

Unit 2 – Working with Numbers and Writing Academic Emails

I Working with Numbers

1. Explain the following terms:

- a set of numbers
- a sequence of numbers
- an odd number
- an even number
- a prime number
- to estimate a number
- to round a number up/down

2. Match the terms to their definitions:

1. an approximate number	A. a number or a quality that does not change
2. an aggregate	B. a number reached by totalling a set of numbers (= the total)
3. discrete data	C. a number which is roughly correct, not precise or exact
4. continuous data	D. a number chosen by chance
5. a constant	E. data that take particular, separate values
6. a random number	F. data that can take any value over a given scale which is possible to subdivide into finer and finer increments
7. to total a set of numbers	G. the numerical amount denoted by an algebraic term (a magnitude, quantity, or number)
8. to tally	H. to add up all numbers of a set
9. a value	I. a symbol which can take on different values (can be arbitrary, not fully specified, or unknown)
10. a variable	J. to match, agree, correspond
11. incidence	K. the size
12. magnitude	L. the occurrence, rate, or frequency of something studied

3. Language practice (the exercises from *Academic Vocabulary in Use*, CUP 2008, p. 59):

a) Dr Syal is advising one of his students who is interested in pollution in road tunnels. Complete the conversation, you are given the first letters to help you.

Dr Syal: You could c_____ the total number of private cars that use the tunnel each week, based on the day-to-day figures, and get an a_____ figure for how much carbon they're all emitting.

Melissa: How p_____ would that figure have to be?

Dr Syal: Oh, it doesn't have to be exact, you just need to e_____ more or less what the total pollution will be. Then you check to see if those figures t_____ with the figures that have already been published for similar tunnels. And the figure won't be c_____ of course; it'll go up and down depending on lots of factors such as weather conditions, average speed, etc.

Melissa: But can we say if the figures will be true for the future too?

Dr Syal: Well, we do know that the traffic growth has been c_____ over the past ten years; it hasn't ever gone down, so I think you can make some useful predictions.

Melissa: Should I present each daily total as a d_____ item or can I put them all together into one figure for each week?

Dr Syal: A weekly total is fine, and you can r_____ it up or d_____ to the nearest 100.

Melissa: Right, OK. Thank you so much for your help.

b) Rewrite these spoken sentences so that they are more appropriate for writing, using the word in italics in an appropriate form.

- There were fewer car accidents last year. *incidence*

- We made a rough guess at what the final figure might be. *estimate*

- The graph shows the results from the lowest to the highest. *magnitude*

- A computer program helped us to work out the significance of the difference variables. *calculate*

- Taking x away from y will help you arrive at the correct answer. *subtract*

- The results from the first experiment were not the same as those we got from the repeat experiment. *tally*

4. Prime Numbers

a) Define a prime number. How many primes do you know?

b) Listening. EXAM PRACTICE. Watch the video and fill in the gaps in the following summary
<https://www.youtube.com/watch?v=8mqHOkkq5fY>

The speaker mentions that there are _____ good reasons explaining that 1 is not a prime number. The first reason is that prime numbers can be defined as having exactly two distinct _____. The speaker considers the other reason as the real one and this reason is based on the _____ Theorem of Arithmetic. This theorem states that every integer greater than 1 is either a prime or has a _____ prime factorization. If 1 was a prime, you would need to modify the theorem, or it would completely _____ down. So we prefer to exclude 1 from prime numbers as it is us who have defined this particular _____ of numbers. To put it simply, everything works out better without 1 being a prime number although 1 is considered the _____ number of all.

c) Special types of primes. Do you know what the following numbers have in common?

3, 7, 31, 127, 8191, 131071, 524287, 2147483647, 2305843009213693951,
618970019642690137449562111, 162259276829213363391578010288127,
170141183460469231731687303715884105727.

Translate the following text into English:

Mersennovo prvočíslo je prvočíslo, které je o jedna menší než nějaká celočíselná mocnina dvojky. Mersennovo prvočíslo M tak má tvar $M = 2^z - 1$, kde z je libovolné přirozené číslo. Příkladem může být prvočíslo 3, protože platí $2^2 - 1 = 3$.

d) Read the text and answer the questions:

In 1644, French monk and mathematician Marin Mersenne (1588–1648) stated that numbers of the form $2^p - 1$ are primes only when p has the following and no other values:

$p = 2, 3, 5, 7, 13, 17, 19, 31, 67, 127$, and 257.

Mersenne himself didn't actually test his assertion for any values greater than $p = 19$. In fact, it wasn't until 1750 that Leonhard Euler (1707–1783) verified that $2^{31} - 1$ (or 2147483647) is a prime.

In 1811, in his book *An Elementary Investigation of the Theory of Numbers*, Peter Barlow (1776–1862) stated that this prime number "is the greatest that will ever be discovered, for, as they are merely curious without being useful, it is not likely that any person will attempt to find one beyond it."

It turns out that Mersenne and Barlow were both wrong. In 1903, mathematician Frank Nelson Cole (1861–1926) demonstrated that $2^{67} - 1$ is not a prime but the product of 193707721 and 761838257287. At the same time, the discovery of ever-larger Mersenne primes, as these numbers came to be called, steadily progressed to larger and larger values.

A new Mersenne prime was found in December 2017. As of January 2018, 50 are now known. The largest known prime number $2^{77,232,917} - 1$ is a Mersenne prime.

Since 1997, all newly found Mersenne primes have been discovered by the Great Internet Mersenne Prime Search (GIMPS), a distributed computing project on the Internet. GIMPS volunteers are responsible for checking Mersenne numbers within specified ranges of exponents, whenever their computers would otherwise be idle. There's still time to join the search. Maybe your computer will ring up the next champion!

Text based on Science News Online, March 5, 2005, 167 (10), https://en.wikipedia.org/wiki/Mersenne_prime

- What did Mersenne state and what did he not test?
- What was verified by Euler in 1750?
- Why did Barrow think that greater primes would not be discovered?
- What did Frank Nelson Cole demonstrate?
- How many Mersenne primes are known?
- Which method has been used for discovering Mersenne primes for the last decades?

II Writing academic emails (tasks adapted from Agnieszka Suchomelová-Polomska):

1. EXAM PRACTICE. Make questions about underline expressions.

Mary writes emails in English every week.

I have just written an email to my teacher.

Last week they received a very impolite email from a customer.

John will translate this email for me.

Sally still prefers snail mail to emails.

2. Look at the three emails. How are they different? What are the reasons why they were written? Are those emails appropriate? Give arguments for/against.

From: 01234567@mail.muni.cz

Subject: tomorrow

Hi teacher!

I cannot come to school tomorrow, 'cause I'm real sick. I'll do my presentation on the Four Color Theorem next week.

See ya,

Tom Smiley

From: offthewall@email.com

Subject: Steven Bold, 3rd year student of Media and Communication, Monday seminar group, 9 a.m.

Dear Mrs Crow,

I am very unhappy about the fact that I received F for my English exam. As a matter of fact, you are the only one who gave me such a bad mark, and now my distinction is in danger. When can I write the re-take? There are no more terms available, but I have to have it this semester, as I am very busy in summer.

Best regards,

Steven

Steven Bold

PR Assistant

Offthewall International

From: 6543210@mail.muni.cz

Subject: Hello

Dear Mrs teacher,

I was not at school last Wednesday. Can you tell me what you did? And do I have to do any homework?

Robert Dark

2. Dos and Don'ts of academic email writing. Look at the phrases and categorize them into the things you should remember about and those you'd rather avoid doing

- Write a clear subject line
- Have no reference to the attachment (the recipient will see it anyway)
- Leave out personal details
- Start emails with "I want..." or "I need..."
- Write a greeting appropriate to the addressee
- Have exclamation marks for something that is considered very important
- Write a detailed description of events preceding the situation discussed
- Emphasize the conversational aspect
- Keep messages as concise as possible

DOs	DON'Ts

3. Discuss what features those email parts should contain:

<https://www.softchalkcloud.com/lesson/serve/MXv2iJS1bBtQCR/html>

- Title of the email
- Salutation
- The beginning
- The main body
- The ending
- Closing the email and signing

4. Formal vs informal vocabulary. How would you change these words/expressions into more formal ones?

INFORMAL	FORMAL
Thanks	
Sorry for...	
Can you...	
Do you know...	
I can't...	
I don't want to...	

5. EXAM PRACTICE. *Imagine that you are an Erasmus student being at a foreign university. Write an email to prof. Smith apologizing that you could not attend his lecture on Mersenne primes and asking him for sources about this topic. The email should be of 80 - 100 words long in an appropriate style. Include the following points:*

- *who you are*
- *you are sorry you could not come to the lecture (explain why)*
- *you are interested in Mersenne primes, could the professor recommend any literature?*