

TU Liberec Geoworkshop – Part 2

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NORD
University

1

Purpose of teaching geometry - material

- Who observes old churches, recognizes geometry carved in stone.
- Who looks at mosques, finds there the geometry in form of the Islamic patterns

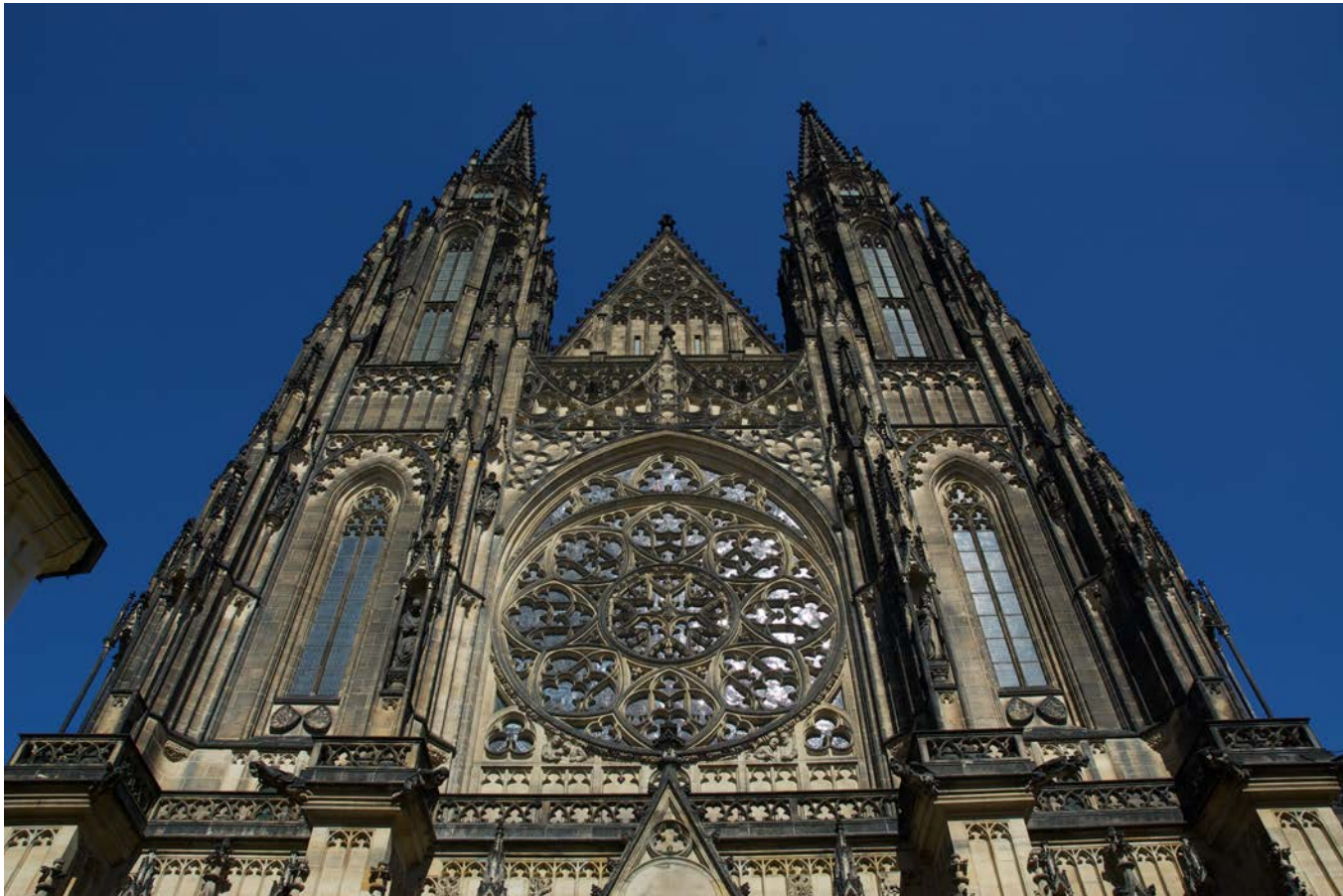


Lisboa

1

Purpose of teaching geometry - material

Geometrical knowledge helps to understand our world:
Ornaments, constructions



1 Purpose of teaching geometry - material

Geometrical knowledge helps to understand our world:

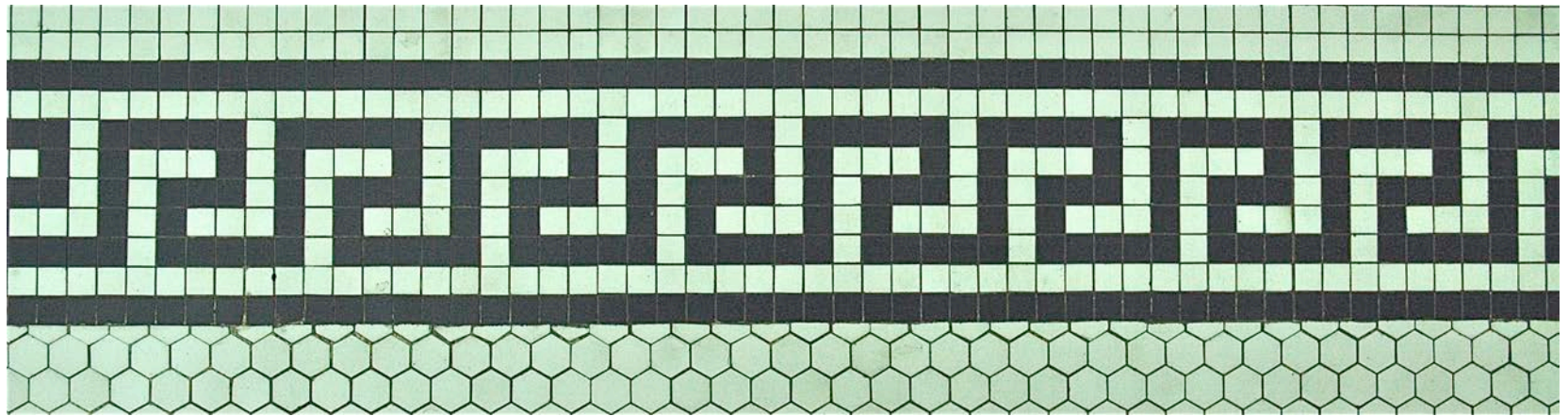




An excursus: It's definitely worth, going deeper into a subject.

2

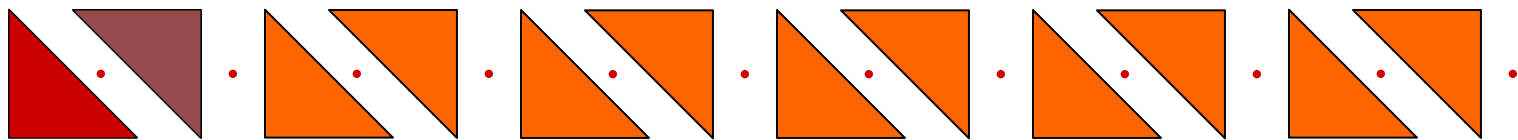
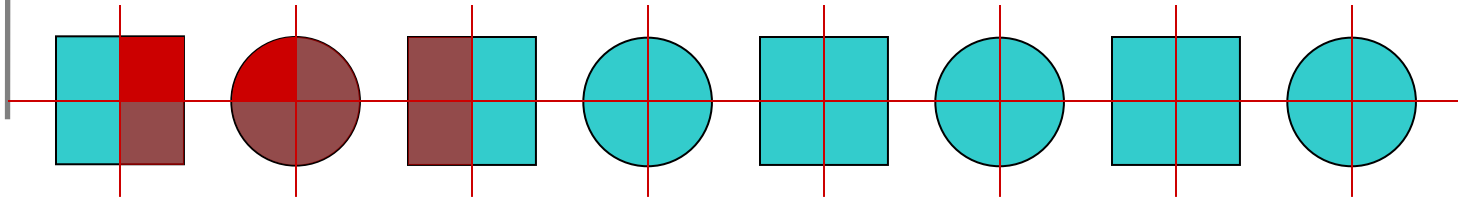
Excursus: Ornaments



ornare - decorate

2

Excursus: Ornaments



2

Excursus: Ornaments

How many types of ornaments may exist?

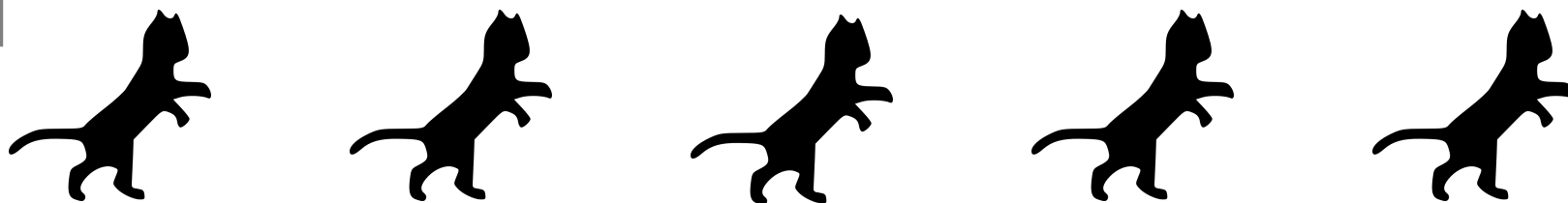
100?

1000?

1 million?

Infinitely many?

???



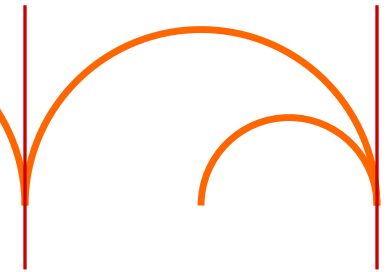
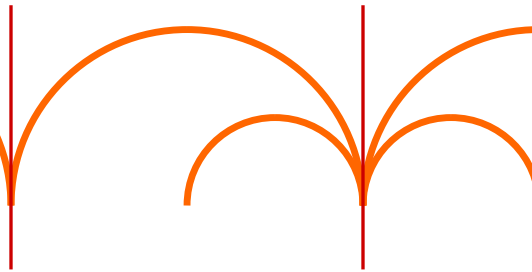
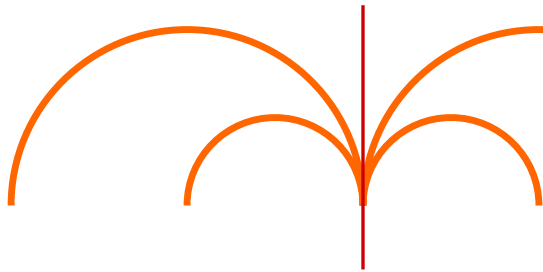
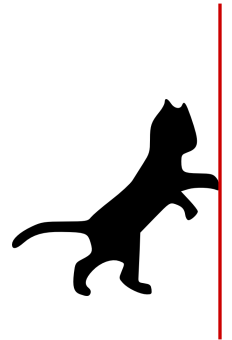
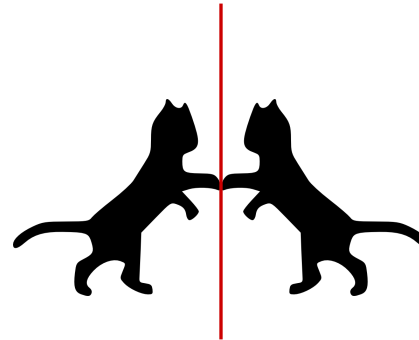
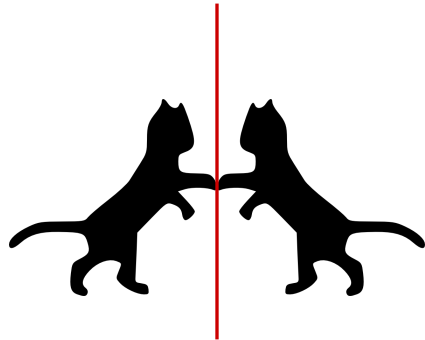
b

b

b

b

b



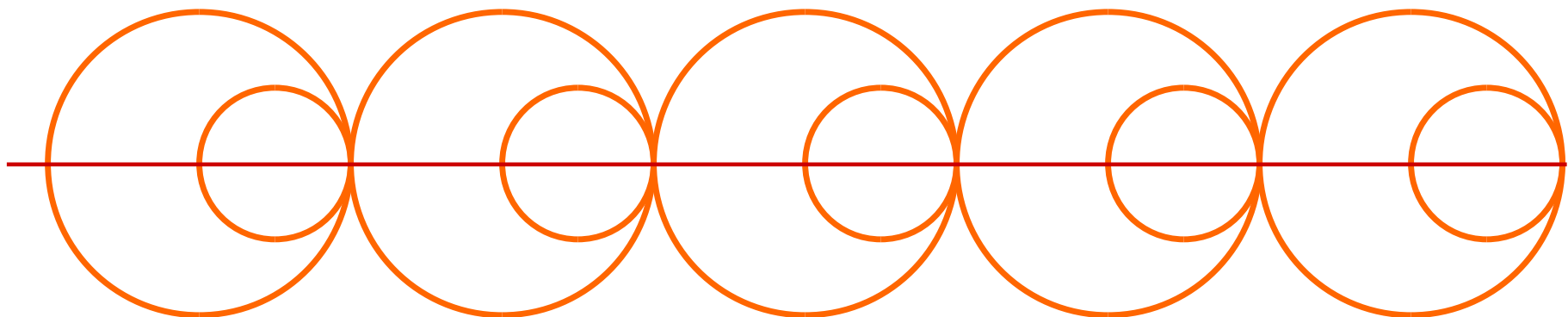
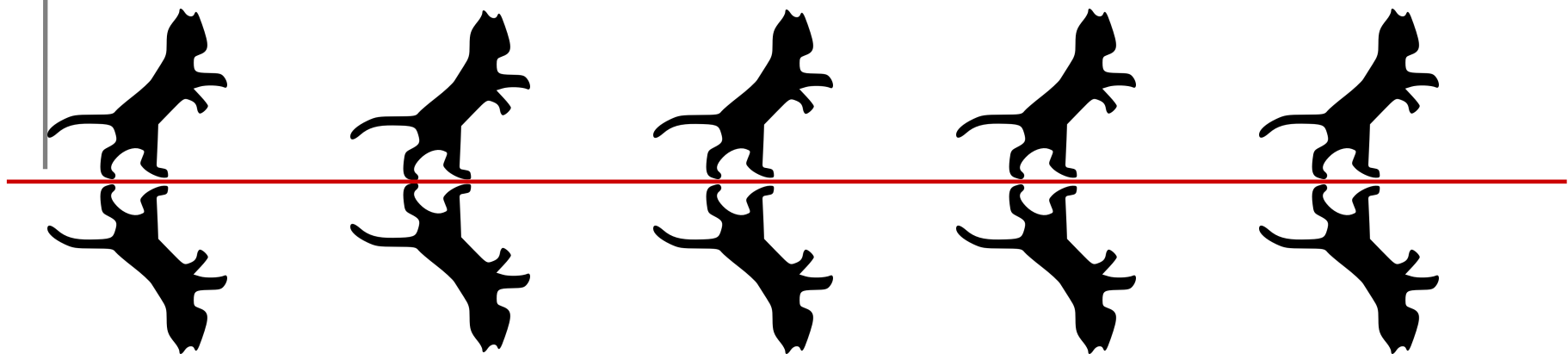
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2

Excursus: Ornaments



b

b

b

b

b

p

p

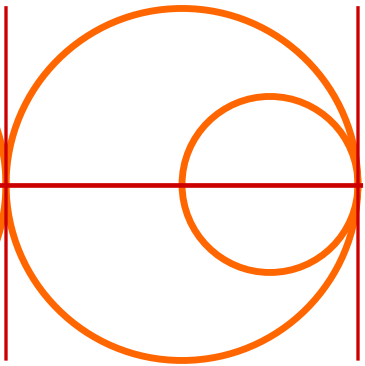
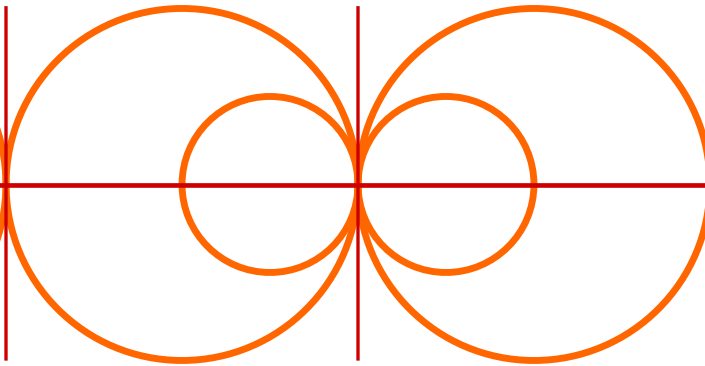
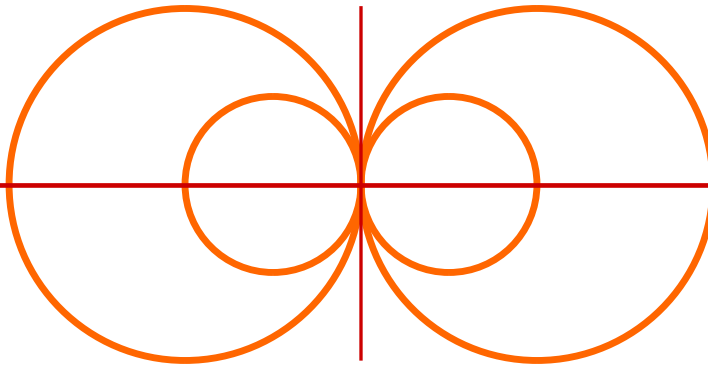
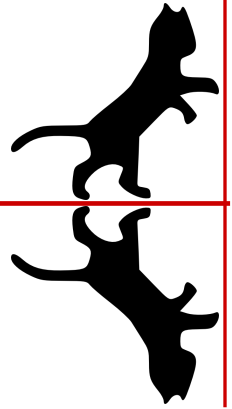
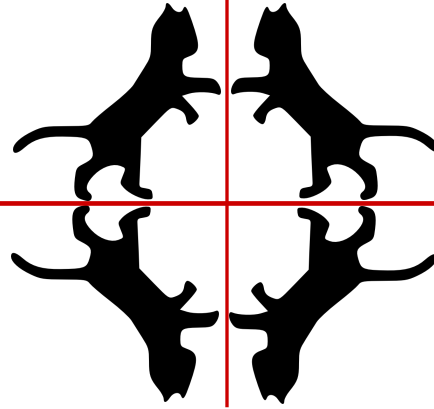
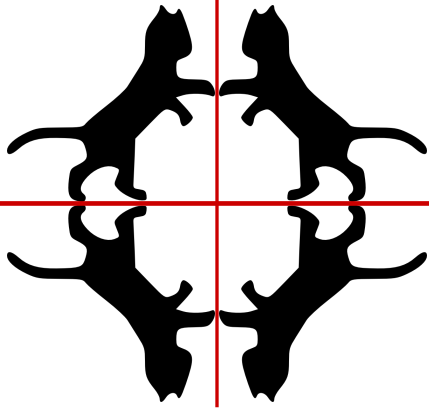
p

p

p

2

Excursus: Ornaments



b

d

b

d

b

p

q

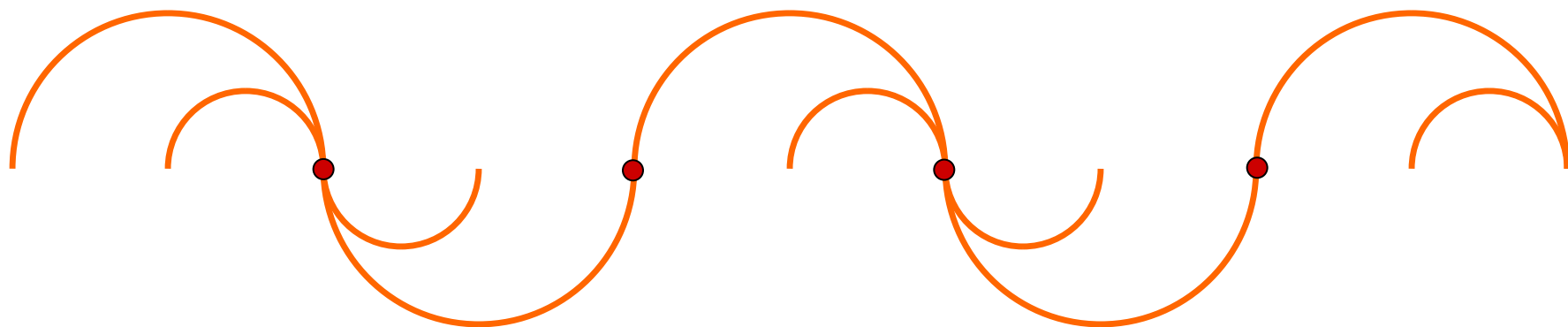
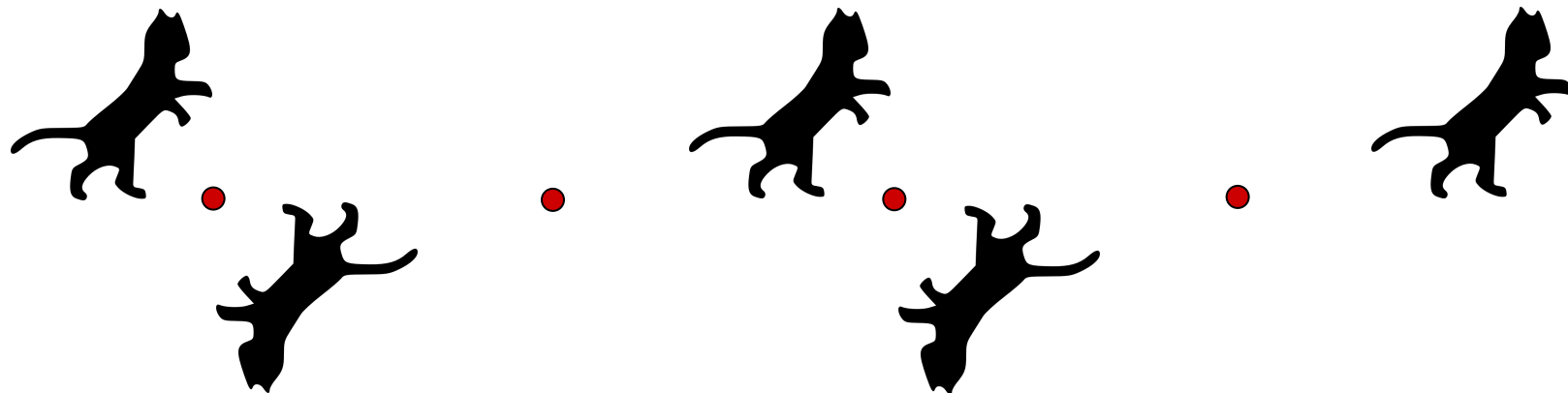
p

q

p

2

Excursus: Ornaments



b



q



b



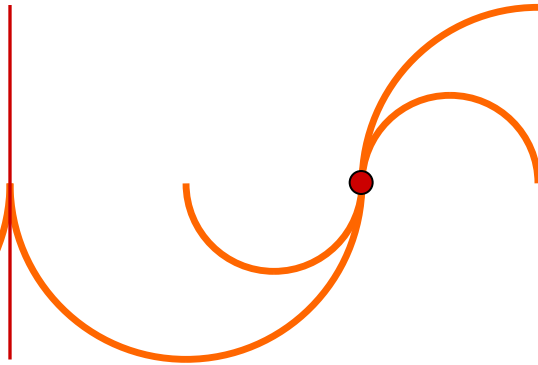
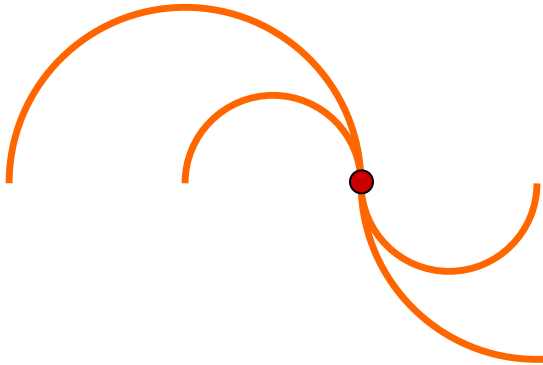
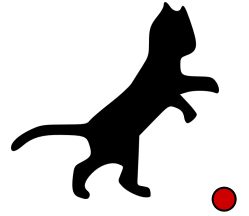
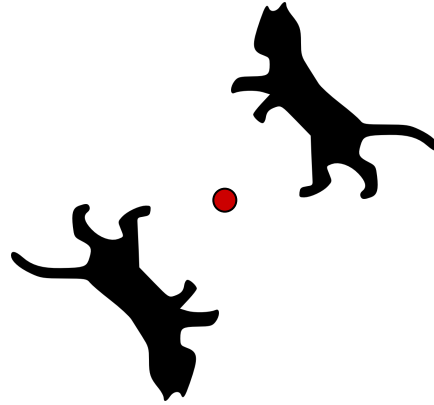
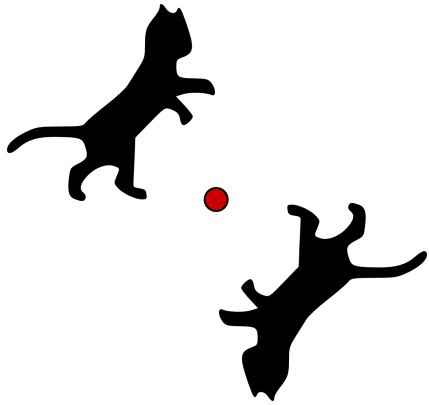
q



b

2

Excursus: Ornaments



b



q

d



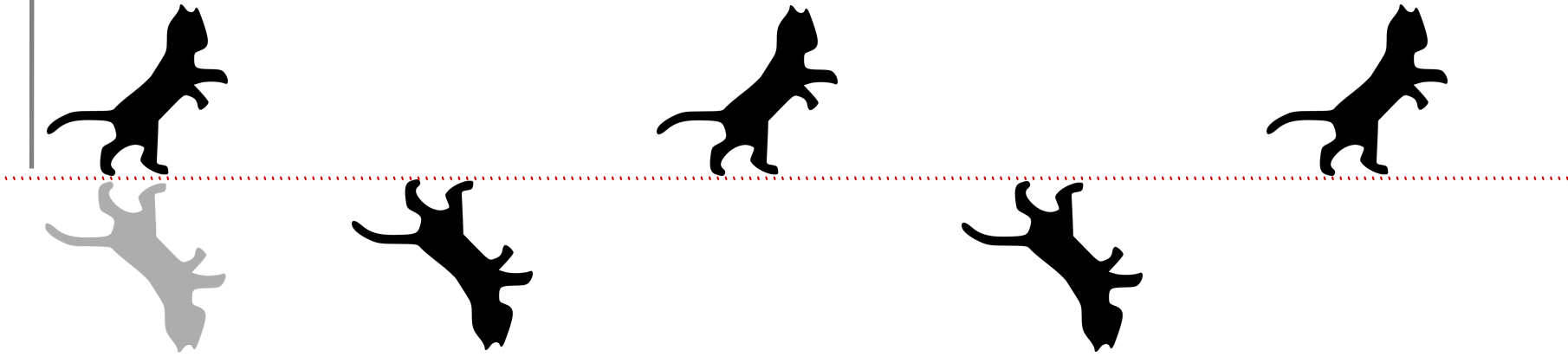
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b



2

Excursus Ornaments



glide reflection: A composite of a reflection across a line and a translation parallel to the line of reflection

b

b

b

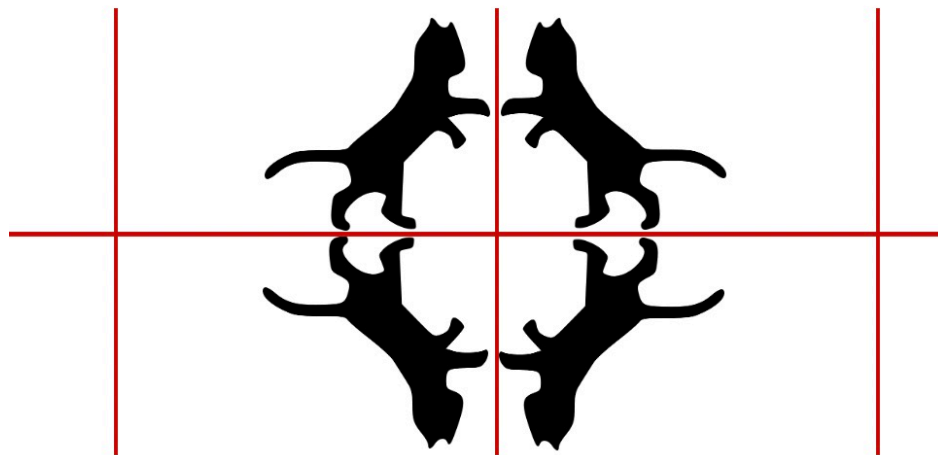
p

p

p

Why is there no number 8?

- We have combined
- - Longitudinal and transverse reflection
- - Transverse and point reflection
- What about the combination of longitudinal reflection and point reflection? ...



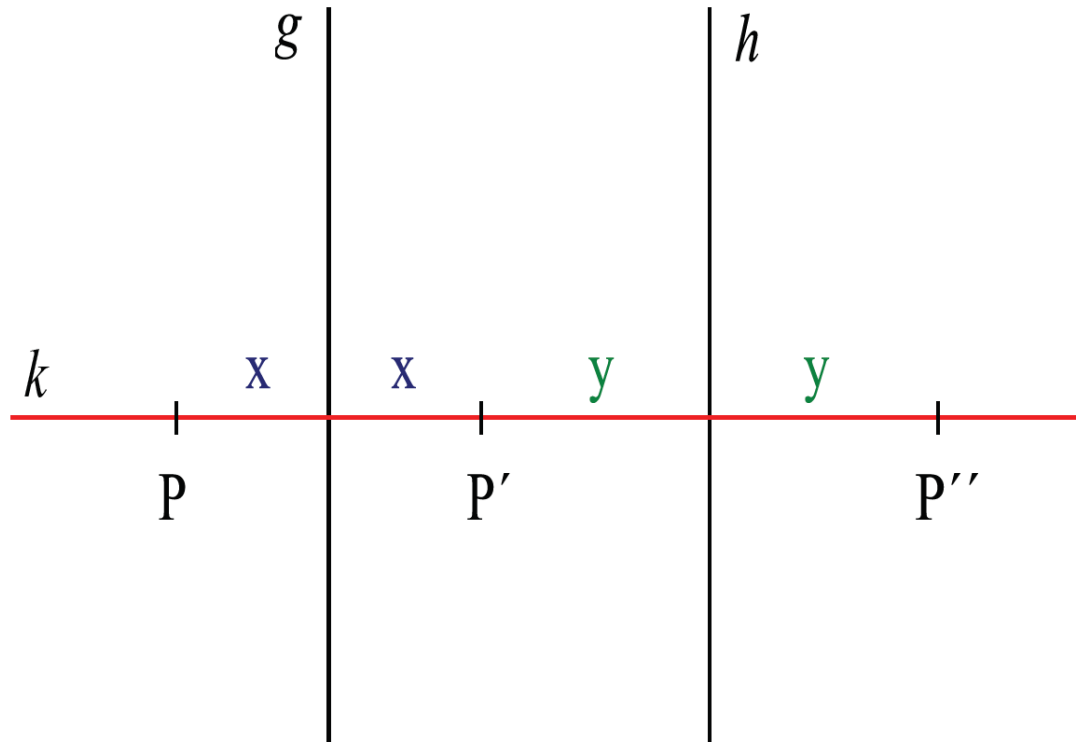
2

Excursus: Ornaments

A bit more mathematical content:

A combination of reflections across 2 lines.

a) 2 parallel lines



2

Excursus: Ornaments

A bit more mathematical content:

A combination of reflections across 2 lines.

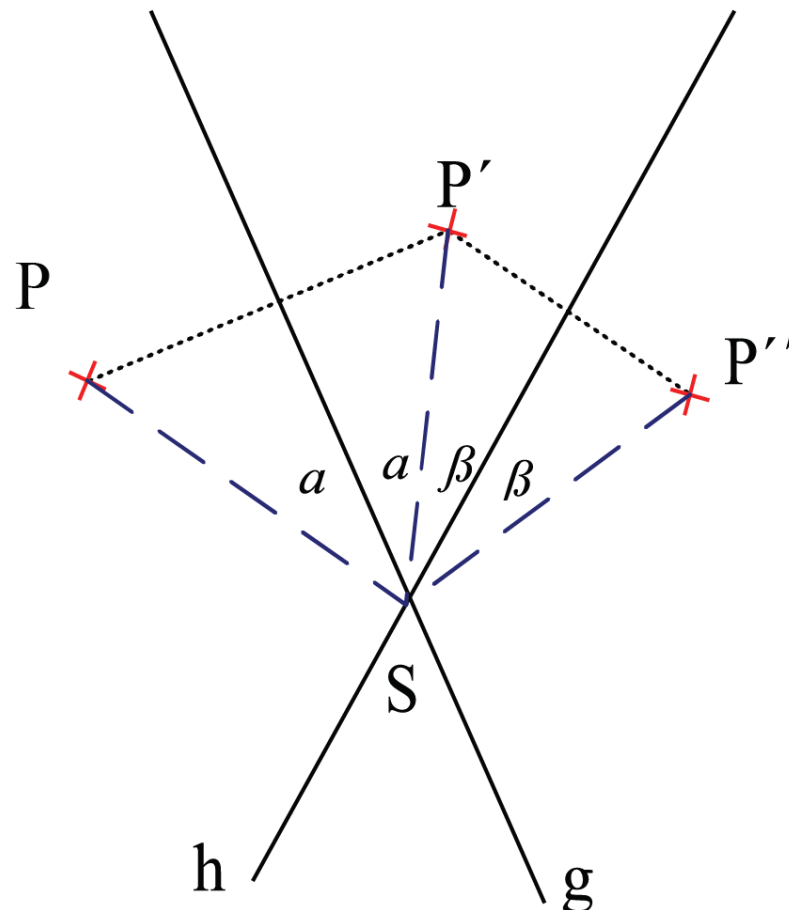
b) 2 lines crossing each other.

Draw a similar picture

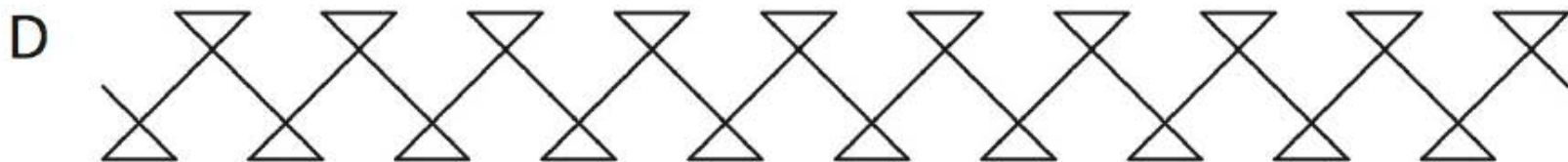
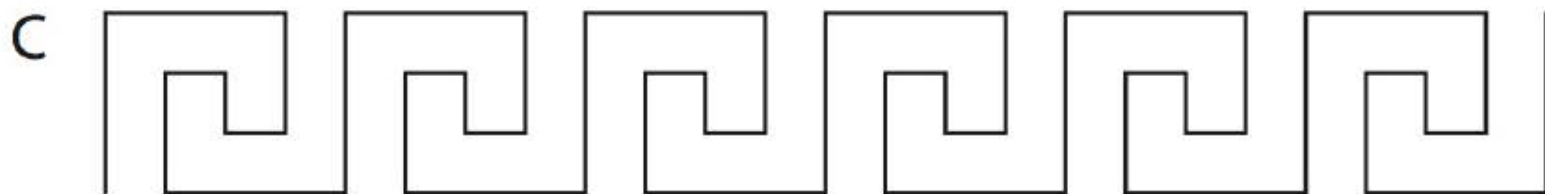
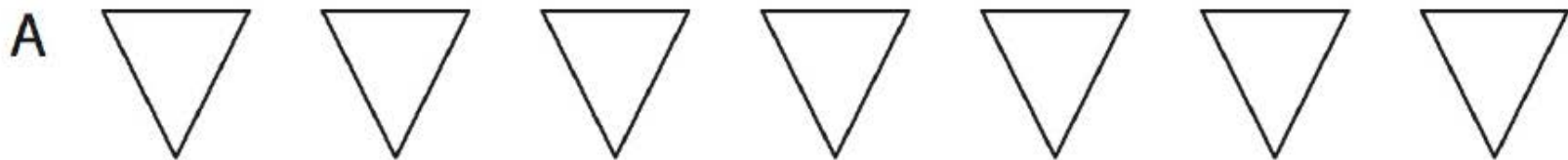
2

Excursus: Ornaments

b) 2 lines crossing each other.



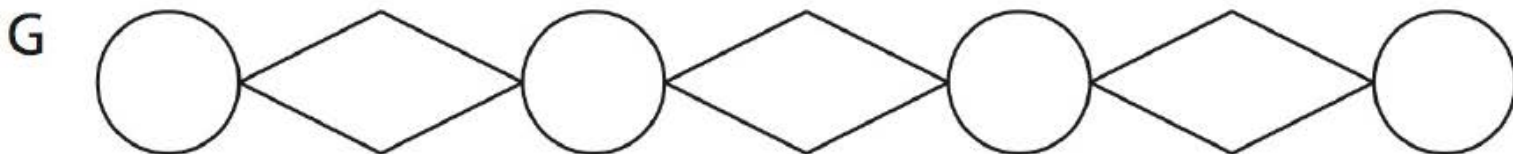
Which kind of symmetry?



2

Excursus: Ornaments

Which kind of symmetry?



References

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- Wittmann, E. Ch. (1999). Konstruktion eines Geometriecurriculums ausgehend von Grundideen der Elementargeometrie. In H. Henning (Ed.), *Mathematik lernen durch Handeln und Erfahrung. Festschrift zum 75. Geburtstag von Heinrich Besuden* (pp. 205–223). Oldenburg: Bueltmann und Gerriets.
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- Vinogradova, N. (2016). A question about a triangle. *The Mathematics Teacher*, 109(6), 420-424. doi:10.5951/mathteacher.109.6.0420