

Euclidean geometry
Exercises 1
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Tutorial exercise 1.1 (Existence of an equilateral triangle)

Prove the following proposition:

- On a given finite straight line to describe an equilateral triangle.

Tutorial exercise 1.2 (Title)

- (a) An exercise without a text between the headline and the enumerate environment.
- (b) A second item.

Homework* 1.1 (Title)

Some quantity of points

- (a) An exercise without a text between the headline and the enumerate environment.
- (b) A second item.

Additional material

Ad Tutorial exercise 1.1. You may need the following definitions and postulates:

- *Definition 15:* A circle is a plane figure, bounded by one continued line, called its *circumference* or *periphery*; and having a certain point within it, from which all straight lines drawn to its circumference are equal.
- *Postulate 1:* Let it be granted that a straight line may be drawn from an one point to any other point.
- *Postulate 3:* Let it be granted that a circle may be described with any centre at any difference from that centre.

Ad Tutorial exercise 1.2. Something I've been wanting to write.

Ad Homework* 1.1. Something I've been wanting to write.

Solutions

Solution of Tutorial exercise 1.1. Draw two circles around either point of the straight line with radius given by the line itself. Both exist due to Postulate 3. Both circles intersect in two points, choose any of them, and draw two straight lines from the chosen points to each of the two centres. Both lines exist and are unique due to Postulate 1.

It remains to show that the constructed triangle is equilateral. But by Definition 15, the given straight line's length equals the length of any of the two others for they are the radii of the two circles. Hence, all straight lines are equal in length.

Sketch of Tutorial exercise 1.1. Construct two circles centred at any of the end points of the straight line, choose one of the two intersections of the circles, then this point together with the two centres form a triangle. It remains to prove that the all triangle's faces equal in length.

Sketch of Tutorial exercise 1.2.

- (a) a sketch of a solution
- (b) a sketch of a solution