

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Secondary Education  
June 2008

**PHYSICS**  
**Unit Physics P3**

**Higher Tier**

Wednesday 11 June 2008 1.30 pm to 2.15 pm

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>a ruler.</li> </ul> <p>You may use a calculator.</p>
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Time allowed: 45 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

**Advice**

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

**PHY3H**  
**H**



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Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
		7	
		8	
Total (Column 1)		→	
Total (Column 2)		→	
TOTAL			
Examiner's Initials			

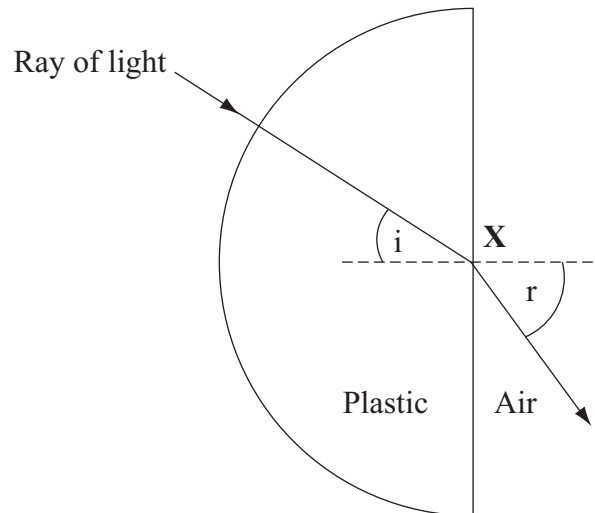


Answer **all** questions in the spaces provided.

- 1 (a) A student investigated the refraction of light as it passes out of a transparent plastic block.

She aimed a ray of light at point **X**. She marked the position of the ray as it passed through the transparent plastic block and into the air.

The angle  $i$  is the angle of incidence.



- 1 (a) (i) What is the name of angle  $r$ ?

.....  
(1 mark)

- 1 (a) (ii) What is the name of the dashed line?

.....  
(1 mark)



- 1 (b) A camera uses a lens to produce an image which falls on a light detector.



Name a light detecting device which may be used in a camera.

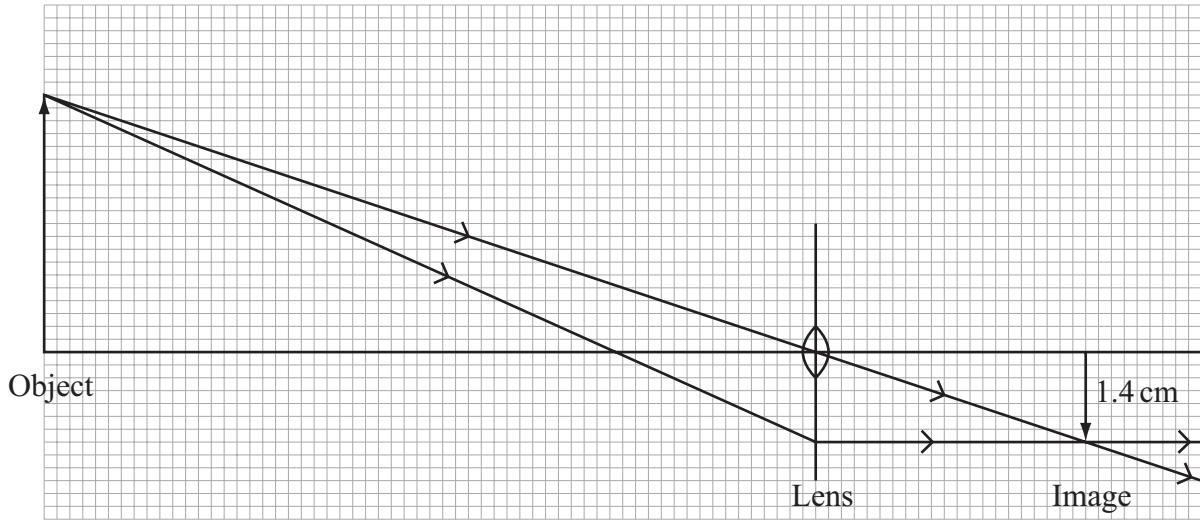
.....  
(1 mark)

**Question 1 continues on the next page**

**Turn over ►**



1 (c) The diagram shows the position of an image formed in a camera.



1 (c) (i) What type of lens is shown in the diagram?

.....  
(1 mark)

1 (c) (ii) Use the equation in the box to calculate the magnification.

$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

Show clearly how you work out your answer.

.....  
.....

Magnification = ..... (2 marks)

1 (d) Why does the image formed in a camera have to be a real image?

.....  
.....

(1 mark)

7
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- 2 (a) Thousands of artificial satellites are now in orbit around the Earth. A student used the Internet to collect information about four of them.

The table shows the data that the student collected.

Satellite	Altitude (= height above the surface of the Earth) in kilometres	Period of orbit in hours
A	300	1.5
B	850	1.7
C	20 000	12.0
D	36 000	24.0

- 2 (a) (i) What conclusion, on the relationship between the altitude of a satellite and its period of its orbit, can the student come to from this data?

.....  
 .....  
 (1 mark)

- 2 (a) (ii) Any conclusion from the data in the table may not be valid for all satellites.

Give **two** reasons.

1 .....  
 .....  
 2 .....  
 .....  
 (2 marks)

- 2 (b) The Moon is the Earth's only natural satellite.

Explain how the Moon stays in a nearly circular orbit around the Earth.

.....  
 .....  
 .....  
 (2 marks)

**Question 2 continues on the next page**

**Turn over ►**



2 (c) Two students see a film in which people on a spaceship hear an explosion on another spaceship.

The students think that this is not possible. What scientific evidence supports their opinion?

.....  
.....  
*(1 mark)*

2 (d) Some people say that space should not be explored.

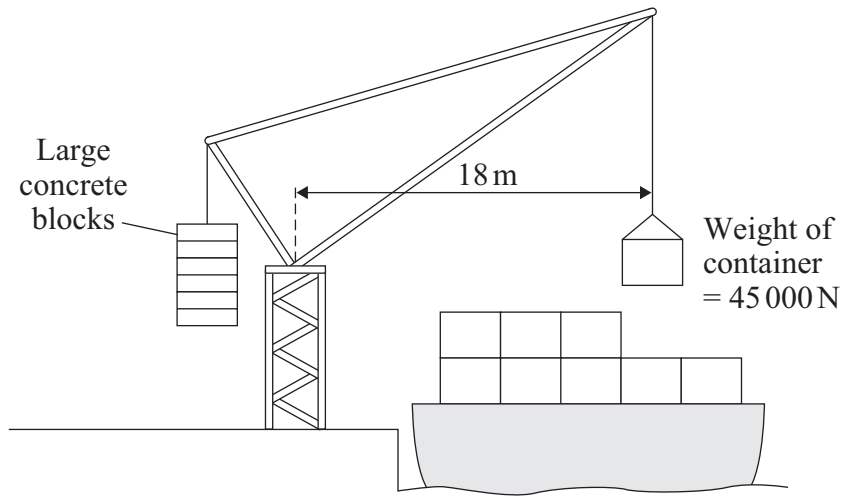
Do you agree with them? Explain your answer.

.....  
.....  
.....  
*(2 marks)*

8
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- 3 The diagram shows a crane which is loading containers onto a ship.



- 3 (a) Use the equation in the box to calculate the moment of the container which is being loaded.

$\text{moment} = \text{force} \times \text{perpendicular distance from the line of action of the force to the axis of rotation}$
--

Show clearly how you work out your answer and give the unit.

.....

.....

Moment of the container = .....  
(3 marks)

- 3 (b) Suggest and explain the purpose of the large concrete blocks.

.....

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.....

.....

.....

(3 marks)



4 The statement in the box is from an article in a science magazine.

Scientists think that all the elements on Earth are also present throughout the Universe.

4 (a) (i) Name the process by which these elements were formed.

.....  
(1 mark)

4 (a) (ii) Where did the elements form?

.....  
(1 mark)

4 (a) (iii) What caused these elements to be distributed throughout the Universe?

.....  
(1 mark)

4 (b) Scientists have only examined a tiny fraction of the Universe. What is the basis for the statement in the science magazine?

.....  
.....  
(1 mark)

4

5 Ultrasound can be used in industry for detecting internal cracks in metals.

5 (a) State **two** features of ultrasound.

1 .....

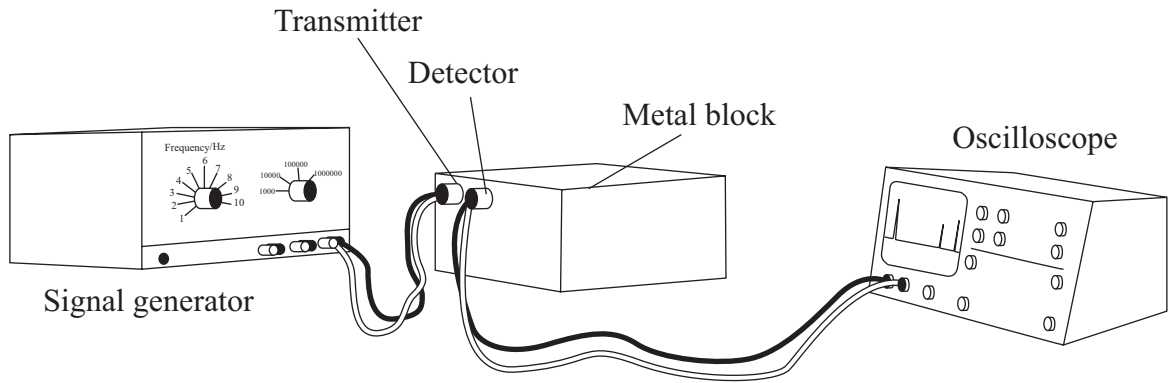
2 .....

(2 marks)

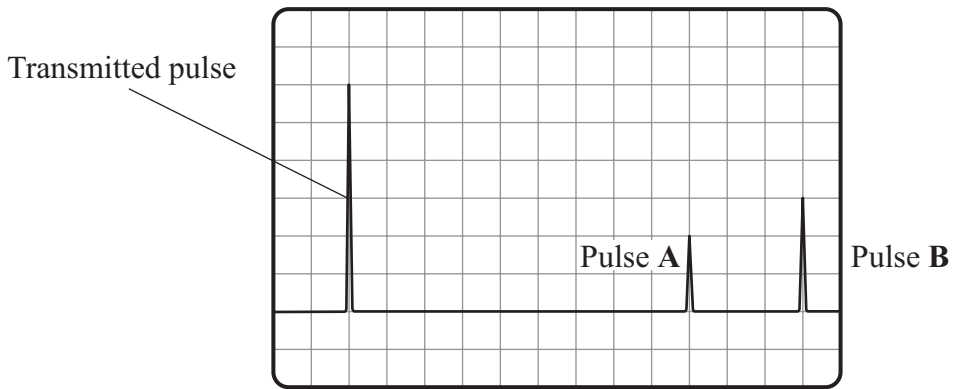




- 5 (b) The diagram shows an ultrasound transmitter and detector fixed to the front of a metal block. The block has an internal crack.



The diagram below shows the screen of the oscilloscope connected to the detector.



- 5 (b) (i) Explain why pulse A and pulse B occur.

.....

.....

.....

(2 marks)

- 5 (b) (ii) The metal block is 120 mm from front to back. What is the distance, in mm, from the front of the block to the internal crack?

Distance = ..... mm  
(1 mark)

5

Turn over for the next question

Turn over ▶



- 6 (a) This notice is on the back of a television set.



The transformer used in the television set has 75 turns on its primary coil. The potential difference (p.d.) across the primary coil is 230 volts and the p.d. across the secondary coil is 32 200 volts.

Use the equation in the box to calculate the number of turns on the secondary coil.

$$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

Show clearly how you work out your answer.

.....

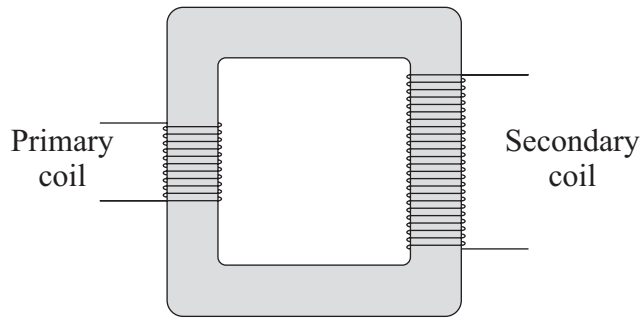
.....

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Number of turns on the secondary coil = .....  
(2 marks)



6 (b) The diagram shows the structure of a transformer.



Explain how the transformer works.

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(3 marks)

5
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**Turn over for the next question**

**Turn over ▶**

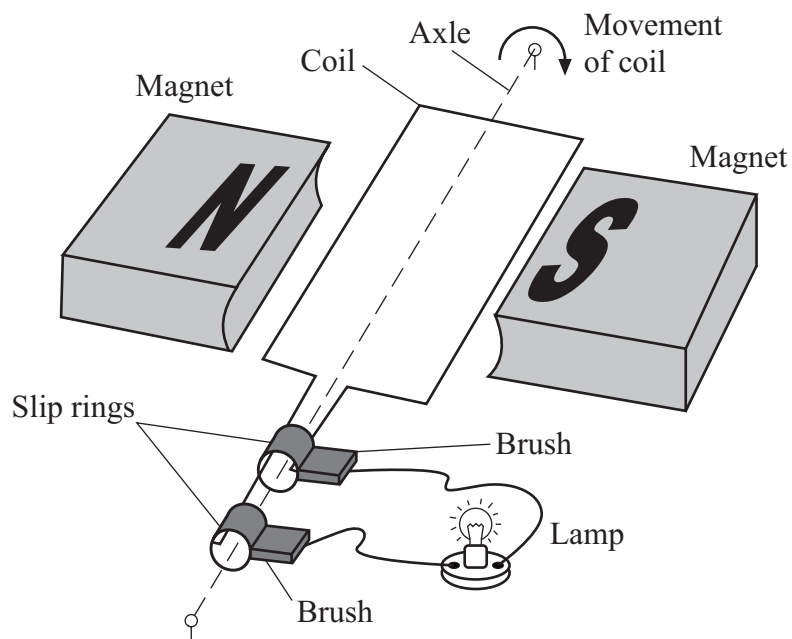


7 A student has an exercise bike.



She wants to connect it to a generator and lamp so that the lamp lights when she pedals fast enough.

The diagram shows the simple generator which she constructs.



Explain how rotating the coil causes the lamp to light.

Include in your explanation the function of the slip rings and brushes.

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(5 marks)

5

**Turn over for the next question**

**Turn over ►**



- 8 The London Eye is the largest observation wheel in the world.



The passengers ride in capsules. Each capsule moves in a circular path and accelerates.

- 8 (a) Explain how the wheel can move at a steady speed and the capsules accelerate at the same time.

.....

.....

.....

*(2 marks)*

- 8 (b) In which direction does each capsule accelerate?

.....

*(1 mark)*

- 8 (c) What is the name of the resultant force that causes the capsules to accelerate?

.....

*(1 mark)*



- 8 (d) The designers of the London Eye had to consider **three** factors which affect the resultant force described in part (c).

Two factors that increase the resultant force are

- an increase in the speed of rotation
- an increase in the total mass of the wheel, the capsules and the passengers.

Name the other factor that affects the resultant force and state what effect it has on the resultant force.

.....

.....

(1 mark)

5

**END OF QUESTIONS**



**There are no questions printed on this page**

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