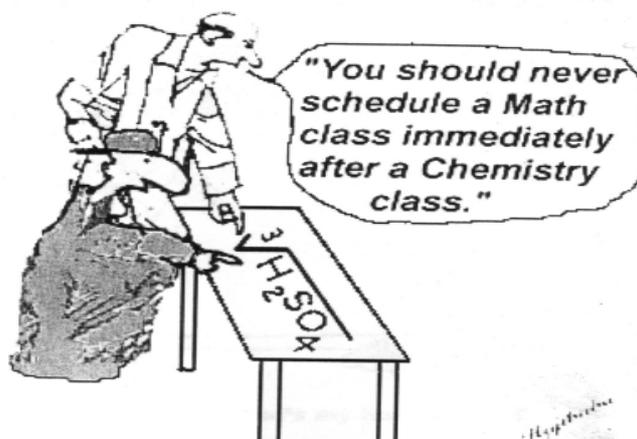


LESSON 6: NUMBERS AND MEASUREMENTS



I. Discuss the questions below in your groups/pairs.

1. Do you have any lucky/unlucky number? Do you believe in numerology?
2. *“Mathematics is the father of all sciences.”*, *“Everything in science has its origin in mathematics.”*, *Mathematics is the most primary science.* – do you agree with these statements? Why? Why not?
3. What could you calculate or measure (express in numbers) in this room?
4. What are the things that these people need to calculate?
 - a. biologist
 - b. astronomer
 - c. physicist
 - d. geologist
 - e. chemist
5. What does it mean to round up/ down a number?
6. What are odd and even numbers? What are whole numbers?
7. *number – figure - digit* What is the difference?

II. Reading numbers

“Individual mathematicians often have their own way of pronouncing mathematical expressions and in many cases there is no generally accepted ‘correct’ pronunciation.”

Read these numbers or fractions:

0.2	3000 000 000
0.05	7000 000 000 000
26	1 st
138	2 nd
2479 (ordinal number/hotel room)	43 rd
503349777 (telephone number)	2000 000
2,053	67 th
2.053	1/3; 1/4; 2/5

III. Simple arithmetics

Look at the way we say these examples:

$4 + 4 = 8$	four and (plus) four is / equals eight
$9 - 2 = 7$	nine minus two is seven
$5 \times 5 = 25$	five times five is twenty-five or five multiplied by five is twenty-five
$8 \div 4 = 2$	eight divided by four is two

Here are some more arithmetical symbols. Notice how to say them.

2^2	two squared	$\sqrt{\quad}$	square root of ...
$- 2^3$	minus (negative) two cubed	$\sqrt[3]{\quad}$	cube root of ...
2^4	two to the power of four	π	pi
$\log_{10}7$	log of seven to the base ten	$x=3(a+b)$	x equals three, bracket a plus b, bracket

Work in pairs. Solve these maths problems.

- | | | |
|-------------------------|-------------------------------|---------------------------|
| a) $12 - 6 = \dots$ | d) $\sqrt{16} = \dots$ | g) $\sqrt[3]{27} = \dots$ |
| b) $9 \times 5 = \dots$ | e) $4 + 7\frac{1}{5} = \dots$ | h) $2^4 = \dots$ |
| c) $30 \div 6 = \dots$ | f) $9^2 = \dots$ | i) $\pi = \dots$ |

Look at this example:

Add six to seven. Now **multiply by** four. **Subtract** four. **Divide by** twelve. What is the answer?

$$6 + 7 = 13, \quad 13 \times 4 = 52 \quad 52 - 4 = 48 \quad 48 \div 12 = ?$$

Work in pairs. Write down graphical image of the problems below, then take turns in saying them aloud and finding the answer (one of you should say the equation and the other should give the answers without looking at the paper). See how quickly you can do it.

- Multiply 7 by 9. Add 9. Divide by 6. Subtract 3. What is the answer?
- Subtract 8 from 24. Divide by 2. Add two. Multiply by 10. What is the answer?
- Add six to eight. Multiply by 10. What is the answer?
- Take 50% of the students in your class. Multiply by 2. Divide by 4. What is the answer?

IV. Units of measurement.

1. a) Give the names of quantities and their measurement units that you know.

b) Do you know the British system of units? Which units are equal to:

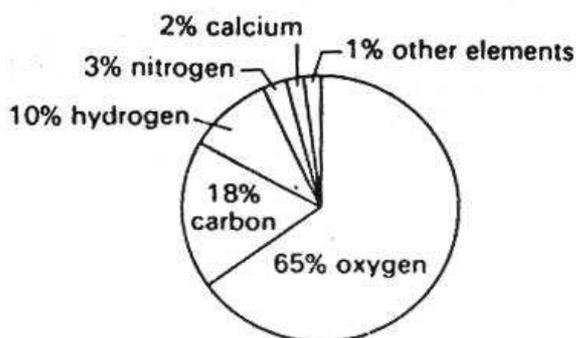
0.9144 of a metre; 2.54cm; 1 609m; 4 000m; 30.48cm

2. Work with a neighbour. Complete the table and then describe these numbers:**Example:**a) *One kilometer equals a thousand meters* *or ten to the power of three*

a) kilo-	one thousand: $1 \text{ km} = 1000 \text{ m}$	10^3
b) deci-	one tenth: $1 \text{ dm} = \frac{1}{10} \text{ m}$	10
c) centi-	one hundredth: $1 \text{ cm} = \frac{1}{100} \text{ m}$	10
d) milli-	one thousandth: $1 \text{ mm} = \frac{1}{1000} \text{ m}$	10
e) micro-	one millionth: $1 \text{ } \mu\text{m} = \frac{1}{1000000} \text{ m}$	10
f) nano-	one thousand millionth: $1 \text{ nm} = \frac{1}{1000000000} \text{ m}$	10
g) pico-	one picometer: 1 pm	10
h)	one _____ : 1 fm	10^{-15}
i)atto-	one _____ : 1 m	10^{-18}

V. Percentages*65% (per cent) of our body weight is oxygen.**Our body contains 65% of oxygen.**Oxygen represents/ makes up 65% of our body weight.*

Describe the rest of the diagram below using the structures given.

**VI. Using letters as symbols, write a formula for each relationship. The first one is done for you:**

1. Work is the product of force times the distance through which the force acts.
 $w = f \times d$
2. Velocity is calculated by dividing distance by time.
3. The volume of a cube is calculated by multiplying the length times the width times the height.
4. Power is the rate at which work is done; it is computed by dividing work by time.
5. Kinetic energy is calculated as one half the product of the mass times the velocity squared.

VII. Read the following formulas:

1. $N = \text{kg m s}^{-2}$
2. $v = u + at$
3. $s = ut + \frac{1}{2}at^2$
4. $K = mc^2 \left(\frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} - 1 \right)$

VIII. Put the following statements into mathematical notation:

1. the squared sum of x and y is equal to the sum of x squared, the product of two x and y, and y squared;
2. twice the sum of p and 5, diminished by 30;
3. x to the power of minus 10 is less than cube root of y;

IX. Say whether the following statements are true or false;

1. It takes thousands of seconds for the light to travel from the Sun to the Earth.
2. Distance of the Earth from the Sun is of the order of magnitude of 10^{11} km.
3. One day is millions of seconds.
4. The size of a virus is of the order of magnitude 10^{-4} .

Ex. I-VI and XII adapted from A. Rozkošná (*Sources: Lesson based on* Bates, Martin and Dudley-Evans, Tony: *Nucleus of General Science*. Longman 1990. *Adapted from* Cihová, Jarmila et al. *Angličtina pre študentov chémie*. Bratislava: Univerzita Komenského, 2003.)

Ex. VII-XI: *Angličtina pre fyzikov*, Alena Zemanová

GRAMMAR REVISION: COUNTABLE/ UNCOUNTABLE NOUNS

- I. Divide the words below into two categories: countable and uncountable nouns**
 metre, science, molecule, nitrogen, information, radius, second, heat, fraction, time, petroleum, research, change, object, ion, water, light, substance, matter, energy, electron, equilibrium, neutron, vacuum, knowledge

Remember that some nouns used frequently in scientific writing can be countable or uncountable, depending on how they are used.

e.g. sound (in general) **or a sound** (a particular sound)
colour (in general) **or a colour** (such as red)

II. Complete the sentences below with “many” or “much”

1. How _____ years ago were the Universe and space-time created?
2. How _____ time does it take the Earth to go around the Sun?
3. How _____ seconds are there in one day?
4. How _____ of the Universe do we know today?
5. How _____ planets are there in the solar system?
6. How _____ liquid does a beaker contain?
7. How _____ energy would you need to boil 10 litres of water?
8. How _____ nitrogen does the atmosphere contain?
9. Do you find _____ useful information about quantum physics on the Internet?
10. Will we exploit _____ more nuclear energy in the future than we do today? What do you think?

III. Complete the sentences with “little”, “a little”, “few”, “a few”

1. As very _____ research has been done in the field, we still have no antidote to the disease.
2. Doing just _____ research has produced some interesting findings.
3. Only _____ scientists were invited to take part in the project. That is probably why it was not successful.
4. The project team consists of _____ well-known chemists.

Week 6 – Numbers and Measurements - Vocabulary	
four and (plus) four is / equals eight	čtyři plus čtyři se rovná osm
nine minus two is seven	devět mínus dva je sedm
acceleration	zrychlení, akcelerace
five times five is twenty-five / five multiplied by five is twenty-five	pět krát pět je dvacet pět
eight divided by four is two	osm děleno čtyřmi je dva
two squared	dva na druhou
minus (negative) two cubed	mínus dva na třetí
two to the power of four	dva na čtvrtou
square root of ...	druhá odmocnina
cube root of ...	třetí odmocnina
three quarters	tři čtvrtiny
a third	třetina
one thousandth/one over a thousand	jedna tisícina / jedna lomeno tisíc
How much is five and four?	Kolik je pět plus čtyři?
one thousand two hundred and fifty-eight	tisíc dvěsta padesát osm
add (v)	přičíst
subtract (v)	odečíst
One kilometre equals nought point six two one miles.	Jeden kilometr se rovná nula celá šedesát dva mil.
7. 65 per cent of our body weight is oxygen.	7,65 procent tělesné váhy je kyslík.
approximate	přibližný
Round off	zaokrouhlit
diameter	průměr
velocity	rychlost
resistance	odpor
el.charge	elektrický náboj
angle	úhel
density	hustota; propustnost
obtain a species (v)	získat vzorek
surface area (n+n)	povrch
width (n)	šířka
length (n)	délka
square metre (adj+n)	metr čtvereční
cubic metre (metre cubed) (adj+n)	metr krychlový
electric current (adj+n)	elektrický proud
electric power(adj+n)	elektrický výkon
electric resistance (adj+n)	elektrický odpor
temperature (n)	teplota
degree Centigrade (n+n)	stupeň Celsia
kilometres per hour	kilometry za hodinu
Second is a unit of time.	Sekunda je jednotka času.