

AQA GCSE Physics Required Practicals DIY equipment and tips for technicians

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10 required activities

1. Specific heat capacity (solid)
2. Thermal insulation - Physics specification only
3. Resistance (wire)
4. V-I characteristics (filament bulb, resistor, diode)
5. Density
6. Light (reflection and refraction)
7. Force and extension (spring)
8. Acceleration ($F=ma$)
9. Waves (ripple tank) - Physics specification only
10. Radiation and absorption (Leslie cube)

Challenges

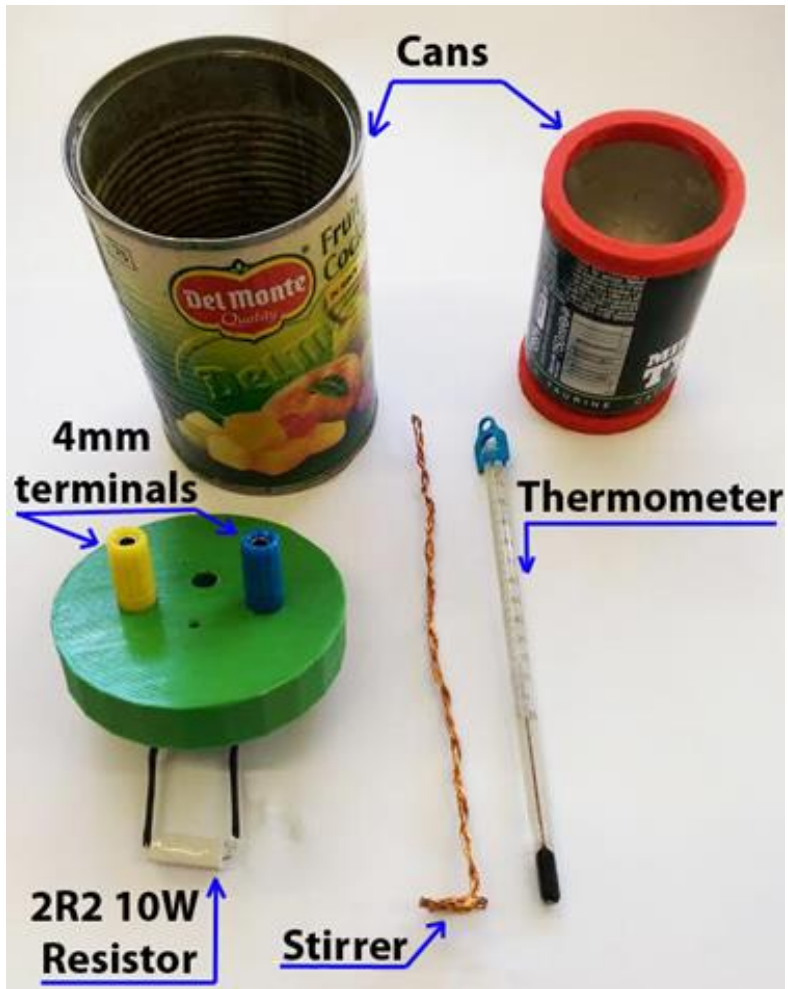
Technicians often find the following activities more challenging:

- Specific heat capacity
- Acceleration
- Waves
- Radiation and absorption

Sometimes these activities involve expensive apparatus that has to be bought-in.

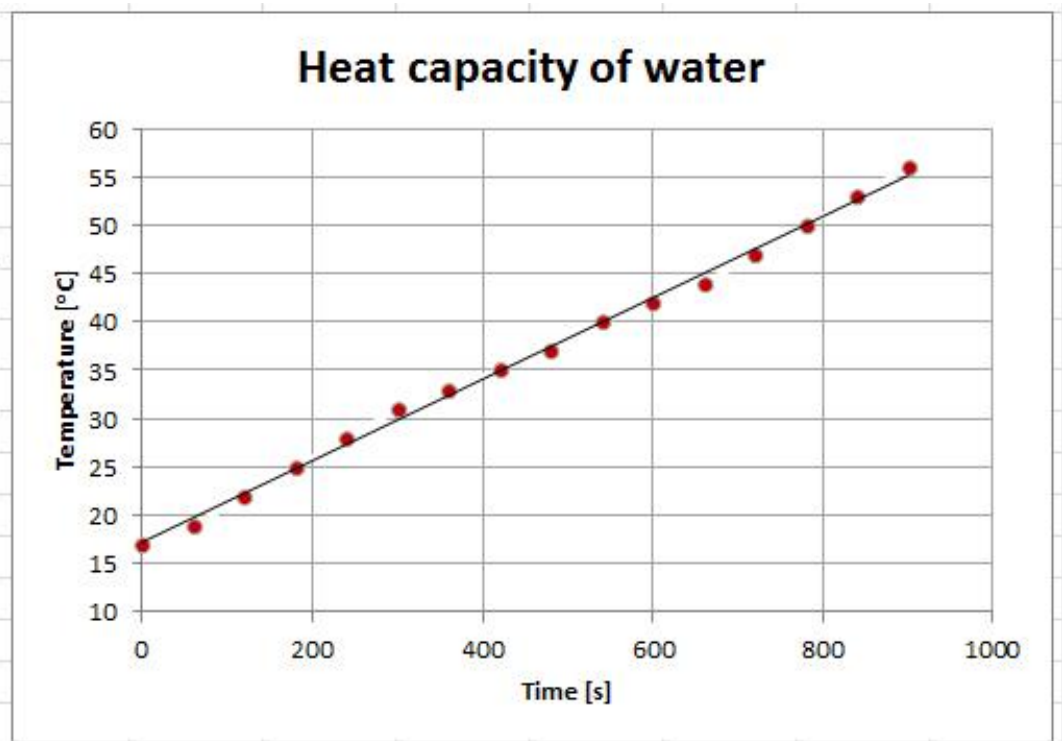
The following slides detail some simple and inexpensive DIY equipment that technicians can put together themselves.

Specific heat capacity



Specific heat capacity

t [s]	T [°C]	m [kg]	0.07233
0	17	U [V]	7.14
60	19	I [A]	1.98
120	22		
180	25		
240	28		
300	31	c_w [J kg/°C]	4510
360	33	c_w [J kg/°C]	4181
420	35		
480	37	Error [%]	7.3
540	40		
600	42		
660	44		
720	47		
780	50		
840	53		
900	56		



Specific heat capacity

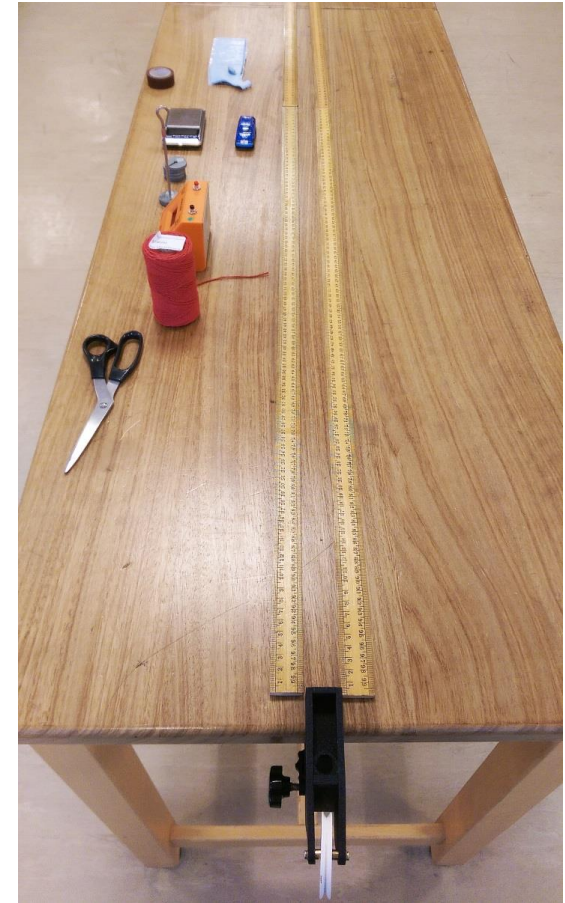


m_{copper} [kg]	0.201
T_{copper} [°C]	87
m_{water} [kg]	0.265
T_{water} [°C]	17
$T_{\text{water \& copper}}$ [°C]	21
c_{water} [J/kg*K]	4198.9
Calculated value	
c_{copper} [J/kg*K]	337.2
Real Value	
c_{copper} [J/kg*K]	386.0



Acceleration

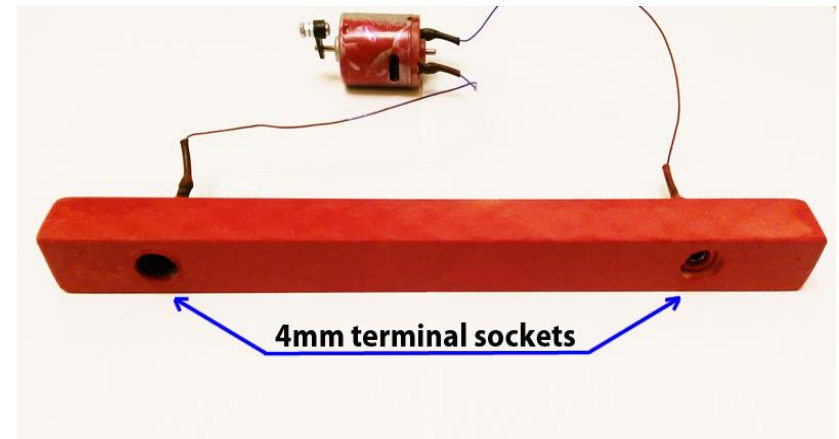
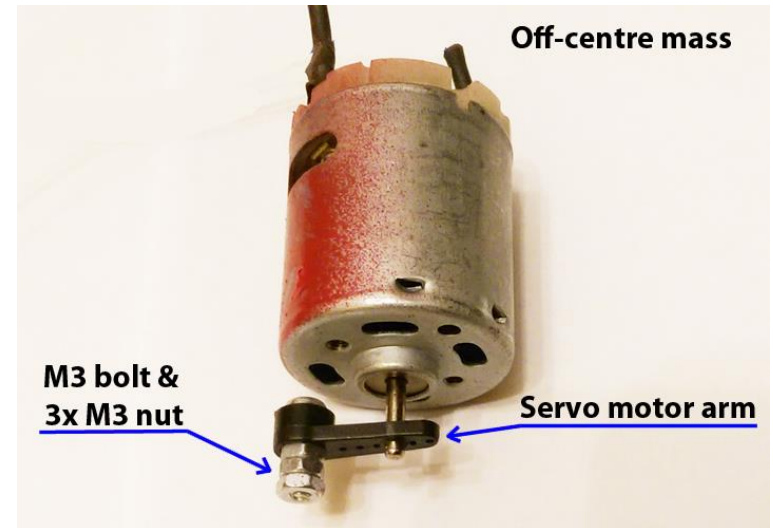
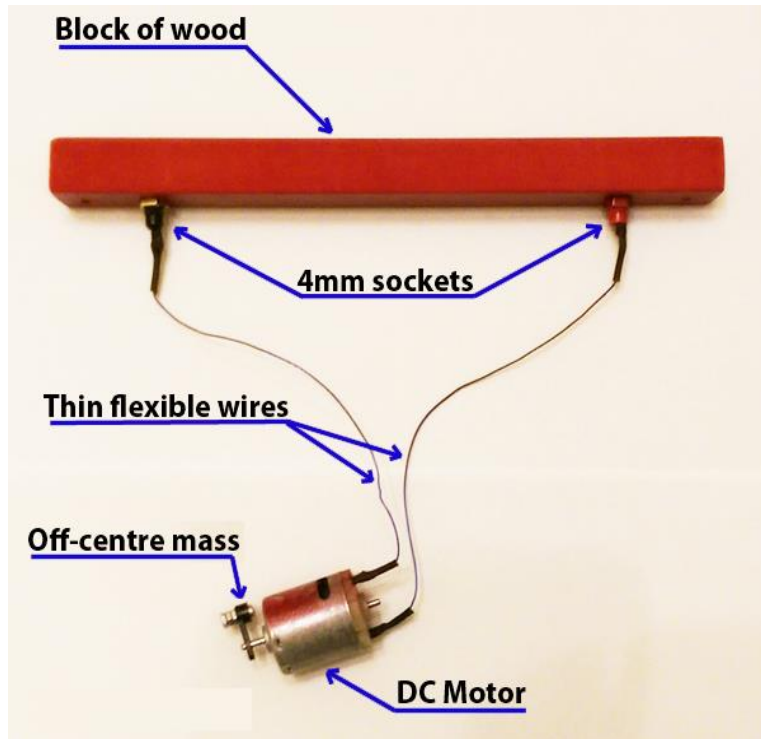
- Use a metal toy car
- Put extra 200g to 400g masses on top of the car
- Create a track using meter rulers
- Use a smartphone camera if possible



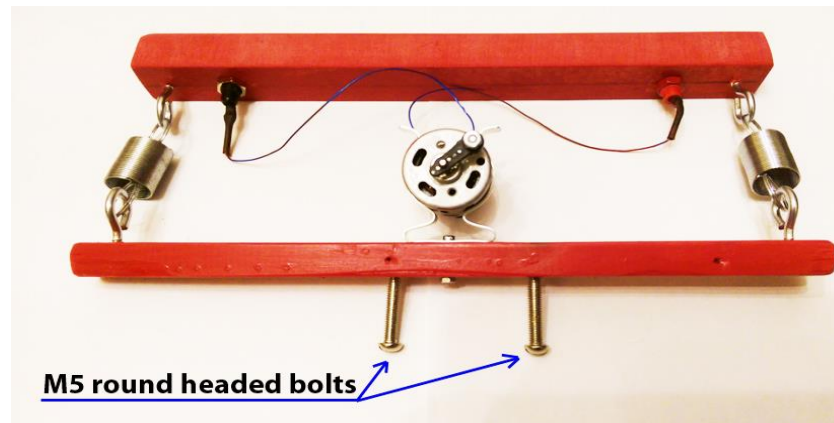
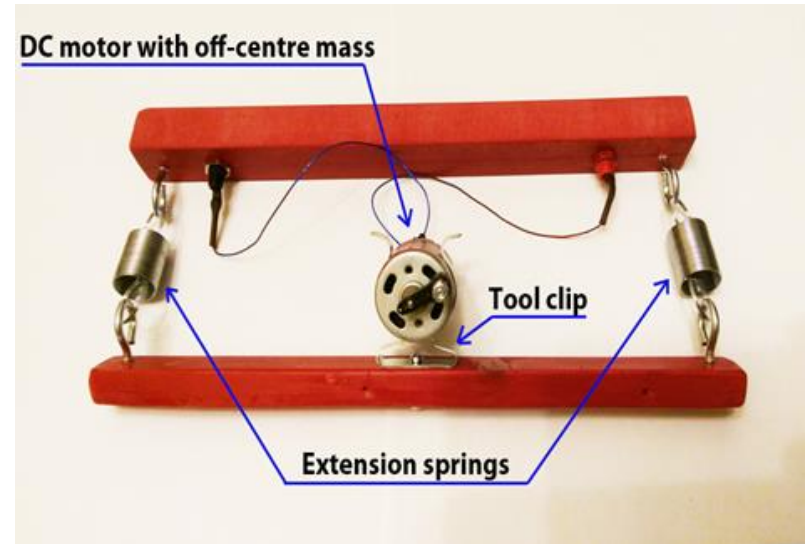
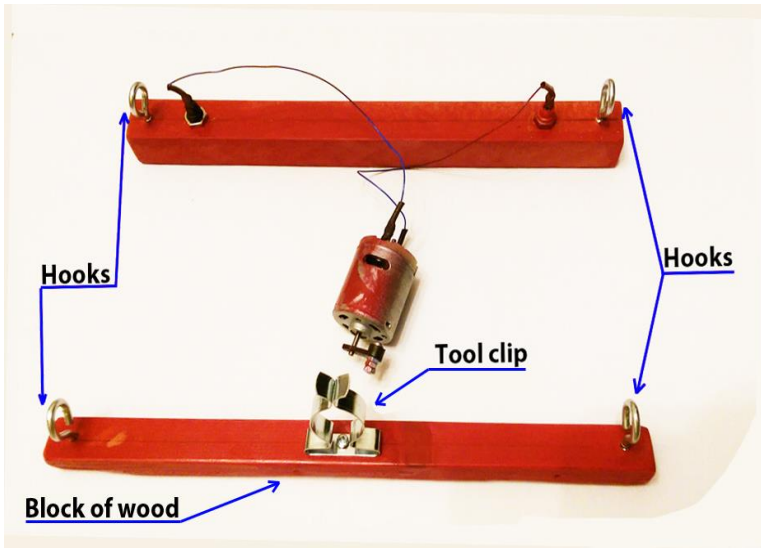
Acceleration - results

$m_{\text{Car}} = 461 \text{ g}$		$F = 0.2 \text{ N}$		$m_{\text{Car}} = 461 \text{ g}$		$F = 0.4 \text{ N}$	
$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$
20.0	0.94	20.0	0.77	20.0	0.77	20.0	0.77
40.0	1.77	40.0	1.38	40.0	1.38	40.0	1.38
60.0	2.44	60.0	1.91	60.0	1.91	60.0	1.91
80.0	2.89	80.0	2.30	80.0	2.30	80.0	2.30
100.0	3.16	100.0	2.44	100.0	2.44	100.0	2.44
$F = 0.2 \text{ N}$		$m_{\text{Car}} = 261 \text{ g}$		$F = 0.4 \text{ N}$		$m_{\text{Car}} = 461 \text{ g}$	
$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$	$L \text{ [cm]}$	$t \text{ [s]}$
20.0	0.64	20.0	0.59	20.0	0.59	20.0	0.59
40.0	1.13	40.0	1.03	40.0	1.03	40.0	1.03
60.0	1.52	60.0	1.43	60.0	1.43	60.0	1.43
80.0	1.77	80.0	1.65	80.0	1.65	80.0	1.65
100.0	1.92	100.0	1.75	100.0	1.75	100.0	1.75

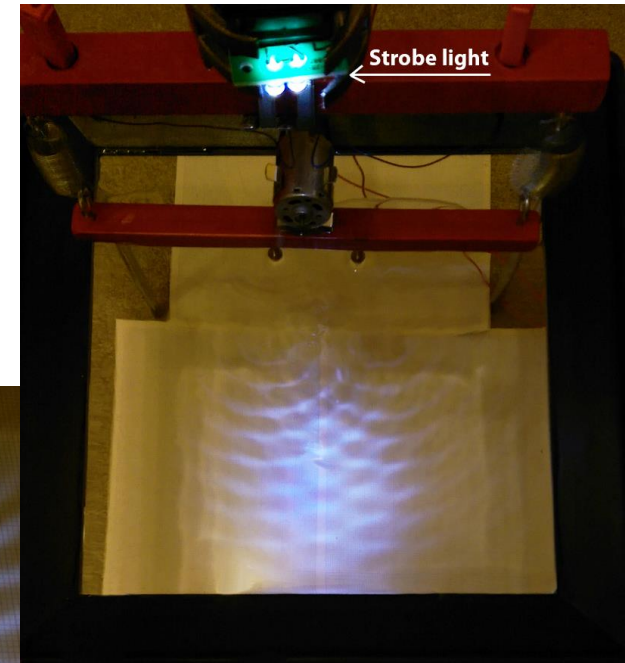
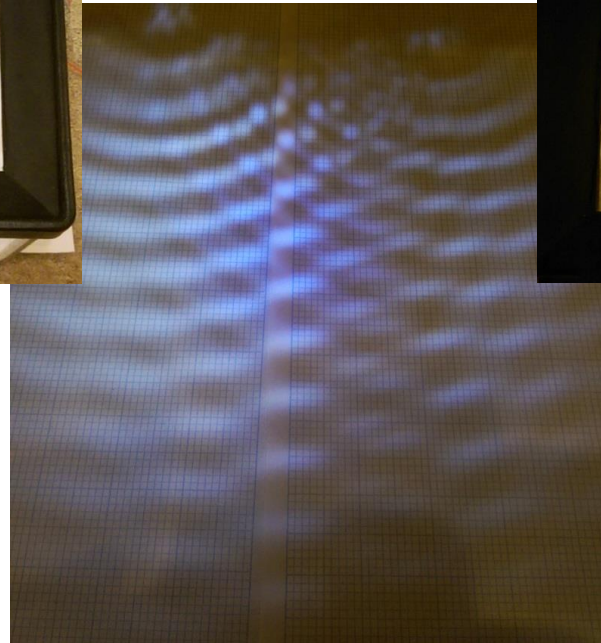
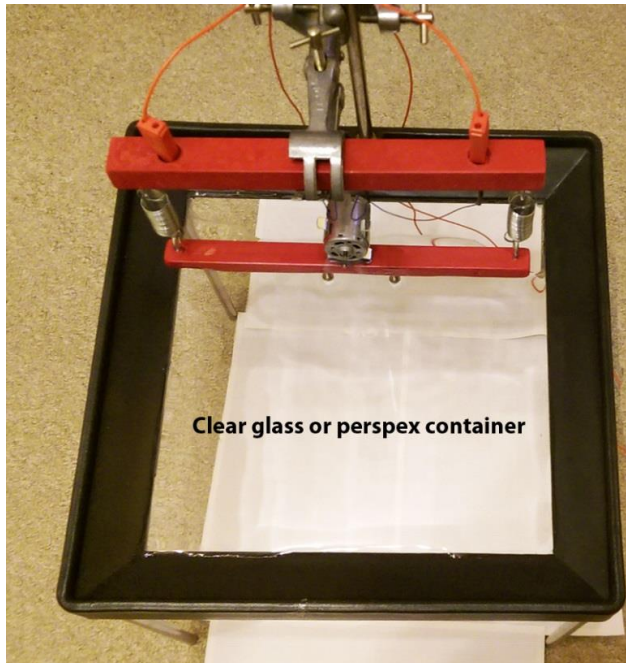
DIY ripple tank



DIY ripple tank



DIY ripple tank



Making a Leslie “can”



Making a Leslie “can”

Exactly same results as using Leslie cube.



Thank you
