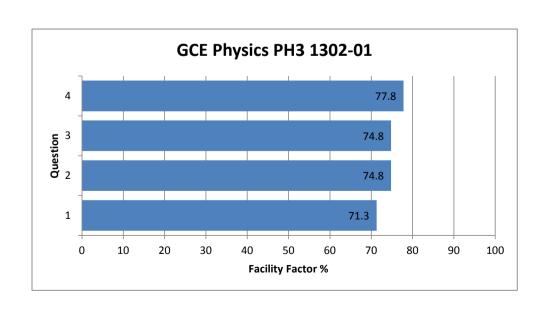


WJEC 2014 Online Exam Review

GCE Physics PH3 1302-01

All Candidates' performance across questions

?	?	?	?	?	?	?	_
Question Title	N	Mean	S D	Max Mark	F F	Attempt %	
1	3094	5.7	1.9	8	71.3	100	\leftarrow
2	3094	6	1.7	8	74.8	100	
3	3094	6	1.7	8	74.8	100	
4	3094	18.7	3.9	24	77.8	100	\leftarrow



Ta	sk	A1	(15	min	ute	s)

In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	Вута	aking appropriate measurements, determine the volume of the block.	[2]
(b)	Calc	culate the percentage uncertainty in the volume.	[3]
(c)	(i)	Calculate the absolute uncertainty in the volume.	[1]
	(ii)	Quote both the volume along with its absolute uncertainty to an appropriate r of significant figures.	number [1]
(d)	State	e clearly how you could reduce the absolute uncertainty in the volume.	[1]

Turn over. © WJEC CBAC Ltd. (1323-01A)

Task A1 (15 minutes)
In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	By taking appropriate measurements, determine the volume of the block.	[2]
	length = 11.6cm	
	sight = 6.5 cm	*******
	height = 1.9 cm	
\	Islume = length x width x height = 11.6 x 6.5 x 1.9 = 143.26 cm ³ Calculate the percentage uncertainty in the volume.	
(b)	Calculate the percentage uncertainty in the volume.	-) [3]
a):	osolute uncertainty for all newswoments = 1 mm = 0.1 cm	
0/0	uncestainty of length = 11.6 = ×180 = 0.862% (8st)	
•/ ₈	1. 200/bish 1. 2014 = 0.1 × 100 = 11.28/2 1.54% (3)	
1/0	uncertainty of height = 1.9 × 100 = 5.26 % (30)	
میا	certainty of volume = 0.862+ 1.54 + 5.26 = 7.663688399	
(c)	(i) Calculate the absolute uncertainty in the volume. ラーららか (35f)	[1]
(0)	absolute uncertainty = $\frac{7.66}{156} \times 143.26$	L'J
	= 10.979 and = 10 cm (184)	
	(0-119 cm = 10 cm (18f)	
	(ii) Quote both the volume along with its absolute uncertainty to an appropriate number of significant figures.	nber [1]
	Volume = 140cm (40±10cm3	*****
(d)	State clearly how you could reduce the absolute uncertainty in the volume.	[1]
. ,		
	Ist more than one block to take measurements of length, width and height, so the obsiderate uncertainty of each measurement	********
	3 La ser a Marson la company de la commencia d	Line
	No text I have be accepted by the volumes when well	
£.	3 laser, so the percentage uncertainty of the volume is lover and Mix the absolute absolute uncertainty will se reduced. You could also use a measuring levice with a smaller absolute maniforty e.g. a	
•	Vernier Carliner. Smaller resolution.	

Task A1 (15 minutes)

In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a) By taking appropriate measurements, determine the volume of the block.	[2]
length = 11.6 cm	
widh = 6.5 cm	
height = 1.9 cm //	
Volume = length x width x height = 11.6 x 6.5 x 1.9 = 143.26 cm3	
= att/30000 = 1400	} [3]
absolute uncertainty for all newsulonets = 1 mm = 0.1 cm	
% uncertainty of length = 11.6 = x100 = 0.862% (324)	
% uncertainty of witch = 0.1 × 100 = 1588 1.54% (301)	
1/2 uncertainty of height = 1.9 × 100 = 5.26 % (301)	
uncertainty of volume = 0.862+ 1.54 + 5.26 = 7.663688399	
(c) (i) Calculate the absolute uncertainty in the volume.	[1]
absolute uncortainty = $\frac{7.66}{100} \times 143.26$	
= 10-979 cm3 = 10 cm (18L)	
(ii) Quote both the volume along with its absolute uncertainty to an appropriate nu of significant figures.	mber [1]
Volume = 160cm (40±10cm3	
V	
(d) State clearly how you could reduce the absolute uncertainty in the volume.	[1]

Use more than one block to take measurements of length, width percentage and height, so the obstate uncertainty of each measurement is lover, so the percentage uncertainty of the volume is lover and ruefore the absolute uncertainty of the volume is lover and ruefore the absolute uncertainty of 115e reduced. You could also use a also were a supplied with a consideration of the consider

also use a measuring device with a smaller a bootel Vernier Calliper.

Task A1 (15 minutes)
In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	By taking appropriate measurements, determine the volume of the block.	[2]
	Wilth 115 mm	
	Length 74 mm	
	Height 15 mm	********
*********	115 ×74 ×15 = 127650 mm = 127.	650
(b)	Calculate the percentage uncertainty in the volume. $\frac{1}{15} + \frac{1}{74} + \frac{1}{15} = 8.89 \% 1$	[3] 2-dp)
	Percentage unceptainty is writer	*******
	l'ettenlarge uncertainty in benyth)	
	Percentage un wertainty in height	********
(c)	(i) Calculate the absolute uncertainty in the volume.	[1]
	8.89° × 127.65 = ±11.345	CM.
	(ii) Quote both the volume along with its absolute uncertainty to an appropriate nur of significant figures.	nber [1]
	$127.65_{cm}^{3} \pm 11.35_{cm}^{3}$ (2.d.p))
(d)	State clearly how you could reduce the absolute uncertainty in the volume. By wing rule scales of the scales of t	[1]
	rother than to. I can	

323 1A005

Task A1 (15 minutes)

In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	By taking appropriate measurements, determine the volume of the block. [2]	1 2
	Wilth 115 mm	
	Length 74 mm	
	Height is mm	
	$115 \times 74 \times 15 = 127650 \text{mm} = 127.650$	3
(b)	Calculate the percentage uncertainty in the volume. [3] $\frac{1}{15} + \frac{1}{15} = 8.89 \times (12.4p)$	3
	Percentage uncertainty in wellett Percentage uncertainty in benyth	
	l'etienlarge uncertainty in heagth)	
	Percentage uncertainty by height	of marking and
(c)	(i) Calculate the absolute uncertainty in the volume.	
	8.89° × 127.65 = ±11.345 cm³	
	(ii) Quote both the volume along with its absolute uncertainty to an appropriate number of significant figures.	0
	$127.65 cm^{3} \pm 11.35 cm^{3} (2.d.p)$	
(d)	State clearly how you could reduce the absolute uncertainty in the volume. [1]	0
	By using rule scales of 1 lms	-
	rother than to. I cm	



Task A1 (15 minutes)

In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	By taking appropriate measurements, determine the volume of the	ne block.	[2]
Vol	ume = Lxbxh	= 11.5cm	
*********		~ = 6.6cm	
	= 136-62 cm³ (to 2do) heigh	æ = 1.8c	Y
	THAMBOURE .	***************************************	••••••
(b)	Calculate the percentage uncertainty in the volume. P = \frac{\pi}{\times} \times 100%	***************************************	[3]
	= 0-1 11-5+6-6+1-8	***************************************	
*********	= 0.5%	*******************************	
(c)	(i) Calculate the absolute uncertainty in the volume.	à	[1]
	u = 0.1	·	
10	2 = 0.05 cm = 0.10	×	****
整	(ii) Quote both the volume along with its absolute uncertainty to of significant figures.	an appropriate	number [1]
	Volume = 136.62 cm³ 136.00	cm3 (to 35	(F.)
	absolute incertainty = 0.05 cm 0.05	cm (to 35	F.)
(d)	State clearly how you could reduce the absolute uncertainty in th	e volume.	[1]
	By measuring the blocks dimensions	يتعيد	Ο
	igital Caliper - Therefore the residualis		Hen:
	Ratter than a fuler,	as there '	us.
	a different resolution.		

01A006

Task A1 (15 minutes)

In this task you will determine the volume of a glass block. Repeat readings are not required for this task.

(a)	By taking appropriate measurements, or	determine the volume of the block. [2]
Volu	me = Lxbxh	Length = 11.5cm
	= 11.5 = 1.6 = 9	

= 11.5 x 6.6 x 1.8 Breath = 6.6 cm = 136-62 cm³ (to 240) height = 1.8 cm

(b) Calculate the **percentage** uncertainty in the volume. [3]

 $\rho = \frac{u}{x} \times 100\%$

= 0.1 11.5+66HP

= 0 · 5 %

(c) (i) Calculate the **absolute** uncertainty in the volume. [1]

u = 0.1 $2 = 0.05 \text{ cm}^{+} = 0.1 \text{ cm}$

(ii) Quote both the volume along with its absolute uncertainty to an appropriate number of significant figures. [1]

Volume = 136.62 cm³ (to 35F)
absolute uncertainty = 0.05 cm 0.05 cm (to 35F)

(d) State clearly how you could reduce the absolute uncertainty in the volume. [1]

By measuring the blocks dimensions using a

digital Califor Therefore the resolution is a other

a different resolution





Task B4 (45 minutes)

Two wires of different materials are joined together. You are going to carry out an investigation to determine the position of the join.

Repeat readings are not required for this task. An additional measurement is required for part (e)(ii).

(a) (i) Complete the following diagram to show the circuit that has been set up for you.



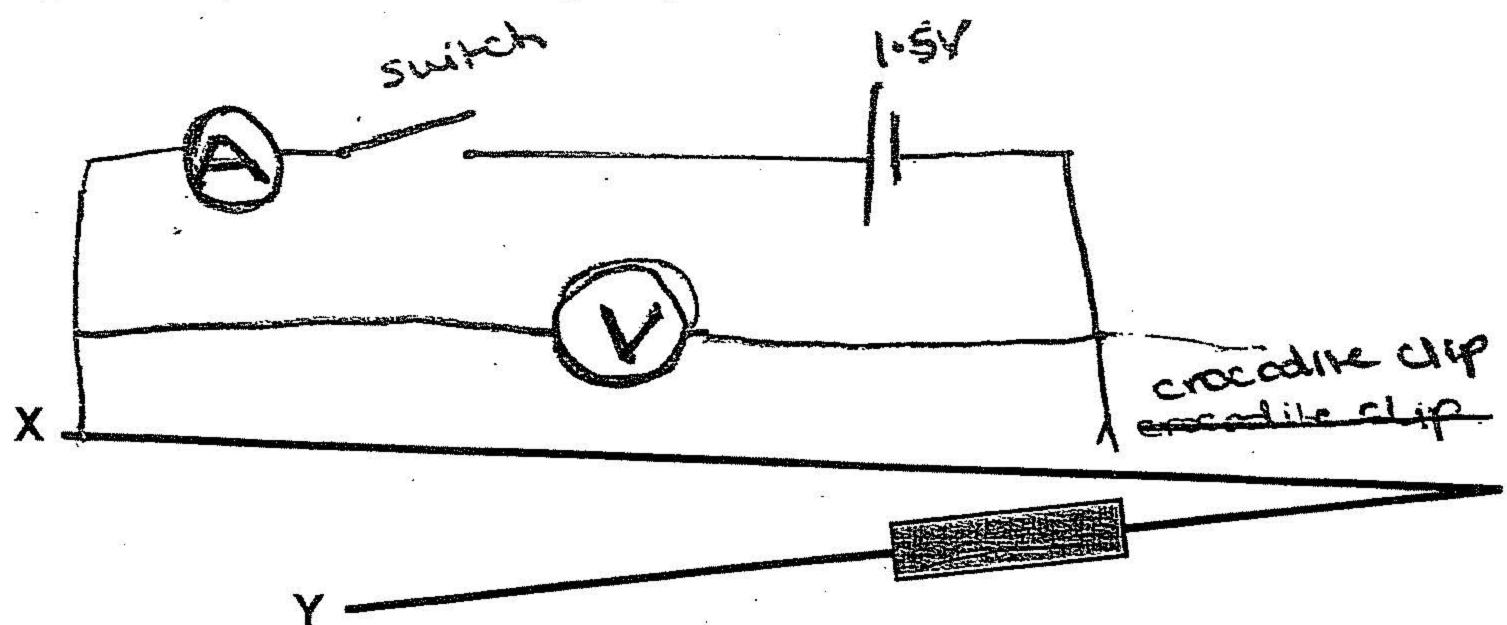
(ii)	Write a plan to describe how you would use your circuit to investigate how resistan varies with length starting from point X .	ic∈ [3]
•••••		
•••••		
•••••		
•••••		
• • • • • • • • • • • • • • • • • • • •		

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(ii) Write a plan to describe how you would use your circuit to investigate how resistance varies with length starting from point **X**. [3]

I will dip the crocodile and at printy equal distances

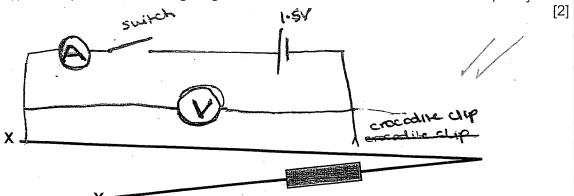
from so to y to cach cup I will flick the suitch to
connect the full circuit and measure the restricted and
current using the voltmeter and ammeter from this I
can calculate the reestance using P=Y. Then plot a
graph of distance against resistance. I will down
one the

Task B4 (45 minutes)

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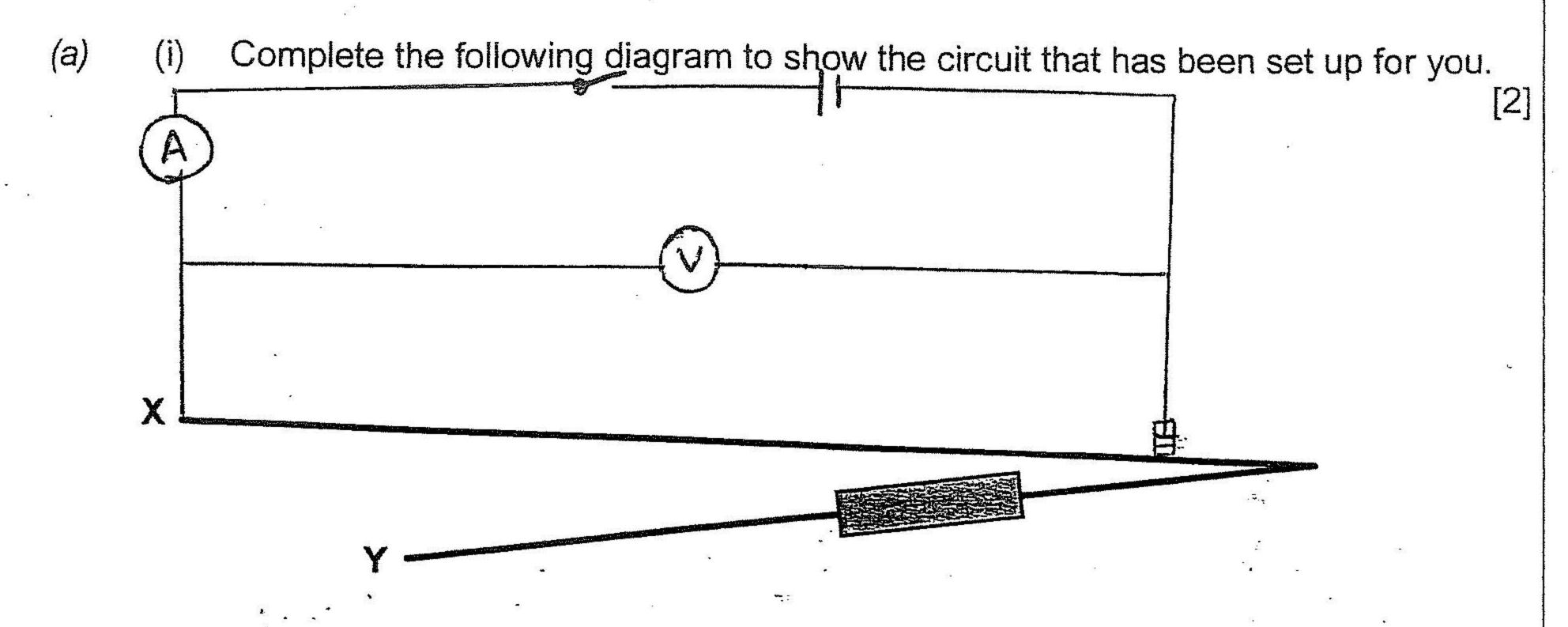
from se to y rev each cup I will flick the switch to
connect the full circuit and measure the soldage and
connect using the voltmeter and ammeter from this I
can calculate the resistance using P=Y other plots
graph of distance against resistance. I will drive

 \bigcirc

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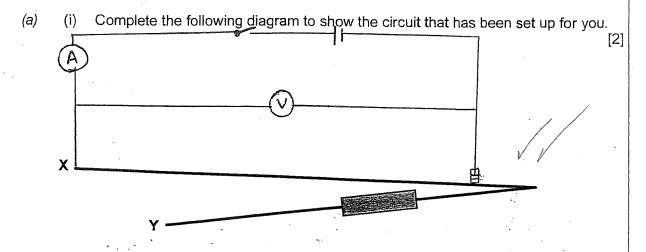
(ii) Write a plan to describe how you would use your circuit to investigate how resistance varies with length starting from point X. [3]

I am going to attach the crocidile clip to different parts of the wire and record the voltage and current. I am going to use the full set of wire to get good results. Ham going to find the resistance of each point by using a graph and draw a line of best fit and find gradient to get the relationship with resistance. I am going to find the resistance by using dividing voltage by current. I am going to plot records on graph (resistance against length) to find

Task B4 (45 minutes)

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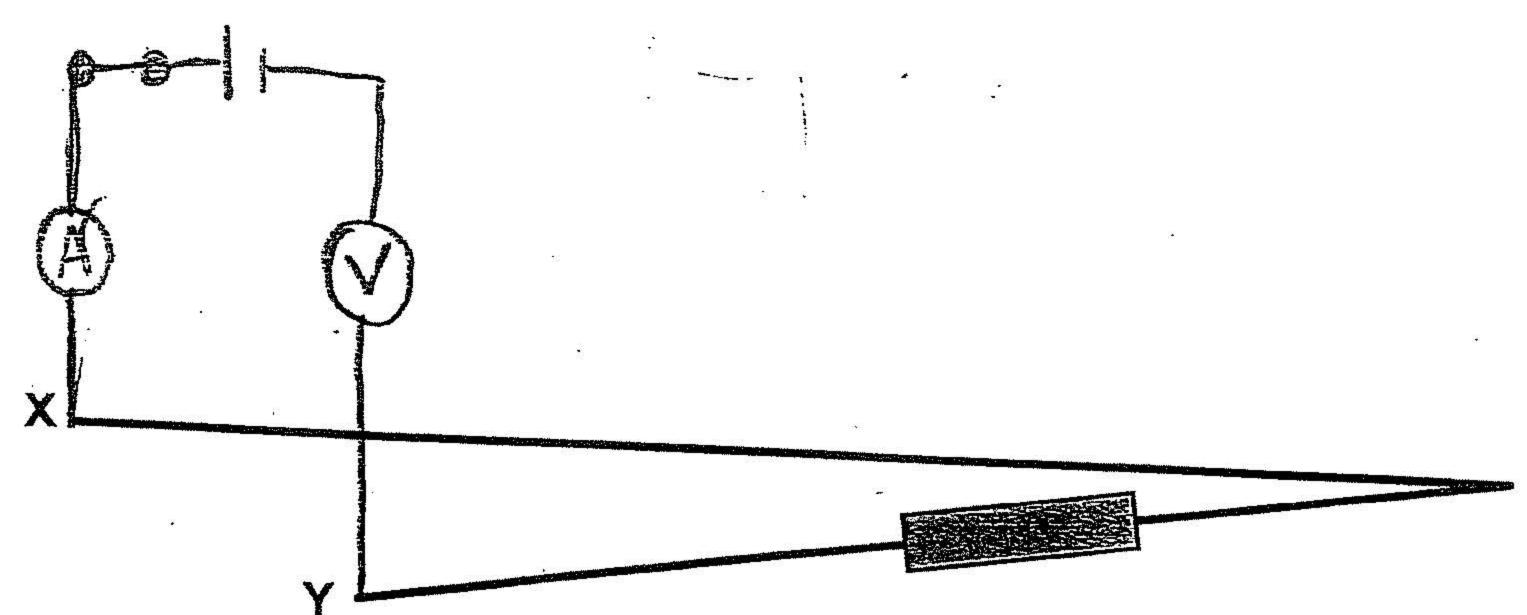
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(ii) Write a plan to describe how you would use your circuit to investigate how resistance varies with length starting from point **X**. [3]

Then Connect the wire from the voltmeter to the wire *I would then more the wire at different distances down wire *X* and therefore resulting in a Change of Current and voltage.

[2]

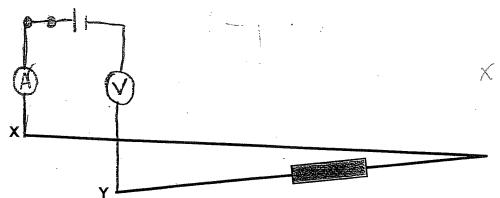
SECTION B

Task B4 (45 minutes)

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4 e (ii) The value of resistivity for different materials is given in the following table.

Material	Resistivity (Ωm) (at 20°C)
Platinum	1.06×10^{-7}
Nichrome	1.10 × 10 ⁻⁶
Tin	1.09×10^{-7}
Constantan	4.90×10^{-7}
Zinc	5.90 × 10 ⁻⁸

Resistivity, ρ , is given by the equation:

$$\rho = \frac{RA}{l}$$

where R is the resistance, l is the length and A is the cross-sectional area of the wire.

Using the equation above and by measuring the diameter of the wire, determine the material of the wire starting at X . [5]

END OF PAPER

Examiner only

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material of the wire starting at X . [5]
Out gradient represents I for the wire
sterting at X. Hence po com be calculated
become from the diameter we use $A = \pi \left(\frac{1}{2} \right)^2$.
Mensurement 2 of Dinneter = 0.32 mm
Measurement 2 of Dianets = 0.30 mm
New whe for Diameter = 0.32+0.30 = 20.31 mm \$ 0.01 mm
$A = \pi \left(\frac{3}{2}\right)^2$ $= \pi \times \left(\frac{3 \cdot A ^2}{2}\right)^2$
= 7.5476 ×10° = 7.5×10° m
$\rho = \mathbb{R} A = (\mathbb{R}) \times A = (6.4) \times (2.5 \times 10^{-8})$
$O = 1 \cdot P \times 10^{-7} $
Thus, He to experimental error it is Suitable to determine that he material of the vive Starting at X is Constanstan.
flot the material of the wine Starting at X is Constantan.
END OF PAPER

Examiner only

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				.5		0 -				L-
٥٨٢	9.00	Lier	t	represe	nts		tex	the	wire	
Stasting	Je		ζ.	Hen	Ce	o c	an be	sale	. I ate	
Starting because	Loom	P e	d	cameter	1	~Se	A = 7	(学)	7	
Measure	-									
			٤ ١	Diamete						
Measures	rent.		\	in amete		2.20				

New who for Diameter = 0.32 +0.30 = 0.31 mm ± 0.01 mm

$$A = \pi \left(\frac{9}{2}\right)^2$$

$$= \pi \times \left(\frac{3 \cdot |x|_0 - |x|_0}{2}\right)^2$$

=7.5476 .. X10" m2 = 7.5X10" m2

$$p = PA = PX = (6.4) \times (7.5 \times 10^{-8})$$

Thus, to experimental error it is suitable to determine that the material of the wive Starbing at X is Constanston.

END OF PAPER



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Using the equation above and by measuring the diameter of the wire, determine the material of the wire starting at X . [5]
Diameter of whe Dolzmn > 202xio
Area of wire = TTI2
Radius=1.35×10-4m 5.23×10-8m2
Area of whe= Th (1035 x 10-4) = 5002 x 100 =
Resistance = 12222 802922 1.29002
Length= 0220m 4200m 0020m
P=6,29×(5,73×10-8)
P=3660-1240-2-36640-20m
Moderial of whe searing we a
Moderial of whe starting to 2 = P=1.029 x (5.73 x 10 - 8) P=3.7 x 10 - 2 am
terial of 0.2 END OF PAPER Mosterial of outle
1 TATULATION ENUTER IN X

Examiner only

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Using the equation above and by measuring the diameter of the wire, determine the material of the wire starting at **X**. [5]

Diameter of wire: 0.027mm > 2.7x10 m

Area of wire: The 2

Redius: 1.35x10 m

S. 23x10 m

Area of wire: The (1.35x10 m) = 5.23x10 m

Area of wire: The (1.35x10 m) = 5.23x10 m

Resistance: 1.29ma

Length: 0.20m 420m 0.20m

f=6.29 x (5.73x10-8)

P- 7-80-175-10-23-6x10-20m

P=1.29 × (5.73×10-9) P=3.7×10-

The material of 002

the wire is a the

END OF PAPER

yateral of wife



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Diameter of wire = 0.31mm	IJ
P=RA	<u></u>
L	1.075mm = 0.000075 m2
$A = Mr^2$	P = (3.63)(0.000075)
$= \pi(0.155)^2$	1000
= 0.075 mm²	= 2-7×10-7 Rm
R = .0.76+01.37+2.00+	
. 10	As the resistivity
= 3.63 n	is closest to Tin,
L = 1m	material × must
**************************************	be Tin
, u	

END OF PAPER

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Diameter of wire = 0.31m	n
P = RA	
\c\c_	10 = 0,000075 m2
$A = Tr^2$	P = (3.63)(0.00075)
= TT(0.155)2	1000
= 0.075 mm ²	= 2-7×10-7 Rm
R = 0.76+ 01.37+2.00+	
. 10	As the resistivity
= 3.63 n	is closest to Tin,
t = m	material × must
•	be Tin. X



