Trial Exam I – 20 grammar questions **(risposte in fondo)**

1. How many genes …….. each human cell contain?
   a) do b) is c) does d) are e) is able to
2. Visualizing individual molecules of DNA for …… genetic and physical studies involves two basic steps.
   a) both b) much c) a lot d) lots e) so
3. …… 1994, these researchers found a new method that uniformly extends and aligns large numbers of molecules.
   a) On b) In c) At d) Already e) Since
4. Plants have colonized virtually every habitat on the planet, from the …… deserts to the oceans.
   a) driest b) most dry c) more dry d) much dry e) many dry
5. Some weeks ago I was asked the following question: "Aristotle studied under Plato, …….?"
   a) doesn't he b) really c) wasn't he d) isn't it e) didn't he
6. Who ……. that the speed at which a galaxy is moving away from us is proportional to its distance?
   a) did found b) does find c) find d) do find e) found
7. Distances to nearby stars …….. measured by means of the parallax method.
   a) can b) is able to be c) are able to be d) can be e) is
8. The nearer …… , the brighter it will appear.
   a) a star is b) is a star c) a is star d) is star e) star is
9. The deepest parts of the oceans are the ocean trenches, …… are on average 100 km wide.
   a) who b) whose c) which d) what d) why
10. Scientists believe there ……... between 5 and 22 glacial periods during the last 2 million years.
    a) is b) are been c) are being d) have been e) had been
11. Stainless steels are produced …….. iron with chromium and sometimes also with nickel.
    a) in alloying b) to alloying c) with alloying d) by alloying e) so alloying
12. ……. telephone lines are good enough, portable computers can be connected to the telephone system anywhere in the world.
    a) Whereas b) Hence c) Notwithstanding d) Moreover e) As long as
13. ……. isotopes of an element contain the same nuclear charge, and their chemical properties are identical, they do not display the same physical properties.
    a) Yet b) Even though c) Despite d) Thus e) However
14. When …… the first oil well drilled in the U.S.A.?
    a) was b) has been c) could be d) will be e) are
15. Stem cells can, ……. other types of cells, grow into anything.
    a) although b) nevertheless c) since d) unlike e) yet
16. As everyone's DNA is significantly different, the forensic technique known as genetic fingerprinting is becoming …… important in identifying criminals.
    a) much b) a lot c) more and more d) most e) already
17. The height of waves and the distance between them are largely determined by wind ……. and the distance over which they have been transported.
    a) strong b) strongly c) strength d) stronger e) strengthen
18. What areas of science did Archimedes work …….. most?
    a) the b) very c) much d) a e) in
19. Protists are very small organisms, ranging from 0.00001 …….. 1 mm in length.

a) since b) until c) up to d) as far as e) till

20. A quadrilateral is …… plane figure with four sides.
a) whose b) those c) any d) all e) whole

The neutron

In the 1920s physicists thought that everything was made of just two components: electrons and protons. The prevailing theory was that, in each atom, lightweight negatively charged electrons whizzed around a tiny dense nucleus that held heavy positive protons and some more electrons. Then, in the early 1930s, came a surprise. Physicists found that alpha-particle radiation could induce samples of the light element beryllium to give off some other form of radiation – one exceptionally good at knocking protons out of other elements. In 1932 the English physicist James Chadwick, working at Cambridge, repeated these experiments and found that he could explain the effects if the alpha particles were knocking other particles – each about as heavy as a proton, but with no electric charge – out of the beryllium nuclei. These neutral particles could in turn knock protons out of other elements.

For a while Chadwick thought that the 'neutron' was not a fundamental particle, but a tightly bound electron and proton. But by 1934 measurements showed that the neutron was slightly too heavy for that. Physicists had to live with a new basic ingredient of matter. Atomic nuclei are made not of protons and electrons, but protons and neutrons. The various isotopes (or versions) of a particular element, which have the same chemistry but different weights, all contain the same number of protons but different numbers of neutrons.

This discovery helped to drive the furiously rapid advances in nuclear physics of the 1930s. The neutron is the key to the nuclear chain reactions that drive power stations and explode atomic bombs: neutrons fly out like shrapnel from each nucleus when it splits, hitting other nuclei and causing them to break up too. They also have less violent uses now: as probes of the structure of matter, undeflected by the charges around atoms because of their electrical neutrality.

1. What difference in weight is there between a neutron, on the one hand, and a tightly bound electron and proton, on the other.

a) A tightly bound electron and a proton are as heavy as a neutron.
b) A tightly bound electron and a proton are not quite as heavy as a neutron.
c) A neutron is much heavier than a tightly bound electron and a proton.
d) A tightly bound electron and a proton weigh half as much as a neutron.
e) A neutron weighs slightly over twice as much as a tightly bound electron and a proton.

2. What components make up an atom?

a) Electrons and protons.
b) Electrons, protons and neutrons.
c) Neutrons and protons.
d) Electrons and neutrons.
e) Beryllium, electrons, protons and neutrons.

3. Which of the following statements is, according to the information in the text, <u>False</u>?

a) Research in nuclear physics progressed very quickly between 1930 and 1940.
b) James Chadwick did not realise at once that the neutron was a fundamental particle.
c) In 1929 physicists still believed that electrons and protons were the only components things were made of.
d) The different isotopes of any given element, despite having the same chemistry, vary in weight.
e) Atomic nuclei are made up of two components, both of which are electrically charged.

4. Collisions between which of the following are crucial to a nuclear chain reaction?
a) Atoms and atomic nuclei.
b) Atoms and electrons.
c) Electrons and atomic nuclei.
d) Neutrons and alpha particle radiation.
e) Atomic nuclei and neutrons.

5. How could subjecting a sample of beryllium to alpha-particle radiation lead to protons being knocked out of some other elements?
a) Neutrons in the alpha-particle radiation could knock protons directly out of the atomic nuclei of the other elements.
b) The alpha-particle radiation could knock protons out of the beryllium nuclei, which could in turn knock protons out of the other elements.
c) The alpha–particle radiation could induce the beryllium nuclei to give off neutrons and these could then go on to knock protons out of the other elements.
d) The alpha-particle radiation could cause particles of light to be emitted from the beryllium nuclei, and these could in turn knock protons out of the other elements.
e) The alpha-particle radiation could neutralize the electric charge of the protons in the other elements, thus knocking them out.

Jumping genes

After gaining her PhD in botany at Cornell University, USA, in 1927, Barbara McClintock began to study the genetics of maize. At the time, most geneticists used the fruit fly as their 'model' organism, but maize was preferred at Cornell. The colour of the kernels on a cob of maize are a clear expression of its genetic inheritance, while the plant's large chromosomes, which carry the genes, are easier to study under the microscope. And the slow maturation of maize allows the researcher more time to reflect on a genetic experiment.

By 1931 McClintock had shown that the exchange of genes during the production of germ cells – known as meiosis – is accompanied by an exchange of chromosomal material. The experiments are regarded as a milestone in the history of genetics, since they establish the link between chromosomes and genetic inheritance.

But McClintock is probably better known for her work on 'jumping genes'. In 1941 she moved to the Cold Spring Harbor Laboratory in New York state, which was to become a famous gathering place for pioneers in molecular biology. Noting the occasional appearance of odd-coloured spots and splashes on the leaves and kernels of her maize plants, she began to wonder about mechanisms that controlled the genes for colour. She developed the idea that they were mobile genetic elements that could jump around the chromosome. When they jumped into a gene, they disrupted its switching on and off. The genome – the total complement of genetic material in a cell – was far more fluid than anyone had ever imagined.

When McClintock presented this work to the genetics community in 1951, she was met with blank stares and indifference – even whispers that she was a little mad. By the 1970s, however, McClintock's mobile genetic elements, named 'transposons', had been discovered in a number of organisms. She was rewarded for her pioneering work with the Nobel Prize for Physiology or Medicine in 1983.

1. When did McClintock demonstrate that genetic inheritance and chromosomes are linked?
a) Before 1927.
b) Between 1927 and 1931.

c) Between 1931 and 1941.
d) Between 1941 and 1951.
e) After 1951.

2. How did other scientists first react to McClintock's ideas on jumping genes?
a) They awarded the Nobel Prize for Physiology or Medicine to her.
b) They invited her to work in the Cold Spring Harbor Laboratory.
c) They rewarded her with a PhD at Cornell University.
d) They congratulated her on her discovery.
e) They did not take them seriously.

3. What work did McClintock present to the genetics community in 1951?
a) Work showing that genes contained elements that were more mobile than had previously been thought.
b) Pioneering work conducted on the genetics community.
c) Work showing that the genome contained much more fluid than researchers had hitherto believed.
d) Work revealing that meiosis and an exchange of chromosomal material occur at the same time.
e) Work demonstrating that maize is more suitable for research purposes than the fruit fly.

4. Why was maize preferred to the fruit fly as a 'model' organism at Cornell University?
a) The fruit fly has smaller chromosomes than maize and grows more slowly.
b) The fruit fly has larger chromosomes than maize and grows more quickly.
c) The fruit fly doesn't grow as quickly as maize and its chromosomes are larger.
d) Maize doesn't grow as quickly as the fruit fly and its chromosomes are larger.
e) Maize grows more slowly than the fruit fly and its chromosomes are not as big.

5. According to the idea developed by McClintock, what was the cause of the odd-coloured spots and splashes which sometimes appeared on the leaves and kernels of her maize plants?
a) McClintock herself, because she had devised a wonderful mechanism for controlling the genes for colour.
b) Mobile genetic elements switching cells on and off and thus changing their colour.
c) The total complement of genetic material in one cell flowing into another cell.
d) Chromosomes jumping around from one maize plant to another.
e) Transposons disrupting the functioning of the genes for colour.

Keys

Grammar questions :
1.c; 2.a; 3.b; 4.a; 5.e; 6.e; 7.d; 8.a; 9.c; 10.d; 11.d; 12.e; 13.b; 14.a; 15.d; 16.c; 17.c; 18.e; 19.c; 20.c.

The Neutron:
1. b; 2. b; 3. e; 4. e; 5. c.

Jumping genes:
1. b; 2. e; 3. a; 4. d; 5. e.