

FOR OFFICIAL USE

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G

K & U PS

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Total Marks

3220/401

NATIONAL
QUALIFICATIONS
2007

WEDNESDAY, 16 MAY
9.00 AM – 10.30 AM

PHYSICS
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

Reference may be made to the Physics Data Booklet.

- 1 All questions should be answered.
- 2 The questions may be answered in any order but all answers must be written clearly and legibly in this book.
- 3 For questions 1–5, write down, in the space provided, the letter corresponding to the answer you think is correct. There is only **one** correct answer.
- 4 For questions 6–18, write your answer where indicated by the question or in the space provided after the question.
- 5 If you change your mind about your answer you may score it out and replace it in the space provided at the end of the answer book.
- 6 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



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3. Which row of values would result in the greatest kinetic energy?

	<i>Mass</i> (kilograms)	<i>Speed</i> (metres per second)
A	45	8
B	45	4
C	50	10
D	50	8
E	50	4

Answer

1

4. A rocket is pushed forwards because its engine gases

- A are pushed backwards
- B spread outwards
- C are pushed forwards
- D surround the rocket
- E spread inwards.

Answer

1

5. In outer space, the engine of a space probe is switched on for a short time. When the engine is switched off, the rocket

- A changes direction
- B moves at a steady speed
- C slows down
- D speeds up
- E follows a curved path.

Answer

1

[Turn over

Marks

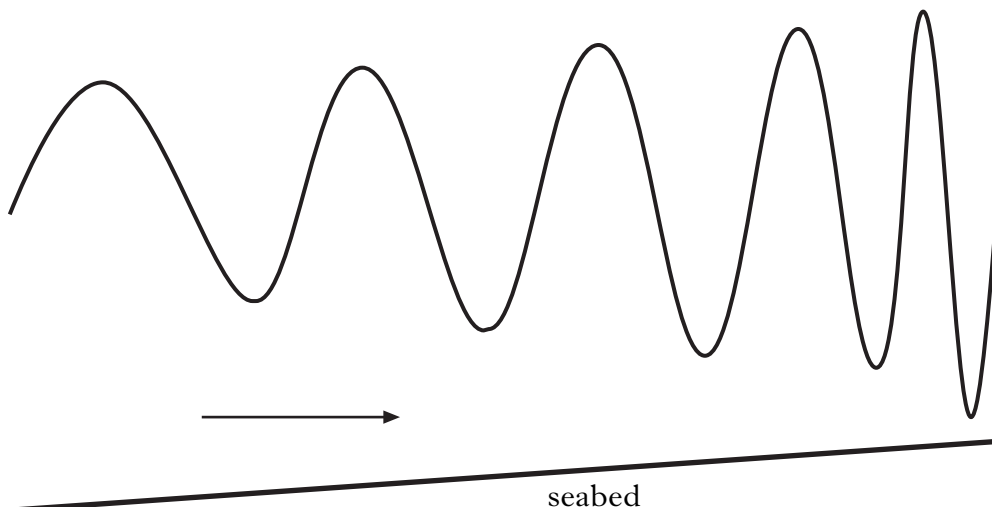
6. (a) (continued)

(iii) Calculate the frequency of the wave.

Space for working and answer

2

(b) The drawing below shows changes in the wave as it approaches the beach.



Complete the sentences below by circling the correct answers.

(i) As the wave approaches the beach,

its wavelength $\left\{ \begin{array}{l} \text{decreases} \\ \text{increases} \\ \text{stays the same} \end{array} \right\}$.

1

(ii) As the wave approaches the beach,

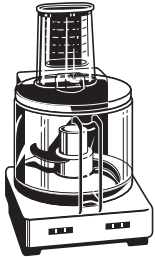


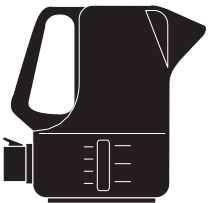


its amplitude $\left\{ \begin{array}{l} \text{decreases} \\ \text{increases} \\ \text{stays the same} \end{array} \right\}$.

1

[Turn over

Marks

7. Appliances convert electrical energy into other forms of energy.

<i>Appliance</i>	<i>Rating plate</i>
Food processor 	<div style="border: 1px solid black; padding: 10px; text-align: center;"> 230 volts 50 hertz 400 watts </div>
Hair dryer 	<div style="border: 1px solid black; padding: 10px; text-align: center;"> 230 volts 50 hertz  1200 watts </div>
Kettle 	<div style="border: 1px solid black; padding: 10px; text-align: center;"> 230 volts 50 hertz 2200 watts </div>
Lamp 	<div style="border: 1px solid black; padding: 10px; text-align: center;"> 230 volts 50 hertz  60 watts </div>

(a) State the **useful** energy output from the following appliances.

(i) Lamp: electrical energy \longrightarrow energy

1

(ii) Kettle: electrical energy \longrightarrow energy

1

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10. Different types of radiation are used to detect and treat illnesses and injuries. Four of these radiations are

infrared laser light ultraviolet X-rays

(a) What type of radiation is used to treat skin conditions such as acne?
..... **1**

(b)



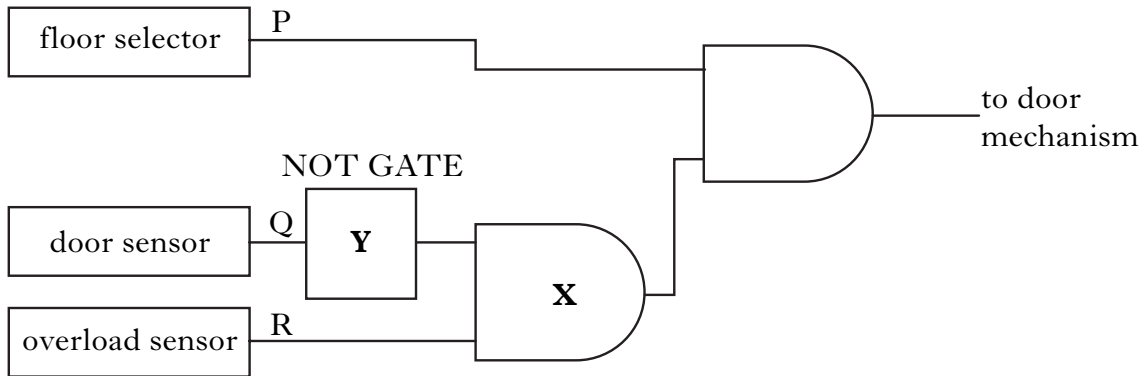
(i) State **one** medical use of X-rays.
..... **1**

(ii) What can be used to detect X-rays?
..... **1**

Marks

13. An electronic system is used to control a lift. When a floor has been selected, two checks are made:
 there are no obstructions to the doors;
 the lift is not overloaded.

Part of the circuit is shown below.



The logic states are as shown for the floor selector, the sensors and the door mechanism.

		logic level
floor selector	not pressed	0
	pressed	1
door sensor	no obstruction	0
	obstruction	1
overload sensor	overloaded	0
	not overloaded	1
door mechanism	doors open	0
	doors closed	1

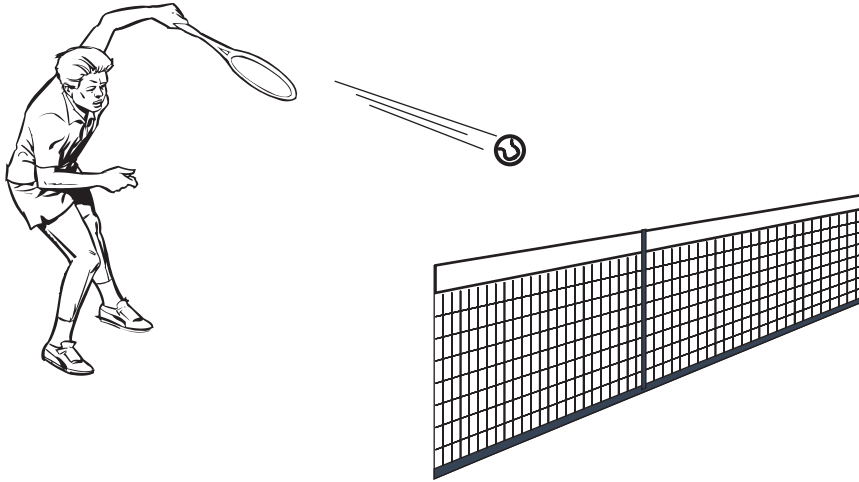
- (a) Name logic gate **X**.

.....

1

Marks

14. In a tennis match, the player hits the ball to serve.



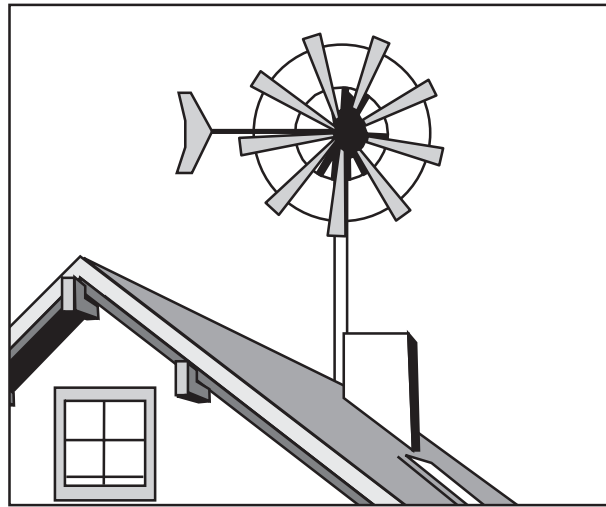
- (a) The ball travels 24 metres from the server's racquet to the opponent's racquet at an average speed of 40 metres per second.
Calculate the time taken.

Space for working and answer

2

Marks

17. A householder installs a wind turbine electricity generator.



The table gives information about the wind turbine.

Rated power output	1.5 kilowatts
Product life	20 years
Installation cost	£1600

- (a) In the year 2006, the wind turbine generated electricity for 2000 hours.
Calculate the energy generated in kilowatt-hours during 2006.

Space for working and answer

2

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YOU MAY USE THE SPACE ON THIS PAGE TO REWRITE ANY ANSWER YOU HAVE DECIDED TO CHANGE IN THE MAIN PART OF THE ANSWER BOOKLET. TAKE CARE TO WRITE IN CAREFULLY THE APPROPRIATE QUESTION NUMBER.

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