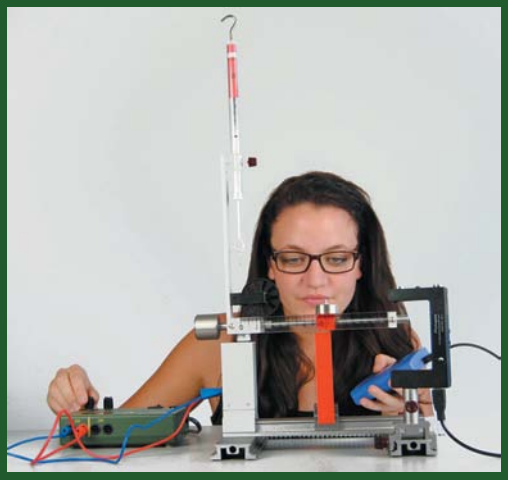
Student Experiments

Manual

CENTRIFUGAL FORCE

P9160-4Z



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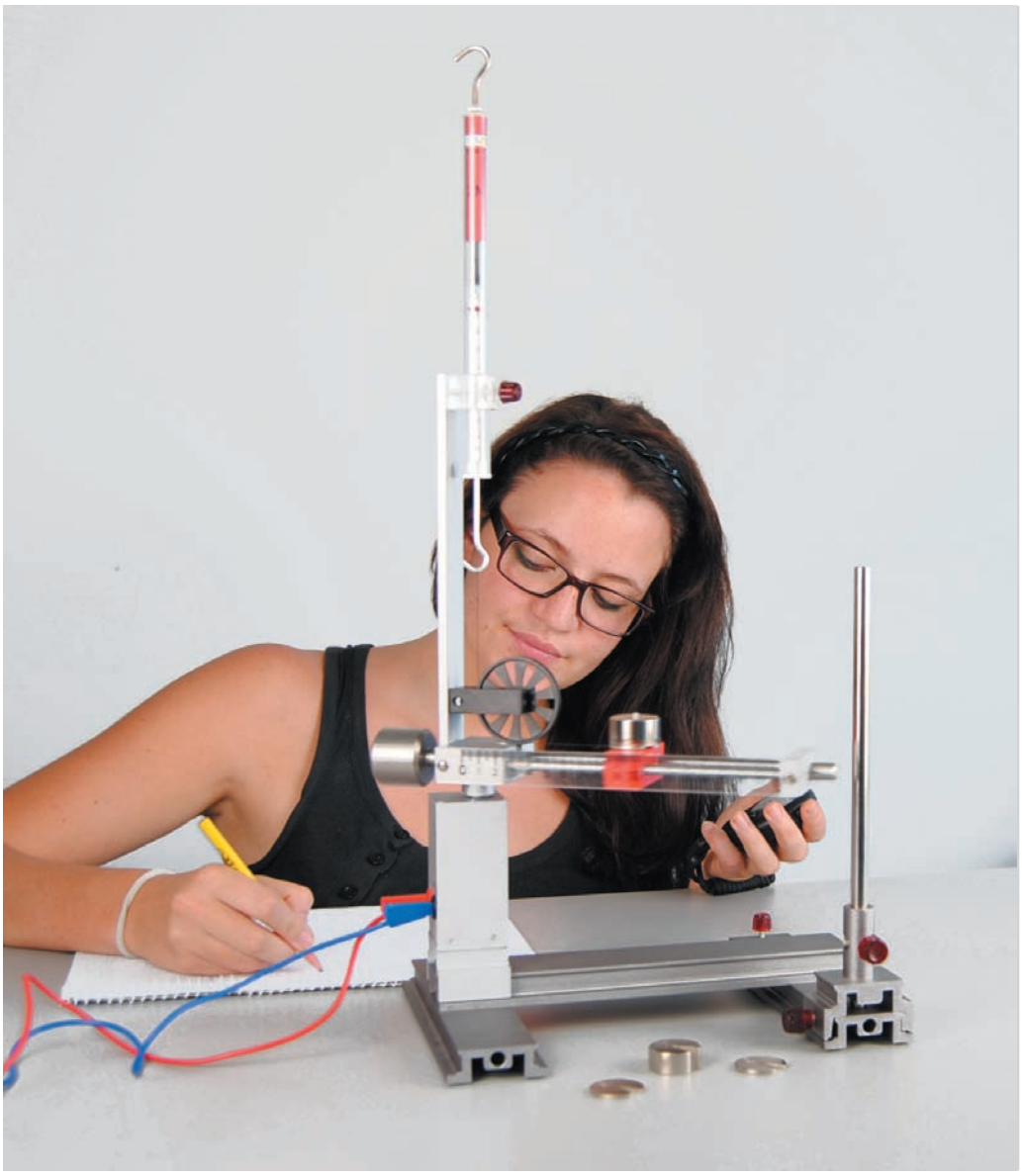
DETERMINATION OF THE CENTRIFUGAL FORCE AS A FUNCTION OF THE MASS

MRS 2.1

Required Kit:
P9110-4Z Centrifugal force



Recommended accessory:
1x P1325-9S Counter with 2 light gates

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To determine exactly the dependence of the centrifugal force F_z from the mass m of a circulating body, the other two parameters (r and ω) must be held constantly.

Experiment-set up:

It is recommended that following settings are made on the device at the beginning of the experiment:

- Start with the sliding weight of 50g and increase the mass in steps of 20g.
- Move the reading pin to the zero-marking at the scale for height adjustment on the dynamometer.

Experiment:

To take the device into operation, set a voltage of 6V on the low-voltage power supply. Then, read the value of the orbiteral period (several measurements are possible with the light gates within short time). To read off the radius later on, we move the slider with gate along the crossrail until it is positioned below the sliding weight. Finally, read off the centrifugal force from the dynamometer.
Stop the rotation of the device by turning the knob of the low-voltage power supply completely to the left and read off the radius after the rotation arm has stopped.
Then transfer the values into the chart.
The next values can be measured by increasing the mass to 70g (by adding additional two 10g slotted weights). The dynamometer has to be adjusted upwards by 1cm to keep the radius constant.
As mentioned above, put the device into operation again and turn the knob until the orbital period of the previous measured value is reached again.
Afterwards we check whether the radius kept constant. Readjust, if required.
The further course of the experiment is carried out as described above.

Evaluation:
Perform the experiment and transfer the measured values into the chart.

(The columns T/s and r/cm shall be used as columns to document that the orbital period T and the radius r stay constant.)

m/g	F_z/N	T/s	r/cm

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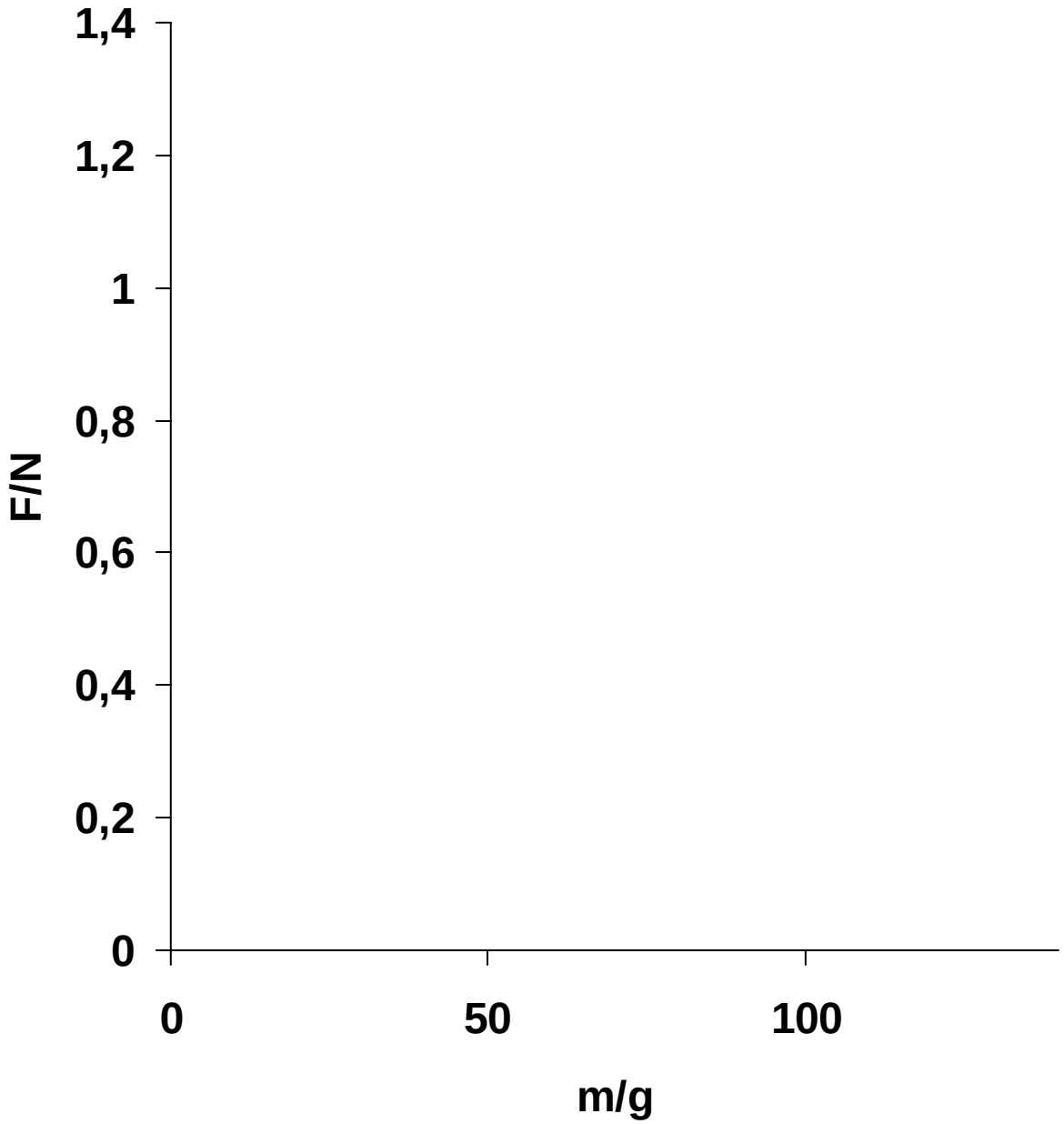
The chart can be converted into a diagram by reading off and transferring m/g at the abscissa and F_z/N at the ordinate;
Units: 10g match with 1cm; 0,1N match with 1cm.



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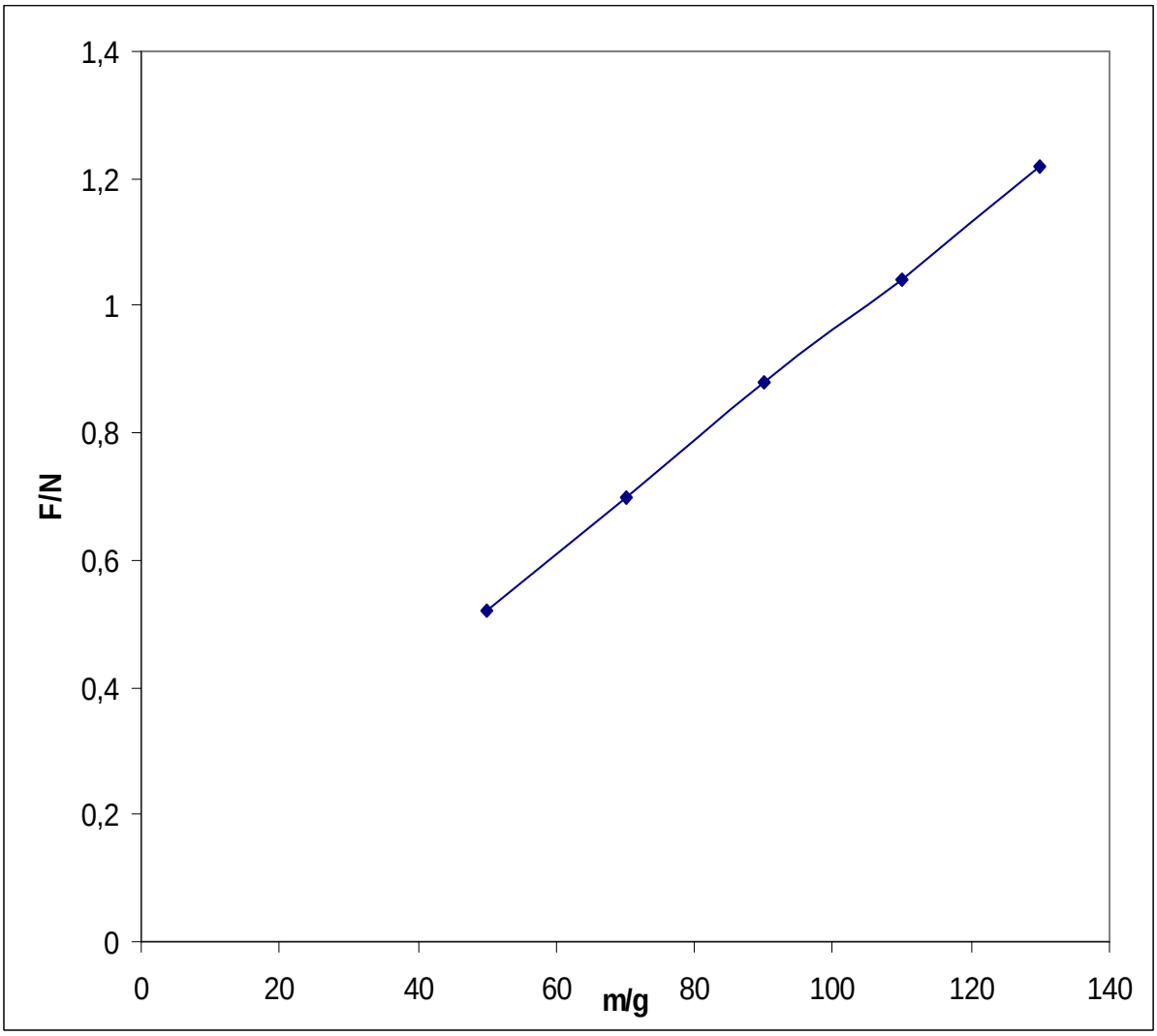
MRS 2.1

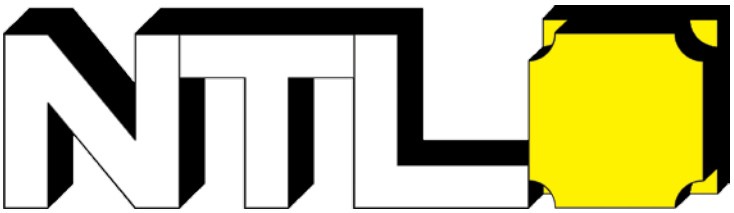
Example:
The following values have been measured with the above-defined settings:

m/g	F_z/N	T/s	r/cm
50	0,52	0,813	13,5
70	0,7	0,811	13,5
90	0,88	0,811	13,5
110	1,04	0,811	13,5
130	1,22	0,813	13,5

This results in following diagram:



Conclusion:
The centrifugal force is directly proportional to the mass of the circulating body. This means when the mass gets increased by equal values, the centrifugal force also increases by the same values.



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