Similar shapes, teacher

The rule stating that similar triangles are proportional is known to the students from secondary school. This purpose of this activity is for the student to recall the rule and be prepared to

- Recognize similar shapes, triangles in particular
- Use the ratio-rule to calculate lengths

The activity is used as an introduction to the topic. It should support the student's elaboration of the concept of similar shapes by linking to what she already knows and by letting her explore the concept further. Examples of questions the student might ask:

- Does the rule apply to all triangles?
- How can I draw similar triangles?
- Does the rule apply to other shapes, or only triangles?
- Can I use the rule for any practical purposes?
- What about the area of the triangles, is there a similar rule?

The activity will be followed by exercises where the student uses similar shapes to calculate distances and lengths. This means the student should get familiar with the correspondence between the geometrical way of seeing the rule and the algebraic way. By passing on to working with algebra the student hopefully will achieve necessary skills in calculating lengths.

The activity Similar triangles applies one way of drawing similar triangles. In the next pages follows two examples of alternative drawings which can be used to learn to recognize and draw similar triangles. The construction protocol can be made visible from the View-menu.

The exploration of ratios between similar distances in similar shapes (not triangles) leads to all kinds of practical problems where we have a drawing in some scale. Map, house, kitchen, boat, garden, streets ….

GeoGebra can be used to make exercises using maps or other drawings. Use the *Insert Image* tool to show the map in the Graphics View. Right-click in the picture, and choose Fix object. The student can mark the route with lines and circle sectors.

Students who want to continue the exploring of similar shapes can continue by exploring the ratio between areas of similar triangles. A drawing which can be used is found on page 4.

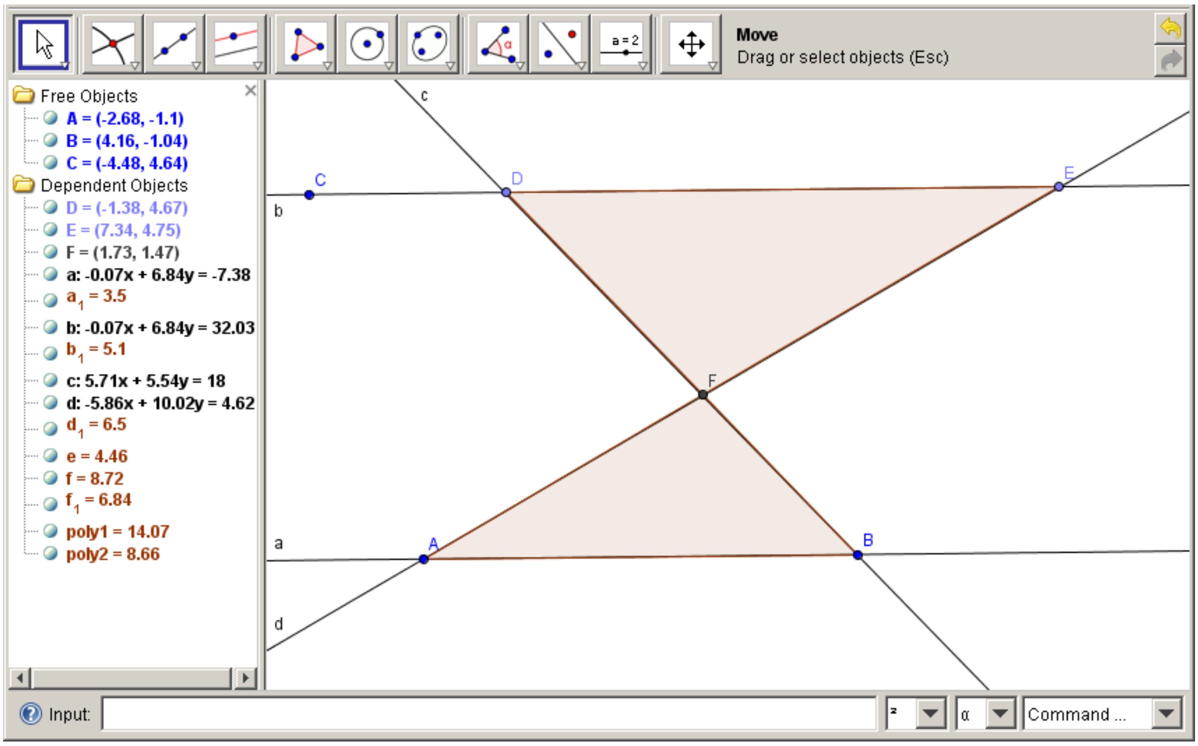
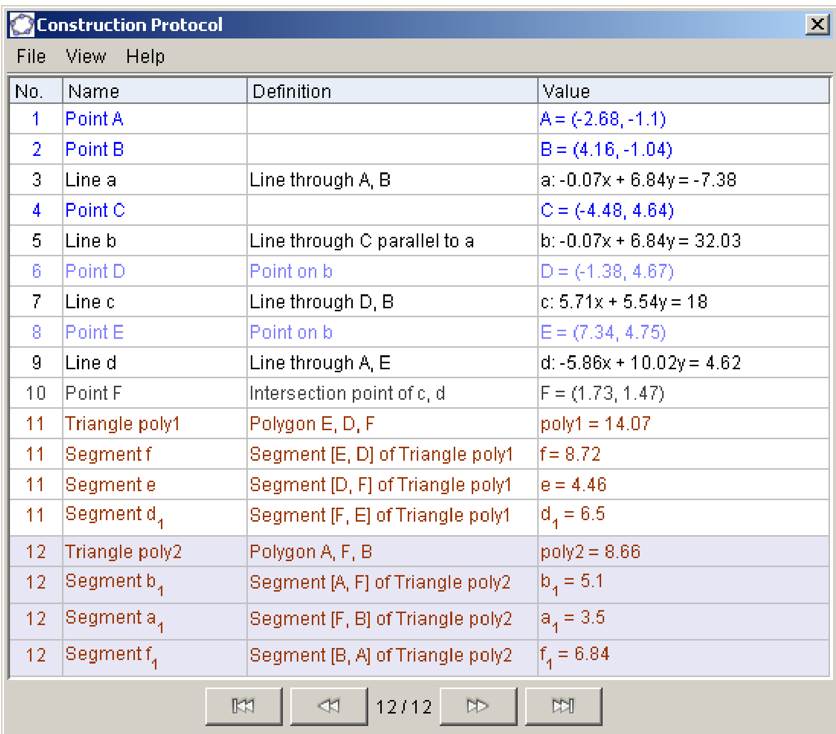


Figure 1. Similar triangles, alternative 1



Construction Protocol

File View Help

No.	Name	Definition	Value
1	Point A		A = (-2.68, -1.1)
2	Point B		B = (4.16, -1.04)
3	Line a	Line through A, B	a: -0.07x + 6.84y = -7.38
4	Point C		C = (-4.48, 4.64)
5	Line b	Line through C parallel to a	b: -0.07x + 6.84y = 32.03
6	Point D	Point on b	D = (-1.38, 4.67)
7	Line c	Line through D, B	c: 5.71x + 5.54y = 18
8	Point E	Point on b	E = (7.34, 4.75)
9	Line d	Line through A, E	d: -5.86x + 10.02y = 4.62
10	Point F	Intersection point of c, d	F = (1.73, 1.47)
11	Triangle poly1	Polygon E, D, F	poly1 = 14.07
11	Segment f	Segment [E, D] of Triangle poly1	f = 8.72
11	Segment e	Segment [D, F] of Triangle poly1	e = 4.46
11	Segment d_1	Segment [F, E] of Triangle poly1	d_1 = 6.5
12	Triangle poly2	Polygon A, F, B	poly2 = 8.66
12	Segment b_1	Segment [A, F] of Triangle poly2	b_1 = 5.1
12	Segment a_1	Segment [F, B] of Triangle poly2	a_1 = 3.5
12	Segment f_1	Segment [B, A] of Triangle poly2	f_1 = 6.84

12 / 12

Figure 2. Similar triangles, alternative 1. Construction protocol.

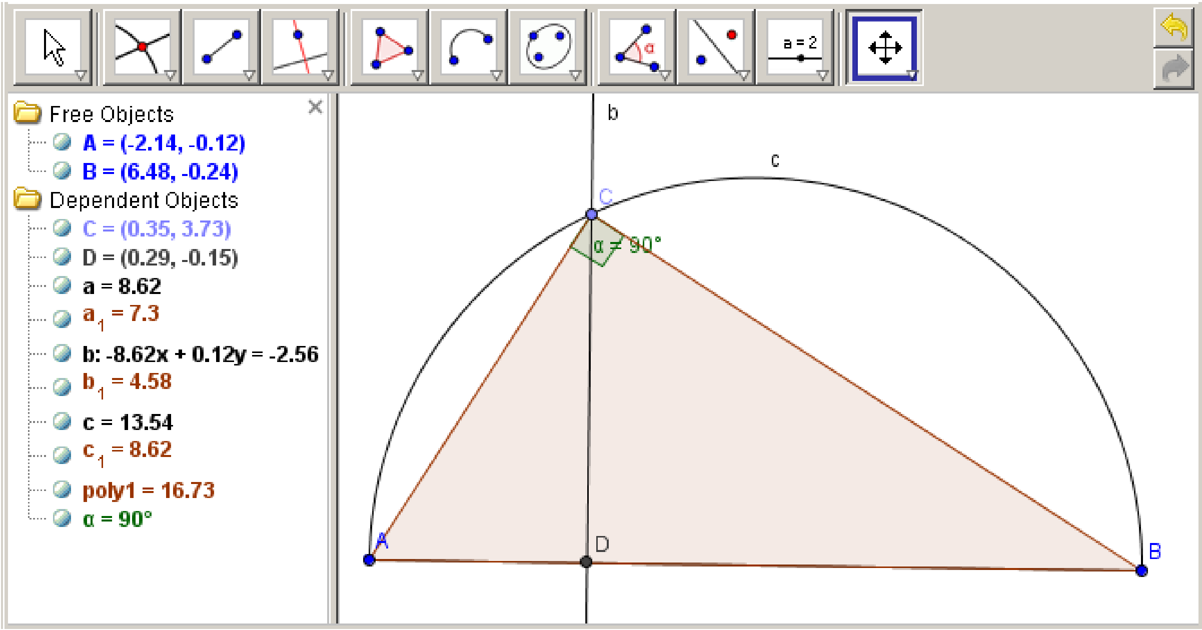
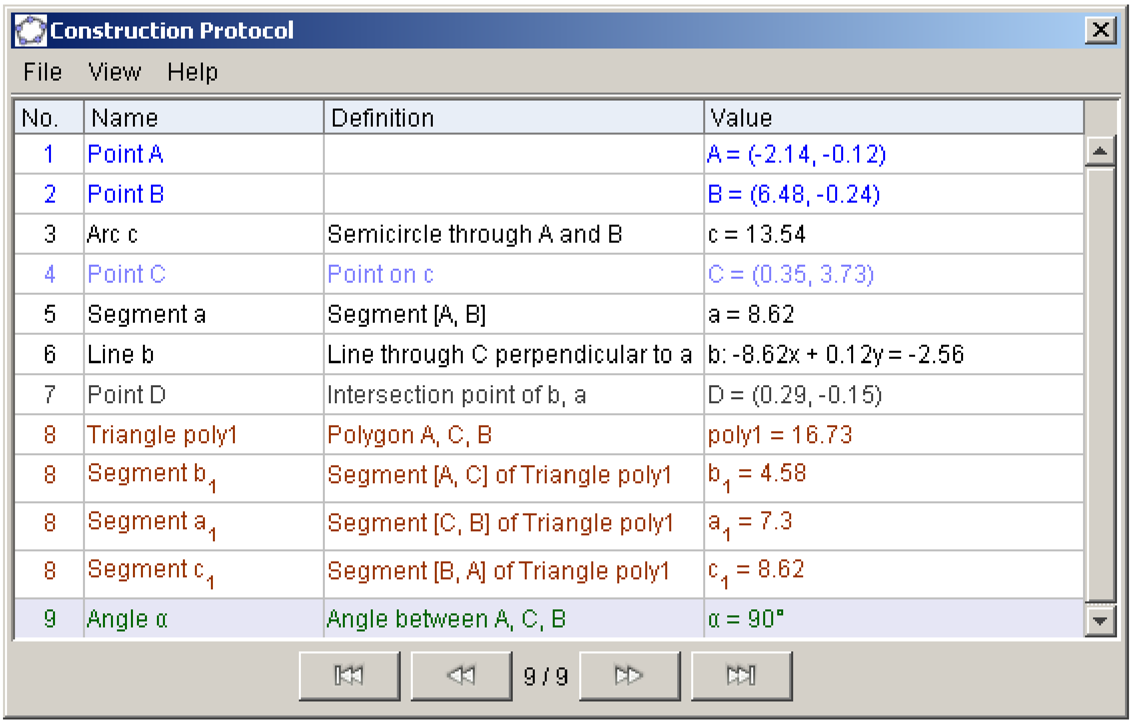


Figure 3. Similar triangles, alternative 2.



Construction Protocol

File View Help

No.	Name	Definition	Value
1	Point A		A = (-2.14, -0.12)
2	Point B		B = (6.48, -0.24)
3	Arc c	Semicircle through A and B	c = 13.54
4	Point C	Point on c	C = (0.35, 3.73)
5	Segment a	Segment [A, B]	a = 8.62
6	Line b	Line through C perpendicular to a	b: -8.62x + 0.12y = -2.56
7	Point D	Intersection point of b, a	D = (0.29, -0.15)
8	Triangle poly1	Polygon A, C, B	poly1 = 16.73
8	Segment b_1	Segment [A, C] of Triangle poly1	b_1 = 4.58
8	Segment a_1	Segment [C, B] of Triangle poly1	a_1 = 7.3
8	Segment c_1	Segment [B, A] of Triangle poly1	c_1 = 8.62
9	Angle α	Angle between A, C, B	α = 90°

9 / 9

Figure 4. Similar triangles, alternative 2. Construction protocol.

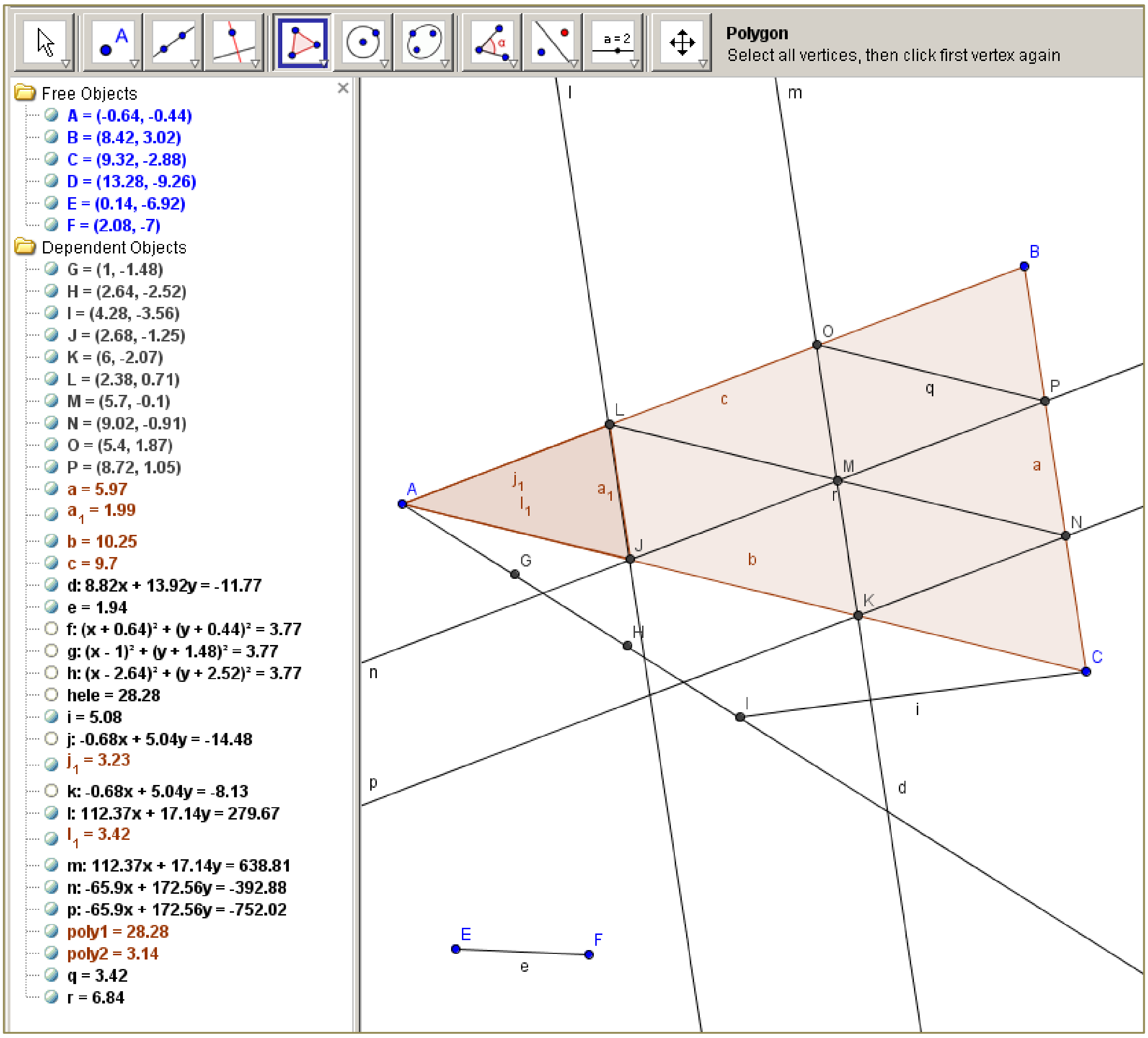


Figure 5. Area ratios