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| **Description : Sedes020mm** | **Institut des Langues Vivantes EPL BAC 1**  **2017-20188** **LANGL1871**  **EXAMEN 28/09/2017** | **NOM :**  **PRÉNOM :**  **NOMA :**  **Signature : BLEU** |

**Indications à suivre pour le remplissage des questionnaires**

Pour répondre, vous mettez une croix (û) dans la case correspondant à votre choix.

La case ne doit pas être complètement noircie sauf pour une correction.

Exemple: ¨ n 🗷

vide mauvaise réponse bonne réponse

Vous pouvez employer indifféremment un stylo ou un bic de couleur foncée.

N'employez pas de typex ni effaceur pour corriger.

1. **COMPLETE WITH THE MOST APPROPRIATE WORDS**

**Fill in the blanks with the most appropriate word. Only ONE option is correct.**

1. Utilities and grid operators have a tremendous challenge every day—to produce enough energy to meet the ever-fluctuating demands on our electric grid. During the day there is peak demand—people, businesses and machines pull energy from the grid. At night, the world slows down, and the grid can prepare for the next spikes in energy use. Over the decades, several different methods have been devised to capture and \_\_\_\_\_ energy so that it can be fed back to the grid when it’s most needed.

a. shape b. store c. release d. dump

2. There’s no evidence that Einstein had any \_\_\_\_\_ in 1917 of the implications of his work for making a beam of coherent light, let alone the extraordinary array of uses that might have. But that just goes to show once again how practically and unexpectedly fruitful ideas in fundamental science can be.

a. dredging b. string c. inkling d. coating

3. It defies conventional wisdom about semiconductors. It's baffling that it even works. It eludes physics models that try to explain it. This newly tested class of semiconductors is so easy to produce from solution that it could be painted onto surfaces to \_\_\_\_\_ our future in myriad colours shining from affordable lasers, LEDs, and even window glass.

a. hook up b. charge up c. light up d. chew up

4. Most scientists think that lightning originates from localized pockets of intense electric fields inside thunderstorms. However, these regions are too small to be detected easily by balloons and aircraft, and the act of measuring the fields can itself initiate lightning and distort results. Currently, scientists believe that the typical electric field needed at sea level to cause a(n) \_\_\_\_\_ is about 3 MV/m but no one has yet measured a field within a thundercloud that even approaches these values.

a. spark b. wire c. pattern d. drop

5. When did we stop thinking that sunset marked the end of the day? Not as long ago as you might think: I am old enough to remember staying on a family farm where evening light came only from kerosene lamps and a home-made diesel generator that charged a stack of clapped-out car batteries. The generator was too noisy to run at night, and by morning the batteries could manage only a \_\_\_\_\_ red glow. As a city child, I loved the romance of it all – the smell of kerosene still evokes warm memories – but Auntie Mabel no doubt couldn’t wait to get connected to the electrical grid. Proper electric light meant progress, status – and a lot less work.

a. dim b. minute c. narrow d. messy

6. Gravity is a force that plaques all efforts to build a structure that stands vertically off the ground. Gravity tends to pull objects towards the centre of the earth with a force proportional to the mass of the object. The challenge is to build stable structures that can perform the task they were designed for without succumbing to the many forces acting on them, such as wind and gravity. Houses are safe and stable structures designed to \_\_\_\_\_ wind and gravitational forces. The frame is the main structure that supports the building and can be considered as the skeleton of the house while the brick work is the skin and adds little to the stability of the structure.

a. withstand b. alleviate c. plague d. hover

7. Electrons may be hard to hold in place, but a new method could allow researchers to manipulate electron positions in a solid using acoustic waves. These waves could generate a periodic electric potential that could trap a \_\_\_\_\_ of electrons in much the same way that a periodic optical field can trap a \_\_\_\_\_ of atoms. The technique could be applied to both electrons and quasiparticles like excitons (electron-hole pairs), opening up a new route to studying the interactions of these particles with each other and with their environment. (find the same word twice)

a. beam b. dam c. crane d. lattice

8. The discovery that neutrinos have mass and can oscillate between different flavours was one of the major \_\_\_\_\_ in particle physics in the past decade, but there is much about these mysterious particles that we still do not understand

a. landslides b. breakthroughs c. nicknames d. ventures

9. Migratory birds often use warm, rising atmospheric currents to gain height with little energy expenditure when flying over long distances. In this week’s online version of the journal *Proceedings of the National Academy of Sciences,* the scientists demonstrated with mathematical models how glider pilots might be able to \_\_\_\_\_ more efficiently by adopting the learning strategies that birds use to navigate their way through thermals.

a. soar b. span c. clog d. stun

10. The [second law of thermodynamics](https://en.wikipedia.org/wiki/2Nd_Law_Of_Thermodynamics) states that the amount of entropy of a system will always increase, which means that entropy is a measure of disorder and the universe is always naturally moving toward a more disordered state. But anything that has entropy must also have a temperature, meaning that it should radiate energy. However, the whole point of the black hole is that it hoards everything so \_\_\_\_\_ that nothing gets out. So how could this be explained?

a. utterly b. tightly c. fairly d. lonely

11. Originally, Hawking visualized this as particle/antiparticle pairs popping in-and-out of existence, annihilating away to produce radiation. That oversimplified picture was qualitatively good enough to describe the radiation far from the black hole, but it \_\_\_\_\_ to be incorrect close to the event horizon. It's more accurate to think of the vacuum changing, and of the radiation as being emitted from wherever the curvature of space is relatively large: within a few radii of the black hole itself.

a. cancels out b. balances out c. turns out d. goes out

12. Recent experiments offer tentative support for time travel's feasibility—at least from a mathematical perspective. The study cuts to the \_\_\_\_\_ of our understanding of the universe, and the resolution of the possibility of time travel, far from being a topic worthy only of science fiction, would have profound implications for fundamental physics as well as for practical applications such as quantum cryptography and computing.

a. core b. stroke c. knob d. groove

13. We know from Isaac Newton and his law of gravitation that any two objects in the Universe \_\_\_\_\_ a force of attraction on each other. This relationship is based on the mass of the two objects and the distance between them. The greater the mass of the two objects and the shorter the distance between them, the stronger the pull of the gravitational forces they \_\_\_\_\_ on each other. (use the SAME word TWICE)

a. overlook b. exert c. outline d. encounter

14. Mathematical physicist and cosmologist [Stephen Hawking](https://www.sciencealert.com/physicist-stephen-hawking-dead-76-cambridge-motor-neurone-disease) was best known for his work exploring the relationship between black holes and quantum physics. A black hole is the \_\_\_\_\_ of a dying supermassive star that's fallen into itself; these small pieces left contract to such a small size that gravity is so strong even light cannot escape from them.

a. remnant b. instance c. device d. jigsaw

15. There’s no denying that the ancient art of [origami](https://www.sciencealert.com/this-origami-style-battery-could-double-the-life-of-wearable-gadgets) paper folding has given the world reams of brilliant miniature sculptures, and now NASA wants to take that \_\_\_\_\_ craftiness off-planet. The space agency is teaming up with crowdsourcing site Freelancer to find origami experts that can help it come up with a design for radiation shielding to protect future spacecraft from dangerous [galactic cosmic rays](https://www.sciencealert.com/scientists-are-developing-a-magnetic-shield-to-protect-astronauts-from-cosmic-radiation) (GCRs).

a. notorious b. intricate c. inflatable d. runaway

1. **COMPLETE WITH THE MOST APPROPRIATE WORDS**

**PASSAGE: Fill in the gaps with the most appropriate filler. Each word can only be used once.**

**aces - attending - attire - behaviour - bending - commuting - divide - load - make - off - physician - pulling - scientist - states - strain - through - times - who - wonders**

**APPLICATION AND LIMITATIONS OF HOOKE’S LAW**

by [justscience](http://www.justscience.in/author/justscience) 24 May,2017

Robert Hooke, an English (16) **\_\_\_\_\_\_\_\_**, gave the Hooke’s Law of elasticity in 1660. It (17) **\_\_\_\_\_\_\_\_** that for the relatively small deformations of an object, the size of the deformation or displacement is directly proportional to the deforming (18) **\_\_\_\_\_\_\_\_** or force. With these conditions, the object would return to its original size and shape with removal of the load

According to the Hooke’s law, the elastic (19)**\_\_\_\_\_\_\_\_**of solids can be explained by the fact that the small displacements (of molecules, atoms or ions) from their normal positions are proportional to the force which causes the displacement. The deforming force is applied (20) **\_\_\_\_\_\_\_\_** compression, stretching, squeezing, twisting or (21) **\_\_\_\_\_\_\_\_** a solid.

Hooke’s law explains that the applied force is equal to a constant (22) **\_\_\_\_\_\_\_\_** the change in length or displacement. F= kx Where, F is force, K is constant of proportionality and X is displacement.

Hooke’s law can also be explained in the terms of (23) **\_\_\_\_\_\_\_\_** and stress. The former is the deformation produced by the stress. And stress is the force on the unit areas within a material caused due to externally applied force.

Even though the direction of force isn’t established, a negative sign is always added. It is because of the restoring force which causes the displacement. (24) **\_\_\_\_\_\_\_\_** down a spring will make the spring extend downwards and the resulting force would be upwards. Thus, it is essential to (25) **\_\_\_\_\_\_\_\_** sure of the fact that the direction of the restoring force should be specified consistently while approaching elastic related mechanic problems.

1. **COMPLETE WITH THE MOST APPROPRIATE LINK WORDS**

**a. although b. despite c. due to d. in order to e. instead f. instead of**

**g. since h. thereby i. unless j. unlike k. until l. whatever**

**---(1)- --** those of a conventional transformer (which may couple 97%+ of the fields between windings), a Tesla coil's windings are "loosely" coupled, with a large air gap, and thus the primary and secondary typically share only 10–20% of their respective magnetic fields. **---(2)- --** a tight coupling, the coil transfers energy (via loose coupling) from one resonant circuit (the primary) to the other (the secondary) resonant at the same frequency, over a number of radio frequency cycles.

In the following example you can see how transistors work. A 9V battery connects to a [LED](http://www.build-electronic-circuits.com/what-is-an-led/) and a [resistor](http://www.build-electronic-circuits.com/what-is-a-resistor/). But it connects through the transistor. This means that no current will flow in that part of the circuit **---(3)-- -** the transistor turns ON.

To turn the transistor ON you need to apply 0.7V from base to emitter of the transistor. Imagine you have a small 0.7V battery. (In a practical circuit you would use resistors to get the correct voltage from **---(4)- --** voltage source you have)

When you apply the 0.7V battery from base to emitter, the transistor turns ON. This allows current to flow from the collector to the emitter. And **---(5)- --** turning the LED ON!

A capacitor is a device consisting of two conducting "plates" separated by an insulating material. When the plates have a potential difference between them, the plates will hold equal and opposite charges. **---(6)- --** the potential difference between the plates, there is an electric field between them. The energy stored in a capacitor can be calculated from either the energy stored in the electric field between the plates, or **---(7)-- -** from the separated equal and opposite charges on the separated plates of the capacitor.

Newton's [First Law of Motion](https://www.thoughtco.com/introduction-to-newtons-laws-of-motion-2698881) states that an object in motion tends to stay in motion **---(8)- --**  an external force acts upon it.

1. **COMPLETE WITH THE MOST APPROPRIATE VERB FORMS**

**Stephen Hawking's explosive new theory**

Prof Stephen Hawking has come up with a new idea to explain why the Big Bang of creation led to the vast cosmos that we **---(31)---** see today.

Astronomers can deduce that the early universe expanded at a mind-boggling rate because regions separated by vast distances have similar background temperatures.

They have proposed a process of rapid expansion of neighbouring regions, with similar cosmic properties, to explain this growth spurt which they call inflation.

But that left a deeper mystery: why did inflation occur in the first place?

Now New Scientist reports that an answer **---(32)---** by Prof Stephen Hawking of Cambridge University, working with Prof Thomas Hertog of the Astroparticle and Cosmology Laboratory in Paris.

Prof Hawking is best known for his attempts to combine theories of the very small, quantum theory, and that of gravity and the very big, general relativity, into a new theory, called quantum gravity.

Quantum mechanics is awash with strange ideas and can shed new light on inflation, which came in the wake of when the universe itself was around the size of an atom.

By quantum lore, when a particle of light travels from A to B, it does not take one path but explores every one simultaneously, with the more direct routes **---(33)---** more heavily.

This is called a sum over histories and Prof Hawking and Prof Hertog propose the same thing for the cosmos.

In this theory, the early universe **---(34)---** by a mathematical object called a wave function and, in a similar way to the light particle, the team proposed two years ago that this means that there was no unique origin to the cosmos: instead the wave function of the universe embraced a multitude of means to develop.

This is very counter intuitive: they argued the universe **---(35)---** in just about every way imaginable (and perhaps even some that are not). Out of this profusion of beginnings, like a blend of a God’s eye view of every conceivable kind of creation, the vast majority of the baby universes withered away to leave the mature cosmos that we can see today.

But, like any new idea, there were problems. The professors found that they **---(36)---** not explain the rapid expansion - inflation - of the universe, evidence of which is left behind all around us in what is called the cosmic microwave background, in effect the echo of the big bang, a relic of creation that can be measured with experiments on balloons and on space probes.

Now, in a paper in Physical Review Letters with Prof James Hartle of the University of California, Santa Barbara, they realized that their earlier estimates of inflation were wrong because they **---(37)---** through the connection between, on the one hand, their theoretical predictions and, on the other, our observations of the echo.

At first, they found that the most probable history of the cosmos had only undergone "a little bit of inflation at the beginning, contradicting the observations," said Prof Hertog. Now, after a correction to take account of how the data we have on inflation is based on only a view of a limited volume of the universe, they find that the wave function does indeed predict a long period of inflation.

"This proposal, with volume weighting, can explain why the universe **---(38)---**," Prof Hawking tells New Scientist. By taking into account that we have a parochial view of the cosmos, the team has come up with a radical new take on cosmology.

Most models of the universe are bottom-up, that is, you start from well-defined initial conditions of the Big Bang and work forward. However, Prof Hertog and Prof Hawking say that we **---(39)---** not and cannot know the initial conditions present at the beginning of the universe. Instead, we only know the final state - the one we are in now.

Their idea is therefore to start with the conditions we observe today - like the fact that at large scales one does not need to adopt quantum lore to explain how the universe (it behaves classically, as scientists say) - and work backwards in time to determine what the initial conditions might have looked like.

In this way, they argue the universe did not have just one unique beginning and history but a multitude of different ones and that it has experienced them all.

The new theory is also attractive because it fits in with string theory - the most popular candidate for a "theory of everything."

String theory **---(40)---** the existence of an" unimaginable multitude of different types of universes in addition to our own," but it does not provide a selection criterion among these and hence no explanation for why our universe is, the way it is", says Prof Hertog.

"For this, one needs a theory of the wave function of the universe."

And now the world of cosmology has one. The next step is to find specific predictions that can be put to the test, to validate this new view of how the cosmos came into being.

1. a) could b) will c) may d) can
2. a) has been proposed b) is proposed c) has proposed d) will be proposing
3. a) using b) be used c) being used d) to use
4. a) can describe b) can be described c) will be describing d) would describe
5. a) begins b) began c) has begun d) is beginning
6. a) could b) can c) would d) may
7. a) was not fully thought b) have not fully thought c) had not fully thought d) had not fully been thought
8. a) did inflate b) doesn’t inflate c) had inflated d) has been inflated
9. a) do b) have c) be d) did
10. a) allowed b) is allowing c) allows d) has been allowing

**V. CHOOSE THE MOST APPROPRIATE SENTENCES:**

**How Quantum Computers Work**

Will we ever have the amount of computing power we need or want? If, as Moore's Law states, the number of transistors on a microprocessor continues to double every 18 months, the year 2020 or 2030 will find the circuits on a microprocessor measured on an atomic scale. And the logical next step will be to create quantum computers, which will harness the power of atoms and molecules to perform memory and processing tasks. **---------------(1)---------------**

Today's computers work by manipulating bits that exist in one of two states: a 0 or a 1. Quantum computers aren't limited to two states; they encode information as quantum bits, or qubits, which can exist in superposition. Qubits represent atoms, ions, photons or electrons and their respective control devices that are working together to act as computer memory and a processor. **---------------(2)---------------**

This superposition of qubits is what gives quantum computers their inherent parallelism. According to physicist David Deutsch, this parallelism allows a quantum computer to work on a million computations at once, while your desktop PC works on one. A 30-qubit quantum computer would equal the processing power of a conventional computer that could run at 10 teraflops (trillions of floating-point operations per second). **---------------(3)--------------**

Quantum computers also utilize another aspect of quantum mechanics known as entanglement. One problem with the idea of quantum computers is that if you try to look at the subatomic particles, you could bump them, and thereby change their value. If you look at a qubit in superposition to determine its value, the qubit will assume the value of either 0 or 1, but not both (effectively turning your spiffy quantum computer into a mundane digital computer). To make a practical quantum computer, scientists have to devise ways of making measurements indirectly to preserve the system's integrity. Entanglement provides a potential answer. In quantum physics, if you apply an outside force to two atoms, it can cause them to become entangled, and the second atom can take on the properties of the first atom. So if left alone, an atom will spin in all directions. The instant it is disturbed it chooses one spin, or one value; and at the same time, the second entangled atom will choose an opposite spin, or value. **---------------(4)--------------**

If functional quantum computers can be built, they will be valuable in factoring large numbers, and therefore extremely useful for decoding and encoding secret information. If one were to be built today, no information on the Internet would be safe. Our current methods of encryption are simple compared to the complicated methods possible in quantum computers. Quantum computers could also be used to search large databases in a fraction of the time that it would take a conventional computer. **---------------(5)------------**

1. Quantum algorithms are often non-deterministic, in that they provide the correct solution only with a certain known probability.
2. Other applications could include using quantum computers to study quantum mechanics, or even to design other quantum computers.
3. Because a quantum computer can contain these multiple states simultaneously, it has the potential to be millions of times more powerful than today's most powerful supercomputers.
4. The calculation ends with a measurement, collapsing the system of qubits into one of the 2n pure states, where each qubit is zero or one.
5. This allows scientists to know the value of the qubits without actually looking at them.
6. A Turing machine can simulate these quantum computers, so such a quantum computer could never solve an undecidable problem like the halting problem.
7. Quantum computers will be able to perform certain calculations significantly faster than any silicon-based computer.
8. The most advanced quantum computers have not gone beyond manipulating more than 16 qubits, meaning that they are a far cry from practical application.
9. Today's typical desktop computers run at speeds measured in gigaflops (billions of floating-point operations per second).
10. The capacity of a quantum computer to accelerate classical algorithms has rigid limits — upper bounds of quantum computation's complexity.

**VIII. Select the statements which best correspond to the text you have heard. You will hear the text twice.**

Can we expect AI to improve?

AI is no longer a far-fetched concept that we only see in films.

Should we be afraid about AI taking over our lives?

Although it is developing fast, it’s still in its **\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_**.

AI is a catch-all term for a **\_\_\_\_\_\_\_\_** of recent technologies such as digital assistants.

Then there’s machine learning where computers learn to do what humans do. This is used in **\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_** and tensorflow for example.

AI refers to computer programs that perform tasks they’ve learned.

AI is getting smarter (computers beat humans at poker) and is found in every domain, from **\_\_\_\_\_\_\_\_** to art.

This year, AI has shifted from **\_\_\_\_\_\_\_\_**machine learning to on-device AI computing with mobile processors designed by **\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**. But there are very few examples of those new apps.

In 2018, we expect to execute mobile processing on mobile devices because it makes AI faster, uses less power and keeps your **\_\_\_\_\_\_\_\_** on your phone, which is better for your **\_\_\_\_\_\_\_\_**.

2:36

<https://www.youtube.com/watch?v=inrYCH_9dO8>

**IX. Fill in the blanks according to what you have heard. You will hear each sentence twice.**

1. A defect was found in the water-cooling **\_\_\_\_\_\_\_\_**.
2. Remote sites can be tracked using a(n) **\_\_\_\_\_\_\_\_** monitoring system.
3. Solar panels are used by many countries as part of a strategy to reduce their reliance on **\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**.
4. Whichever kind of **\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_**or service you require – we have what you need to maximize your return on investment.
5. This stick is used for **\_\_\_\_\_\_\_\_** the amount of oil in the engine.
6. The software uses grey-level differences for the image segmentation for each of the three different colour **\_\_\_\_\_\_\_\_**.
7. The wave motion is then manifested by undulations of **\_\_\_\_\_\_\_\_**of constant density within the fluid.