FOR OFFICIAL	USE						K&U	PS
Presenting Centre No.	Candidate No.	Subject No.	Level	Paper No.	Group No.	Marker's No.		
		3220						
						'	Total	Marks
		•						

[3220/285]

1992

SCOTTISH CERTIFICATE OF EDUCATION

PHYSICS

Standard Grade—GENERAL LEVEL

Thursday, 14th May-9.30 a.m. to 11.00 a.m.

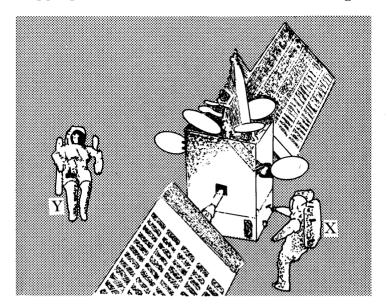
Fill in these boxes and read what is printed below.

name(s)) Surname
Number of seat occupied at examination

- All questions should be answered.
- The questions may be answered in any order but all answers must be written clearly and legibly in this booklet.
- For questions 1-8, 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 9-23, write your answer where indicated by the question or in the space provided after the question.
- You may score out your original answer and replace it in the space provided at the end of the answer booklet.
- Before leaving the examination room you must give this book to the Invigilator. Failure to do so may result in you losing all marks.

			K	&U	PS
1.	The	e part of a television receiver which selects the signal from one stationed the	n is		
	À	decoder			
	В	tuner			
	$\overline{\mathbf{C}}$	amplifier			
	D	modulator			
	E	aerial.			
	L				
		Answer	-	1	
2.		at is the colour of the insulation on the wire which should be connected to pin of a mains plug?	the		
	A	Blue			
	В	Brown			
	C	Black			
	D	Blue and yellow			
	E	Green and yellow			
		Answer		1	
3.	The	e circuit diagram below shows five components, labelled A, B, C, D and nected to a d.c. supply.	1 E,	-	
		E E		·	
		$A \square$	3		
		► B			
		<u> </u>		İ	
	Wh	ich component symbol represents a variable resistor?			
		Answer		1	
4.	Wh	ich of the following is a unit of electrical energy?			
	A	Ampere			
	В	Volt			
	C	Coulomb	,		
	D	Watt			
	E	Joule			
	ند	Toute The second of the second			
		Answer		1	-
[322	20/28	Page two			

5. Astronaut X is tapping the side of a satellite which is orbiting the moon.



Astronaut Y, at the other side of the satellite, will not hear the tapping because the sound will

- A be at too low a frequency
- B be at too high a frequency
- C not travel through space
- D be refracted away from Y

Compact disc player

E reflect back from the satellite.

6.	Wh	ich of the following does not contain an amplifier?
	A	Tape recorder
	В	Video recorder
	C	Transformer
	$\vec{\mathbf{D}}$	Hearing aid

7. The voltage gain of an amplifier may be calculated from the expression
 A output voltage input voltage
 B input voltage output voltage

C output voltage – input voltage

 $\begin{array}{ccc} D & \frac{output\ voltage-input\ voltage}{input\ voltage} \end{array}$

 $E = \frac{\text{input voltage}}{\text{output voltage} - \text{input voltage}} .$

Answer

Answer

Answer

[3220/285]

E

Page three

[Turn over

					K&U
Far out in	space, a space ca	psule has its rocke	et engine fired. Whe	n the engine is	
	off, the capsule w				
J	ally slow down a	nd stop			
	nue to speed up	1			
	at a steady speed	1			
	diately stop	1:			
E move	in the opposite of	irection.			
			Ans	wer	
The diagra	am shows a water	r wave travelling al	long a tank. The tar	ık is marked as	
	20 m	22 m	24 m	26 m	
+10 cm				-	
0					
$-10 \text{cm} - \frac{1}{2}$					
			· · · · · · · · · · · · · · · · · · ·	· · /	
What is th	ne wavelength of	the wave?			
			Answer		
		† 12 V			
			-		
(a) What	is the current in	the resistor?			
• •			4		
(b) What	is the voltage ac	ross the resistor?	Answer	C	
Space fo	or working and an	iswer			
	·				
Complete each space		itement by inserting	ng the word increase	e or decrease in	
_		crease the maximu	m acceleration of a	car. He should	
	the eng	ine force of the ca	r and	its mass.	
20/2057		Dana farm			
20/285]		Page four			1

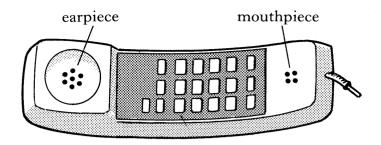
What is		
Space	for working and answer	
		2
A miniat	ure submarine is travelling horizontally through the water. The captain	
sees the	following information on a monitor in front of him.	
	Mass of submarine = 500 kilograms	
	Speed of submarine = 2 metres per second	
	Acceleration of submarine = 0·1 metres per second per second	
(a) Calo	culate the horizontal force which is accelerating the submarine.	
	culate the horizontal force which is accelerating the submarine. for working and answer	
Space	for working and answer	
Space (b) By h		
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By the	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor?	
Space (b) By h	for working and answer now much will the speed of the submarine have increased 5 seconds after captain looked at his monitor? for working and answer	

[3220/285]

K&U	PS

3

14. (a) A telephone handset has an earpiece and a mouthpiece as shown.



Complete the following by inserting the missing words.

The earpiece contains a loudspeaker which changes energy
to sound energy. In the mouthpiece there is a
which changes energy to energy. The signal
from the mouthpiece is transmitted along the wires at a speed of almost
300000000 metres per second which is the speed at which
travels

(b) A telephone cable between Scotland and America is 4800 kilometres long.

(i) How long will it take a signal to travel along the cable from Scotland to America?

Space for working and answer

Why will it take longer for the signal to reach America if it is transmitted by satellite link rather than along the cable?

1

2

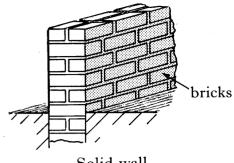
	Source	Voltage	Frequency	Type of current	
	Mains supply			a.c.	
	Car battery	12 Volts	0		
	Complete the table	to provide the n	nissing details.		3
(b)	A 12 volt car batter system.	ry supplies the e	lectrical energy fo	r a car's 60 watt hi-fi	
	-	ximum electrical	energy transform	ed each second in the	
•	(ii) Calculate the c ating at full vo	urrent drawn fro	m the battery whe	en the system is oper-	1
S	pace for working and	d answer			
	(iii) The interior la switched on.	mp in the car dr	aws a current of (0.5 ampere when it is	
	~				
	Calculate the r	esistance of the	amp.		
S	Calculate the r		amp.		
S			amp.		
S			amp.		
S			amp.		
S			amp.		
S			amp.		
S			amp.		
S			amp.	[Turn over	
S			amp.	[Turn over	
S			amp.	[Turn over	

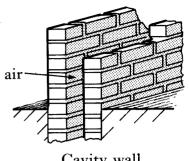
44 01		K&U	PS
	ona and Debbie are revising at home for a Physics test.		
(a)	Shona makes up the crossword and clues shown below to test Debbie's knowledge of the application of physics in medicine.		
	ACROSS		
2	2. Radiation used to		
	L treat skin conditions.		
2	T 3. Radiation used to detect broken		
	R bones. 4. Used to make		
	A thermograms.		
	S DOWN		
	1. Used to shatter		
	kidney stones.		
4	N		
<u> </u>			
	Complete the crossword started by Debbie.	3	
(b)	Debbie says that lasers are used in medicine and asks Shona to describe		
	one use.		
	Write down one use of lasers in medicine.		
		1	
(c)	Shona asks Debbie to draw a diagram showing how a beam of laser light		
	would be bent as it passes through a glass block. She begins by drawing the diagram as shown below.		
	laser glass block		
	beam		
	(i) What name is used to describe the handing of the laser light?		
	(i) What name is used to describe the bending of the laser light?		
	,	1	
	(ii) Complete the diagram to show the path of the laser beam through and		
	out of the block.		
		2	
3220/28	5] Page eight		

(a) Part of	a list of electr	conic components advertised for sale in an electronics	K&U
magazir	ne is shown be	elow.	۱
	Catalogue No.	Component Price (£)	
	TH3	Thermistor 0·12	
		Light emitting diode (LED) 0.20	
		Light dependent resistor (LDR) 0.60 Thermocouple 7.40	
		Thermocoupie	
		Loudspeaker 2·20 Solar cell 6·50	
		Push switch 0.20	
	54770	T dsir switch	
		ut devices in the list.	
(A)		(B)	
(ii) Dr	aw the symbo	ol used for the LED.	
Space for	answer		
		,	
	•		
			1
(iii) Sta	te the energy	transformation which takes place in a solar cell when	
	s in use.	Y	
			1
(h) An elec	tronic circuit	is shown below.	
(b) Thi cicc	trome encur	• +5 volts	
] (X)	
	4		
	+	z	
	_ __	n	
	. 🔌		
		į	
			:
		○ 0 volts	
(i) Na	me componer		
		nt Z.	1
	me componer	nt Z.	1
		nt Z.	1
		nt Z.	1

			K&U	PS
18.	(a)	Tony cycles to school every day on his racing bicycle in order to keep fit. He decides to find out if he is becoming fitter by timing how long it takes to cycle up a particular hill.		
		Describe how he could find his average speed over this part of the journey.		·
			3	
	<i>(b)</i>	After the summer holidays he has a lot of books to take back to school and he uses his new mountain bike. On the way he finds the time it takes to cycle up the same hill is much longer than before. He decides that he is less fit.		
		From the information given, suggest two reasons why this is not a fair test of his fitness.		
		Reason 1:	\ \ !	3 *
		Reason 2:		
				2
	(c)	On arriving at school, he carries the books, which have a mass of 4 kilograms, up to the Physics department which is 8 metres above ground level.		
		(i) What is the minimum force needed to lift the books?		
				1
		(ii) How much work is done in raising the books from ground level to the Physics department?		
		Space for working and answer		
	~	pace for working and answer		
			2	
	L		2	

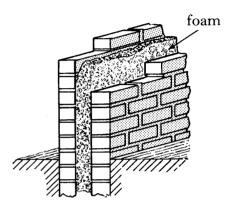
19. On a cold winter's day, heat is lost through the walls of a house. Houses can have different types of wall as shown below, depending on how they were built.



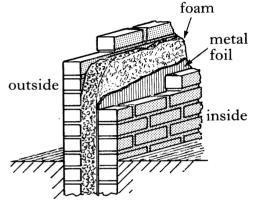


Solid wall

Cavity wall



Cavity wall filled with foam



Cavity wall filled with foam and a layer of metal foil.

The table below shows the ways in which heat is lost by the different types of wall.

H—lots of heat loss M—medium heat loss L—little heat loss

Conduction	Convection	Radiation
Н	L	M
L	L	M
L	L	L
L	\mathbf{M}	M
		H L L L L L

(a) From all the information given above, match the type of wall with the walls labelled A, B and D. Enter your answers to complete the table below.

Type of wall	Wall
Solid wall	
Cavity wall	
Cavity wall filled with foam	
Cavity wall filled with foam and a layer of metal foil	С

(<i>b</i>)	Wall C is	the only	one which	has a low	heat loss	by radiation.	Explain.
--------------	-----------	----------	-----------	-----------	-----------	---------------	----------

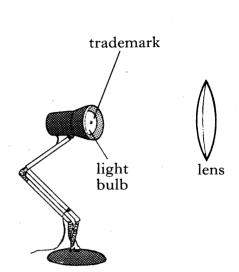
2

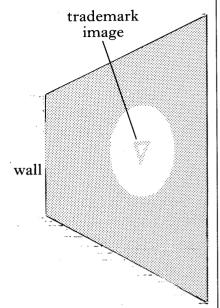
		K&U	PS
20.	(a) The diagram below shows the system used to send electrical energy from a power station to a home.		
	power station to a nome.		
	ПП		
	275 000 volts		
	home		
	power station		
	Y		
	(') I 1 ('C 1 1 1 1 1 1 1 7		
	(i) Identify the parts labelled Y and Z.		
	Part Y:		
	Part Z:	2	
		1	
	(iii) State whether the 275 000 volts used in the transmission line is	1	
	alternating voltage or direct voltage.		
			1
	(b) The power station in the above diagram uses coal as the fuel. Name the energy transformation which takes place when coal is burning.		
		1	
			:
			-

Page twelve

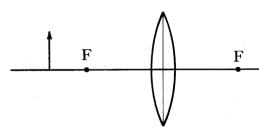
[3220/285]

21. While investigating a convex lens, Michael notices that he can project an enlarged image of a light bulb on the wall. The image shows the manufacturer's trademark which is stamped on the light bulb.





(a) Complete the ray diagram below to show how an enlarged image can be formed with a convex lens. The points marked F are one focal length from the centre of the lens.



(b) Michael compares the trademark on the bulb with the image formed on the wall. What difference, other than the trademark being smaller than the image, would be seen?

What would happen to the appearance of the image if the lens was moved closer to the light bulb?

[Turn over

3

1

1

		K&U	PS
22 . (a)	Stewart, who is very interested in astronomy, owns a telescope which is constructed as shown in figure 1.		
	eye Y Z figure 1		
	What names are given to the convex lenses Y and Z?		
	Lens Y:		
	Lens Z:		2
(b)	One evening Stewart used a camera to photograph the flight path of an orbiting earth satellite. The camera shutter was open for 4 seconds out of every 5 seconds over a period of time. During this time a series of images was produced on the photograph as shown in figure 2. The dark lines represent light received from the satellite.		
			:
	figure 2		
	(i) Why are there short gaps between the lines on the photograph?		
			1
	(ii) What was the total time to take the photograph?		
			1
	(iii) Describe the speed of the satellite.		
		1	
[3220/2	85] Page fourteen		

23. The table below gives some information about our s	solar system.	
--------------------------------------------------------	---------------	--

	Mass (Earth masses)	Distance from Sun (million kilometres)	Weight of 1 kilogram at surface (newtons)
Sun	333 000		270
Mercury	0.06	58	4
Venus	0.82	110	9
Earth	1	150	10
Moon	0.013	150	1.6
Mars	0.11	228	4
Jupiter	318	780	26
Saturn	95	1430	11

K&U PS

1

1

1

1

(a)	Which planet in the table has the greatest mass?
(b)	Which object in the table is a star?
(c)	On which two planets would you have the same weight?
(<i>d</i>)	Which planet is nearest to Earth?

[END OF QUESTION PAPER]

Page fifteen

	K&U	PS
YOU MAY USE THE SPACE ON THIS PAGE TO REPLACE ANY ANSWERS		
YOU HAVE DECIDED TO CHANGE IN THE MAIN PART OF THE ANSWER BOOKLET. TAKE CARE TO WRITE IN CAREFULLY THE APPROPRIATE		
QUESTION NUMBER.		
		:
	.	