RENOVATING OUR HOME

Home improvements and budget

From time to time, it becomes necessary to renovate our home. The walls are in need of a fresh coat of paint and the floor has to be replaced. Perhaps, we can save money by doing some of the work ourselves instead of hiring expensive craftsmen. How can we choose the best materials? How do we know how much material we need and how can we calculate the price? We need to calculate the areas, compare different materials and finally, we have to determine whether the renovation costs fit into our budget.

Overview "Renovating our home"

How to calculate areas in order to define the need of material for renovating our home?

Context
Everyday life
Finances

Cognitive processes
Managing situations
Analysing situations
Processing information
Problem solving
Critical thinking

Target group (incl. necessary prior skills and competences)

Adult learners with skills in basic arithmetic operations

X2/Y1

Content
Quantity and number
Dimensions and shape
Using a calculator

Dispositions
Self-confidence
Affection

Learners know the difference between areas and perimeter. They are able to calculate the need of material and the resulting price.

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Main information

Content	Basic arithmetic operations Calculating with money (using a calculator) Identifying areas and perimeter - Estimating and measuring length and area
Target group	Adult learners with skills in basic arithmetic operations
Learning intention	What is the intention of adults to face this problem? – Numeracy for personal and private purposes – Numeracy for professional issues
Duration	Approx. 5 lessons
Material and resources	Tape measures, scales, brochures from furniture stores and hardware stores, sketches of flats, calculators, flipcharts, graph paper, …
Group size	Range from 5 to 10 learners
Problem statement	When renovating of our home is necessary, it is important to have an overview of the resulting costs. Therefore, we have to know the mathematical concept of an area and make area and price calculations.
Working questions	How to estimate length and width? How to identify areas? How to calculate areas? Who to read sketches? How to calculate the need of materials for the renovation (paint, flooring, …)? How to calculate the price of the materials? How to compare prices (special offers, …)? How to make the right shopping decision according to one's own financial possibilities?
Learning outcomes and results	The learners are able to plan their renovation operations. They can estimate and calculate the need of material and the approximative costs. They can better understand and verify the quotes from craftsmen.
Reference to National Qualification Frame	Optional (country's decision)

Working plan

Time (lessons)	Description of content/activities	Material	Methodical and didactic information[1]
20 min	**Activation** The trainer starts a discussion about renovation work at home. • Which experiences do the learners have? • Are there do-it-yourselfers in the group? • What kind of renovation work can be done without the help of a professional craftsman? The results can be noted on a flipchart.	Flipchart	HITS questioning
50 min +	**Estimating and measuring** The learners estimate the size of different objects. They get familiar with the different terms and abbreviations of length dimensions (mm, cm, m, …) In a second step they estimate the size of the classroom (length, width). After the learners have given their estimates, some learners can re-measure to check the results. Finally, they estimate the area. The trainer focusses on the term "square meter" and the abbreviation "m^2".	Objects or pictures of objects of different sizes Flipchart Measuring tapes, scales Flipchart	HITS metacognitive strategies hands on learning
50 min +	**Learning – Reading a sketch** The learners get the sketch of a room or a flat and learn to read it. They answer questions, e.g.: • How long and how wide is the room? • What is the biggest / smallest room? • Which rooms are on the right / left hand side? The learners can work in small groups.	Sketch of a room or of a flat with measurements (Appendix 3)	HITS Worked examples Collaborative learning

[1] for description and explanation of kinds of tasks, HITS and other background information please consult the teacher's/user's guide

	The learners can also try to draw a sketch of their own home. The learners mark the area (flooring) and the perimeter (skirting boards) of the different rooms.	Graph paper (Appendix 4)	
50 min +	**Learning – Calculation of the area** Before starting to calculate areas and perimeters the repetition of multiplication might be necessary. The learners count the length and the width of different rectangles and squares and write them down. The trainer introduces the formula to calculate areas. Afterwards the learners calculate the different rectangles and squares. They can compare their results with a partner. Optionally, the trainer can show videos to deepen the topic. The learners calculate the area of the rooms from the sketch. They can use a calculator, as multiplication with decimal numbers could be difficult.	Multiplication tables Montessori material for calculating areas Appendix 2a, 2b Flipchart Appendix 1 Appendix 3 Calculator	HITS Explicit teaching Worked examples Explicit teaching Worked examples Collaborative learning Multiple exposure
30 min	**Learning – Calculation of the price** The learners compare different offers in the brochures and calculate the price for given examples. Learners can use a calculator, as multiplication with decimal numbers could be difficult.	Brochures from furniture stores or hardware stores Appendix 3	HITS Worked examples
	Transfer The learners discuss what additional costs can arise when laying a new floor (adhesives, nails, spacers, hammer,…) The learners measure a room in their flat and calculate the square meters. They try to make sketch including the measurements and they calculate the renovation costs of the floor.	Brochures of hardware stores Internet research Flipchart Graph paper	HITS Questioning

Suggestions for the teacher/user

The example presented here should be considered as exemplary and inspirational material presenting a guideline with a high range of possibilities of adapting those suggestions to a specific group of learners or an individual learner with his or her very personal requirements.

In concrete terms, the example "Renovating our home" could be adapted these ways:

- Duration: According to the prior skills and the interest of the learners the phase of activation can take more time. Trainers should devote enough time to the understanding of difference between an area and a perimeter as well as of the different measures of length and area.
- Further or additional material / learning setting: The learners can use authentic brochures for the calculation of the prices, they can do the research on the internet or can even go to a hardware store to inform themselves on site.
- Level of difficulty: According to the learners' skills, the examples can be adapted for several levels of difficulty. It is possible to use sketches with more complex floor plans. The learners can also calculate the need of paint to repaint the walls, excluding the areas of windows and doors, etc.

Our educational activities aim at numeracy skills being not only memorized, but first of all being practiced and functionally used by the learners in daily life or/and vocational situations. It is therefore recommended to implement the idea of HITS[2] (higher impacts of teaching skills) as far and often as possible: ...

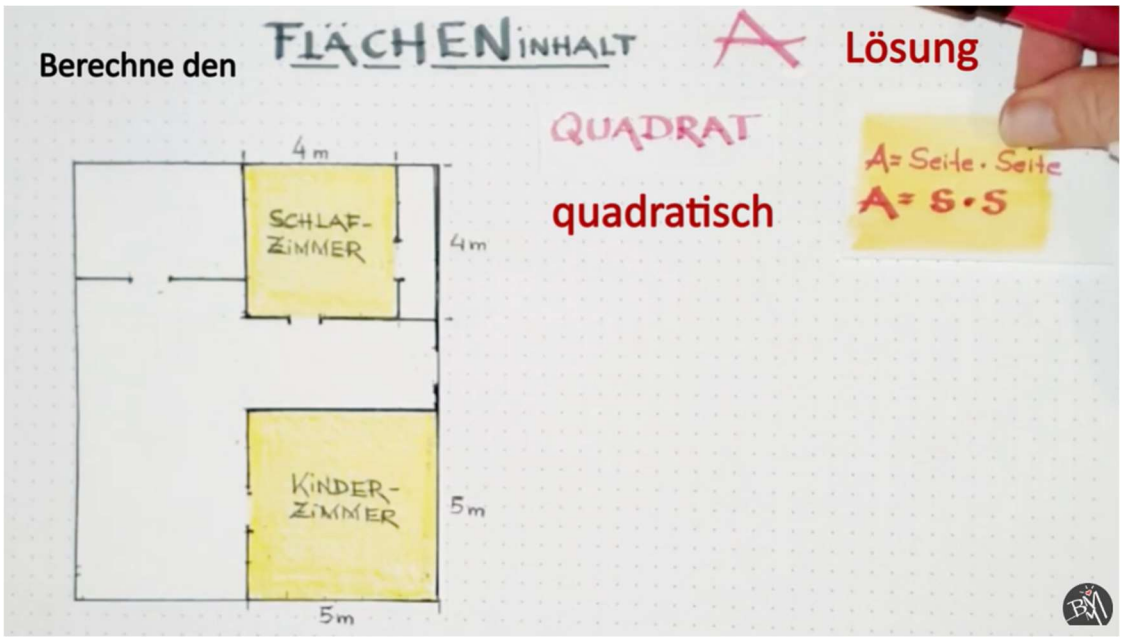
- ... work with concrete and authentic material that learners will recognize from everyday life situations. The learners can be encouraged to take their own leaflets and brochures with them, to compare products and prices.
- ... ask the learners questions and let them raise questions themselves. It can be crucial to discuss numeracy themes, contexts and numbers.
- ... think of possible ways of transfer: The learners are able to estimate roughly the cost of renovation work. They will be better able to check estimates from professionals and – in a further step – whether the costs are in line with their financial situation.
- … use collaborative learning: Learners with better mathematical skills can help their colleagues under the teacher's guidance. Usually both sides benefit from this method.

[2] For general information and explanation on HITS please see teacher's/user's guide

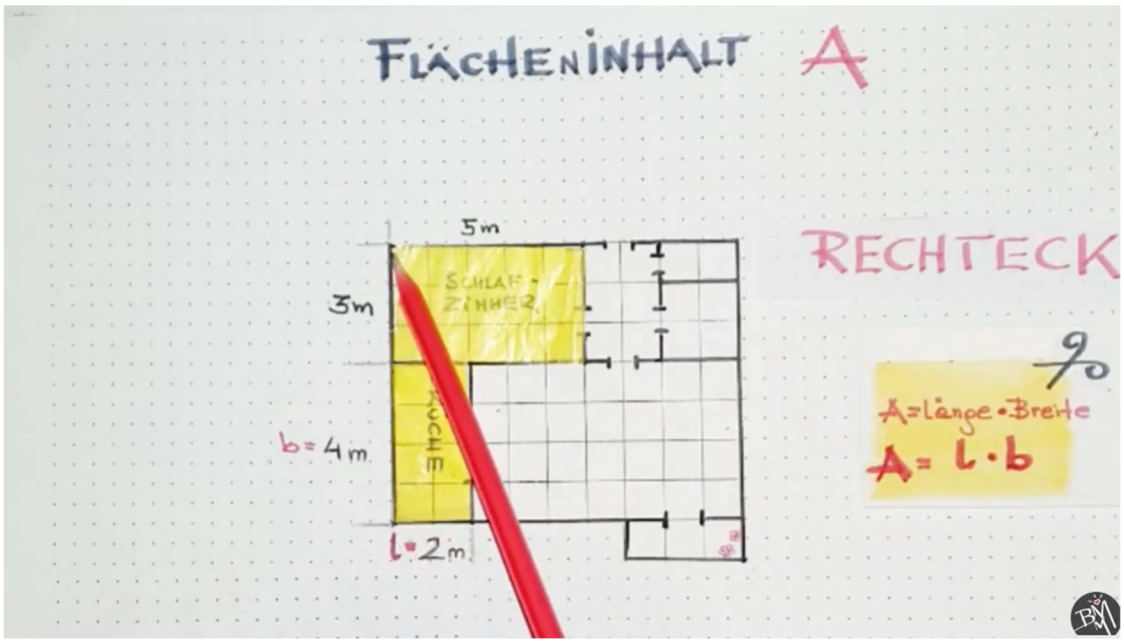
Appendix 1

Explaining video for the calculation of areas:

www.youtube.com/watch?v=hQpI_J3P7f4; [28.08.2023]

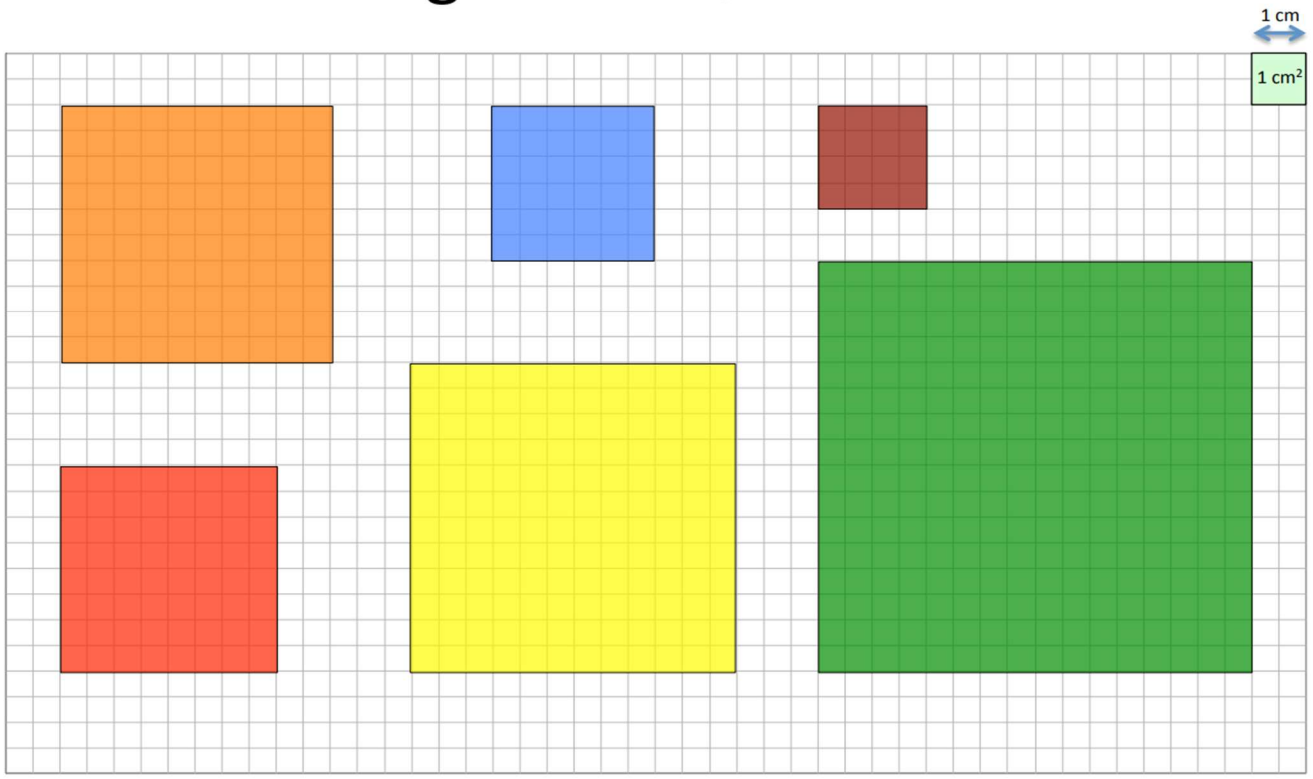


www.youtube.com/watch?v=o08Q9IK61d0, [28.08.23023[



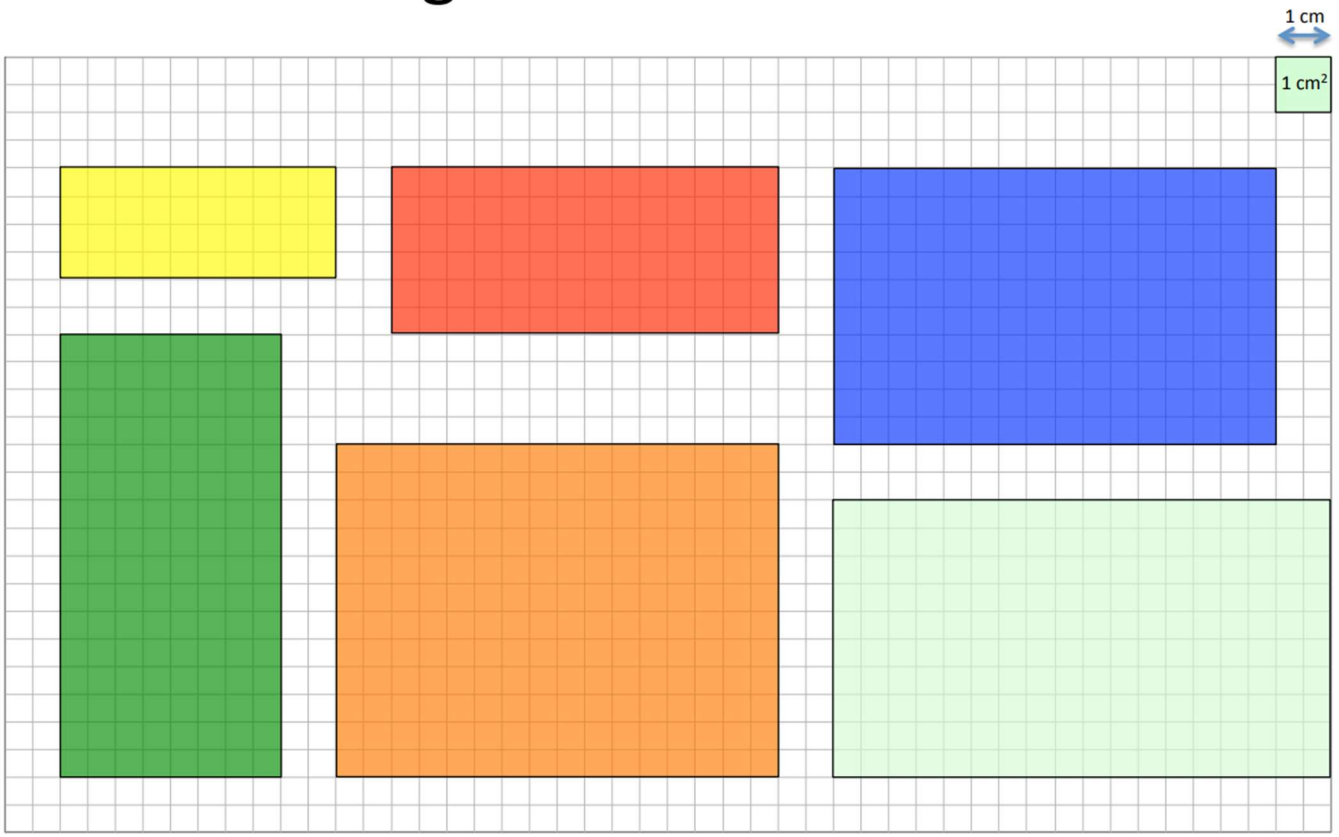
Appendix 2a

Bestimme den Flächeninhalt der folgenden Quadrate



Appendix 2b

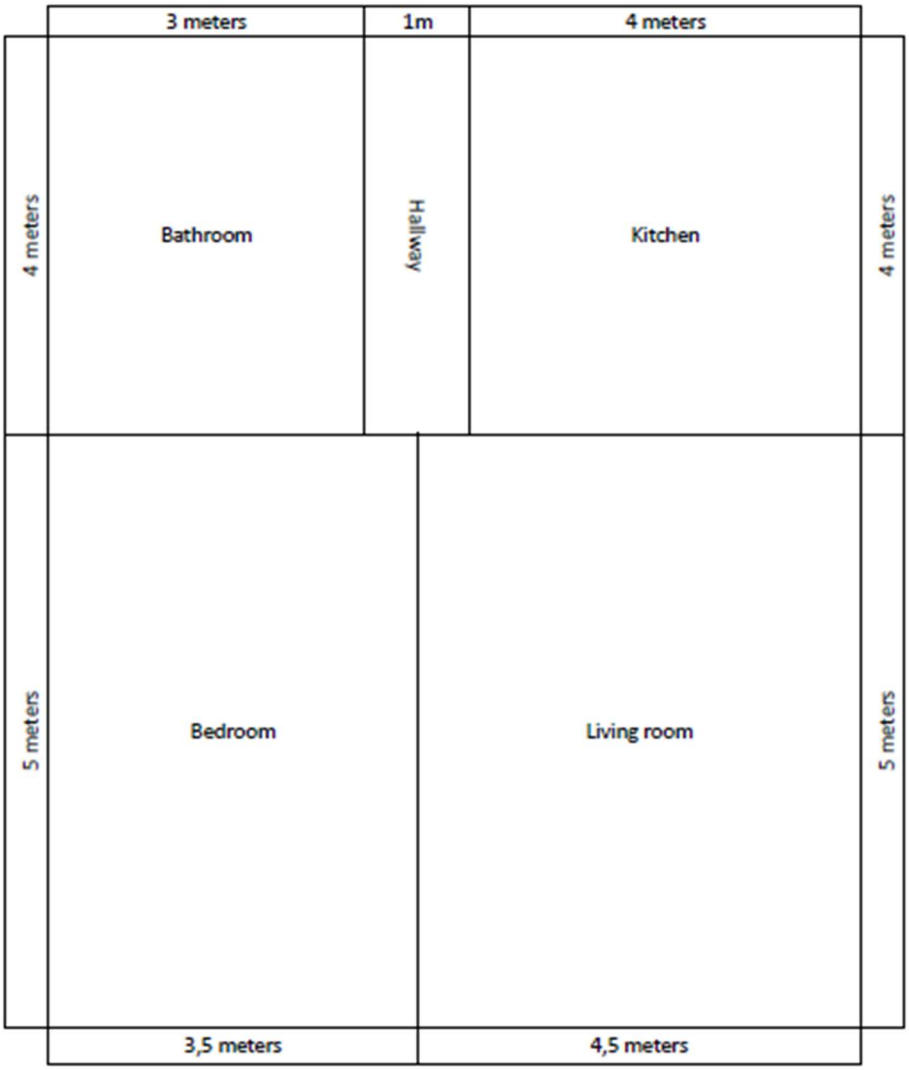
Bestimme den Flächeninhalt der folgenden Rechtecke



Quelle: www.mathestunde.com/flaecheninhalt-rechteck [28.08.2023]

Appendix 3

My apartment

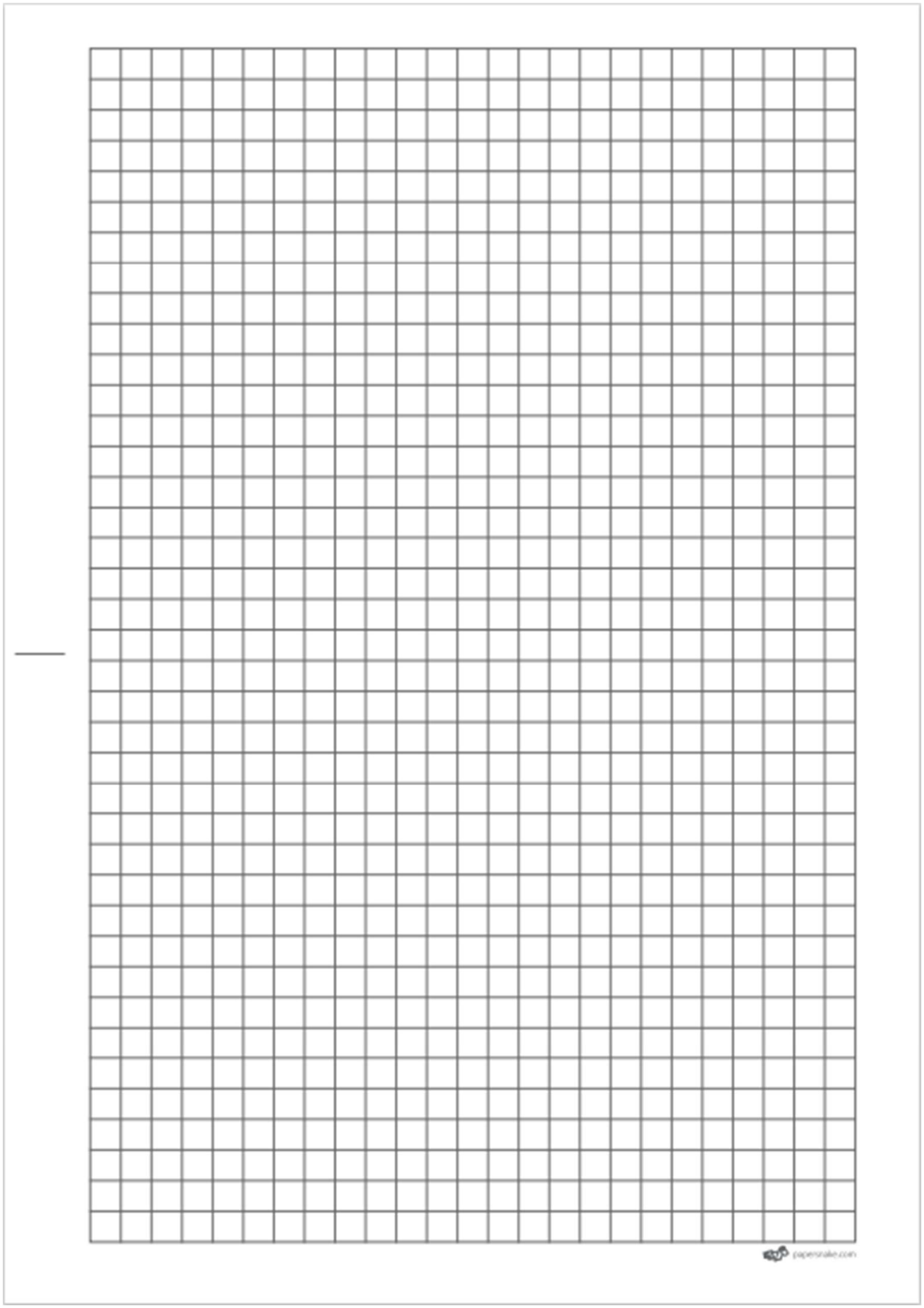


How many square meters do the rooms have?

	Bathroom	Kitchen	Hallway	Living Room	Bedroom
lenght (m)					
width (m)					
area (m^2)					

How many square meters does the apartment have?

Appendix 4



Quelle : www.papersnake.de/kariert/kariert7x7.pdf, [30.08.2023]

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