V123

Template

Fritz Ali Agildere Jan Lucca Viola fritz.agildere@udo.edu janlucca.viola@udo.edu

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TU Dortmund – Department of Physics

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1 Objective

This experiment serves as a template for a report in the advanced lab course.

2 Theory

The Pythagorean theorem describes aspect ratios.

2.1 General

We can always write

$$a^{2} + b^{2} = c^{2}$$
 (1a)
 $a^{2} = c^{2} - b^{2}$ (1b)

for any right triangle.

2.2 Specific

With a = b follows from the general case (1a) that

$$2a^2 = c^2 \tag{2}$$

must hold.

3 Procedure

A Geodreieck is used.

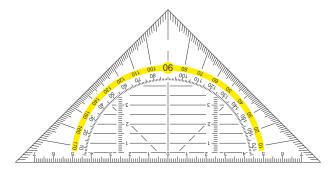


Figure 1: Schematic depiction of a Geodreieck.

4 Results

Table 1: General measurements.

a / mm	b / mm	c / mm
1	2	2.25
2	3	3.60
3	4	5.00
4	5	6.40

Table 2: Specific measurements.

a / mm	c / mm
1	1.4
2	2.8
3	4.2
4	5.7
5	7.1

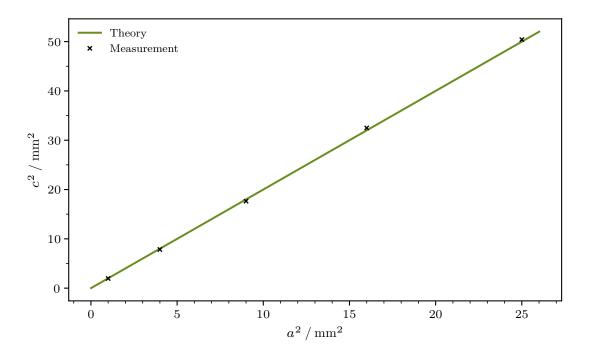


Figure 2: Measurements and theory prediction.

For $c^2 = ma^2 + n$ and using numpy.polyfit [1] we find

$$m = 2.03 \pm 0.01$$
 $n = (-0.24 \pm 0.21) \,\mathrm{mm}^2$

as parameters.

5 Discussion

The measurements are in good agreement with predictions derived from theory.

References

[1] Charles R. Harris et al. "Array programming with NumPy". In: *Nature* 585.7825 (Sept. 2020), pp. 357–362. DOI: 10.1038/s41586-020-2649-2. URL: https://doi.org/10.1038/s41586-020-2649-2.

Appendix

