Curriculum for Mathematics vg1 theoretical

(Mathematics T)

This is a translation from Norwegian Nynorsk of the official Norwegian subject curriculum text.

Established as regulations by the Ministry of Education and Research on 15 November 2019. The examination scheme was established by the Ministry of Education and Research on 29 June 2020.

Valid from 01.08.2020

About the subject

Relevance and central values

Mathematics T is an important subject for acquiring tools for understanding mathematical relationships. The subject shall help pupils to develop mathematical problem solving strategies which will prepare them for further work in other subjects that require mathematics. Mathematics T shall prepare pupils for an education and working life that require mathematical understanding through the theoretical application of mathematics.

All subjects shall help the pupils to understand the value system for learning. Critical thinking in mathematics includes critical evaluation of reasonings and arguments and can arm the pupils to make their own decisions and take a stand on important questions in their own life and in society. When the pupils are given the time to think, reflect, reason mathematically, ask questions and experience that the subject is relevant, the subject facilitates creativity and innovation. Mathematics shall help pupils to develop their ability to work independently and to collaborate with others through exploration and problem solving, and can help pupils to become more aware of their own learning. Giving the pupils the opportunity to solve problems and master challenges on their own contributes to developing perseverance and independence.

Core elements

Exploration and problem solving

Exploration in mathematics T means that the pupils search for patterns, find relationships and discuss their way to a shared understanding. The pupils shall place more emphasis on strategies and approaches than on solutions. Problem solving in mathematics T means that the pupils develop a method for solving a problem not previously encountered. Computational thinking is important in the process of developing strategies and approaches to solve problems, and means breaking a problem down into sub-problems that can be solved systematically. This also includes evaluating whether sub-problems can be solved best with or without digital tools. Problem solving also means analysing and reformulating known and unknown problems, solving them and evaluating whether the solutions are valid.

Modelling and applications

A model in mathematics T is a description of reality using mathematical language. The pupils shall gain insight into how mathematical models are used to describe phenomena from everyday life, working life and society in general. Modelling in mathematics T means creating such models. It also

means to critically evaluate whether the models are valid and what limitations the models have, evaluate the models in view of the original situations, and evaluate whether they can be used in other situations. Applications in mathematics T means giving the pupils insight into how to use mathematics in different situations within and outside of the subject.

Reasoning and argumentation

Reasoning in mathematics T means the ability to follow, evaluate and understand mathematical chains of thought. It means that the pupils shall understand that mathematical rules and results are not random, but have clear reasons. The pupils shall formulate their own reasoning in order to both understand and solve problems. Argumentation in mathematics T means that the pupils give reasons for their approaches, reasonings and solutions, and prove that these are valid.

Representation and communication

Representations in mathematics T are ways of expressing mathematical concepts, relationships and problems. Representations can be concrete, contextual, visual, verbal and symbolic. Communication in mathematics T means that the pupils use mathematical language in conversations, argumentation and reasoning. The pupils shall have the opportunity to use mathematical representations in different contexts through their own experiences and in mathematical conversations. The pupils shall have the opportunity to explain and give reasons for the choice of form of representation. The pupils must be able to switch between mathematical representations and everyday language and to switch between different representations.

Abstraction and generalisation

Abstraction in mathematics T means using a formal symbol language and formal reasoning. Generalisation in mathematics T refers to the pupils discovering relationships and structures without being presented a finished solution. The pupils shall have the opportunity to explore concepts and symbols in order to express results and relationships by using algebra and suitable representations.

Mathematical fields of knowledge

The fields of knowledge in mathematics T are related to mathematical theory. The fields of knowledge form the basis the pupils need in order to develop their mathematical understanding by exploring relationships within and between the mathematical fields of knowledge.

Interdisciplinary topics

Democracy and citizenship

In mathematics T the interdisciplinary topic of democracy and citizenship refers to giving the pupils the opportunity to explore, model and analyse large datasets and data related to life in society.

Basic skills

Oral skills

Oral skills in mathematics T refers to creating meaning through dialogue in and about mathematics. This means communicating ideas and discussing mathematical problems, strategies and solutions with others. It also refers to describing and discussing abstract mathematical concepts.

Writing

Writing in mathematics T refers to describing and explaining relationships, discoveries and ideas using suitable representations. Writing in mathematics T is a tool for developing one's own thoughts and learning. This means the ability to solve problems using a precise mathematical language.

Reading

Reading in mathematics T refers to creating meaning in texts from society, working life and the field of mathematics. Reading in mathematics T means being able to sort information, analyse and evaluate its form and content, and summarise information in multimodal texts.

Numeracy

Numeracy in mathematics T refers to using mathematical representations, concepts and approaches to do calculations and evaluate whether solutions are valid. This means recognising problems that can be solved using mathematics and formulating questions about these. Mathematics has a particular responsibility for teaching numeracy.

Digital skills

Digital skills in mathematics T refers to the ability to use graphing tools, spreadsheets, CAS, dynamic geometry software and programming to explore and solve mathematical problems. It also means finding, analysing, processing and presenting information using digital tools.

Competence aims and assessment

Competence aims and assessment mathematics 1T

Competence aims after mathematics 1T

The pupil is expected to be able to

- formulate and solve problems through the use of computational thinking, different problem solving strategies, digital tools and programming
- read and understand mathematical proofs and explore and develop proofs in relevant mathematical topics
- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explain the difference between an identity, an equation, an algebraic expression and a function
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- model situations related to different topics, discuss, present and explain the results and argue the validity of the models
- read, extract and evaluate mathematics in relevant texts on various topics and present relevant calculations and analyses of the results
- explore and describe the properties of polynomial functions, rational functions, exponential functions and power functions
- use average and instantaneous growth rates in concrete examples and account for the derivative
- explain polynomial division and use it to rewrite algebraic expressions, discuss functions and solve equations and inequalities
- explain the definitions of sine, cosine and tangent and use trigonometry to calculate the length, angles and area of arbitrary triangles
- justify the area, sine and cosine rules
- use trigonometry to analyse and solve complex theoretical and practical problems involving length, angles and area

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop

competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Building and Construction

Competence aims after mathematics 1T-Y for Building and Construction

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them

- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Building and Construction, and evaluate how different factors affect the result
- use trigonometry to calculate lengths, angles and area, and use scale to calculate lengths and area when problem solving in Building and Construction

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Building and Construction. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Building and Construction. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Electrical Engineering and Computer Technology

Competence aims after mathematics 1T-Y for Electrical Engineering and Computer Technology

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- explain the definitions of sine, cosine and tangent, interpret the definitions graphically and relate them to examples in Electrical Engineering and Computer Technology
- use trigonometry to calculate lengths, angles and areas of triangles when problem solving in Electrical Engineering and Computer Technology

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Electrical Engineering and Computer Technology. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Electrical Engineering and Computer Technology. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Hairdressing, Floral, Interior and Retail Design

Competence aims after mathematics 1T-Y for Hairdressing, Floral, Interior and Retail Design

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Hairdressing, Floral, Interior and Retail Design, and evaluate how different factors affect the result
- explore and use the properties of geometric shapes and calculate lengths, angles, area, volume, proportions and scale when problem solving in Hairdressing, Floral, Interior and Retail Design

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Hairdressing, Floral, Interior and Retail Design. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and

develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Hairdressing, Floral, Interior and Retail Design. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Crafts, Design and Product Development

Competence aims after mathematics 1T-Y for Crafts, Design and Product Development

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them

- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Crafts, Design and Product Development, and evaluate how different factors affect the result
- explore and use the properties of geometric shapes, calculate lengths, angles, area, volume, proportions and scale when problem solving in Crafts, Design and Product Development

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Crafts, Design and Product Development. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Crafts, Design and Product Development. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Healthcare, Child and Youth Development

Competence aims after mathematics 1T-Y for Healthcare, Child and Youth Development

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Healthcare, Child and Youth Development, and evaluate how different factors affect the result
- do calculations related to welfare technology involving economy

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Healthcare, Child and Youth Development. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Healthcare, Child and Youth Development. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Information Technology and Media Production

Competence aims after mathematics 1T-Y for Information Technology and Media Production

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Information Technology and Media Production, and evaluate how different factors affect the result
- explore and use geometric shapes and proportions and use them in design and product development

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Information Technology and Media Production. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Information Technology and Media Production. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Agriculture, Fishing and Forestry

Competence aims after mathematics 1T-Y for Agriculture, Fishing and Forestry

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Agriculture, Fishing and Forestry, and evaluate how different factors affect the result

- explore and use the properties of geometric shapes and calculate lengths, angles, area, volume, proportions and scale when problem solving in Agriculture, Fishing and Forestry

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Agriculture, Fishing and Forestry. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Agriculture, Fishing and Forestry. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Restaurant and Food Processing

Competence aims after mathematics 1T-Y for Restaurant and Food Processing

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Restaurant and Food Processing, and evaluate how different factors affect the result
- interpret and do calculations on nutritional and energy content, and convert between different compound units related to Restaurant and Food Processing

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Restaurant and Food Processing. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Restaurant and Food Processing. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through

understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Sales, Service and Tourism

Competence aims after mathematics 1T-Y for Sales, Service and Tourism

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- read, use and create spreadsheets when working with budgets, bids and cost calculations related to Sales, Service and Tourism, and evaluate how different factors affect the result
- interpret and do calculations on statistical data that are relevant to Sales, Service and Tourism

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Sales, Service and Tourism. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try

and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Sales, Service and Tourism. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Competence aims and assessment mathematics 1T-Y for Technological and Industrial Production

Competence aims after mathematics 1T-Y for Technological and Industrial Production

The pupil is expected to be able to

- identify variable quantities in different contexts, create formulas and explore these using digital tools
- explore strategies for solving equations, systems of equations and inequalities, and argue for one's thought processes
- explore relationships between quadratic equations, quadratic inequalities, quadratic functions and the binomial formulas, and use these relationships in problem solving
- collect data from the practice field, make estimates and do calculations, and prepare suitable representations of these results, and present them
- do calculations and evaluations related to measurement uncertainty and tolerance
- explore and use the properties of geometric shapes, and calculate length, angles, area, volume, proportions and scale when problem solving in Technological and Industrial Production

Formative assessment

Formative assessment shall help to promote learning and develop competence in mathematics 1T-Y for Technological and Industrial

Production. The pupils demonstrate and develop competence in the subject when they find, understand and generalise mathematical relationships. The pupils also demonstrate and develop competence when they work exploratively, with a problem solving approach and through modelling by planning, carrying out and presenting subject-related work. The pupils also demonstrate and develop competence by exploring mathematical concepts, using mathematical methods and reasoning.

The teacher shall facilitate for pupil participation and stimulate the desire to learn by allowing the pupils to explore mathematics and solve mathematical problems by reasoning, arguing and modelling. The teacher and the pupils shall engage in dialogue about their development in programming and strategies for solving problems. The pupils shall have the opportunity to try and fail. With the competence the pupils have demonstrated as the starting point, they shall have the opportunity to express what they believe they have achieved and reflect on their development in the subject. The teacher shall provide guidance on further learning and adapt the teaching to enable the pupils to use the guidance provided to develop their competence in discovering relationships between mathematics and theoretical applications.

Assessment of coursework

The grade awarded for coursework shall express the overall competence of the pupil after completing mathematics 1T-Y for Technological and Industrial Production. The teacher shall plan and facilitate for the opportunity for the pupils to demonstrate their competence in different ways, including through understanding, reflection and critical thinking, and in different contexts. The teacher shall award one grade in mathematics based on the competence the pupil has demonstrated in writing, orally and digitally, by using mathematical forms of expression, problem solving strategies and reflecting on and arguing for solutions and models.

Type of assessment

Assessment of coursework

Mathematics 1T: The pupil shall receive one grade for coursework.

Mathematics 1T-Y: The pupil shall receive one grade for coursework.

Examination for pupils

Mathematics 1T: The pupil can be selected for a written examination. The written examination is prepared and graded centrally. The pupil can also be

selected for an oral-practical examination with a preparation part. The oral-practical examination is prepared and graded locally.

Mathematics 1T-Y: The pupil can be selected for a written examination. The written examination is prepared and graded centrally. The pupil can also be selected for an oral-practical examination with a preparation part. The oral-practical examination is prepared and graded locally.

Examination for external candidates

Mathematics 1T: The external candidate must sit for a written examination. The written examination is prepared and graded centrally.

Mathematics 1T-Y: The external candidate must sit for a written examination. The written examination is prepared and graded centrally.