

## Lesson 6: NUMBERS

### I. Discuss the questions below

1. Is it Maths or Math? Choose the correct verb form: *Mathematics give/gives you wings.*
2. “Mathematics is the father of all sciences.” Do you agree? Can you think of other metaphors for mathematics? What about maths in relationship to physics?
3. Why do you think some ancient people believed mathematics to be mysterious? Why do you think certain numbers were considered magical?
4. What could you calculate or measure (express in numbers) in this room?
5. What are the things that these people need to calculate?
  - a. physicist
  - b. biologist
  - c. astronomer
  - d. geologist
  - e. chemist

**II. a) Give an example of a cardinal, ordinal, decimal, even, odd, irrational and prime number. What does it mean to round a number up/down?**

**b) Read these numbers or fractions:**

0.2

0.05

2479 (ordinal number)

549495009 (telephone number of your teacher – call in emergency)

2,053

2.053

1800

1 415 605

2 000 000 000

$1/3$ ;  $3/4$ ;  $2/5$ ;  $14/15$

### III. Listening: How big is a billion?

([https://www.youtube.com/watch?annotation\\_id=annotation\\_215752&feature=iv&src\\_vid=SbZCECvoaTA&v=C-52AL\\_ojyQ](https://www.youtube.com/watch?annotation_id=annotation_215752&feature=iv&src_vid=SbZCECvoaTA&v=C-52AL_ojyQ))

**Listen and watch the video on the different systems, then summarise the main points.**

### IV. Simple arithmetics

**Look at the way we say these examples:**

$4 + 4 = 8$	four <b>and (plus)</b> four is / <b>equals</b> eight
$9 - 2 = 7$	nine <b>minus</b> two is seven
$5 \times 5 = 25$	five <b>times</b> five is twenty-five <i>or</i> five <b>multiplied by</b> five is twenty-five
$8 \div 4 = 2$	eight <b>divided by</b> 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	$\pi$	pi
$\log_{10}7$	log of seven to the base ten	$x=3(a+b)$	x equals three, bracket a plus b, bracket

V. Work in pairs. Solve these maths problems.

- |                         |                               |                           |
|-------------------------|-------------------------------|---------------------------|
| a) $125 - 69 = \dots$   | 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 3. What is the answer?

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

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

VII. Read the following formulas:

- $N = \text{kg} \cdot \text{m} \cdot \text{s}^{-2}$
- $v = u + at$
- $s = ut + \frac{1}{2}at^2$

VIII. Mill's constant

([http://www.numberphile.com/videos/mills\\_constant.html](http://www.numberphile.com/videos/mills_constant.html))

**Listen and watch the video on Mill's constant. What is it used for? Why do the presenters find it special? Does it have any limitations?**

Lesson adapted from: A. Rozkošná (Sources: Bates, Martin and Dudley-Evans, Tony: *Nucleus of General Science*. Longman 1990. Zemanová, A. *Angličtina pre fyzikov*.)

<http://www.numberphile.com/>

**GRAMMAR REVISION: COUNTABLE/ UNCOUNTABLE NOUNS****I. Divide the words below into two categories: countable and uncountable nouns**

metre, science, molecule, knowledge, nitrogen, information, radius, second, heat, fraction, time, petroleum, research, change, object, ion, light, substance, matter, energy, electron, advice

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

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

**Now answer these questions.**

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

- As very \_\_\_\_\_ research has been done in the field, we still have no antidote to the disease.
- Doing just \_\_\_\_\_ research threw up some very useful information.
- Only \_\_\_\_\_ scientists were invited to take part in the project. That is probably why it was not successful.
- The project team consists of \_\_\_\_\_ well-known chemists.

<b>Week 6 – Numbers and Measurements - Vocabulary</b>	
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

## JAF01

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.