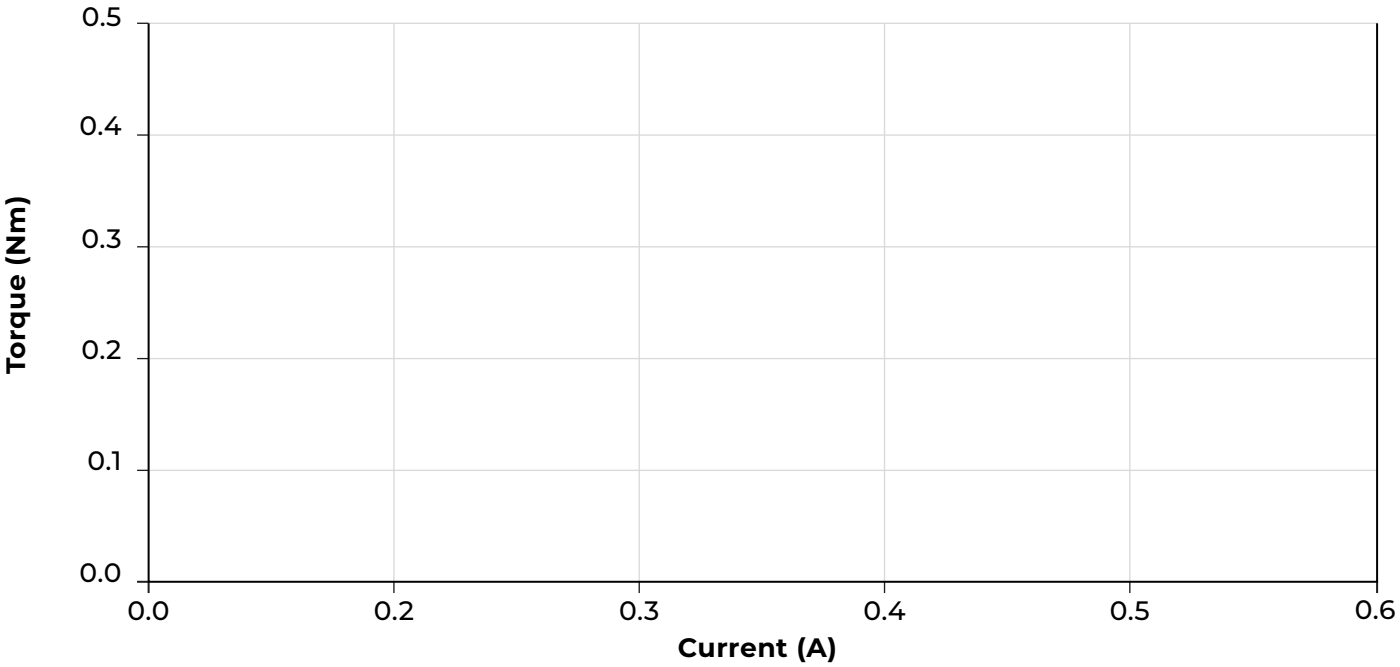
Activity sheet 3

3a. Set r = 0.1 m and, for the range of values for mass, plot a chart of torque (Y axis) against current draw (X axis).

Mass (kg)	Current (A)	Torque (Nm)
0.10		
0.15		
0.20		
0.25		
0.30		
0.35		
0.40		
0.45		
0.50		

Torque (Nm) v Current (A)



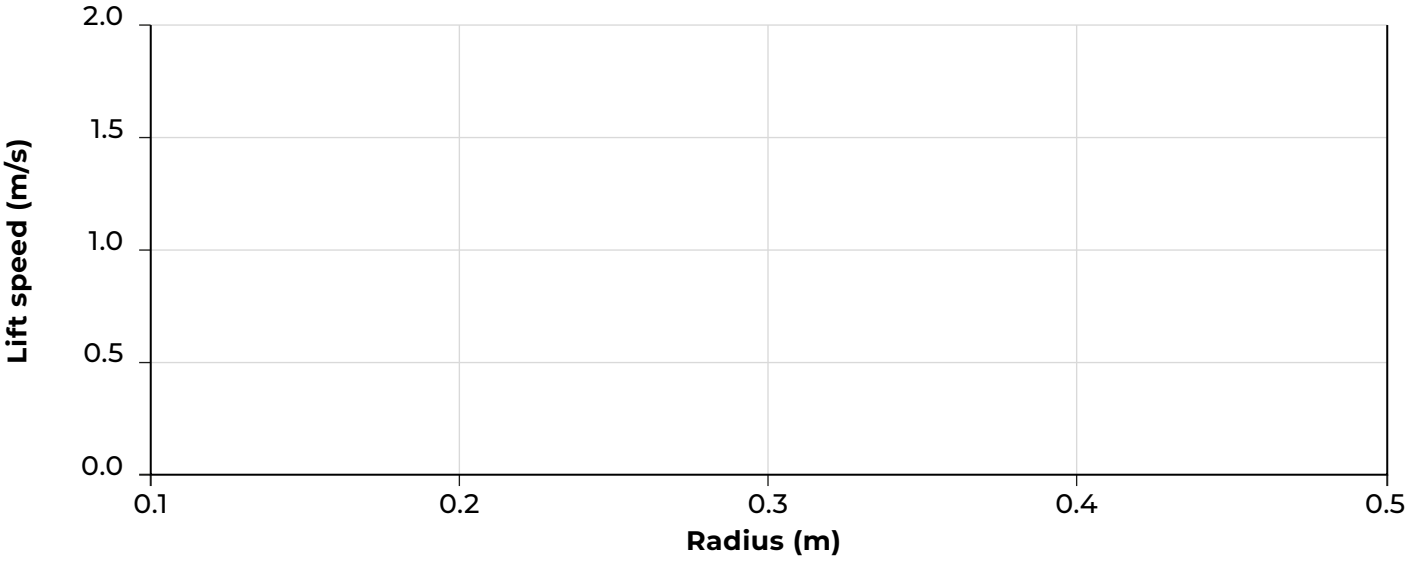
Activity sheet 3 continued

3b. What do you predict about how lift speed will vary with radius?

Start with r = 0.1 m and m = 0.2 kg. Time the hoist. Change the radius and repeat your measurement to find r for the fastest lift speed at m = 0.2 kg.

Radius (m)	Time (s)	Speed (m/s)
0.10		
0.15		
0.20		
0.25		
0.30		
0.35		
0.40		
0.45		
0.50		

Lift speed (m/s) v Radius (m)



Royal Academy of Engineering

4

Electrical machines

Activity sheet 4

Verify that $P_{out} = \frac{\tau \, 2\pi N}{60}$

Choose two combinations of radius and mass. Use the values for torque, rotational speed and mechanical power to verify the relationship. Use π = 3.14159.

Radius:	Mass:
Radius:	Mass:

The table below shows how torque, rotation speed and power change as the radius increases when lifting a mass of 0.2 kg. (Remember that 1 W = 1 Nm/s). Use the power formula above to help you interpret the table and suggest why power increases to a maximum, but then decreases.

Radius (m)	Torque (Nm)	Rotation (RPM)	Power (W)
0.1	0.2	115.2	2.413
0.15	0.3	100.8	3.167
0.2	0.4	86.4	3.619
0.25	0.5	72	3.77
0.3	0.6	57.6	3.619
0.35	0.7	43.2	3.167
0.4	0.8	28.8	2.413
0.45	0.9	14.4	1.357
0.5	1	0	0

Reason