



Duration: 30 minutes

EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ARTS AND SCIENCES

DEPARTMENT OF PHYSICS

PHYS 102 –LAB-FINAL EXAM
2019-2020 Spring (June 19 2020)



All Electronic Devices, Smart/programmable Watches, Phones, Prohibited



SOLUTION

Student Number	Name	Surname	Group	Signature

Your Score out of 10:	
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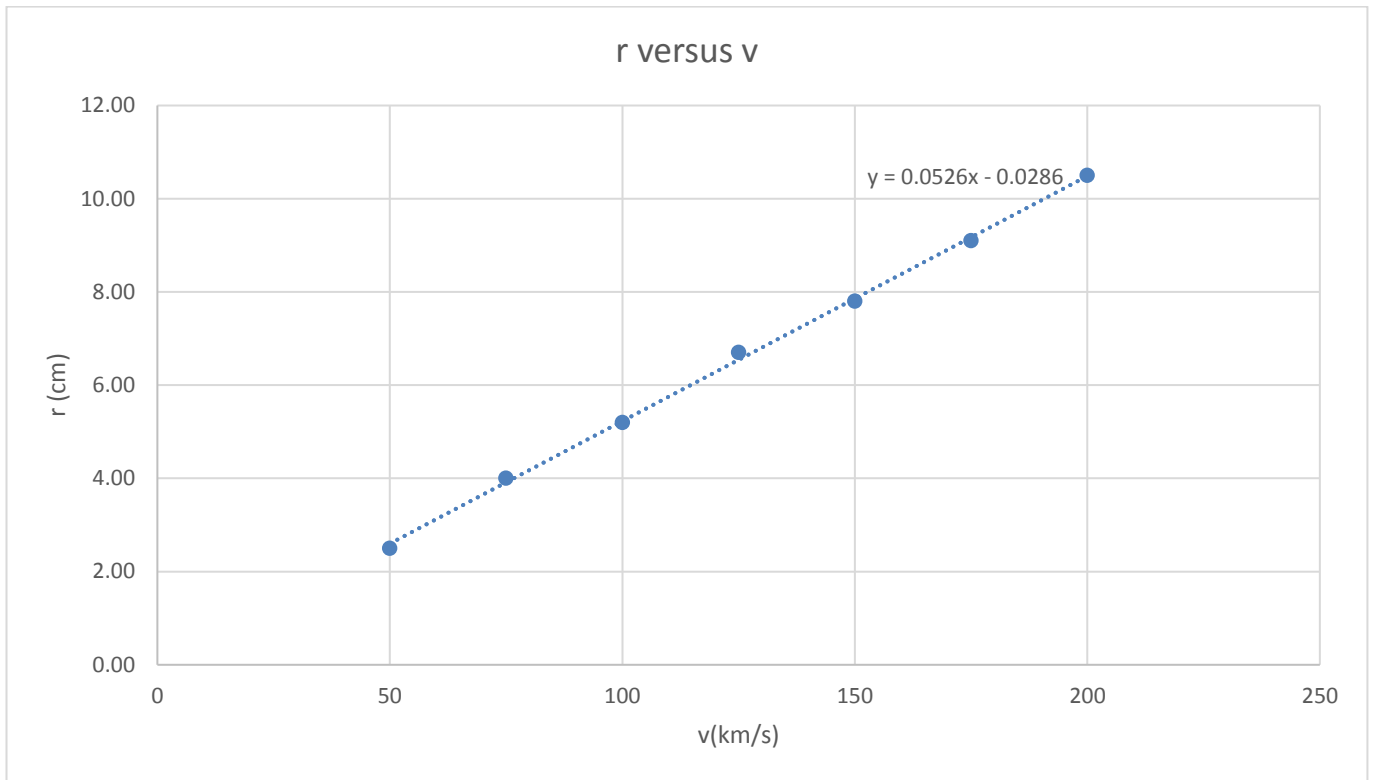
A charged particle moves perpendicular to a uniform magnetic field $B = 100mT$. In the following table you recorded the radius r of the circular motion of the charged particle with respect to its speed:

$r(cm)$	$v(km/s)$
2.5	50
4.0	75
5.2	100
6.7	125
7.8	150
9.1	175
11.5	200

- Plot the least square line r versus v .
- What is the slope of the least square line with its correct SI unit.
- If the mass of the charged particle is $M = 5amu$ and theoretically $r = \frac{M}{qB} v$ what is the electric charge of the particle. (Note that $1amu = 1.66 \times 10^{-27}kg$)
- If the theoretical value of the charge is $n \times e$ in which n is an integer number, and $e = 1.60 \times 10^{-19}C$ find n (the closest number) and then find the percentage error of this experiment. (1pts)

Solution:

a)



b) $Slope = 0.0526 \text{ (cm)/(km/s)} = 0.0526 \times 10^{-5} \text{ s}$

c) From the equation: $\frac{M}{qB} = slope \rightarrow q = \frac{M}{B(slope)} = \frac{5 \times 1.66 \times 10^{-27}}{100 \times 10^{-3} \times 0.0526 \times 10^{-5}} C = 1.58 \times 10^{-19} C.$

d) Since $e = 1.60 \times 10^{-19} C$ we find that $n = 1$ and therefore the error is given by $\frac{|1.60 - 1.58|}{1.60} = 1.25\%.$