circular glass block from three different directions as shown in **Figure 10**.

Figure 10



X **Y** **Z**

5 (c) (i) Which diagram, **X**, **Y** or **Z**, shows total internal reflection of the light?

[1 mark]

Diagram _____

5 (c) (ii) Which angle, **A**, **B** or **C**, is the critical angle of the light in the block?

[1 mark]

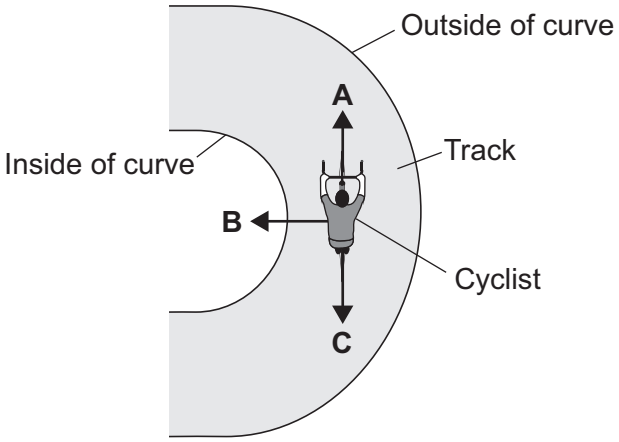
Angle _____

10

6 **Figure 11** shows a cyclist moving at a constant speed around a circular part of a cycle track.

There is a centripetal force acting on the cyclist when he is in the position shown in **Figure 11**.

Figure 11



6 (a) (i) When the cyclist is in the position shown in **Figure 11**, in which direction, **A**, **B** or **C**, does the centripetal force act?

[1 mark]

Direction _____

6 (a) (ii) What effect does the centripetal force have on the cyclist?

[1 mark]

_____

_____

Question 6 continues on the next page

6 (b) (i) The cyclist moves around the circular part of the track a second time, at the same speed. This time he is closer to the outside of the bend.

What effect does this have on the centripetal force needed?

[1 mark]

Tick (✓) **one** box.

The centripetal force is bigger. ☐

The centripetal force stays the same. ☐

The centripetal force is smaller. ☐

6 (b) (ii) A second cyclist moves around the circular part of the track. The second cyclist has a greater mass than the first cyclist.

What effect does the greater mass have on the centripetal force needed?

[1 mark]

Tick (✓) **one** box.

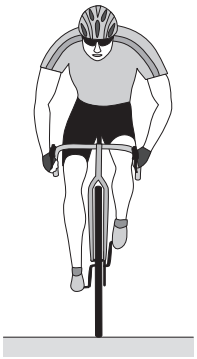
The centripetal force is bigger. ☐

The centripetal force stays the same. ☐

The centripetal force is smaller. ☐

6 (c) **Figure 12** shows a stationary cyclist with both feet on the pedals.

Figure 12



Use the correct answers from the box to complete the sentence.

Each answer may be used once, more than once or not at all.

[2 marks]

heavy	**high**	**low**	**narrow**	**wide**

The cyclist on the stationary bicycle is unstable and is likely to topple over.

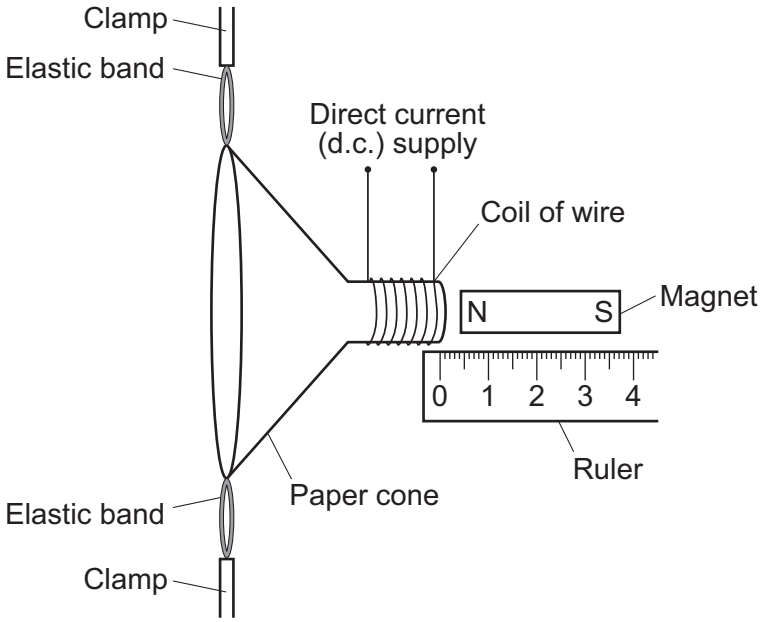
This is because the cyclist and bicycle have a _____ centre of mass and a _____ base.

6

Turn over for the next question

7 **Figure 13** shows a loudspeaker made by a student. When there is a current in the coil the paper cone moves.

Figure 13



The student investigates how changing the size of the current in the coil of wire affects the distance moved by the paper cone.

7 (a) State **two** variables the student should control.

[2 marks]

1 _____

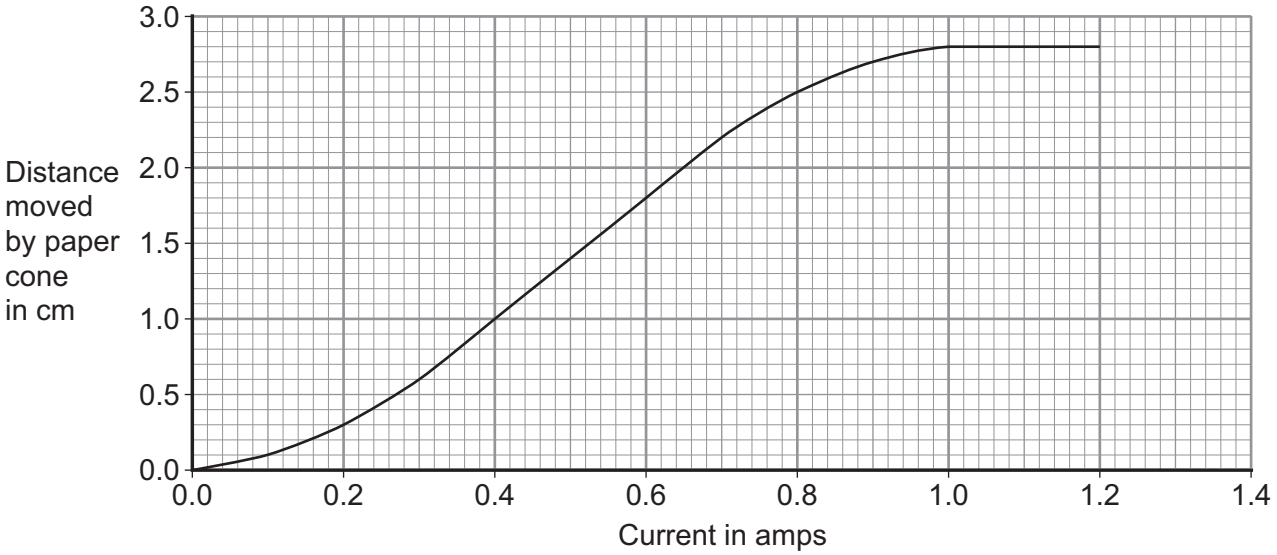
_____

2 _____

_____

7 (b) The results of the student's investigation are shown in **Figure 14**.

Figure 14



7 (b) (i) When the current increases from 0.5 A to 0.9 A, how much does the distance moved increase?

[2 marks]

Increase in distance moved = _____ cm

7 (b) (ii) State **two** conclusions that can be made from the graph.

[2 marks]

1 _____

_____

2 _____

_____

6

Turn over for the next question

8 (a) Glasses may be used to correct defects of vision. Some glasses have been designed with lenses that can be adjusted to give different focal lengths.

Suggest **one** advantage of using adjustable lenses in glasses.

[1 mark]

8 (b) **In this question you will gain marks for using good English, organising information clearly and using scientific words correctly.**

Explain how the human eye forms an image.

Your explanation should include:

- how a normal eye causes light from objects at different distances to form an image
- why long sight and short sight cause blurred images.

Do **not** include diagrams in your answer.

[6 marks]

Extra space

7

Turn over for the next question

9 CT scans are used by doctors to create three-dimensional images of a patient's body.

9 (a) (i) Explain why CT scans can increase the risk of cancer to the patient.

[2 marks]

9 (a) (ii) Although CT scans increase the risk of cancer they are still carried out.

Suggest why.

[1 mark]

9 (b) A child has a CT scan. Her mother stays in the room with her during the scan.

Suggest **one** precaution that the mother should take during the scan.

[1 mark]

9 (c) Ultrasound can also be used to create three-dimensional images of a patient.

State **one** advantage of using CT scans rather than ultrasound scans.

[1 mark]

5

END OF QUESTIONS

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