Results and Discussion

Let V = Heater Voltage (volts), I = Heater Current (amperes), Heat Flow, Q (watts)

T1 = Temperature at 7 mm radius (inside)
T2 = Temperature at 10 mm radius
T3 = Temperature at 20 mm radius
T4 = Temperature at 30 mm radius
T5 = Temperature at 40 mm radius
T6 = Temperature at 50 mm radius (outside)

Radius at thermocouple T1 R1 = 0,007 (m)
Radius at thermocouple T6 R6 = 0.050 (m)
Thickness of disk (cylinder length) L = 0.0032 (m)

The necessary data for calculations will be recorded to the table given below.

VOLTS	AMP	Q	T1	T2	T3	T4	T5	T6
V	I	W	°C	°C	°C	°C	°C	°C
Radius (mm)			7	10	20	30	40	50

For each set of readings plot a graph of temperature against radius. Observe that each temperature profile is a curve and that the gradient at any point on the curve decreases with increasing radius from the heater at the centre.

Calculations: Using the equation given below, calculate the thermal conductivity.
Thermal conductivity is defined as:

$$k = [Q ln \frac{r_2}{r_1}]/[\, 2\pi L(T_1 - T_2)]$$

Calculate the thermal conductivity of the brass disk using two different radius and corresponding temperatures. Compare the value obtained with the original value at the same heat flow.

Conclusion:

1. Compare the value of thermal conductivity, *k* of brass obtained from linear heat conduction experiment and calculate the percentage difference.
2. Calculate the percentage difference between the theory and experimental value of thermal conductivity, *k*.
3. Based on the result obtained, which experiment (linear/radial) is more accurate. Explain your answer.