

I. Vocabulary: Choose the answer that best matches the meaning of each bold word or phrase (20%)

1. Fungal spores, lighter and smaller than all plant seeds, are mainly **dispersed** from their parent by wind.
A. spread widely B. delivered C. made more stable D. collected
2. The **devastating** earthquake and tsunami in Fukushima ruined most of the buildings there and killed thousands of lives.
A. foreboding B. damaging and harmful C. bitter D. intimidating
3. The philosophy of Barack Obama's foreign policy has been **postulated** as "The Obama Doctrine" for the principles it advocates.
A. disputed B. dismissed C. assumed D. scorned
4. Debates have been stirred on whether inmates should become the **integral** part of the social workforce.
A. constituent B. honest C. extrinsic D. outward
5. A mistake that was **inadvertently** made by the clerk has cost him his job.
A. intentionally B. deliberately C. carefully D. accidentally
6. It is **mandatory** that all students, regardless of degree program, take at least five core courses offered by the university.
A. compulsory B. optional C. elective D. voluntarily
7. The Bumrungrad Hospital, one of the leading international hospitals in the world, is known for treating patients with **state-of-the-art** technology.
A. very expensive B. the most advanced C. fashionable D. national treasure
8. Clinicians argue that **rigorous** scientific research is not necessary on alternative medicine, but researchers think otherwise.
A. powerful and forceful B. scrupulously accurate C. lenient D. strenuous
9. Under **optimal** temperature and growth conditions, certain bacteria can have a generation of 15-20 minutes.
A. unfavorable B. adverse C. ideal D. disagreeable
10. The word "Linsanity" is now in most NBA fan's **vernacular** as a result of Jeremy Lin's stunning breakout performance in these past few weeks.
A. collection B. everyday language C. souvenir D. password

II. Sentence Completion: Choose the word that best completes the sentence (10%)

11. Mary is _____ and would never want to be closed in a small room or space.
A. xenophobic B. homophobic C. acrophobic D. claustrophobic
12. Studies show that _____ children are at high risk for a number of conditions, including overweight, high blood pressure and high cholesterol.
A. slim B. anorexic C. obese D. malnourished
13. The ways web-based social media impact our lives are rather different from the ways traditional media do, the most notable being that social media allow communication to become more _____.
A. interactive B. hyperactive C. stagnant D. torpid
14. According to the International Labor Organization, the recent economic decline is likely to increase the unemployment rate for women as well as to make gender _____ in economic policies more visible.
A. equality B. discrepancy C. disparity D. similarity
15. Children with disabilities are discriminated against and treated as burden mainly due to _____ understanding by society and a lack of social supports.
A. sufficient B. ample C. disinterested D. inadequate

III. Written Expression: Identify the underlined word or phrase that must be changed in order for the sentence to be correct (14%)

16. My (A) strong experience, (B) good training, and (C) am a hard worker (D) qualify me for this position.
17. In (A) recent years, some educators argue that it is better for undergraduate students (B) to focus on only one or two subjects than to study a (C) diversified range of different (D) subject.
18. The furniture and refrigerator were (A) delivered (B) promptly to my home, but they were not the style I (C) ordered, and the (D) price was not right either.

19. The saltwater (A) crocodile, the largest of all living (B) reptiles, can travel long (C) distances at sea and is capable of killing any animal that (D) enter its territory.
20. If you are (A) assigned a specific topic for a research paper, you can begin (B) by going to the library to look for (C) informations that (D) is relevant to the topic.
21. According to scientists, if a woman's waist is 70 percent as wide as her (A) hips, she (B) viewed as attractive by most men because the evolution of the brain (C) associates this body figure (D) with fertility.
22. Even though some companies view bribery (A) as illegal, (B) other tolerate it because it is a good way to speed up the (C) completion of a deal and (D) prevent harassment.

IV. Cloze Test: Choose the best answer for each missing word or phrase in the following passages (20%)

On the day of Taiwan's presidential election, hundreds of millions of ethnic Chinese worldwide watched the ballot count on TV and the Internet. Taiwan is the sole ethnic Chinese society (23) a second democratic turnover of power. Ethnic Chinese communities around the world (24) their hopes on this crucial political experiment. By succeeding, we can make unparalleled contributions to the democratic development of all ethnic Chinese communities. This responsibility is (25) to fulfill. The new administration's most urgent task is to lead Taiwan through the daunting challenges from globalization. The world economy (26) profoundly, and newly emerging countries are arising rapidly. We must upgrade Taiwan's international (27) and recover lost opportunities. The uncertainty of the current global economy poses as the main challenge to the revitalization of Taiwan's economy. Yet, we firmly believe that, with right policies and steadfast determination, our goals are (28) our grasp. (Source: President Ma's Inaugural Address in 2008)

23. A. to complete B. has completed C. completed D. to completing
24. A. laid B. is laying C. have laid D. will be laying
25. A. yours B. ours C. theirs D. them
26. A. change B. is changing C. had changed D. changed
27. A. competition B. competitiveness C. competitive D. competitor
28. A. beyond B. under C. next to D. within

The cinema offers a number of possible pleasures. One is scopophilia (a pleasure in looking). There are circumstances in which looking (29) is a source of pleasure, just as, in the reverse formation, there is pleasure in being looked at...[Freud] associated scopophilia with taking other people as objects, (30) them to a controlling and curious gaze... The camera satisfies a primordial wish (31) pleasurable looking, but it also goes further: developing scopophilia (32) its narcissistic aspect. (source: excerpt from "Visual Pleasure and Narrative Cinema" by Luara Mulvey)

29. A. itself B. at it C. forward to D. after
30. A. is subjecting B. subjecting C. subjects D. subjected
31. A. in B. at C. to D. for
32. A. in B. at C. to D. for

V. Reading Comprehension: Choose the best answers to the following questions (36%)

In a recent experiment, scientists asked a group of prescreened people to look at a set of gray patterns and try to visualize color. Eleven members of the group had been identified as highly susceptible to hypnosis while seven of the subjects were not susceptible. Hypnosis is a trance-like state characterized by heightened focus, concentration, and inner absorption, according to the Mayo Clinic. About 10 percent of people worldwide are highly susceptible to hypnosis while 10 percent are not influenced at all. The remaining 80 percent—the majority of the population—are moderately susceptible, said study co-author William McGeown, a neuroscientist at the U.K.'s Hull University. The new study found that all the subjects who were easily hypnotized reported seeing a range of colors even while not under hypnosis, McGeown said. The scientists didn't just take their word for it—MRI scans showed that the parts of the subjects' brains linked to color perception lit up when they saw the imaginary hues. "We can see changes in these color-sensitive regions of their brains, which they have no way of faking," said McGeown, who published the study with colleagues in the December issue of the journal *Consciousness and Cognition*.

The new study also found that being under hypnosis enhanced color hallucination in susceptible subjects. But those who were not susceptible to hypnosis could not hallucinate color with or without hypnosis. Stephen Kosslyn, a psychologist at Stanford

University, said the results reinforce his team's earlier research. In 2000, Kosslyn and colleagues published one of the first studies on hallucinating color. Their experiment asked highly susceptible people under hypnosis to imagine gray squares as being in color. That study, which used PET scans of the subjects' brains, also found that the subjects activated parts of their brains associated with color perception. The new study confirms a similar finding with MRI scans, which are more often favored in today's experiments because they provide better spatial resolution, co-author McGeown said.

Ultimately, the hallucination research may help medical professionals who use hypnosis to treat a range of conditions, from phobias to pain, McGeown noted. That's because, despite its medical use, many people are fearful of the procedure. The new research shows that suggestion can be almost as powerful a tool, which means there may be a less intimidating alternative for people fearful of hypnosis, he said. "Psychological therapies which consist of making suggestions to a patient—even in the absence of hypnosis—may help with their problem substantially."

(Source: "People Can Hallucinate Color at Will" by Christine Dell'Amore in *National Geographic News*, published December 7, 2011)

33. The word "susceptible" in this passage is closest in meaning to
- A. unresistant
 - B. invulnerable
 - C. unexposed
 - D. doubtful
34. Which of the following is NOT one of the characteristics of hypnosis?
- A. The subject is put into a sleeplike state
 - B. Hypnosis is a state of mental concentration
 - C. A hypnotized mind is judging and critiquing.
 - D. None of the above
35. Which of the following statements is NOT true?
- A. Subjects who are susceptible to hypnosis can hallucinate color.
 - B. Subjects who are unsusceptible to hypnosis can visualize color when being under hypnosis.
 - C. Only MRI scans were used in the experiment conducted by William McGeown and his partner.
 - D. The parts of the brain that respond to color perception are activated when the subjects are hallucinating color.
36. According to McGeown, the findings of hallucination research may be of help to people with
- A. irrational fear of a specific object or activity
 - B. migraine
 - C. fever
 - D. A and B only
37. Which of the following statements best summarizes the central idea of this article?
- A. Hypnosis can help people with their problems.
 - B. Some people are fearful of hypnosis
 - C. Only a portion of people are susceptible to hypnosis.
 - D. People can hallucinate color just with the power of suggestion.

"Green" has become a popular English phrase. It means that something is good for the environment. Customers are looking for products that are "natural," "pure," and "made from recycled materials." They feel good about helping the Earth and about buying food and cosmetics that are healthier for their bodies. Anita Roddick sensed this when she founded The Body Shop in 1976. She advertised cosmetics that were "100 percent pure" and boasted that The Body Shop's products were not tested on animals. Also, she said The Body Shop did not take unfair advantage of the workers in poor countries.

For some people, this sounded too good to be true. In 1994, reporter Jon Entine wrote a famous magazine article disputing Roddick's claims. He said that The Body Shop cosmetics were actually only one percent pure. Entine also pointed out that most of the ingredients in The Body Shop's product were, indeed, tested on animals. This prompted Roddick to change the phrase on her cosmetics labels. Instead of "not tested on animals," it became "against animal testing." Later, other critics joined in. The London chapter of Greenpeace accused The Body Shop of exploiting poor workers.

Today many other "green" companies face similar criticism. Are products marketed as "green" really good for environment, or

do producers simply claim that they are so they can make more money? It's a tough question. Thanks to writers such as Entine, however, one thing is certain: They are less likely to trust the manufacturer's word.

(Source: "The Green Myth" in *Reading for the Real World*, Campus Publishing, 2009)

38. According to the passage, the word "green" has become associated with products
- A. that are not greasy and look fresh
 - B. that are friendly to the environment
 - C. that can be easily absorbed by the body
 - D. All of the above
39. Which of the following claims of The Body Shop was NOT disputed by Jon Entine?
- A. The Body Shop cosmetics did not exploit workers in poor countries.
 - B. The Body Shop cosmetics were not tested on animals.
 - C. The Body Shop cosmetics were 100% pure.
 - D. None of the above
40. Which of the following statements best summarizes the main idea of the article?
- A. Customers should never trust the manufacturers because they are dishonest.
 - B. Green advertising claims could be misleading.
 - C. "Green" is a good marketing strategy to sell products.
 - D. False advertising should be punished.
41. Which of the following statement would the writer of this passage probably agree with?
- A. We should stop buying "green" products because none of them is really "green."
 - B. Anita Roddick has abused the trust of her customers.
 - C. Writers such as Jon Entine work to ruin manufactures' reputation.
 - D. All products are bad for environment.

About a year ago I was diagnosed with cancer. I had a scan at 7:30 in the morning, and it clearly showed a tumor on my pancreas. I didn't even know what a pancreas was. The doctors told me this was almost certainly a type of cancer that is incurable, and that I should expect to live no longer than three to six months. My doctor advised me to go home and get my affairs in order, which is doctor's code for prepare to die. It means to try to tell your kids everything you thought you'd have the next 10 years to tell them in just a few months. It means to make sure everything is buttoned up so that it will be as easy as possible for your family. It means to say your goodbyes. I lived with that diagnosis all day. Later that evening I had a biopsy, where they stuck an endoscope down my throat, through my stomach and into my intestines, put a needle into my pancreas and got a few cells from the tumor. I was sedated, but my wife, who was there, told me that when they viewed the cells under a microscope the doctors started crying because it turned out to be a very rare form of pancreatic cancer that is curable with surgery. I had the surgery and I'm fine now.

This was the closest I've been to facing death, and I hope it's the closest I get for a few more decades. Having lived through it, I can now say this to you with a bit more certainty than when death was a useful but purely intellectual concept:

Your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma — which is living with the results of other people's thinking. Don't let the noise of others' opinions drown out your own inner voice. And most important, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary.

When I was young, there was an amazing publication called *The Whole Earth Catalog*, which was one of the bibles of my generation. It was created by a fellow named Stewart Brand not far from here in Menlo Park, and he brought it to life with his poetic touch. This was in the late 1960's, before personal computers and desktop publishing, so it was all made with typewriters, scissors, and polaroid cameras. It was sort of like Google in paperback form, 35 years before Google came along: it was idealistic, and overflowing with neat tools and great notions.

Stewart and his team put out several issues of *The Whole Earth Catalog*, and then when it had run its course, they put out a final issue. It was the mid-1970s, and I was your age. On the back cover of their final issue was a photograph of an early morning country road, the kind you might find yourself hitchhiking on if you were so adventurous. Beneath it were the words:

"Stay Hungry. Stay Foolish." It was their farewell message as they signed off. Stay Hungry. Stay Foolish. And I have always wished that for myself. And now, as you graduate to begin anew, I wish that for you.

Stay Hungry. Stay Foolish.

(Source: Stanford commencement address delivered by **Steve Jobs** on June 12, 2005)

42. Which of the following statements is/are true about Steve Jobs?
- A. He did not seem to be familiar with some body organs before his illness.
 - B. He was told that he would be dead in less than a year.
 - C. The tumor he got could be removed with surgery
 - D. All of the above
43. The phrase "buttoned up" is closest in meaning to
- A. kept silence
 - B. finished
 - C. loosened up
 - D. tied down
44. Why did Steve Jobs' doctors react so strongly to the fact that Jobs' cancer was actually curable?
- A. They were upset over the misdiagnosis they had made.
 - B. They were worried that Job would sue them for medical malpractice.
 - C. They were surprised that they could keep their patient alive.
 - D. None of the above
45. In his speech, what advice did Jobs give to Stanford students?
- A. Do not try to live up to others' expectation
 - B. Do not let other people speak louder than you do
 - C. Always put yourself in others' shoes
 - D. It is a waste of time to live with others
46. What did Jobs probably mean by "Stay Hungry. Stay Foolish"?
- A. He meant that it is good to eat less and study less.
 - B. He meant that it is important to always have the curiosity for knowledge.
 - C. He meant that without enough food one can never be smart.
 - D. He meant that it is foolish to stay hungry.

Tonight is a particular honor for me because, let's face it, my presence on this stage is pretty unlikely.

My father was a foreign student, born and raised in a small village in Kenya. He grew up herding goats, went to school in a tin-roof shack. His father, my grandfather, was a cook, a domestic servant to the British. But my grandfather had larger dreams for his son. Through hard work and perseverance my father got a scholarship to study in a magical place, America, that's shown as a beacon of freedom and opportunity to so many who had come before him. While studying here my father met my mother. She was born in a town on the other side of the world, in Kansas.

My parents shared not only an improbable love; they shared an abiding faith in the possibilities of this nation. They would give me an African name, Barack, or "blessed," believing that in a tolerant America, your name is no barrier to success. They imagined me going to the best schools in the land, even though they weren't rich, because in a generous America you don't have to be rich to achieve your potential.

They're both passed away now. And yet I know that, on this night, they look down on me with great pride. And I stand here today grateful for the diversity of my heritage, aware that my parents' dreams live on in my two precious daughters. I stand here knowing that my story is part of the larger American story, that I owe a debt to all of those who came before me, and that in no other country on Earth is my story even possible.

Tonight, we gather to affirm the greatness of our nation not because of the height of our skyscrapers, or the power of our military, or the size of our economy; our pride is based on a very simple premise, summed up in a declaration made over two hundred years ago: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable rights, that among these are life, liberty and the pursuit of happiness."

That is the true genius of America, a faith in simple dreams, an insistence on small miracles; that we can tuck in our children at night and know that they are fed and clothed and safe from harm; that we can say what we think, write what we think, without hearing a sudden knock on the door; that we can have an idea and start our own business without paying a bribe; that we can participate in the political process without fear of retribution; and that our votes will be counted -- or at least, most of the time.

And fellow Americans, Democrats, Republicans, independents, I say to you, tonight, we have more work to do..... more work to do, for the workers I met in Galesburg, Illinois, who are losing their union jobs at the Maytag plant that's moving to Mexico, and now they're having to compete with their own children for jobs that pay 7 bucks an hour; more to do for the father I met who was losing his job and choking back the tears wondering how he would pay \$4,500 a month for the drugs his son needs without the health benefits that he counted on; more to do for the young woman in East St. Louis, and thousands more like her who have the grades, have the drive, have the will, but don't have the money to go to college.

People don't expect -- people don't expect government to solve all their problems. But they sense, deep in their bones, that with just a slight change in priorities, we can make sure that every child in America has a decent shot at life and that the doors of opportunity remain open to all.

(Source: Excerpt from **Barack Obama's** Democratic Convention Speech delivered on July 27, 2004)

47. Which of the following is/are mentioned in Obama's speech?
- A. Interracial heritage
 - B. Education
 - C. Opportunity
 - D. All of the above
48. Obama's parents thought their son's African name would not hinder his success because
- A. they believed he could go to the best school.
 - B. America is a racially tolerant country
 - C. Obama is blessed by his name
 - D. one of his parents was born in America
49. Which of the following statements would Obama probably have faith in?
- A. All men are created equal
 - B. One does not have to be rich to achieve one's dream in America
 - C. There is no poverty in America
 - D. A and B only
 - E. B and C only
50. What are some of the social causes that Obama would most probably support according to the passage?
- A. Encouraging interracial marriage
 - B. Offering financial aids to low income students
 - C. Lowering the unemployment rate
 - D. A and B only
 - E. B and C only

單選題（每題 3 分，共計 30 分）

- 下列敘述何者為正確？
 - 傳訊 RNA (messenger RNA, mRNA) 具有反密碼子(anticodon)。
 - 細胞內具有消化作用的胞器是粒線體(mitochondria)。
 - 有絲分裂(mitosis)前期會進行 DNA 複製。
 - 物質藉由滲透作用(osmosis)通過細胞膜不需消耗 ATP。
- 關於交感(sympathetic)神經系統與副交感(parasympathetic)神經系統比較，下列敘述何者為正確？
 - 交感神經的節前神經纖維(preganglionic fiber)會分泌正腎上腺素(norepinephrine)。
 - 排尿的動作是因副交感神經興奮所致。
 - 交感神經會刺激腎上腺皮質(adrenal cortex)分泌腎上腺素(epinephrine)。
 - 戰鬥或逃跑(fight or flight)的反應包括瞳孔放大和骨骼肌血流增加。

(A) a+c (B) b+d (C) a+b (D) c+d
- 下列何者發生在腿部肌肉時，才能維持站立的姿勢？
 - 肌肉疲乏(muscle fatigue)
 - 等張收縮(isotonic contraction)
 - 等長收縮(isometric contraction)
 - 不收縮
- 下列激素的作用，何者敘述為錯誤？
 - 胰島素(insulin)可降低血糖，亦會刺激肝醣、脂肪和蛋白質的合成。
 - 副甲狀腺素(parathyroid hormone)會促進血鈣濃度增加。
 - 褪黑激素(melatonin)於夜間的分泌最少，所以有助睡眠。
 - 體制素(somatostatin)會抑制生長激素(growth hormone)的分泌。
- 關於心音(heart sounds)，下列敘述何者為正確？
 - 第一心音(first sound)是由半月瓣(semilunar valves)關閉所產生。
 - 心室收縮期結束時會產生第一心音。
 - 第二心音會緊接著心電圖(electrocardiogram, ECG)的 QRS 波之後發生。
 - 當心室開始舒張時會聽到第二心音(second sound)。
- 某物質可由腎絲球過濾，且會被腎小管分泌，則此物質的腎清除率應該：
 - 等於菊糖(inulin)清除率
 - 大於菊糖(inulin)清除率
 - 小於菊糖(inulin)清除率
 - 等於腎絲球過濾率(glomerular filtration rate, GFR)
- 下列敘述何者為錯誤？
 - 膽汁(bile)是由膽囊(gallbladder)製造並分泌。
 - 胃會分泌內在因子(intrinsic factor)，可促進腸道吸收維生素 B12，幫助預防惡性貧血。
 - 澱粉經由唾液澱粉酶(salivary amylase)的作用在口腔中即開始消化。
 - 在胃功能調節的腸期(intestinal phase)，胃的活動會受到神經反射及十二指腸分泌的激素所抑制。
- 根據法蘭克-史達林定律(Frank-Starling Law)，心室收縮的強度是：
 - 與心室收縮末期容積成正比
 - 與心室收縮末期容積成反比
 - 與心室舒張末期容積成正比

- (D) 與心室舒張末期容積成反比
9. 關於動作電位(action potential)，下列敘述何者為錯誤？
- (A) 符合全或無(all or none)定律。
 - (B) 再極化(repolarization)過程是因鉀離子(K^+)大量流出細胞所致。
 - (C) 具有絕對不反應期(absolute refractory period)。
 - (D) 在所有的神經纖維(nerve fibers)上均進行跳躍式傳導(salutatory conduction)。
10. 關於布洛卡氏區(Broca's area)，下列敘述何者為正確？
- (A) 位於右大腦半球(right hemisphere)。
 - (B) 是語言理解(comprehension)區。
 - (C) 位於大腦的顳葉(temporal lobe)。
 - (D) 與非流利性失語症(nonfluent aphasia)有關。

名詞解釋（每題 6 分，共計 30 分）

1. 次級主動運輸(secondary active transport)
2. 眼睛的調適作用(accommodation)
3. 運動單位(motor unit)
4. 肺活量(vital capacity)
5. 心輸出量(cardiac output)

問答題（共計 40 分）

1. 請說明腎素-血管收縮素-醛固酮系統(Renin-Angiotensin-Aldosterone System)的作用機制及生理功能。(15%)
2. 請比較鈣離子參與骨骼肌和平滑肌收縮的異同，包括鈣離子來源及釋出時機、以及如何啟動收縮。(15%)
3. 請說明下視丘(hypothalamus)如何調控腦下腺後葉(posterior pituitary)釋放激素。(10%)

高雄醫學大學 101 學年度研究所招生考試

系所：醫學系生物化學科、生理學科、基因體醫學科、藥理學科、醫研所基礎一般（共同基礎組）碩士班
科目：生物化學

I. 解釋名詞：(10%)

1. allosteric enzyme
2. leptin
3. cori cycle
4. single nucleotide polymorphism (SNP)
5. urea cycle

II. 說明下列科學家的貢獻：(8%)

1. Linus Pauling
2. Frederick Sanger
3. Francois Jacob
4. Joseph Goldstein

III. 簡答題：(42%)

1. 舉例並說明二種研究 protein-protein interaction 的方法? (4%)
2. 分別說明: (1) CNBr (2) trypsin (3) Endoproteinase LysC 可以切特定 peptide bond 的位置? (3%)
3. 蛋白質醣化作用(glycosylation)主要分那兩類? 參與的胺基酸與醣類分別是那些, 請分別說明? (6%)
4. 舉例三種基因選殖時(gene cloning)常用的酵素? 個別解釋其用途? (6%)
5. 說明 cDNA library 和 DNA library?(4%)
6. 酵素可以分為幾大類? 其分別功能為何? (6%)
7. 膽固醇在人體有那些重要生化功能? (4%)
8. 分別說明下列藥物(1) Ibuprofen (2) Lovastatin (3) Allopurinol, 可以專一性的抑制那一酵素? (3%)
9. 在 RNA editing 過程, ployA 的功能是? (2%)
10. 設計 2 種可以證明 DNA 複製(DNA replication)是單方向複製 (unidirectional replication)或是雙方向複製 (bidirectional replication)的方法, 要說明原理與如何判別何種複製? (4%)

III. 問答題：(40%)

1. 說明電子傳遞鏈(electron transport chain)的傳遞順序? 下列這些抑制劑 (1) rotenone (2) antimycin A (3) CN⁻ (4) CO, 分別抑制在電子傳遞鏈的那個位置? (10%)
2. 何謂酮體(ketone bodies)? 試畫出其結構? 為什麼糖尿病人(diabetes mellitus)如果血糖控制不好, 很容易造成酮體上升? (10%)
3. 當人體血糖降低時, glucagon 如何調控肝醣(glycogen)的分解, 維持血糖的濃度? (10%)
4. 有一研究生純化出一化學物質; 並算出此物質之分子量大約 252.3, 利用質譜儀推測其結構可能是多環類芳香族物質 C₂₀H₁₂ (polycyclic hydrocarbon), 所以他便設計一連串實驗證明此物質是致癌物質(Carcinogen), 試問此研究生可能設計那些實驗證明此物質是致癌物質? (10%)

I. Multiple choices (45%, each item is one point)

- The molecular weight of glucose is 180, which of the followings are true ?
 - 1 mole of glucose is 180 g
 - 1 mole of glucose contains 6×10^{23} glucose molecules
 - 1 g of glucose contains 6×10^{23} glucose molecules
 - 1 L of 1 M glucose solution contains 6×10^{23} glucose molecules
 - 1 mL of 1 M glucose solution contains 180 g of glucose
- Shuttle vector is a plasmid that is widely used for modern genetic engineering. Which elements are essential for a shuttle vector to propagate, generation by generation, in bacteria ?
 - Multiple cloning sites
 - Poly A signal
 - Prokaryotic replication origin
 - Eukaryotic replication origin
 - Antibiotics resistant gene
- The principle of “nucleic acid hybridization” is applied in:
 - Southern blot
 - Northern blot
 - Western blot
 - Polymerase chain reaction
 - cDNA microarray
- For “wobble position”, which of the followings are true?
 - The first base on a codon
 - The third base on a codon
 - The first base on an anticodon
 - The third base on an anticodon
 - The reason for fewer numbers of transfer RNA than those of codon
- Which are true for DNA replication in a human cell?
 - DNA replicates in 5' to 3' on leading strands
 - DNA replicates in 3' to 5' on lagging strands
 - Bidirectional replication means that DNA replicates in both directions of 5' to 3' and 3' to 5'
 - Okazaki fragment is synthesized during lagging strand replication
 - Each chromosome replicates from single origin
- What kinds of gene mutation will change the resulted protein sequence?
 - Frameshift mutation
 - Missense mutation
 - Neutral mutation
 - Nonsense mutation
 - Silent mutation

7. Which of the followings can regulate gene transcription?
- Enhancer
 - MicroRNA
 - Promoter
 - RNA polymerase
 - Transcription factor
8. The human “X” protein consists of 1000 amino acids, which are NOT possible for the “X” gene?
- The gene length is 3000 base pairs
 - The total exon length is 3000 base pairs
 - The length of coding sequence is 3000 base pairs
 - The initiation codon locates on the second exon
 - The initiation codon locates on the second intron
9. Which sequences/elements can be recognized by ribosomes during translation?
- Shine-Dalgarno sequence
 - Kozak sequence
 - IRES
 - Okazaki fragment
 - TATA box

II. Matching (29%, choose the most suitable one for each molecule or species)

1. Please choose the most appropriate item from the right panel for each RNA (12%)

<u>RNA</u>	<u>Function</u>
1. Messenger RNA	A. Chromosome end elongation
2. Micro RNA	B. Messenger RNA splicing
3. Ribosomal RNA	C. Protein secretion
4. Ssmall nuclear RNA	D. Protein synthesis
5. Telomerase RNA	E. Regulation of gene expression
6. Transfer RNA	F. DNA replication

2. The following proteins are involved in DNA replication, please chose the corresponding function from the table below for each protein (12%)

- Helicase
- Primase
- RPA
- PCNA
- DNA polymerase α
- DNA polymerase δ

<u>Function</u>
A. Catalyzing the formation of phosphodiester bonds
B. Single-strand DNA binding protein
C. Unwinding double-strand DNA
D. An accessory & stabilizing factor of DNA polymerization complex
E. Oligo-ribonucleotide synthesis
F. Initial DNA synthesis
G. Proceeding DNA synthesis
H. Breaking DNA, dispelling the tension, and resealing the strand ahead of a DNA replication growing fork

3. Please choose the correct genome size for each species (5%)

<u>Species</u>	<u>Genome size</u>
1. <i>Caenorhabditis elegans</i>	A. 1.0×10^6
2. <i>Drosophila melanogaster</i>	B. 4.2×10^6
3. <i>Escherichia coli</i>	C. 1.3×10^7
4. <i>Homo sapiens</i>	D. 8.0×10^7
5. <i>Saccharomyces cerevisiae</i>	E. 1.4×10^8
	F. 1.2×10^9
	G. 3.3×10^9

III. Definition (26%, briefly explain the following terms, 2 points each)

1. Melting temperature
2. Complementation
3. Euchromatin and heterochromatin
4. Nucleosome
5. TATA box
6. RNA interference
7. Operon
8. Transposon
9. Cistron
10. Crossing-over
11. Allele
12. Poly A signal
13. Imprinting

(A) 問答題

1. TNF α 及其 monoclonal antibody 之免疫藥理作用而言： (10%)
 - a) TNF α 之化學特性及主要細胞來源為何?
 - b) TNF α monoclonal antibody 之作用點或結合為何?
 - c) TNF α monoclonal antibody 之臨床用途為何?
 - d) 列舉 TNF α monoclonal antibody 之臨床藥品。
 - e) 列舉抑制 TNF α 作用之機轉模式四種。
2. IFN- α 之免疫藥理作用而言： (10%)
 - a) IFN- α 之化學特性及細胞來源為何?
 - b) 列舉 IFN- α 之臨床藥品。
 - c) IFN- α 之臨床用途為何。
 - d) IFN- α 之作用機轉模式為何。
3. Azathioprine 之抗癌作用機轉及骨髓毒性相關症狀為何? (10%)
4. 試說明影響有機酸藥物在腎元(nephron)近端及遠端，經由腎血管釋放及再吸收之因素為何? (10%)
5. 試說明 Endothelin, Substance P, Kinin, Angiotensin 之生理作用並列舉其 Antagonist 在臨床之用途 (10%)

(B) 選擇題: **One choice** (60 %; 2x30%)

- () 1. Cetuximab is a monoclonal antibody, targeting (1) EGF; (2) tyrosine kinase; (3) Ras; (4) EGFR.
- () 2. Glucocorticoids: (1) interfering leucocyte trafficking (transmigration); (2) Enhancing leucocyte trafficking; (3) increasing immunoresponse; (4) depletes T cells.
- () 3. Cyclosporine: (1) increase cytokine release; (2) inhibit cytokine release; (3) activate T cell activation; (4) promote proliferation.
- () 4. Calcineurin is inhibited by (1) Thalidomide; (2) Cytokines; (3) Tacrolimus (4) Azathioprine
- () 5. Which of the following is the non-cell cycle specific anti-cancer drug? (1) Vinca alkaloids; (2) Etoposide; (3) Cisplatin; (4) Bleomycin.
- () 6. Which of the following is wrong for tamoxifen: (1) an estrogen inhibitor (2) usefull to treat breast cancer; (3) inhibit insulin-like growth factor (IGF-1); (4) an androgen receptor antagonist.
- () 7. Thalidomide: (1) higher molecular weight compound; (2) useful hypnotics; (3) immunosuppressive agent; (4) anti-teratogenic agent.
- () 8. Which kind of receptors whose ligands come from heterogenous origin? (1) Steroid; (2) Cytokine; (3) Tyrosine kinase; (4) adrenergic receptor.
- () 9. Long term administration of higher dose aspirin usually leads to (1) hyperuricemia; (2) hypouricemia; (3) thrombosis; (4) hypertension.
- () 10. Which of the following inhibits BPH by high affinity for α 1A and α 1D than α 1B subtype adrenoceptor inhibition, unrelated to anti-hypertension? (1) Doxazosin; (2) Terazosin; (3) Tamsulosin; (4) Prazosin.
- () 11. Which of the following is the specific agent used to reverse severe in-toxication of digitalis? (1) Digoxin; (2) Digitoxin; (3) Dogoxin immune fab; (4) Cetuzumab.
- () 12. Dobutamine: (1) beta 2 agonist useful for asthma; (2) beta 1 agonist useful for heart failure; (3) beta 2 agonist useful for reducing cardiac output; (4) for increasing ventricular filling pressure.
- () 13. Bosentan: (1) useful for pulmonary hypertension; (2) useful for heart failure; (3) with inotropic activity; (4) reducing hepatotoxicity.
- () 14. Which of the following is correct to affect the lipid metabolism? (1) fenofibrate increases PPAR γ ; (2) fenofibrate increases PPAR α ; (3) simvastatin increases PPAR γ and reduces PPAR α expression; (3) pioglitazone increases PPAR α expression.
- () 15. Celecoxib: (1) selective COX-1 inhibitor; (2) selective COX-2 inhibitor; (3) inducing hypotension; (4) COX-2 monoclonal anti-body.

- () 16. Which of the following binds TNF- α molecules and inhibit lymphotoxin- α (1) Infliximab; (2) Adalimumab; (3) Etanercept; (4) Rituximab.
- () 17. Entecavir is used for the treatment of (1) hepatitis C; (2) hepatitis B; (3) influenza.
- () 18. Rivantadine is used for the treatment of (1) hepatitis C; (2) hepatitis B; (3) influenza.
- () 19. For a patient with gouty joint pain, colchicine is used to: (1) *inhibit* diarrhea; (2) *inhibit* phagocytosis of urate crystal by synoviocytes; (3) *induce* phagocytosis of urate crystal by synoviocytes; (4) *treat* chronic gout.
- () 20. Pegylated interferon alfa-2b is subcutaneously used for the treatment of: (1) Chronic hepatitis C; (2) acute hepatitis B; (3) acute hepatitis C; (4) chronic hepatitis B.
- () 21. Lamivudine (3TC) is orally used for the treatment of (1) hepatitis B infection; (2) hepatitis C infection; (3) influenza.
- () 22. Inhaled and oral ribavirin is used for the treatment of (1) hepatitis C; (2) hepatitis B; (3) influenza.
- () 23. Omalizumab is used for the treatment of (1) hepatitis C; (2) hepatitis B; (3) asthma.
- () 24. Which of the following is the mechanism of action of acarbose : (1) Inhibiting ATP-sensitive potassium channel; (2) inhibiting hepatic gluconeogenesis; (3) activating PPARs; (4) inhibiting α -glucosidases.
- () 25. Which of the following is inhibited by finasteride to attenuate benign prostatic hypertrophy? (1) estrogen; (2) progesterone; (3) testosterone; (4) dihydrotestosterone.
- () 26. Which of the following is the action site of tetracycline?
(1) Ribosome; (2) DNA gyrase; (3) folate synthesis; (4) RNA polymerase; (5) cell wall transpeptidase.
- () 27. Which of the following is used to treat penicillins-induced anaphylactic shock?
(1) Epinephrine; (2) hydrocortisone; (3) methylprednisolone; (4) Diphenhydramine. (5) loratadine.
- () 28. Which of the following is not ketamine' effect?
(1) anesthetics; (2) decrease of heart rate; (3) decrease the respiratory rate; (4) psychotomimetic activity.
- () 29. Which of the following diuretics is used for decreasing intracranial pressure? (1) Mannitol; (2) Acetazolamide ; (3) Amiloride; (4) Ethacrynic acid.
- () 30. Which of the following is used in the treatment of nephrogenic diabetes insipidus ? (1) Thiazides; (2) Acetazolamide; (3) Bumetanide; (4) Spironolactone.