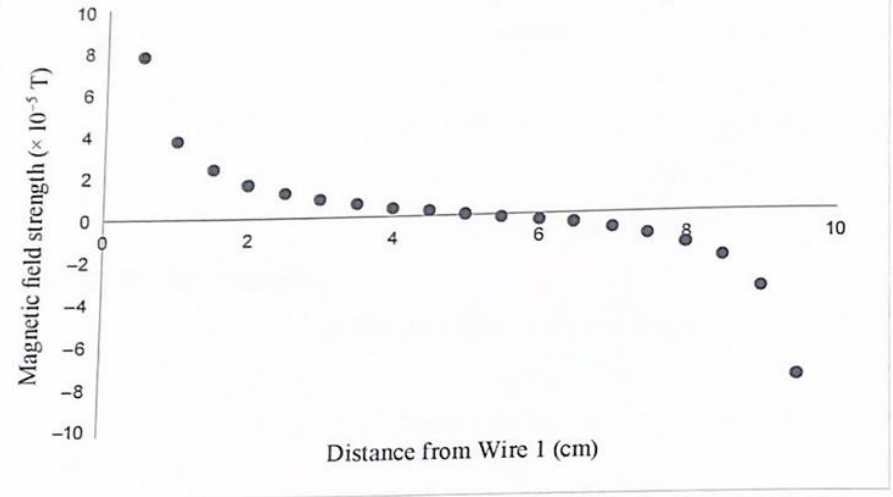
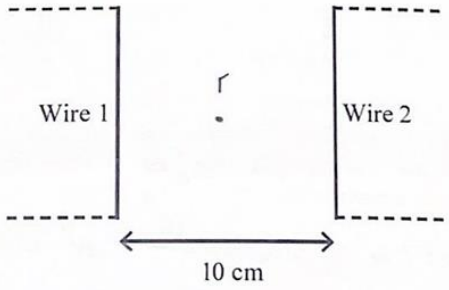
Physics Data Test

QUESTION 25 (10 marks) (3)

The graph and data table below show the magnetic field strength in the space between two straight electric current-carrying wires with respect to the distance from Wire 1.



Displacement from Wire 1 (cm)	Magnetic field strength (× 10^{-5} T)
0.5	7.58
1.0	3.56
1.5	2.20
2.0	1.50
2.5	1.07
3.0	0.76
3.5	0.53
4.0	0.33
4.5	0.16
5.0	0
5.5	−0.16
6.0	−0.33
6.5	−0.53
7.0	−0.76
7.5	−1.07
8.0	−1.50
8.5	−2.20
9.0	−3.56
9.5	−7.58



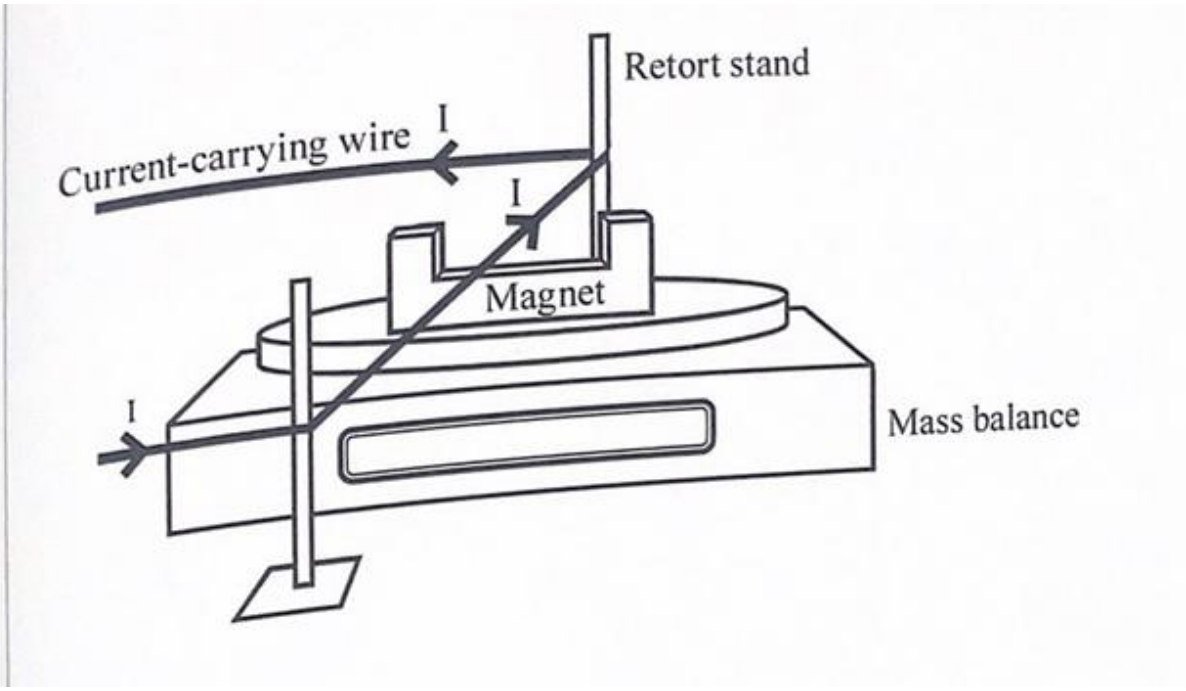
a) Using information in the graph and/or data table provided, draw a conclusion about the direction of the current in Wire 1 with respect to the direction of the current in Wire 2. Justify your answer.

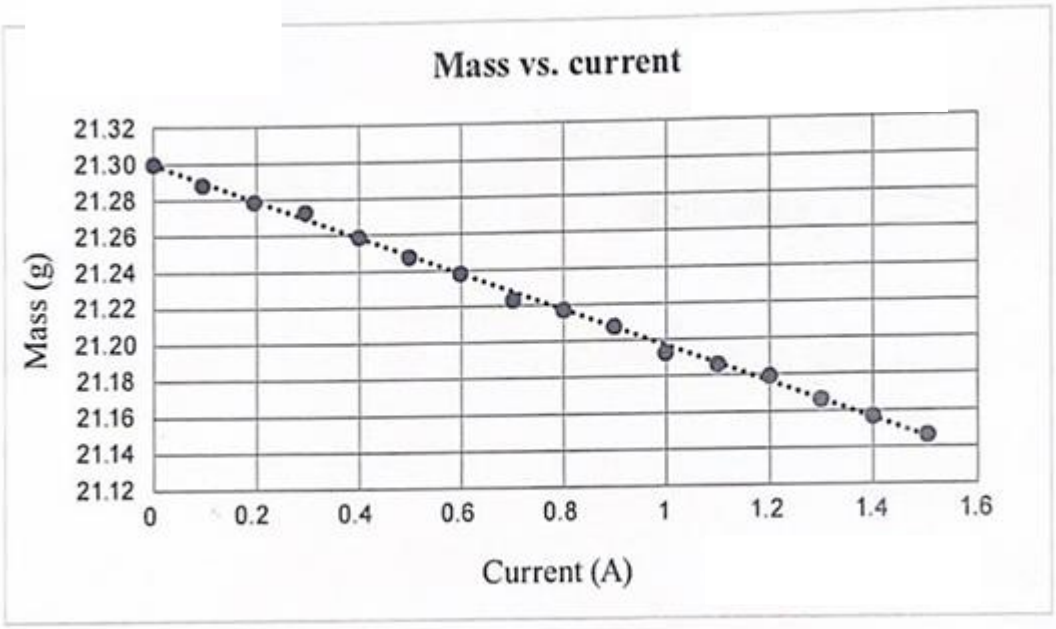
b) Using information from the graph and/or data table, calculate the magnitude of the current in Wire 1 and Wire 2. Show your working.

c) An electron is placed between the two wires, 8 cm from Wire 1 and 2 cm from Wire 2. It experiences a force of 1.6×10^{-21} N and has a velocity of 1350 m s^{-1}. Using data from the table below, calculate the angle (θ) between the electron's direction of travel and the magnetic field. Show your working.

QUESTION 10 (7 marks) (1)

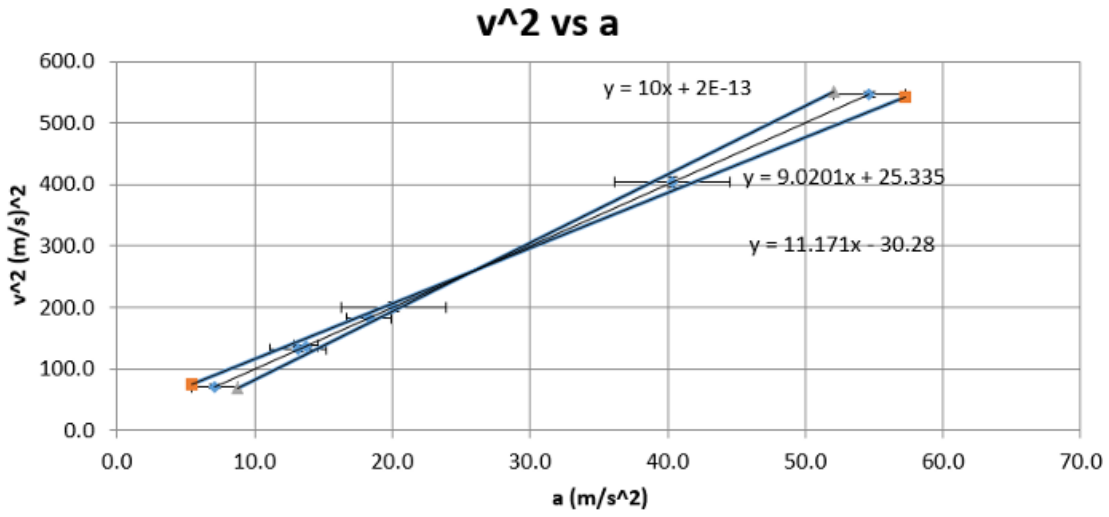
The diagram below shows an experiment setup to investigate the force acting on a current-carrying wire. The magnetic field is perpendicular to the wire. The length of the wire in the magnetic field is 5 cm.





a) On the diagram above, label the north and south poles of the magnet. Give a reason for your choice.

b) Use the graph on page 10 to calculate the magnitude of the magnetic field strength produced by the magnet. Show your working. Express the solution using scientific notation.



1. Is this a linear relationship

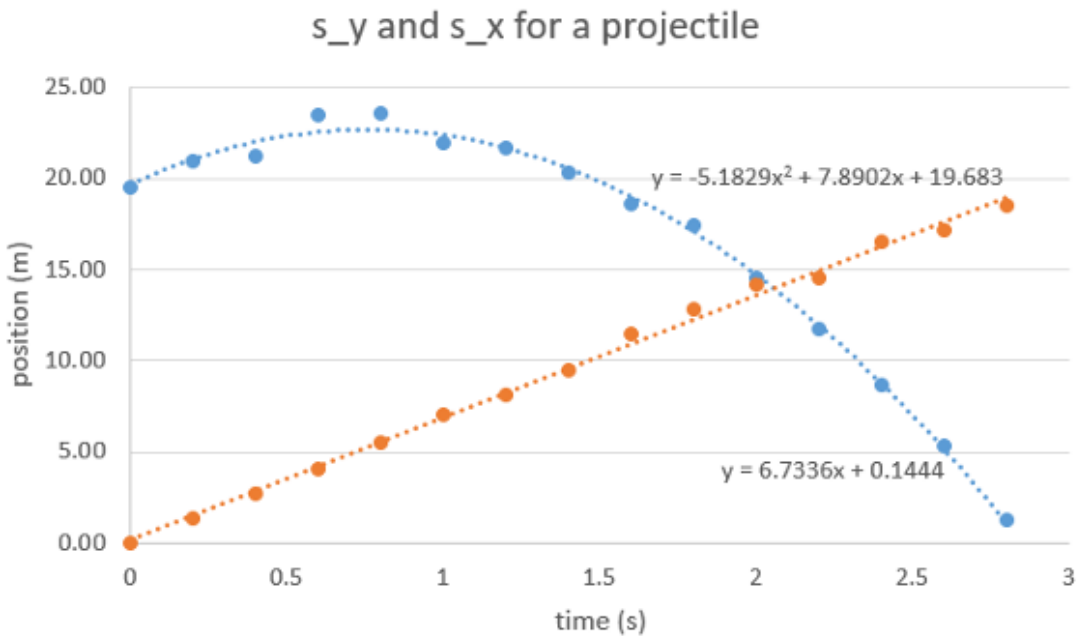
2. Gradient ± Error (units) =

3. Intercept ± Error (units) =

3. Write the equation relating velocity and acceleration for circular motion.

4. Determine the radius of the motion (including error and units)

Projectile Motion



2. Write the equations of motion for position in the x and y directions.

Find:

g =

s_{y0} = u_y =

s_{x0} = u_x =

3. What angle was it launched