

Theme groups

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ScienceMath-Teaching Modules in international PD

→ See cross in the right column if offered in the actual Professional Development

The **ScienceMath** – Project
Professional Development for Interdisciplinary Mathematical Lessons

Lower to middle secondary level

Topic/ Theme	Age and Key-words	Special (interdisciplinary) approaches	Subjects involved and cooperation form	Offered in the actual professional development (cross)
Concept of Parallelism	10 -12 years, parallel, distance, concept of equal distance	Simple experiments	Mathematics (resp. physics), TM	
Temperature	10 – 15 years, Variable, change, rate of change,	Simple experiments	Mathematics, chemistry, TM	
Small Car - Accleration	10 – 16 years, Velocity, speed, safety in traffic situations	Simple experiments with toys	Mathematics, Physics, TM or JP	
Experiments to Proportional Factor 1	12 – 15 years, Proportionality, proportional factor, concept of function, functional relation, linear function	Simple experiments introduced by realistic situations	Mathematics, resp. physics, TM	
Physical Experiments to Proportional Factor 2	12 – 15 years, Proportionality, proportional factor, concept of function, functional relation, linear function, Physical experiments in interdisciplinary lessons	Physical experiments introduced by realistic situations	Mathematics, physics, TM or JP	
Boyle's Law and Concept of Variable	12 – 16 years, Concept of variable, modelling, functional relationship, inverse proportional relationship, Boyle's Law	Physical experiment introduced by realistic situation	Mathematics, physics TM	

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Buoyancy and Concept of Variable	12 – 16 years, Concept of variable, modelling, functional relationship, proportional relationship, buoyancy	Physical experiment introduced by realistic situation	Mathematics, physics, TM	
Refraction and Concept of Variable	12 – 16 years, Concept of variable, modelling, functional relationship, proportional relationship, refraction	Physical experiment introduced by realistic situation	Mathematics, physics, TM	
Thermal Expansion of a Liquid and Concept of Variable	12 – 16 years, Concept of variable, modelling, functional relationship, thermal expansion of a liquid,	Physical experiment introduced by realistic situation	Mathematics, physics, resp. chemistry, TM or JP	
Functional Relation 1	12 – 17 years, Function, linear, quadratic, cubic, inverse proportional and other functional relations, contexts in reality – simple experiments in mathematical lessons	Experiments with long worksheets introduced by realistic situation	Mathematics, resp. physics, TM	
Arithmetic Mean and Car Differential	13 years and older, Arithmetic mean, car differential	Technological,	Mathematics, technics, JP	
Fermat meets Pythagoras	13 – 15 years, Pythagoras' Theorem, extreme value tasks, Fermat's Principle	Physical experiments	Mathematics, physics, PP	
Relationship between Mass and Volume of a Liquid	13 – 15 years and other, Variable, proportionality, constant, function, unit, density	experiments	Mathematics, chemistry, TM or JP	
Nutrition Circle and Pie Charts	14 -16 years, Pie Charts, Percentage calculation, Nutrition Circle, Nutrition	Modelling	Mathematics, biology, TM, PP	

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Proportions: Similarity and Allometry	15 – 16 years, Similarity, homothety, allometry, relation surface and volume, Appearance and behaviour of animals	Integrated worksheets	Mathematics, biology, JP	
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Middle and higher secondary level

Topic/ Theme	Age and key-words	Special (interdisciplinary) approaches		Offered in the actual professional development (cross)
Similar Triangles for Parallax Measurements	14 – 17 years, Similar triangles, parallax measurements	experiments	Mathematics, physics, TM or PP	
Center of mass/ gravity	14 – 19 years, Intersection in triangles, center of mass in planes and bodies, applications of linear algebra, gravity	Simple experiments, Computer	Mathematics, physics, PP or JP	
Sound Functions	15 years and older, Function, digital, sound, resolution	Experiments, Computer	Mathematics, music, technical, physics, PP or JP or TM	
Parabola and Horizontal launch	15 – 16 years, Parabola, horizontal launch	Physical experiments	Mathematics, physics, PP or JP	
Experiments to Investigate Decaying Processes	15 – 16 years (and older), (stunted) growth, decay, experiments, analysing measuring values, regression of measuring values, modelling	Experiments, Esp. reality related	Mathematics, Physics, PP or JP	

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Parabola and Technology	15 years and older, Parabola, car lights, Satellite dish	Experiments, Not-subject related topic	Mathematics, physics, technics, PP or JP	
Logarithmic function	15 – 17 years, Function, logarithm, universe, sound, earthquake	Esp. reality related, Not-subject related topic	Mathematics, physics, geography PP or JP	
Functional Relations 2	15 – 18 years, Concept of function, functional thinking, linear, square, anti- proportional and other functions, physical experiments in interdisciplinary lessons	Physical experiments with long worksheets introduced by realistic situations	Mathematics, Physics, TM, PT, PP, or JP	
Function $x^{3/2}$ and $x^{1/2}$: practical examples with pendulum	15 – 18 years, Function, potential function (rational powers), oscillation of pendulum	Physical experiment, Worksheets (spreadsheet)	Mathematics, Physics JP	
Growth	15 – 18 years, Exponential and linear growth, functional relations, applications of growth, mathematical models, modelling	Worksheets, Esp. related to realistic contexts	Mathematics, Biology, geography, TM	

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Higher secondary level

Topic/ Theme	Age and Key-words	Special (interdisciplinary) approaches	Subjects involved and cooperation form	Offered in the actual PD (cross)
GPS and fair Insurance Premiums	15 – 19 years, Modelling, functional relations, reflecting	Worksheets, Esp. reality related	Mathematics, economy, TM or PP	
$X^{-0,5}$, square root function in divisor	16 years old	Phenomena, experimental measurements with worksheets (spreadsheet)	Mathematics, physics, JP	
Introduction of Trigonometric Functions	16 – 17 years, Trigonometric functions, circulation, oscillation	Experiments, Computer	Mathematics, physics, TM	
Functional Relation 3	16 – 18 years, Concept of function, functional thinking, “unknown” functions in interdisciplinary contexts, experiments	Physical experiments with long worksheets, introduced by realistic situations	Mathematics, physics, JP (or PP)	
Fermat’s Principle and Calculus	16 – 18 years, Optimization problems, calculus, Fermat’s principle	Physical experiments, introduced by realistic situation	Mathematics, physics, JP (or PP)	
Paramecia	16 – 19 years, Logistic growth, modelling, functional relations, concept of derivative, rate of change	Worksheets, Computer, reality related	Mathematics, Biology, TM, PP	
Modelling Things in Traffic	16 – 19 years, Modelling activities in the context of traffic	Worksheets, experiments at the street	Mathematics, physics (technics) PP, TM	
Arc Length of a Plane Curve – “proved by physics”	18 – 20 years, Arc length, horizontal launch	Physical experiments	Mathematics, physics, PP or JP	