



Integration in Science



Türi Gymnasium
Project S.M.I.L.E

2008



Integration between Maths and Science

- The standard of numbers

The absolute value of numbers is presented in standard

e.g $a \cdot 10^k$, where $k \in \mathbb{Z}$ and $1 \leq a \leq 10$

e.g the mass of bacteria'

$m = 0,000\ 000\ 000\ 005 = 5 \cdot 10^{-12}$ kg

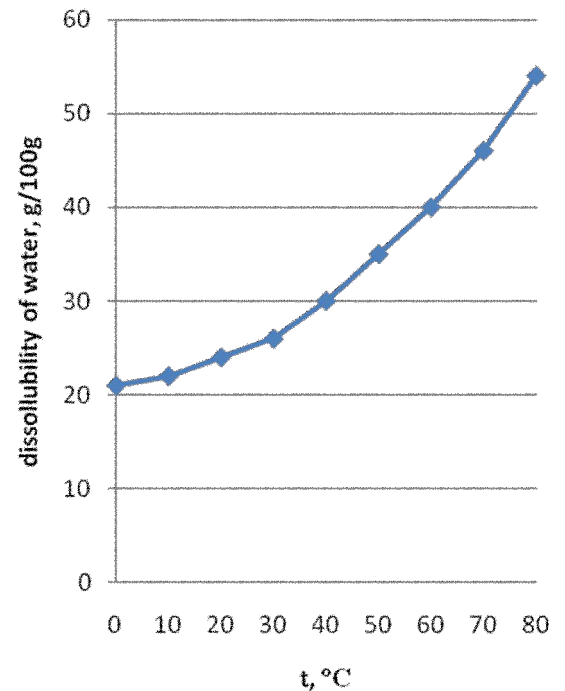
- Finding the percentage, a part of the whole and the whole if only a part is known

e.g The car drives 100km per hour and then slows down to 60km per hour. How many % the speed went down. Calculate and conduct a chart showing the movement.



Integreiting mathematics in Chemmmistry 8.class

- There is visualized the correlation of dissolubility of some solid matter on the graphics.
 - Answer the questions using the graphics.
1. Does the dissolubility of the matter rise or shrink rising the temperature?
 2. How big is the dissolubility of the matter at 20° C?
 3. How much matter do you need to dissolve in the 100g of water at 10° C to get the saturated liquor?
 4. How much matter do you need to dissolve in the 200g of water at 40° C to get a saturater liquor?
 5. 40g of matter was dissolved in the 100g of water at 60° C. Was the result the unsaturated or saturated liquor?





Integreiting mathematics in Chemmistry

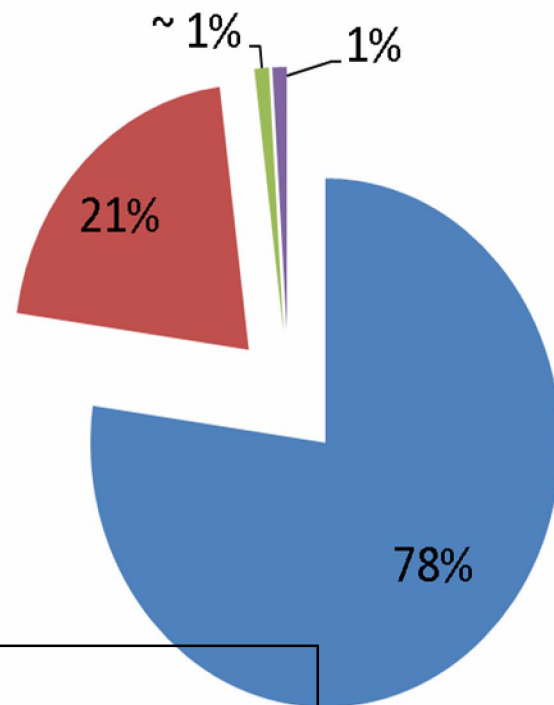
8.class

OXYGEN AND HYDROGEN, THEIR

Ingredients of air

• Mark in the circle as sectors the ingredients of air (use data textbook).

• Fill the table



Main ingredients	Formula of matter	Molarmass of matter	Content of matter in the air(%)
1).....of.air.....	N ₂	28	78%
2).....	O ₂	32	21%
3).....	CO ₂	3	0.03%
4).....	Ar	41	0.93%

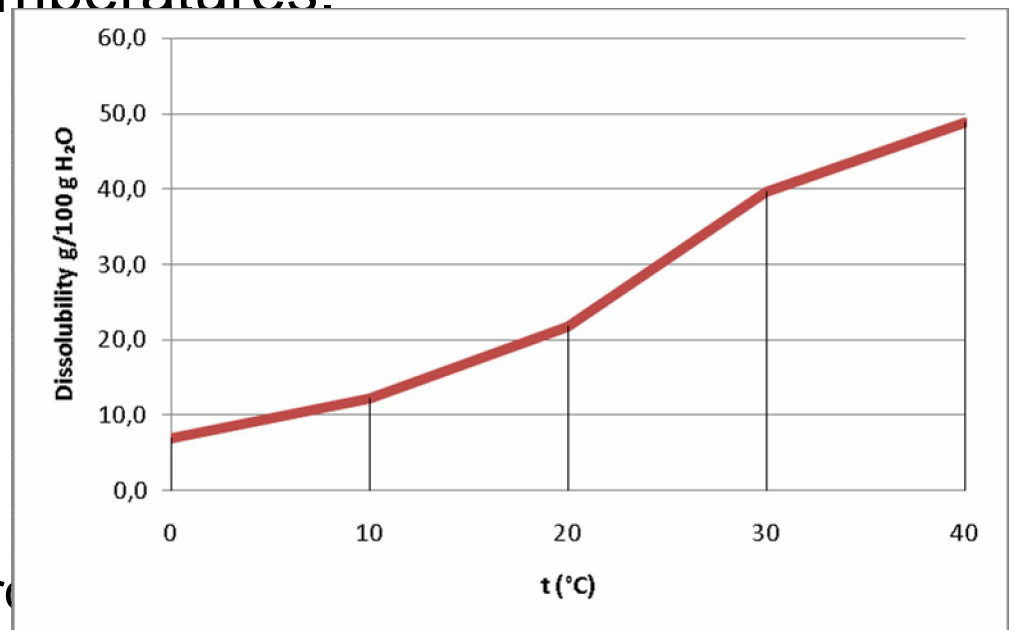


Integreiting mathematics in Chemistry 9.class

Liquors. Qualities of liquors.

- This table presents the dissolubility of soda (Na_2CO_3) in the water in different temperatures.

Temperature °C	Dissolubility g/100 g H ₂ O
0	7,0
10	12,2
20	21,8
30	39,7
40	48,8



- Do the graphics using data from the table and show the dissolubility of bicarbonate of soda in different temperatures
- Find the dissolubility of Na_2CO_3 in the water on the temperature of 25°C from the graphics.
- Do an exercise self using the graphics and give it for saluting to your classmate (example for your deskmate).

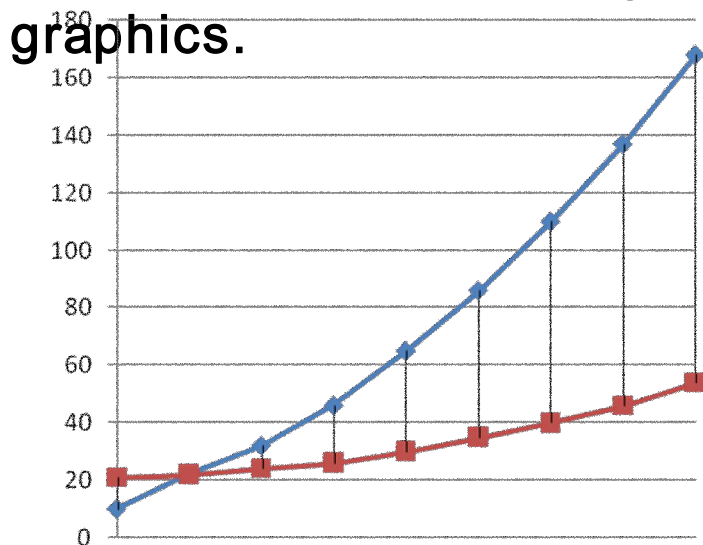


Integreiting mathematics in Chemistry 9.class

Liquors. Qualities of liquors

Graphics presents the correlation of
of
dissolubility of temperature of
potassium nitrate and copper
sulfate.

Answer the questions using
graphics.



1. Does the dissolubility of these matters increases or decreases rising the temperature?

2. Which salt has the bigger dissolubility a) on

the temperature of 20° C; b) on the temperature of 60° C?

3. On what temperature the dissolubility of these matters are almost equal?

4. Rising the temperature has stronger affect to which salt's dissolubility?

5. What is the dissolubility of copper sulfate at the temperature of 60° C?

6. At the temperature of 40° C 100g of KNO₃ was added to 200 cm³ of water. Did all the salt dissolve? Did the saturated or unsaturated liquor



Integrating mathematics into biology

Grade 7

- **Plantcells and tissues** – calculating the size of the microscope
- e.g the enlargement of sighthole X the enlargement of object-glass (10X20)
- **Photosynthesis** – calculating the amount of oxygen produced by a plant, drawing a chart
- e.g the number of gas bubbles that are released into the water by a plant in 1 minute in different temperatures are counted and according the the result a diagram and chart are drawn.
- **Fishes** – measuring the bodylength of fishes
- **Birds** – finding the correlation between birds' body size and the time spent on hatching, drawing a chart based on this knowledge



Integrating mathematics into biology

Grade 8

- **Cells and tissues, viruses** – dimensions, converting units (micrometre, nanometre)
- e.g the length of biggest viruses is 100 nanometres = 0,3 micrometres = 0,0003 mm
- **Organisms and the environment** – the necessary amount of different components for making compost
- **Cohabitation of living organisms, colonies and populations, natural balance** – conducting charts that show changes in populations, conducting diagrams that show the numerosness of organisms
- **Environment protection** – conducting diagrams based on data (e.g amount of pollutant, changes in the environment)



Integrating Physics with Mathematics

Form 8

- Describing movements on the graphics (Ik 84)
- Straightaway and target (definition, mutual positions, learning light shafts) (1,4)
- Angle (definition, measuring, how to construct the beam (ray)) (8)
- Making graphics and diagrams using data (when learning mirror and breaking angle, mechanical moving, pressure in air and liquid bar, sounds) (Ik 114, nd 2,6,7,9,15)
- Calculating surface area of figure, other methods of measuring (5,20)
- Calculating surface area of body when assigning density
- Using inverse number when learning optical strenght (3)



Integrating mathematics into biology

Grade 9

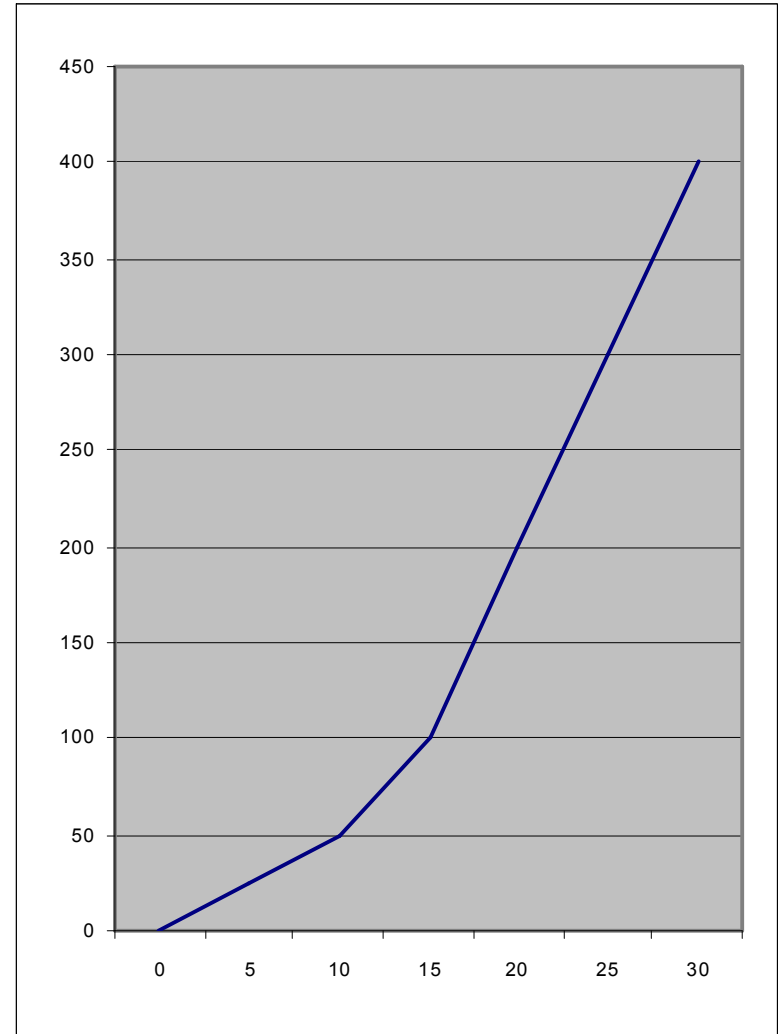
- **Bone structure and composition** – the concept of procentaga, the relative amount substances
- **Human musculature** – finding the time spent on muscular fatigue
- **Bloodstream (system of organs)** –
- **System of breathing organs** – calculating breathing frequency, the amount of air breather in and out and its components, conducting diagrams
- **Nervous system** – measuring the rate of reaction
- **System of digestion** – calculating the amount of energy obtained with food, calculating the amount of energy spent on different physical activities



Integrating Physics with Mathematics

Grade 8

- Negative number – using the definition when learning motion exercises and optical strength
- Using rules of rounding when solving exercises
- Reading data from the graphics (energia) – transmutating units of measure, etc





Integrating Physics with Mathematics

Grade 8

- Negative number – using the definition when learning motion exercises and optical strength (Ik 142)
- Using rules of rounding when solving exercises
- Reading data from the graphics (energies Ik 147) – transmutating units of measure, etc
- Using mathematical formulas when solving exercises (18)
- Using concept of per cent when learning light rate and efficiency of simple mechanisms
- Promoting mathematical thinking in practical exercises (11)
- Concepts of set theory (venn-diagrams) (10)
- Standard figure (number) in mechanics (12)



Integrating Physics with Mathematics

Grade 9

- Most of the topic in form 8 is also possible to use in this form (4,6,9,12,13,14)
- Using standard figure in molecular physics, cosmology, nuclear physics, electrostatics
- Recalculating temperature between the scales of Celcius, Kelvin and Fahrenheit (14)
- Assigning body' s location in space and on plane learning Univers and Solar system (16)
- Using ratios learning astronomy, transformer etc
- Sinusoid and alternating current (17)



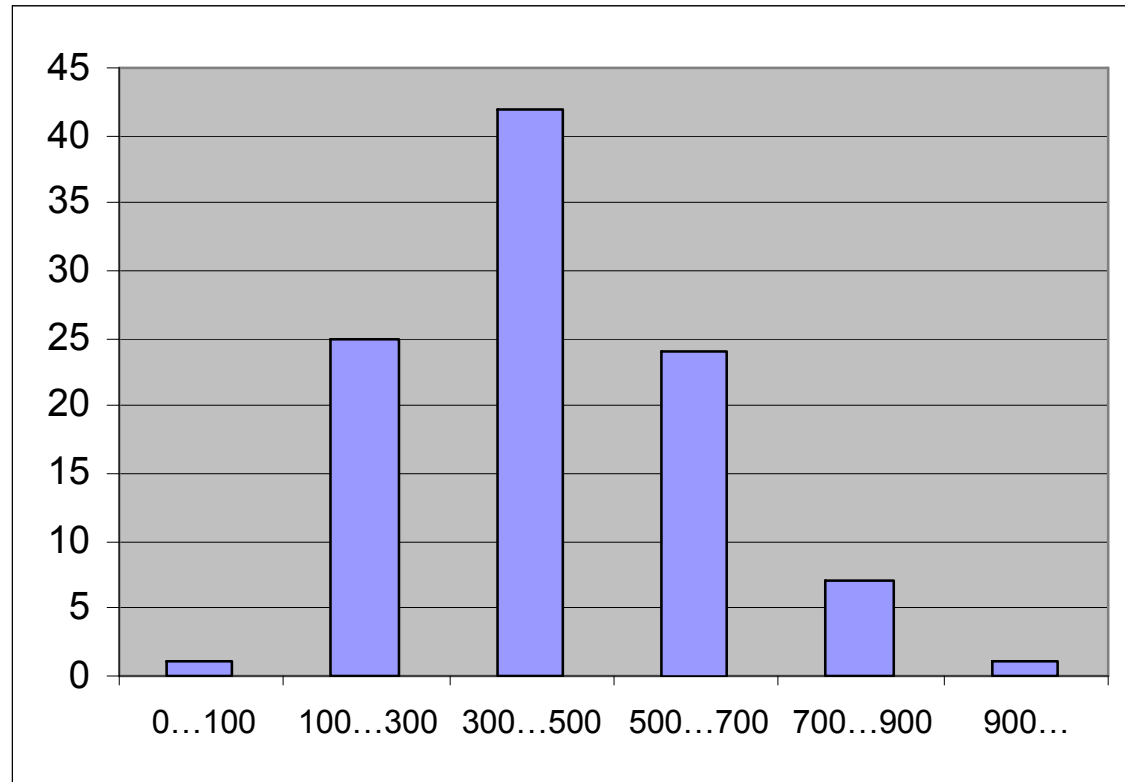
Integrating Physics with Mathematics

Grade 9

Reading data from graphics:

- Allocation (dividing) molecules of oxygen by speed on the temperature of 0°C

m/s	%
0...100	1
100...300	25
300...500	42
500...700	24
700...900	7
900...	1





Integrating Physics with Mathematics

Grade 9

Reading data from graphics:

- Car types by speed

km/h	%
0	4
0...20	10
20...40	33
40...60	55
60...	1

