

# Everybody else does it!

The meday about young people's exaggeration



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# **Everybody else does it!**

2nd edition June 2006

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# Everybody else does it!

## Foreword

‘Please say yes – everybody else does it!’ – is a refrain many young people use to plead with their teachers and parents. Young people often have the idea that other adolescents are allowed to do far more than they themselves are. The same is true of their impression of how much their peers drink and smoke. They believe other young people smoke and drink far more than they actually do, and this belief influences their behaviour. This is called social exaggeration.

The Danish Crime Prevention Council has prepared a theme manual based on the results of the Ringsted Project, a study of young people’s lifestyles and smoking, drinking and drug habits. The study includes a preventive pilot project conducted on several 5th and 6th grade classes and two 7th grade classes. The pilot project documents that it is possible to reduce the risk behaviour of young people by confronting their social exaggerations and the misperceptions most of them have by holding a Theme Day.

The pilot project is interesting from the perspective of crime prevention. While the pilot project was underway, petty crime committed by the 12- to 14-year-olds was halved relative to the control class. In addition, pupils in the classes that participated in the pilot project now smoke and drink less than their peers, and they take less part in bullying and criminal activities such as vandalism, shoplifting and acts of aggression.

The Ringsted study used a method of crime prevention called the Social Norms Approach. In educational terms, it represents the development of a new teaching method. For more details about the teaching method and actual instruction, please see pages 9-17.

There are differences between the scientific method used in the Ringsted study and the model the Danish Crime Prevention Council recommends in practice. The basic differences are explained on page 6.

The material in this manual has been revised, and in this connection we would like to thank the following schools for placing teachers and pupils at our disposal: La Courvejens Skole, Lundtofte Skole and St. Magleby Skole. We would also like to thank Bent Lindhardt, assistant professor, our maths consultant.

We are still interested in feedback and reactions from teachers who take part in a Theme Day as proposed. Our goal is to develop the method further as we believe the theme holds further potential if expanded to include other crime prevention topics. We welcome ideas and comments. Please send e-mails to: [dkr.@dkr.dk](mailto:dkr.@dkr.dk)

Anna Karina Nickelsen  
Head of the Secretariat  
The Danish Crime Prevention Council

# From pilot project to teaching method

The differences between the original Ringsted study and the Danish Crime Prevention Council's teaching method.

	<b>Pilot project</b>	<b>Teaching method</b>
<b>Grade level</b>	5th, 6th and 7th	6th grade is recommended
<b>Type of questionnaire</b>	Part of large questionnaire	Short and targeted
<b>Reference framework</b>	Friends and peers	Peers and older grades
<b>Conducted by</b>	External researchers	Teachers, possibly from other schools
<b>Smoking Report prepared by</b>	External researchers	Teachers, pupils
<b>Smoking Report presented by</b>	Young external role model	Teacher
<b>Group work, etc.</b>	Young external role model	Teacher
<b>Follow-up charting</b>	Yes	No
<b>Parental involvement</b>	Before and after – with external facilitators	Before and after – with teachers
<b>Number of times tested</b>	13 classes (+ pre-trial)	No concrete knowledge produced as yet





# How to use this manual

For pupils to gain crime prevention benefits from the material, the Theme Day elements must be used exactly as explained in the text. The proposed maths material should be considered as a guideline. The aim is to ensure that pupils have the necessary prerequisites for Theme Day.







The timeframe for the instruction is as follows:

- Two weeks of maths instruction as a run-up to Theme Day. This includes preparation time for the pupils' and teachers' part in Theme Day (such as the class report on smoking, for example).
- A Theme Day in which social exaggeration is the hub and maths the spokes. We recommend that the class teacher and maths teacher are present.

The manual contains the following material:

-  The teacher as process consultant
-  Involving parents
-  Teaching programme
-  Guidelines for teachers

## Appendices

-  Academic preparation – maths instruction (Appendix a)
-  Questionnaires for 6th and 9th grade classes (Appendix 1 and Appendix 2)
-  Smoking report (Appendix 3)
-  Group worksheets (Appendix 4, 5, 6, 7 and 8)
-  Social exaggerations (Appendix 9, 10, 11 and 12, teachers' and pupils' worksheets)
-  Class contract (Appendix 13)

***Warning: Skipping any of the above elements may prevent pupils from getting the full crime prevention benefits!***

## The teacher as process consultant

In keeping with the method used by the Ringsted study, you as the teacher will be taking on the role of process consultant on Theme Day.

In this connection, we would like you to be aware of several points, because you will need to step out of your teaching role and into a consulting role. In other words, your own opinions and attitudes will not be relevant here.

As well as creating space for reflection, it is also important for you to take the following into consideration:

- **Dialogue should be used as a tool**
- **There is no one truth – no viewpoints are better than others**
- **Viewpoints should not be criticized**
- **The questions pupils ask should give rise to reflection**

Based on the above points, Theme Day should have the following features:

- Neutrality – equal attention should be paid to each pupil/group in the class, and any kind of personal and moral judgments from you are inappropriate.
- When it is time for you to simplify and explain the outcome of the Smoking Report, it is important to remember that simplification is purely technical and your explanation should be pedagogical and didactic.
- You can create involvement, motivation and reflection in your pupils by keeping the process moving and by asking questions using the words how, why and what, etc.
- Facilitating dialogue means that all pupils are heard and taken seriously and can exchange opinions without being criticized. That will allow the pupils to feel ownership of the Class Contract to be drawn up later in the day.
- Through their involvement, pupils are meant to recognize social exaggeration and the influence it has on behaviour. A change in one individual's behaviour can help change the whole pattern of behaviour. Another aim is for pupils to recognize that their attitudes, values and norms are context dependent.

## Involving parents

**It is very important for class parents to be informed about the course of instruction and to be subsequently involved. In fact, it is a prerequisite for getting the best results.**

Parents should be informed well ahead about the specific maths instruction as a precursor to Theme Day as well as about Theme Day itself. However, the concept of social exaggeration should not be mentioned to parents or children before instruction starts!!!

Information can be disseminated by letter or any other information channels the class teacher usually employs.

A parents' meeting should be planned and held after Theme Day as a follow-up to the programme.

The parents' meeting should touch on the following points:

- A briefing on the essential crime prevention goals and points of the programme
- Presentation of the class Smoking Report
- Presentation of the Class Contract
- What is social exaggeration and how does it influence the choice that today's children and young people make?
- Topic for parental group discussion: "To what extent are we, as parents, confronted with children's social exaggerations?"

The case stories below may be used if desired:

"How does social exaggeration influence the choices we make every day?"

"How can class parents cooperate and counter children's social exaggeration?"

Case story:

Frederik is 13 years old and asks whether he can go to Christian's party on Saturday, because everyone in the class is going. How do you respond as parents?

Case story:

Julie is 12 years old. She badly wants . . . [here the teacher can fill in the blank, such as a portable computer, MP3, article of clothing], because everyone else has one . . .

- How do you respond as parents?
- How can class parents cooperate and counter children's social exaggeration?

As a thought-provoking side remark, in one of their study results researchers concluded that the preventive effect is greatest among pupils whose parents do not smoke!

Naturally, that can give rise to stimulating discussions among parents – after all, this is a documented fact that can encourage dialogue about adults as role models and/or smoking as the first step on the way to other drugs and stimulants.

Teachers and contact parents can also consider possible cooperation with other community resources concerning the risk behaviour of students and young people.

Suggestions for more general questions for parents to discuss:

- What do the others actually do? Perceptions and reality
- What role do you as parents have with regard to young people's smoking habits? And other habits?
- What do we say yes to and why?
- What are others allowed to do?
- Is it genuine information or guesswork about what other children are allowed to do that convinces us to give our children permission to smoke/go to parties/drink, for example?
- How does our children's claim that 'everybody else does it' influence us as parents?
- What do we actually know about our children's smoking habits?



# Teaching programme:

**”The goal of the combined programme is to reduce young people’s social exaggeration and misperceptions, because they have a contagious effect on behaviour. This way fewer pupils start to smoke and engage in other types of risk behaviour.”**

The maths teacher and class teacher work together on the programme.

## **The programme consists of the following elements:**

### **A: Before Theme Day**

We recommend two weeks of daily maths instruction in preparation for Theme Day. See appendix A (pages 19-28).

The pupils fill in their own personal questionnaire (Appendix 1) and distribute a questionnaire to a 9th grade class (Appendix 2).

The teacher then prepares the Smoking Report (Appendix 3) for the class to use on Theme Day.

### **B: Theme Day**

The maths teacher and class teacher are process consultants for the structured process below (see page 6).

### **C: After Theme Day**

Parents’ Meeting as a follow-up to the programme (see page 7).

Follow-up on the pupils’ own Theme Day decisions if so specified in their Class Contract.

### **Point A Before Theme Day:**

- Before Theme Day, pupils receive two weeks of instruction in statistical calculations and calculating percentages during their usual maths classes in order to ensure that they have the necessary understanding of the material.
- Each pupil in the class fills out a personal questionnaire as part of the run-up to and preparation for Theme Day (see Appendix 1). The teachers use this questionnaire as the starting point for preparing the Smoking Report (see A 3), which is the basis for Theme Day. Therefore it is the sole decision of the teachers involved to decide when the questionnaire should be filled out, so that they have enough time to prepare the Smoking Report to present to the pupils on Theme Day. The Smoking Report is calculated in percentages and must be converted into area charts (see appendices 4-8).

Before Theme Day a questionnaire about smoking will be distributed to the oldest pupils at the school (9th graders), see Appendix 2. This questionnaire must also be used in the Smoking Report.

If there is no 9th grade at the school, another local authority school that has a 9th grade must be selected. The group of teachers coordinates which 6th grade classes distribute the questionnaires and which 9th grade classes receive them.

Before Theme Day the teachers divide pupils into reasonably sized groups that will be able to work independently on the day. The same groups will work together for the whole day.

**Point B. Theme Day:**

Theme Day can be planned for one or all of the 6th grade classes.

The maths teacher and class teacher should participate.

The elements listed below are essential for Theme Day. In the interest of the pupils' process of awareness and the crime preventive benefits, it is crucial that the order of the agenda is followed to the letter:

1. The teacher presents the Smoking Report
2. Group work 1: pupils process the actual numbers in the report and convert them into the relevant charts (appendices 4-8)
3. Summary in plenum/class with the teacher's final presentation of the concept of 'social exaggeration'
4. BREAK
5. Group work 2: reflecting on 'social exaggeration'
6. BREAK
7. In plenum the groups present their reflections, and the concept of 'social exaggeration' is put into perspective
8. Group work 3: preventing 'social exaggeration' and proposals for preventing members of the class from smoking
9. Summary in plenum regarding the pupils' proposals for joint class initiatives (Class Contract) – and an evaluation of the day.

**Point 1. The (maths) teacher presents the class Smoking Report** and explains the results to the pupils. As mentioned previously, the results are calculated in percentages.

The teacher subsequently asks the pupils:

*What is the difference between your perception of other young people's smoking habits - and the reality?*

**Point 2. Group work 1**

The class Smoking Report is dealt with in groups.

Each group converts the results of the Smoking Report about class perceptions into concrete charts, either on the computer, which is then printed out, enlarged and coloured in – or as drawn, colour charts (see appendices 4-8). The charts are then glued onto cardboard, flip-over paper or similar.

**Point 3. Summary in plenum/class with the teacher's final presentation of the concept of 'social exaggeration'**

Each group presents its work to the whole class.

The percentage differences between all the prepared charts are explained by asking the class the following question:

*What is the difference between your own perceptions of other young people's smoking habits – and the reality?*

The teacher subsequently presents the concept of 'social exaggeration' to the pupils with the aid of two overheads (appendix 9) and an illustration (appendix 10).

#### **Point 4. BREAK**

#### **Point 5. Group work 2: reflecting on "social exaggeration"**

A copy of the questions in appendix 11 is given to each pupil in the group. The results from each group are presented to the whole class.

#### **Point 6. BREAK**

#### **Point 7. The groups present their reflections on Group Work 2 in plenum**

The concept of 'social exaggeration' is then put into perspective by asking the entire class the following questions:

*What influence does social exaggeration have on our way of understanding others – and our perceptions about the behaviour of others?*

*In what other areas besides smoking might there be a disparity between perceived behaviour and reality?*

*(If this is a difficult question for pupils, teachers can offer examples such as: pocket money, curfew, etc.)*

#### **Point 8. Group work 3: preventing 'social exaggeration' and proposals for preventing members of the class from smoking**

A copy of appendix 12 will be distributed to each pupil for use in the subsequent group work.

The group work is then presented to the rest of the class.

#### **Point 9. Summary in plenum of the pupils' proposals for joint class initiatives (Class Contract) – and an evaluation of the day.**

Based on proposals from all the groups, the class selects items to be incorporated in a joint agreement with the aim of preventing members of the class from smoking. These items are formulated in a Class Contract (see suggestions in appendix 13).

Everyone in the class signs a copy of the Class Contract.

A copy of the Class Contract is then hung:

- In the classroom (all pupils sign this copy)
- In each pupil's home (each pupil signs his or her own copy). A copy signed by all the pupils is sent to all class parents.

#### **Process evaluation:**

This evaluation can be done as follows, for example:

Each pupil answers the following two questions in writing:

1. In your opinion, what was good about the process?
2. How could the process be improved?

### **C: After Theme Day:**

#### **Future initiatives for the class:**

What the class has discovered and how its members want to proceed will depend very much on the needs of the class.

Could the class work similarly with other themes such as alcohol, smoking marijuana, etc.?

Agreements are made about future initiatives for the class and the impending parents' meeting.

Ideas for the parents' meeting can be found on page 6 under "Involving Parents".



# Guidelines for teachers

**The "Everybody else does it!" teaching material is intended to prevent risk behaviour among children and young people. The inspiration for the programme derives from the Ringsted Pilot Project (see page 3). We recommend using the material no earlier than 6th grade, because a good deal of the content requires a certain amount of abstract thinking, which can cause problems if the pupils are too young.**

In the following, we present the prerequisites pupils need in order to understand and consider Theme Day, as well as the preparations and thoughts that you, as the teacher, should be aware of. We emphasized a couple of the key points on pages 6 and 7: the teacher as process consultant and parental involvement, as these are crucial to the programme as a whole.

## **Theme Day as the hub of the programme**

The material presupposes that a six-hour Theme Day is arranged for the one or more classes involved. Theme Day can be organized in many different ways.

For example, all the 6th grade classes in the school can be involved. Or the 6th grade pupils from other schools in the local authority. Probability speaks in favour of greater impact for Theme Day if many classes are involved.

The teaching material compares pupils' smoking with the smoking pattern of young people in Copenhagen. If a school in Copenhagen uses the material, naturally the name of the comparison town can be changed to any large town or city with which the pupils are familiar. The actual figures are the same for all large cities. It has been shown that the exaggerated perceptions pupils have about each other's behaviour, mentioned in the summary, increase in step with the physical distance between towns. The actual figures concerning the smoking habits of young people come from the National Board of Health in Denmark.

## **Prior to Theme Day**

When you embark on preparations for Theme Day, it is important that you do not mention or use the concept of 'social exaggeration' ahead of time.

## **Calculating percentages and statistics**

It is a prerequisite that pupils have worked with percentages and statistics and understand these concepts before Theme Day.

Experience has shown that it is difficult for many children and young people to take in the fact that just because more people live in a large city, it does not necessarily mean that relatively more of them smoke.

Obviously, a spreadsheet program can be used if all pupils have computer access.

Pupils should be able to:

- Calculate using percentages
- Convert percentages to pieces of the pie in a pie chart
- Know the difference between relative and absolute comparisons

- Know and use area charts and other types of chart
- Understand and use the concept of ‘averages’
- Use a calculator

For suggestions for maths preparation, see Appendix A, pages 19-28.

### **Abstract concepts**

A certain amount of abstract thinking is necessary for being able to work with the concept of ‘social exaggeration’. Before Theme Day it is important to devote some of the class’s English lessons to working with abstract concepts.

It can be a good idea to allow the class to try to relate to other preconceptions. Divide the class into small discussion groups and ask each pupil to explain how they perceive cultural differences, justice, independence or what is meant by prevention. Is it possible to arrive at a common understanding on the basis of the various perceptions? In the process of this group assignment, all pupils should practise giving their opinions as well as listening. The teacher should function exclusively as a process consultant.

### **Questionnaires (appendices 1 and 2)**

There are two questionnaires, one for each of the 6th grade pupils and one for pupils in a selected 9th grade class (appendices 1 and 2). If there is more than one 9th grade class at the school, the teacher should decide which one should be asked to fill in the questionnaire. The questionnaire should be handed out to pupils in the 6th grade a good two weeks before Theme Day. The pupils should fill in the questionnaire during class time and be told about the plans for a Theme Day on smoking.

The 6th graders are in charge of the **questionnaire** for the 9th grade class. This should also be handed out in plenty of time with the message that the 6th grade class will be holding a Theme Day. In this context, we have considered cigarettes equal to other forms of tobacco, as we anticipate that most young people who start smoking smoke cigarettes rather than a pipe or cigars.

### **What does smoking mean?**

Taking a drag on a friend’s cigarette is not considered smoking: you have to buy, borrow or take a cigarette yourself and smoke it. Even if you only smoke at parties and not every day, we consider you a smoker.

### **Class Smoking Report (Appendix 3)**

The basis for the class Smoking Report is the two questionnaires filled in by pupils in the 6th and 9th grades. You will need to process them and convert the data so that you can present the report on Theme Day.

### **On Theme Day (we refer to the course of instruction)**

When you present the Smoking Report, you should make allowance for the remarks we made under Teacher as Process Consultant.

It is during this presentation that the pupils are confronted with their own social exaggeration and what that means. The surprise or awareness that their expectations do not correspond to reality is the fulcrum and motivation for further work.



### **Social exaggeration**

In the summary on page x, we explain how majority misperceptions and social exaggeration arise and should be defined. In our material we chose to put focus on social exaggeration, as we know that many pupils imagine that all their friends and acquaintances smoke, drink at parties, etc., much more than they themselves do.

After the preparations for Theme Day, pupils should immediately be able to make a relative and absolute comparison and on that background understand what social exaggeration is. Using appendices 9 and 10 as overheads will help pupils visualize the concept.

It is the existence of social exaggeration that is important and the turning point, not smoking behaviour in itself.

### **Class Contract (Appendix 13)**

The results of the class' proposal for changed behaviour is processed and formulated in writing in a Class Contract. It is important that the contract is worded and presented in a form that the pupils can be proud of and feel ownership about. It can be embellished with computer graphics if desired.

### **Evaluation**

As a conclusion to Theme Day the pupils evaluate the day and, depending on their proposals for the Class Contract, there may be points that need follow up later.

### **After Theme Day**

After Theme Day parents should be involved to a wide extent. We recommend a parents' meeting, as we described in the section 'Involving Parents'.

# The Ringsted Project

## Summary

The three-year Ringsted research project studied young people's smoking habits, alcohol consumption, use of legal and illegal drugs, and their experience with violence and other forms of crime. Young people's risk behaviour was seen in the context of their lifestyles, living conditions and ways of living.

The project illuminates risk behaviour throughout the period of adolescence from child to adult. The target group for the study was young people between the ages of 11 and 24 residing in Ringsted local authority. Ringsted was selected because it is considered an average local authority whose experience could easily be applied elsewhere.

The basic perspective of the project is 'performative youth' understood as young people who try to live up to the expectations they feel others have of them. Their behaviour is influenced by the desire for status, recognition and acceptance.

## The Ringsted Pilot Project

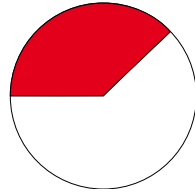
The Ringsted Pilot Project is a secondary part of the Ringsted Project. Pupils from 24 classes participated in the study, almost equally divided between 5th and 6th grades and two 7th grades. The objective was to study how children and young people process their perceptions about each other as well as to prevent risk behaviour. The method the researchers used is called the Social Norms Approach. The researchers wanted to study the following questions:

- 1. Is it possible to reduce young people's exaggerated perceptions of each other's use of tobacco?*
- 2. If it is possible to reduce the exaggerated perceptions about tobacco – or independent of that – would that have a contagious effect on other areas, for example, by reducing their exaggerated perceptions of each other's alcohol consumption or drug use?*
- 3. If it is possible to reduce the exaggerated perceptions about tobacco – or independent of that – would it then have the effect of reducing their actual use of tobacco or attitude towards smoking?*
- 4. Depending on or independent of the possible effects listed under points 1-3 above, would it help to reduce young people's actual use of alcohol and or drugs and or their attitudes to them? (Balvig et al. 2005, page 324).*

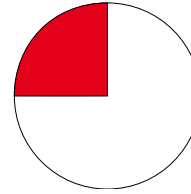
The researchers were interested in taking a closer look at what influences the attitudes and behaviour of children and young people, and in particular to learn how they believe a situation is or should be and their resulting behaviour. Young people's perceptions of reality do not always coincide with actual reality. In the chapter entitled "Everybody Else Does It!", Flemming Balvig writes that: "People sometimes act towards and with each other in ways none of the parties want, but which are based on misunderstood expectations." (Ibid, page 215).

## Social exaggeration and majority misperceptions

The study documents the existence of social exaggeration and majority misperceptions anchored in misunderstood expectations. Therefore there are serious reasons to assume that the expectations young people have play a significant part in their behaviour.

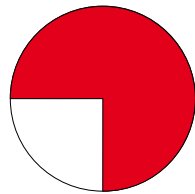


What we believe

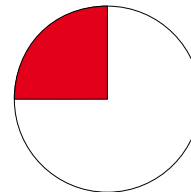


Reality

*Social exaggeration* has the result that we believe more people believe or do certain things than in fact do so (ibid, page 220). However, knowledge of each other influences the magnitude of the exaggeration.



What we believe



Reality

*Majority misperceptions* arise when we think that most people believe or do certain things, when in fact only a minority believe or do them. Physical distance between people influences the degree of misunderstandings.

Researchers agree that documenting and processing social exaggeration has a preventive effect on crime. The method, the Social Norms Approach, is both simple and inexpensive. The method is based on the assumption that awareness and processing of social exaggeration is a more effective form of intervention than the traditional focus on the damage to health caused by smoking. The approach questions the effect of information and campaigns, the methods previously used to try to prevent risk behaviour. If we can get young people to recognize and confront their social exaggeration, it will change their smoking behaviour and attitudes – and that in turn will affect other behaviour such as crime.

## Risk behaviour

Flemming Balvig describes the study as a controlled experiment aiming to prevent risk behaviour in young people. In this context risk behaviour should be understood as more specific behaviours that have damaging effects over the long term and can be assumed to have 'ripple effects', in the sense that if we influence the causes of a certain type of behaviour, it is highly likely to work on other types of serious risk behaviour. The study shows that by working on social exaggeration and majority misperceptions about smoking, the number of thefts (shoplifting from outdoor displays, for example) and other risk behaviour fall in the age group 5th and 6th grades (ibid, page 363).

The participants in the study are 5th or 6th grade children, because in many ways their behaviour has not yet been influenced by alcohol and other stimulants. These grades were selected because the aim of the study is to prevent rather than cure. Smoking tobacco was selected on the basis of the age group, and pupils therefore answered a questionnaire about smoking. Their responses form the basis for a so-called Smoking Report.

The researchers behind the Ringsted Study conclude that on the basis of the study it was possible to reduce pupils' social exaggeration about tobacco after the first year. In addition, the pilot also influenced other types of behaviour, including bullying, vandalism, stealing from home and other types of actual crime.

The Ringsted Study also shows that it is possible to influence social exaggeration, and perhaps even more importantly, to reduce risk behaviour in young people.

Theme Day is described in more detail on pages 9-12 of the teaching plan, and important considerations prior to the day are discussed in the guidelines for teachers on pages 6-8.

*The book (in Danish only) "The Ringsted Study – Lifestyle and Prevention in the Local Community" describes the results of a large-scale project on young people's lifestyles and use of alcohol and other stimulants. Professor Flemming Balvig, dr.jur., headed the project, together with a dedicated team: Lars Holmberg, an anthropologist and Anne-Stina Sørensen, a sociologist. The Inge og Asker Larsen Foundation supported the three-year project. The book was published in March 2005 by Jurist- og Økonomforbundets forlag.*

# Academic preparation in mathematics

## Suggested instruction in mathematics by Bent Lindhardt

Before Theme Day, we recommend that schools give pupils a maths refresher course or help them review their skills in some other way.

The list below can serve as a check list. We explain the concepts in more detail below and describe the problems related to understanding them.

We also describe:

- Some topics for class discussion.
- Some 'hands-on' activities.
- Some realistic examples of how to use the concepts.

We recommend starting the maths course about one or two weeks before Theme Day.

## Important maths elements

Pupils should:

- Know that percentages are another way of writing fractions.
- Be able to use percentage in a relative comparison of two different quantities.
- Be able to convert between the representational forms of decimals, percentages and fractions.
- Be able to use decimals, percentages and fractions to describe a part of a whole.
- Be able to calculate a percentage when the relationship between two absolute figures is known, eg,  $117/255 = 0.46 = 46\%$ .
- Be able to calculate percentage decrease and increase.
- Be able to understand and use percentages in everyday situations.
- Be able to calculate averages and use the concept in everyday situations.
- Be acquainted with various types of chart such as area charts, column charts and pie charts.
- Be able to use the spreadsheet program Excel to sort data, calculate averages and convert decimals into percentages.
- Be able to use the Excel function "Chart Wizard" to create charts.

## Understanding percentages

Most pupils already know about percentages. Of the three representational forms – fractions, decimals and percentages – they are probably the most frequently used in everyday life. We often hear the term used idiomatically in expressions such as 'That's 100% correct' or 'That's 100% OK' to express that something is completely correct or OK. Expressions like '110% OK' are clearly nonsense.

The media in particular use percentages to express "part of something" such as "50% of all women with breast cancer will survive the disease" or "They only have a 5% chance of winning."

Explaining that 100% means the whole and that 0% is nothing should be the starting point for teaching the concept of percentages – meeting pupils on their level. Explaining that 1% equals  $1/100$  is less important and will often come across merely as a mathematical statement totally unrelated to pupils' everyday experience.

### **But percentages can be a difficult concept to grasp**

One problem with using percentages is their misunderstood resemblance to whole numbers. 4% and 5% look very similar to the whole numbers 4 and 5 although they represent the fractions  $1/25$  and  $1/20$ . Teachers should make an effort to focus on the relationship between fractions and percentages – using a very simple approach. To start with, pupils should understand that 0%, 25%, 50%, 75% and 100% are special ways of expressing 0,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  and 1. In addition to understanding the relationship between fractions and percentages, pupils must realise that to understand a percentage it is necessary to know the entire quantity on which it is based. In other words, there is a difference between 25% of 100 kroner and 25% of 200 kroner.

Apart from thinking about percentages as a certain part of a whole, eg, 20% of something, these numbers can also be visualised as fixed points on the number line, which can be quite confusing. 25%, which corresponds to 0.25, has a well-defined position on the number line, a position that never changes. In this context, we can add 25% to 25%, which gives 50%, or we can multiply five by 25% and get 125%. We can do calculations with these percentages in the same way as with decimals and fractions.

However, the perception of a percentage as representing part of some quantity can lead to problems when doing calculations. When adding 25% to 25%, pupils must understand that both instances of 25% must be based on the same entire quantity, otherwise the calculation makes no sense. It is even more confusing in cases where, in absolute values, 20% is more than 50%. This is an abstraction that causes problems for most people, even adults. Newspapers, radio and TV frequently provide disastrous examples of statements about precisely this relativity.

### **Calculating with percentages**

Being able to calculate something as a percentage of something else is an important skill. It can be explained in a few steps.

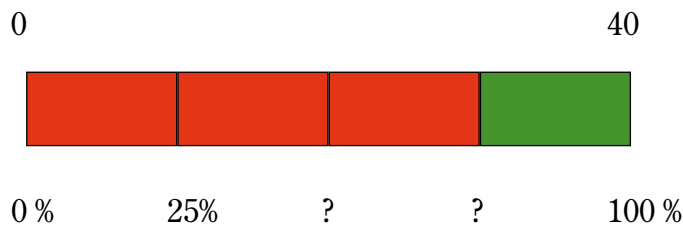
**The first step** should be calculations related to simple fractions such as halves and quarters, progressing later to more random percentages such as 15% of 235 kroner.

There are many ways of explaining how to do these calculations.

The traditional way is first to find out what 1% is by dividing the number by 100 and multiplying the result by 15. This can be explained by saying that the 235 kroner are evenly distributed among 100 compartments in a huge box. Then the pupil counts how many kroner there are in 15 of the compartments. This seems to be a simple first lesson that gives the pupil an initial

understanding of the concept. However, in our experience, pupils later start wondering ‘what exactly do we do with the 15% – do we have to divide by 15 or ...’. Therefore it could be an advantage to have pupils understand early on that 15% of 235 corresponds to 0.15 of 235, which is a multiplication problem. Pupils should also know how to use the percentage key on their pocket calculator to calculate a percentage:  $235 * (\text{key}) 15\% (\text{key}) = (\text{key})$ . One way of learning how to calculate percentages is to use a percentage strip. A percentage strip expresses the relationship between absolute figures and relative figures (see the diagram below).

*A percentage strip*



**For the second step**, pupils should be able to calculate percentage increases (eg, price increases) and percentage decreases (eg, discounts). To take this a stage further, pupils should understand that they can key in  $235 + 15\%$  on their calculator, which corresponds to a 15% increase on 235 kroner, whereas  $235 - 15\%$  means that a product costing 235 kroner is 15% cheaper. Generally, it is mathematically sounder to understand that the first of these calculations corresponds to the multiplication problem  $(100\% + 15\%) * 235$  kroner, ie,  $115\% * 235$  kroner

*Example*



There are further, more complicated steps but the above would be appropriate for 6th grade pupils.

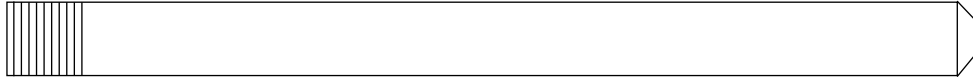
**Charts – a summary**

Pupils will often have a good knowledge of column charts, but rarely of any other types of chart. In this material, area charts are used as a type of percentage chart with 10 x 10 squares. This is a good visual presentation of percentage calculations that often gives a more immediate idea of the relative differences.

A pie chart is a more complicated variation on the area chart and the most common. The problem is the pupils’ inability to understand that they have to divide the circumference of the circle into 100 parts, with each part corresponding to 1%. One part equals 3.6 degrees, as the total circle circumference is 360 degrees.

12% of the circle thus corresponds to  $12 * 3.6 \text{ degrees} = 43.2 \text{ degrees}$ , which the pupils then draw using a protractor. For 6th grade pupils, this is a complicated calculation in many ways.

Before instructing the pupils in how to use a protractor to divide up the circle, teachers might find it helpful to use the following exercise:



*Drawing of how to colour the strip and turn it into a pie chart*

### **Using spreadsheets**

It is assumed that pupils have basic user knowledge of the Excel spreadsheet program so that they can open, process and save a spreadsheet. They are expected to understand the difference between entering text, numbers and formulas. Pupils should also be able to present collected data in tabular form and write simple formulas using =, cell names and calculation functions.

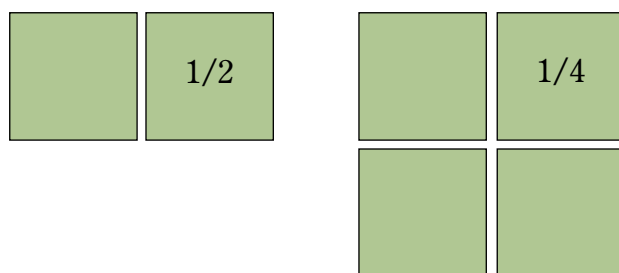
# Class discussions

1) Make three shapes out of three sheets of paper, or draw three shapes on the blackboard, representing a whole, a half and a quarter. Name and colour each shape.

Ask what fraction each shape is relative to the other shapes.

2) Which is the larger,  $\frac{1}{2}$  or  $\frac{1}{4}$  ?

Draw the two shapes below on the board. Let the pupils talk about which is the larger and how they can tell.



3) Ask if anyone knows the word percent, where they have heard the word and what it means. Ask if anyone knows how to write fifteen percent using symbols.

4) Ask about how we use percentages, eg.: 'What does it mean if the class is 100% girls' or if 'If 0% are girls'? 'If half the class were girls, how could you express that?'

5) Collect 20 items, where 5 differ from the other 15. Ask what fraction of the whole the five items make up. Ask what fraction of the whole the remainder make up. Ask the pupils to give each answer also as a percentage. Ask how many items you have to take away to remove 50%.

If there is time, repeat the exercise but with 12 items of which 3 differ from the other 9.

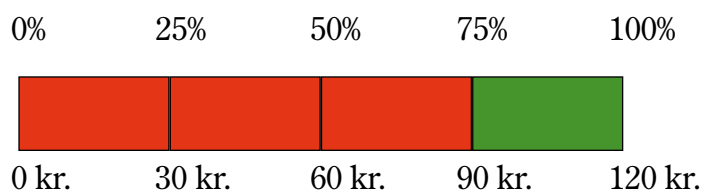
6) Do the same exercises as above but with harder fractions and percentages.

7) Ask the pupils if they know what a discount is. Ask them to give examples of a discount and situations where they might come across a discount. Introduce a situation such as a sale in a clothes shop. Everything is being sold at a 25% discount.

Have some pictures or draw some items of clothing on the board.

The clothes cost 120 kroner, 100 kroner and 200 kroner. Show a percentage strip like the one on the next page.

*Figure 2: Percentage strip (see earlier example)*



Ask the pupils to fill in a second percentage strip together on the board, this time using 200 kroner.

8) Ask the pupils to name a fraction, eg,  $\frac{2}{5}$ . Translate the fraction into a decimal and then into a percentage. If necessary, begin a diagram on the board to illustrate the three forms of representation.

Point to an empty place in the diagram and ask the pupils to suggest an answer. Use a pocket calculator.

Fraction	Decimal	Percentage
$\frac{2}{5}$	0.4	40%

9) Show the class 4 white and 12 blue centicubes placed on one sheet of paper, and 3 white and 10 blue centicubes placed on another sheet. Ask which sheet has the most white centicubes. Discuss the difference between the two concepts, relative and absolute.

10) Compare the class with the whole school. For example, what is the proportion of girls and boys in the class compared with the whole school. Express the proportion as a fraction, then calculate it as a decimal and again as a percentage. The pupils must grasp the idea that percentages make it easier to compare relative figures.

## Group activities

### Group activity 1: Percentage Memory

**Materials:** Cardboard or glossy paper

Play Memory, where half of the cards show fractions (eg, 0,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1) and the other half show the corresponding percentages (eg, 0%, 25%, 50%, 75%, 100%). Pupils have to correctly pair a fraction and a percentage to win a trick.

### Group activity 2: Roll the die

**Materials:** Die, 1 cm graph paper, two colours.

Draw a 10 x 10 cm gameboard. Divide the pupils into two teams and assign a colour to each team. The teams take turns rolling the die. If the result of a roll is an even number, the team must colour five squares of the gameboard with its colour. If the result is an odd number, it must colour ten squares. As the game advances, the two shapes cover more and more of the gameboard. Each shape is always required to be “connected” in the sense that every square in the shape must share an edge with at least one other square in the shape. (It is not sufficient to share a corner.) The first team to run out of space loses.

Make sure the pupils understand that five squares are 5% of the gameboard and ten squares are 10%. At the end of each round let them calculate the percentage of the gameboard currently occupied by each shape.

### **Group activity 3: Prices**

Paste pictures of some goods and prices from a supermarket on a sheet of paper that you duplicate and hand out to the pupils.

- Ask the pupils to calculate  $\frac{2}{5}$  of the prices and explain how they did it.
- Then ask them to use their calculators to calculate 0.4 of the prices. Show them it can be done by keying in  $0.40 * \text{price} =$  .
- Last, ask the pupils to use their calculators to calculate 40% of the prices. Show them it can be done by keying in  $\text{price} * 40\% =$

### **Group activity 4: How big a percentage?**

Conduct a mini-survey in the class of an issue on which pupils can vote either yes or no. Discuss how the numbers of yes and no votes can be expressed relative to all the votes cast.

How can you compare the results of two surveys in which different numbers of votes were cast?

### **Group activity 5: How much fat?**

Bring along cartons from different types of milk, for example, 'mini milk', that clearly state the fat percentage.

Bring the following questions into the discussion:

- Is there a lot of or only little fat in this mini milk?
- What is the fat percentage in two litres of mini milk?
- How would you express the fat percentage as a decimal?
- How would you express the fat percentage as a fraction?
- How much fat does 1% fat in 1 litre of mini milk amount to? How much if there is 0.5% fat?
- How much fat is there in 1 litre of whipping cream with 38% fat?

# Scenario 1: The car park

In this story the pupils have to use percentages to compare things that are not easy to compare without using percentages, such as different-sized car parks containing different numbers of parked cars.

Quantities can be expressed as absolute or relative figures. The relevance of the two types of comparison depends on what is being compared. Of course, both relative and absolute comparisons can be made, but in this case the specific focus is on the relative method.

The pupils have to find ways of doing these relative comparisons. Some pupils will use percentages while others will use fractions.

We add an extra line of numbers to the percentage strip so we can compare the absolute and relative figures.

Ask the pupils to draw two car parks, A and B, with space for different numbers of cars, for example, 50 in one and 40 in the other. Identify the car parks by name or colour so they are easy to talk about.

Ask the pupils to think about the various settings in which the car parks might be located.

- Discuss which car park is fullest if there are 20 cars in each car park.
- Discuss how you can express how full they are.
- Discuss how many cars are needed to fill each car park by 50%.
- Discuss how many cars are needed to fill each car park by 20%.
- If there are 15 cars in each car park, how full is each car park expressed as a percentage?
- Give an example of how many cars have to be parked in each car park in order to say they are equally full.

If there is time, ask the pupils to imagine a mega car park with space for 3,500 cars. Repeat those exercises above that are relevant here.

## Scenario 2: Long queues of cars

The average (mean value) is a statistical concept often used as the sole descriptor of a data collection. In relation to the part-whole concept, the average value is often perceived as the part that would divide the whole into equal parts. For example, the average of the dataset {4, 6, 5, 9, 1} is 5, and the corresponding 'equally divided' dataset is {5, 5, 5, 5, 5}. Other statistical descriptors such as largest and smallest value, mode, range, and median can be brought in to reinforce the understanding of the concept of averages.

Many people drive cars, polluting the atmosphere.

A group of pupils from 6a carried out a survey in which they counted the number of people in every car that passed by over a one-minute period.

Number of cars	10
Number of people	12

How many cars contain only one person?

How many people are there in each car on average?

If the pupils count for ten minutes, how many people and cars do they have to register to get the same average?

6a ends up with this result after an hour:

Number of cars	520
Number of people	720

Calculate how many people were in each car on average. Which of the two averages seems to be more correct? Why?

The previous day 6b got this result:

Number of cars	400
Number of people	800

Calculate the average number of people per car. Look at the two averages. Why can't you add these together and divide by 2 to obtain a final average?

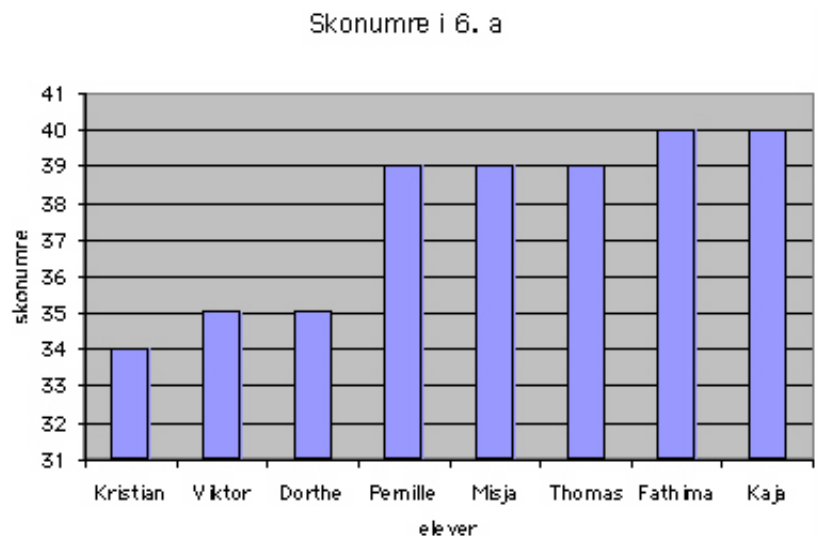
# Scenario 3: Survey of shoe sizes

The following exercise should be done in the computer room or another room with access to a large number of computers.

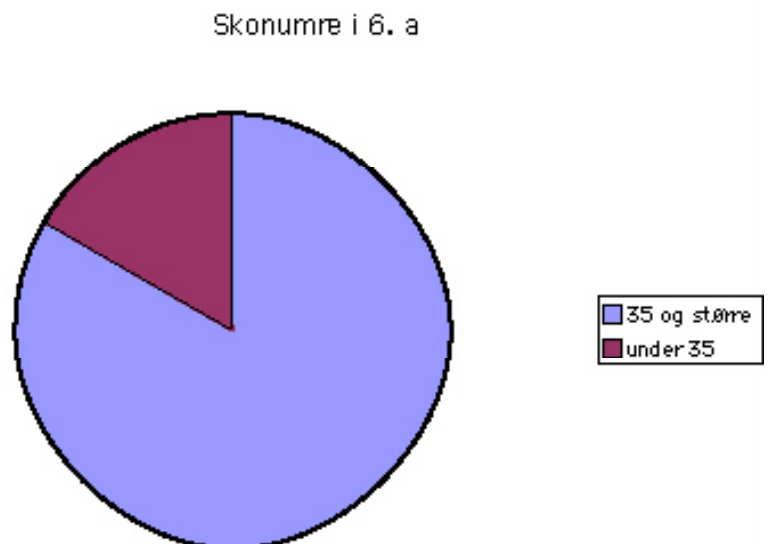
There should be a maximum of two pupils per computer.

Ask the pupils to enter a series of data such as the shoe sizes of everyone in the class. Before doing the exercise, they can discuss how this spreadsheet was made by producing it themselves and subsequently carrying out their own in-class survey.

Pupil	Shoe size
Kristian	34
Viktor	35
Dorthe	35
Pernille	39
Misja	39
Thomas	39
Fathima	40
Kaja	40
<b>Total</b>	<b>301</b>
Average	37.625



Shoe size	Number
35 and larger	5
Under 35	1
<b>Total</b>	<b>6</b>



The pupils have to use Excel's Chart Wizard to do this exercise. Let them experiment with the various types of charts, including the less common ones. Note that the shoe sizes have been sorted by increasing size. Ask the pupils to enter the data randomly and then sort the entries by value.

## Questionnaire to be used for the Smoking Report

### How often do you smoke cigarettes? Tick one box.

1.  I have never smoked cigarettes
2.  I have only smoked cigarettes once
3.  I have only smoked cigarettes a few times
4.  I smoke cigarettes, but only at parties
5.  I smoke cigarettes every da

### Number

- How many of your classmates do you think smoke cigarettes every day?
- In a 6th grade class of 25 pupils in another school in the same local authority, how many do you think smoke cigarettes every day?
- In a 6th grade class of 25 pupils in a school in Copenhagen, how many do you think smoke cigarettes every day?
- How many of the pupils in the 9th grade class whose smoking habits you are going to ask about do you think smoke every day?
- How many pupils are there in the 9th grade class whose smoking habits you are going to ask about?
- In a 9th grade class of 25 pupils in a school in Copenhagen, how many do you think smoke cigarettes every day?

### What do you think about young people who smoke? Tick either yes or no

- Ja    nej
- They are usually very amusing and a lot of fune
- They are cool
- They are far gone
- They are uncool
- They are unattractive
- They are tough
- They are morons
- It's their own business

**Do you think you will ever start smoking? Tick one of the boxes**

- Yes, probably
- No, I don't think so
- No, definitely not

# 9th grade questionnaire

To be handed out before Theme Day

## Dear 9th graders

We 6th graders are planning a Theme Day about smoking and smoking habits. We need your help to find out how many of you smoke.

Before you tick a box, please think about:

What does smoking mean?

Taking a drag on a friend's cigarette is not considered smoking: you have to buy, borrow or take a cigarette yourself and smoke it. Even if you only smoke at parties and not every day, we consider you a smoker.

Please tick one of the boxes below.

Thank you for your help!

Regards, 6th grade

Yes, I smoke

No, I do not smoke

# Smoking Report

## Smoking Report for \_\_\_\_ (grade) at \_\_\_\_\_ school

In this class,  pupils smoke or have smoked (total of questions 2-5).

1.  pupils say that they have never smoked cigarettes
2.  pupils say that they have smoked a cigarette once
3.  pupils say that they have smoked a few times
4.  pupils say that they smoke cigarettes but only at parties
5.  pupils say that they smoke cigarettes every day

### The class's perceptions about the smoking habits of other young people

#### Pupils think that:

pupils from their class smoke cigarettes every day. (Corresponds to  %.)  
The actual figure is less than 0.5%.

pupils from another 6th grade in the local authority smoke cigarettes every day. (Corresponds to  %.) The actual figure is less than 0.5%.

of their peers in Copenhagen smoke cigarettes every day.  
(Corresponds to  %.) The actual figure is less than 0.5%.

9th graders in their own school smoke cigarettes every day. (Corresponds to  %.) The actual figure is  pupils, which corresponds to  %.

pupils from a 9th grade class in Copenhagen smoke cigarettes every day.  
The actual figure is 22%.

*(Source of actual figures: The Danish National Board of Health.)*

### What does the class think about young people who smoke?

They are usually very amusing and a lot of fun      Yes:  pupils      No:  pupils

They are cool:      Yes:  pupils      No:  pupils

They are far gone:      Yes:  pupils      No:  pupils

They are unattractive:      Yes:  pupils      No:  pupils

They are tough:            Yes:  pupils      No:  pupils

They are morons:        Yes:  pupils      No:  pupils

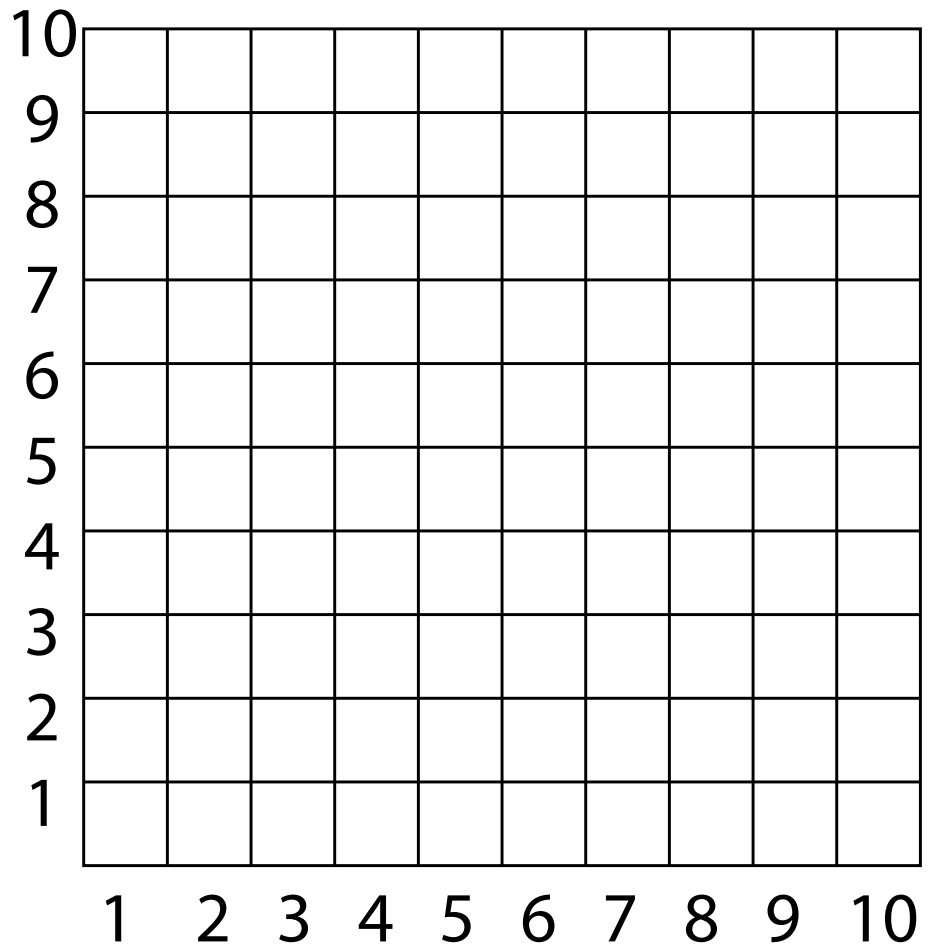
It's their own business:    Yes:  pupils      No:  pupils

**Do the pupils in this class think they will ever start smoking?**

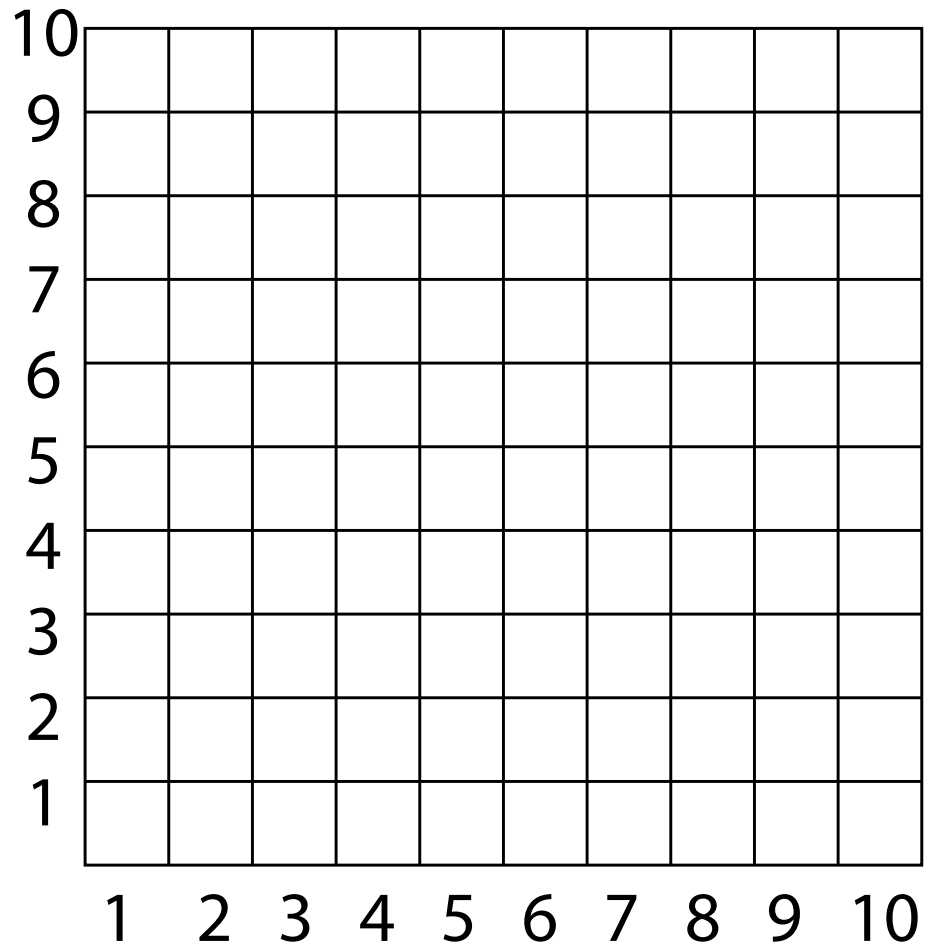
- pupils said: Yes, probably
- pupils said: No, I don't think so
- pupils said: No, definitely not
- pupils did not answer the question

# Group worksheet What we think

Own 6th grade class



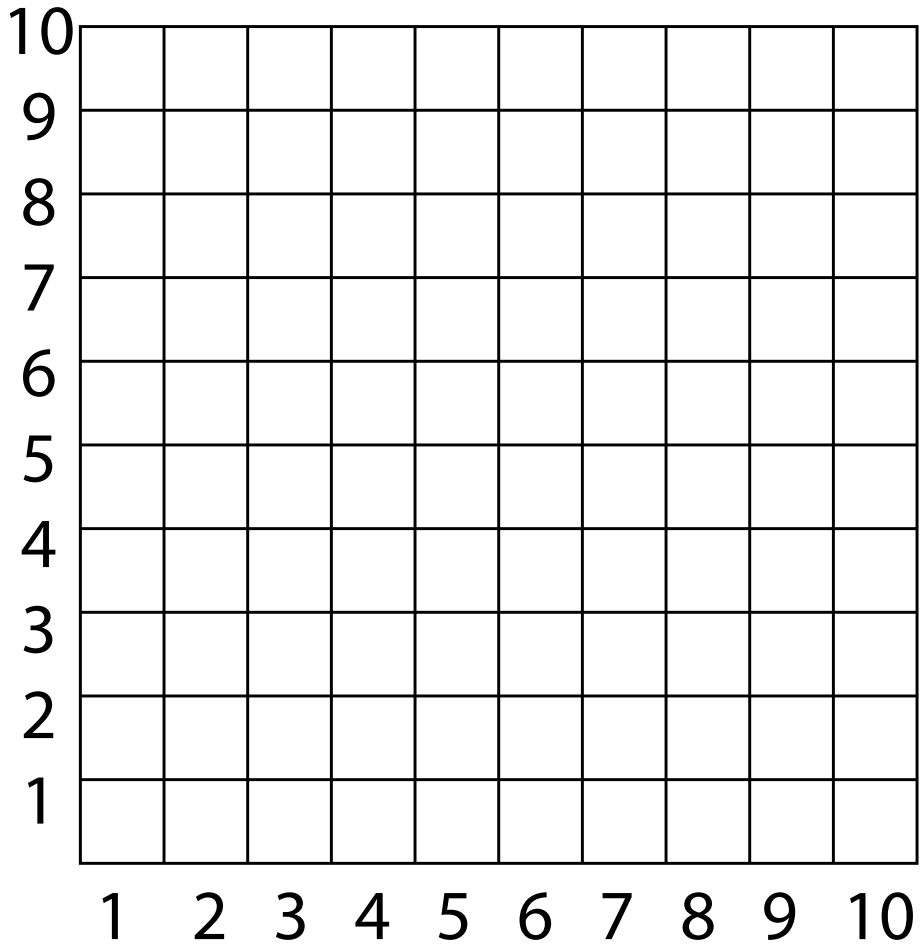
The reality



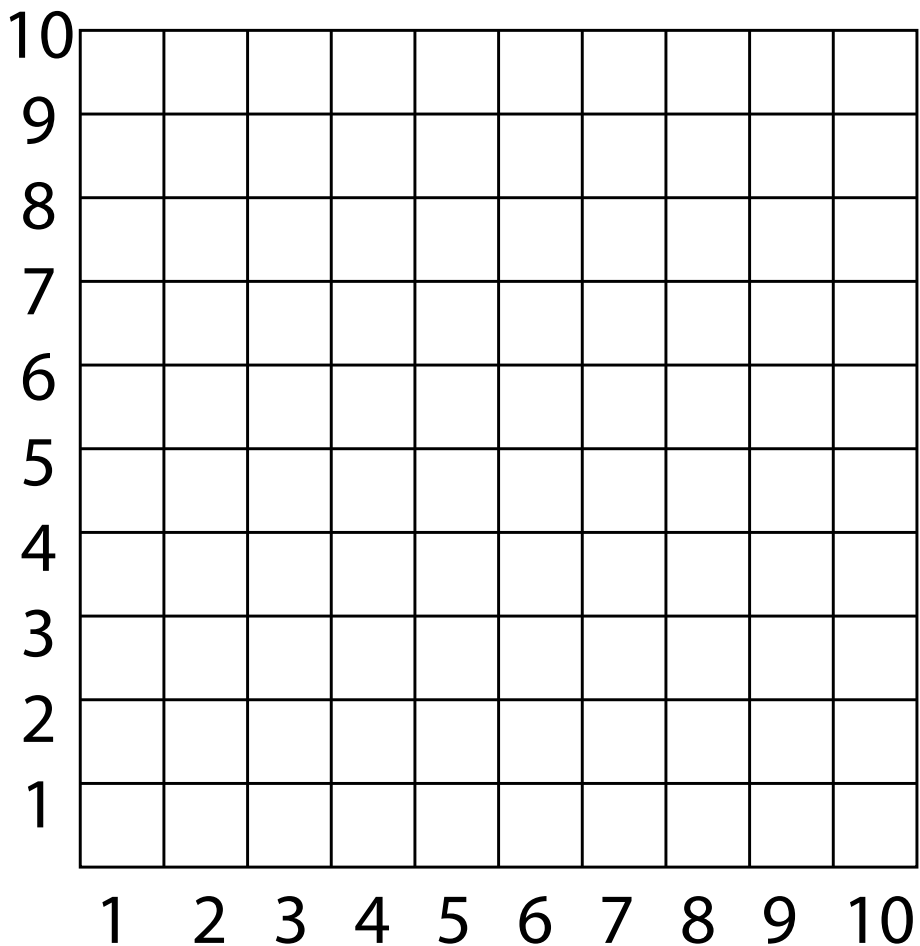
**Group worksheet**

**What we think**

**6th grade class in another school in the same local authority**

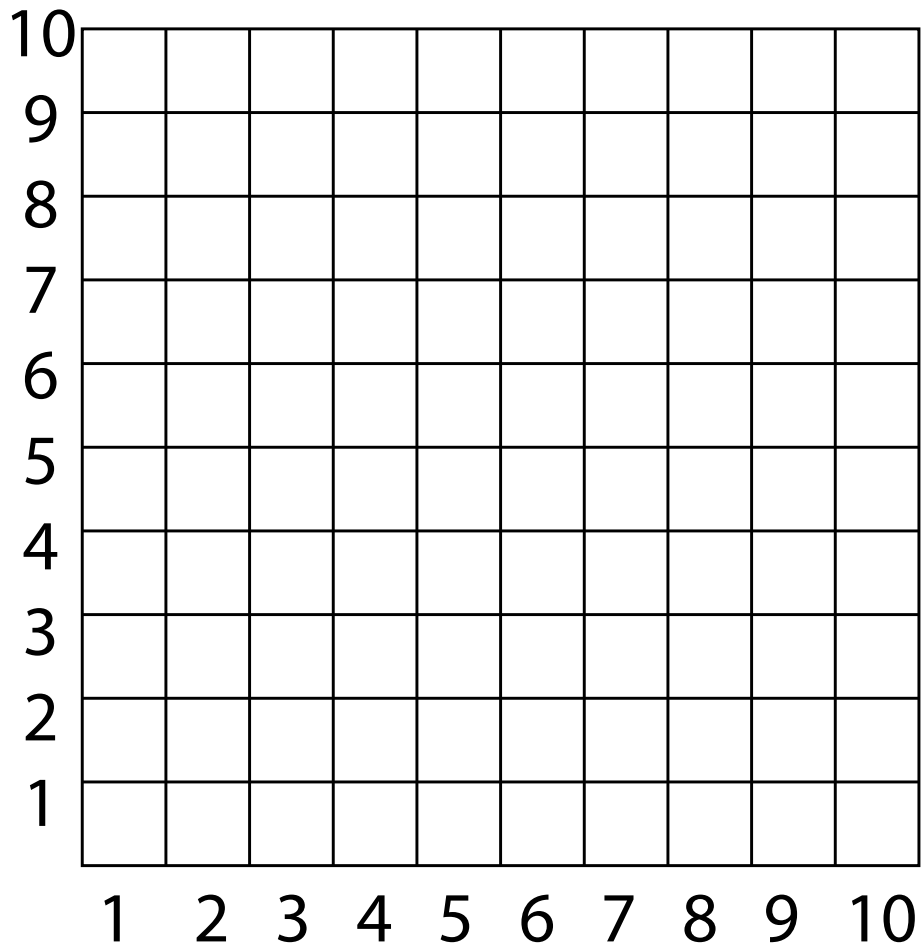


**The reality**

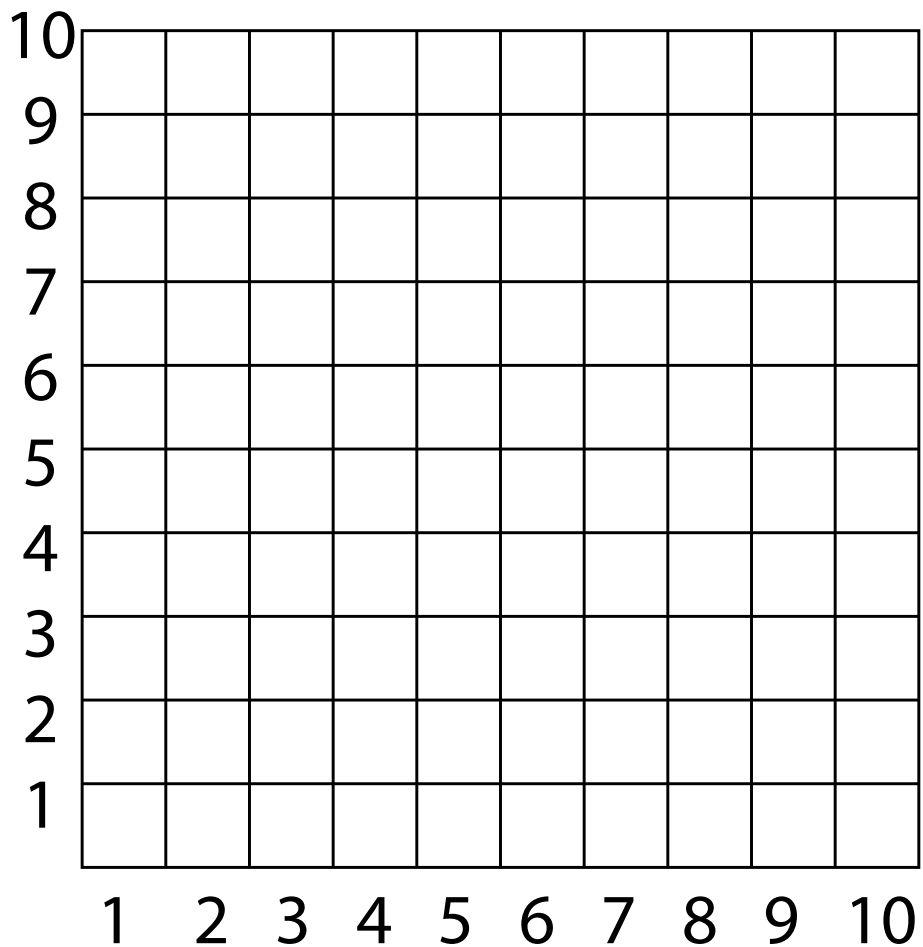


# Group worksheet What we think

6th grade class  
in a Copenhagen  
school

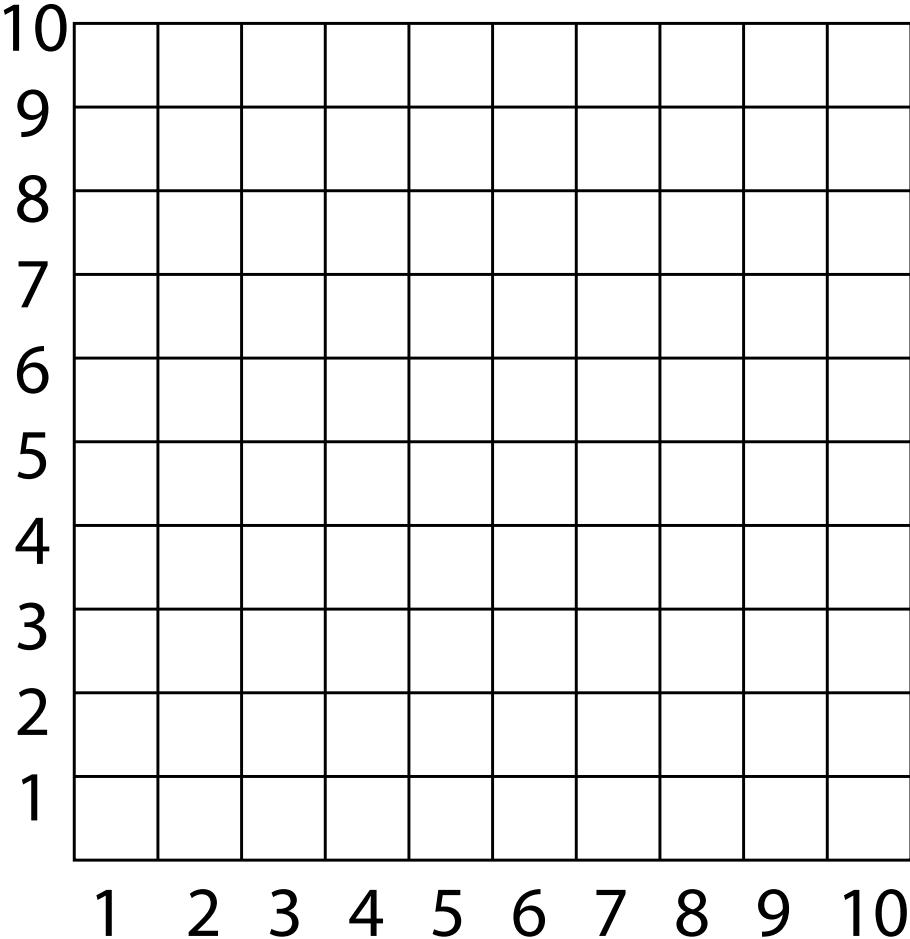


## The reality

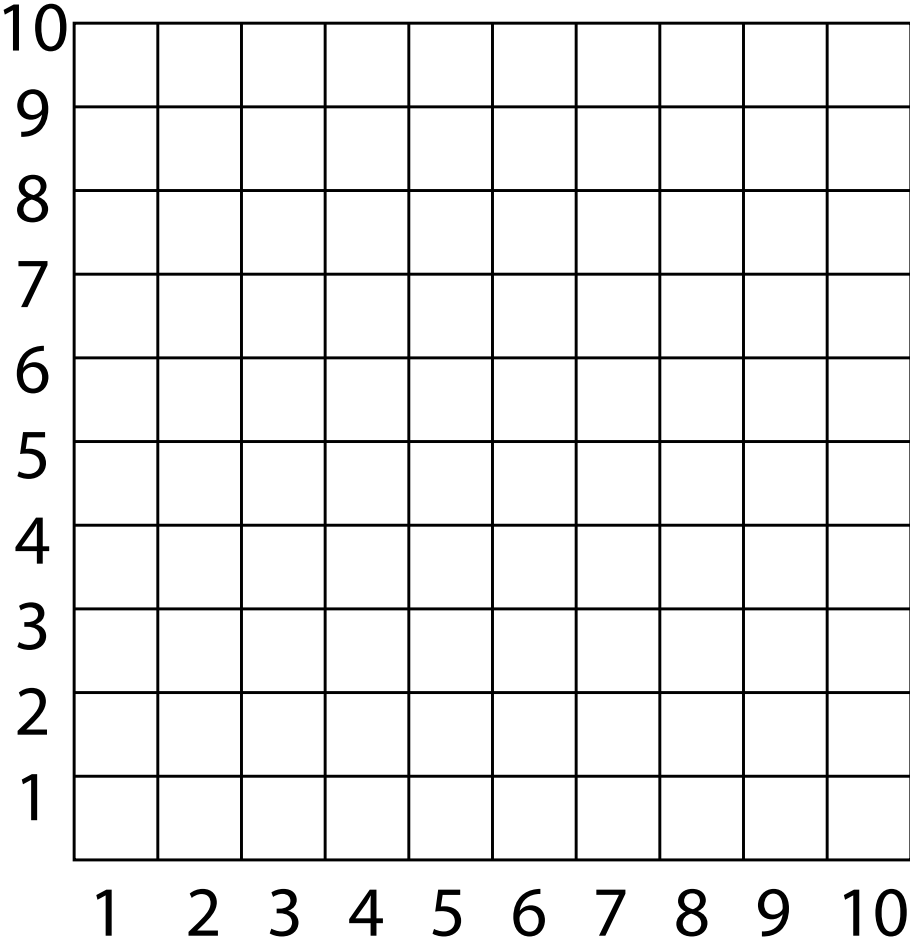


**Group worksheet** What we think

**9th grade class  
in a Copenhagen  
school**

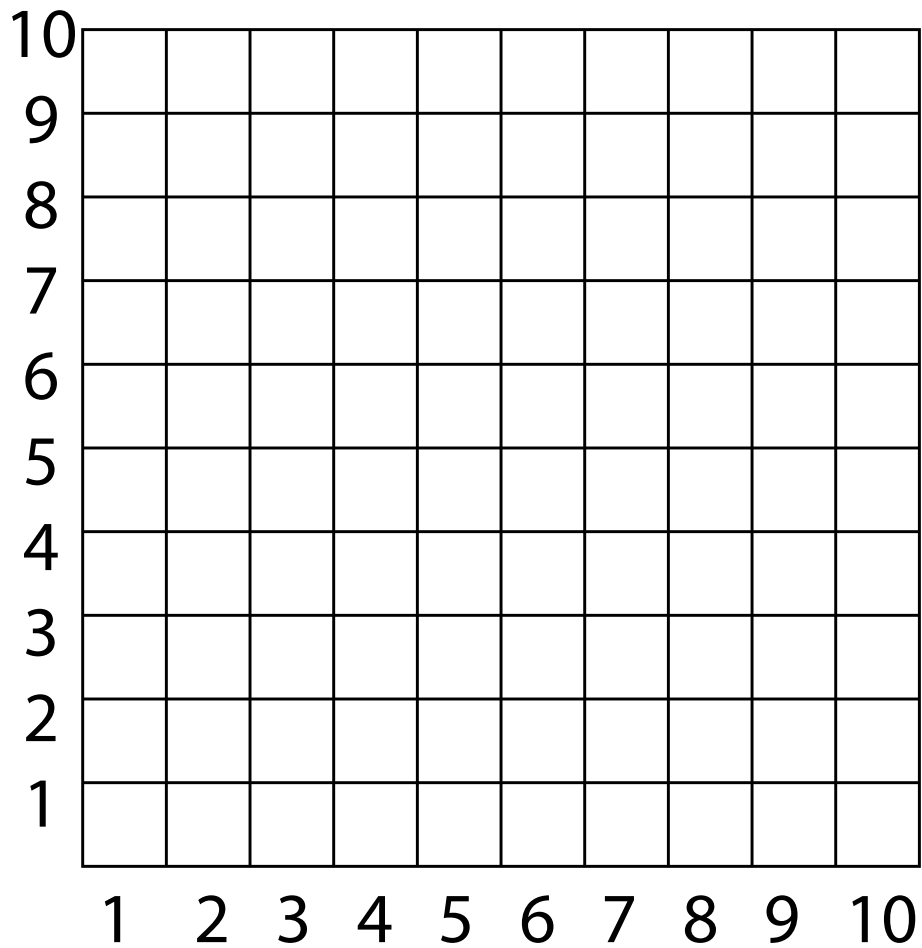


**The reality**

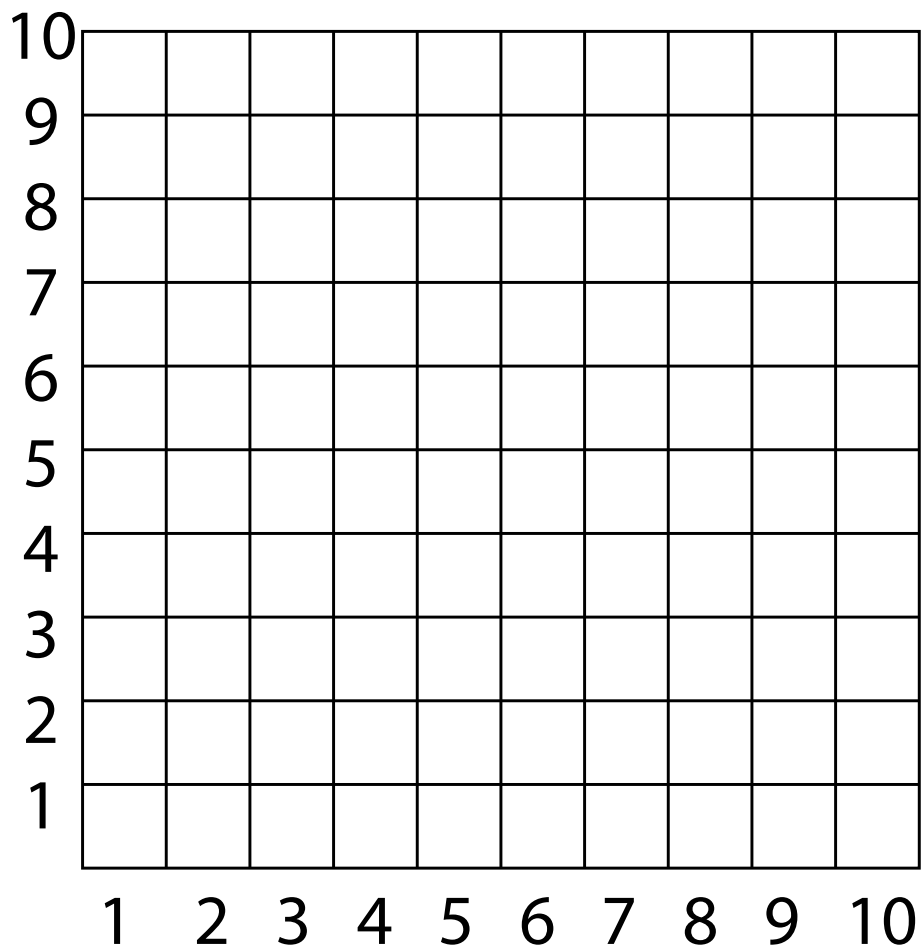


# Group worksheet What we think

9th grade class in  
our school

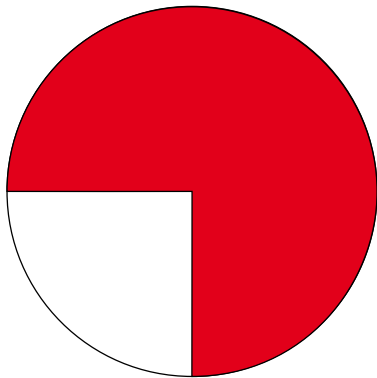


## The reality

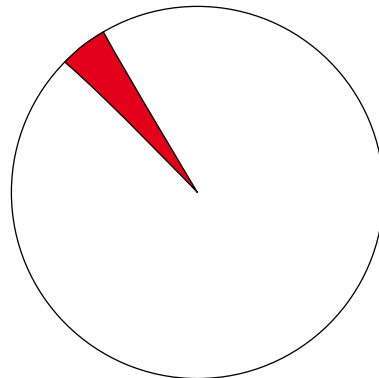


# Teachers' worksheet

## Perception



## Reality



**Social exaggeration:**

**For example, many children and young people think that more young people smoke than is actually the case.**



# Pupils' worksheet 1

## How does social exaggeration arise?

In the space below, suggest some reasons for the difference between how you imagine

•

•

•

•

•

**Present your reasons to the others in the group**

**Present the reasons you agree on as a group to the class on a sheet of card-board, flipover paper or something similar.**

## Pupils' worksheet

### Preventing social exaggeration and misunderstandings:

**In your group, discuss:**

- How can we prevent misunderstandings about other people?
- What can we do to prevent anyone in the class from starting to smoke?

**Each pupil should then suggest practical answers to the following question:**

- How can we as a class prevent or stop someone from starting to smoke?

- 

- 

- 

- 

**Write all your suggestions on a sheet of cardboard or flipover paper.**

**Present your ideas to the rest of the class.**

## Class Contract

The 6th grade at ..... school has decided to help one another to make sure we do not start smoking. We know that pupils of our age generally do not smoke, either in ..... or in the rest of Denmark. So we are not going to start smoking either.

To help one another to stick to our decision, we have agreed to:

1:

2:

3:

4:

5:

6:

