國立臺中教育大學 108 學年度教師專業碩士學位學程招生考試

幼兒教育專業試題

一、 幼兒學習評量具有怎樣的教育意義與功能？(5%)何謂質性評量？(5%)何謂量化評量？(5%)何謂歷程式的評量？(5%)在進行幼兒學習評量時幼兒教師需特別留意哪些事項？(5%)

二、 教育部為因應少子女化的現象，並減輕家長經濟負擔，擬定了 2-5 歲幼兒之少子女化對策計畫（措施）。試從主軸、補充與輔助的角度，說明共包括哪三大措施？(25%)

三、 與幼兒共讀繪本的其中一種方式為「對話式閱讀(dialogic reading)」。請說明對話式閱讀的主要目的為何？(5%)共讀流程為何？(10%)以一本繪本為例，示範對話式閱讀可以用的提問問題。(10%)

四、 彩虹幼兒園園長希望透過三段五級健康學說落實校園流感之預防，請先說明三段五級健康學說之內涵(10%)，並針對第一級至第三級健康內涵，分別例舉幼兒園預防流感之實際作法。(15%)

國立臺中教育大學 108 學年度教師專業碩士學位學程招生考試

英語專業試題

I. Vocabulary and Grammar (40%; 2% each)

1. Language behavior is influenced not only by personality but also by _____ and culture.

   (A) accommodation   (B) convention

   (C) coincidence   (D) reputation

2. The Walt Disney Company is known to _____ the strictest dress codes.

   (A) request   (B) require

   (C) inquire   (D) acquire

3. The government imposed trade _____ against China. The volume of imports was strictly limited.

   (A) abstraction   (B) distraction

   (C) sanctions   (D) sensations

4. A pattern of home-country preference from judges has led to a strikingly _____ scoring data in top-levels sport competitions.

   (A) enhancing   (B) expanding

   (C) raising   (D) inflating

5. A slow _____, burning body fat longer, usually brings out various health problems.

   (A) metabolism   (B) atheism

   (C) eclecticism   (D) neologism

6. A licensed nursing _____ requires communication skills, patience and compassion and physical stamina.

   (A) auxiliary   (B) prosecutor

   (C) defendant   (D) technician

7. Thousands of lives will be at _____ if emergency aid does not arrive in the city soon.

   (A) control   (B) debase

   (C) ruffle   (D) stake

8. It is highly suggested for a company to encourage positive attitudes, build good working relationships and _____ healthy lifestyles.

   (A) convene   (B) convince

   (C) persuade   (D) promote

（背面尚有試題）

9. There are several goals we _____ to reach in our undergraduate program.

    (A) aspire   (B) conspire

    (C) inspire   (D) respire

10. According to the Food and Agriculture Organization, food waste and loss _____ eight percent of global greenhouse gas emissions.

    (A) appeals to   (B) derives from

    (C) gives away   (D) accounts for

11. Expanding a special economic zone is a systematic project which _____ a clear timetable of infrastructure investment.

    (A) calls for   (B) calls on

    (C) calls off   (D) calls up

12. High-income earners objected to _____ for a higher income tax rate.

    (A) charge   (B) be charged

    (C) being charged   (D) charging

13. A workshop will be held on how to improve computer skills of senior employees, many of _____ don't have familiarity with computer-assisted tools.

    (A) who   (B) whom

    (C) those   (D) them

14. Half of the workforce in the top tech companies _____ not over the age of 25.

    (A) are   (B) were

    (C) am   (D) is

15. Mrs. Anderson can always tell when her students _____ enough attention because they start to doze off.

    (A) will not pay   (B) had not paid

    (C) is not going to pay   (D) have not been paying

16. Our sale figures in the first quarter season made our revenue _____ to 10 percent within just four months.

    (A) advance   (B) advanced

    (C) advancing   (D) advancement

17. _____ not for a progressive development of forensic science, pending cases could not be cleared easily.

    (A) It were   (B) Were it

    (C) It was   (D) Was it

18. After weeks of habitation, Eliza is well on her way _____ her muscular strength.

    (A) training   (B) to training

    (C) to train   (D) trains

19. It is not his success ＿＿＿ personality that makes him a person of value.

　　(A) but rather　　　　　　　　(B) rather than

　　(C) instead of　　　　　　　　(D) but also

20. I am convinced ＿＿＿ his competence by his arguments.

　　(A) as　　　　　　　　　　　　(B) for

　　(C) of　　　　　　　　　　　　(D) in

II. Cloze Test (30%; 2% each)

　　The contexts, sociolinguistic and ＿＿21＿＿, within which English was discussed in these conferences were *international* and *intranational*. The term "World Englishes" and ＿＿22＿＿ sociolinguistic and pragmatic justification came later.

　　Why the use of "Englishes" (Kachru, 1985a; Kachru & Smith, 1988)? The term ＿＿23＿＿ the functional and formal variations, divergent sociolinguistic contexts, ranges and varieties of English in creativity, and various types of acculturation in ＿＿24＿＿ the Western and non-Western world. This concept emphasizes "We-ness," and not the dichotomy between *us* and *them* (the native and nonnative users). In this sense, then, English is a valuable tool ＿＿25＿＿ for various functions. The approaches to the study of World Englishes, ＿＿26＿＿, have to be interdisciplinary and integrative, and different methodologies must be used (literacy, linguistic, and pedagogical) to capture distinct identities of different Englishes, and to examine critically the implications of such identities in ＿＿27＿＿ communication.

21. (A) linguistics　　(B) linguistic　　(C) linguistical　　(D) linguists
22. (A) its　　　　　　(B) their　　　　　(C) it　　　　　　　(D) theirs
23. (A) symbols　　　　(B) symbolization (C) symbolic　　　　(D) symbolizes
24. (A) parts of　　　　(B) parts as　　　 (C) a part of　　　　(D) parts for
25. (A) using　　　　　(B) use　　　　　 (C) used　　　　　　(D) in use
26. (A) however　　　　(B) therefore　　　(C) nevertheless　　(D) in spite
27. (A) crossed-culture (B) cross-cultural (C) cross-culture　　(D) crossed-cultural

　　The use of a specific type of ＿＿28＿＿---T-shirt---to communicate other types of information began in the late 1940s, ＿＿29＿＿ faces and political slogans appeared on T-shirts and, in the 1960s, with the commercial logos and other designs. Technical developments in the 1950s and 1960s, ＿＿30＿＿ plastic inks, plastic transfers, and spray paint, led to the use of colored designs and increased the possibilities of the T-shirt as a ＿＿31＿＿ of communication. Approximately one billion T-shirts are purchased annually in the United States (McGraw, 1996).

The significance of the T-shirt in Western culture, as a means of social and political expression, __32__ by comparing its roles in Western countries __33__ the response to it in a nondemocratic country, the People's Republic of China (Barme, 1993). In 1991, a young Chinese artist created T-shirts __34__ humorous statements, some of which could be interpreted as having mild political implications. The T-shirts were enormously successful with the public but were perceived as "a serious political incident" by the Chinese authorities. Thousands of them were confiscated and destroyed, although many Chinese continued __35__ them.

28. (A) clothing   (B) clothings   (C) clothes   (D) cloth
29. (A) where   (B) whereas   (C) when   (D) whenever
30. (A) likewise   (B) such as   (C) such like   (D) for
31. (A) mean   (B) meaningful   (C) meaningless   (D) means
32. (A) is seen   (B) is seeing   (C) sees   (D) has seen
33. (A) for   (B) with   (C) for the   (D) with the
34. (A) bear   (B) bore   (C) born   (D) bearing
35. (A) to wear   (B) wear   (C) wearing   (D) wore

III. Reading Comprehension (30%; 2% each)

When you teach math, or Spanish, or earth science, or almost anything else in a school, textbooks are a basic part of life. And for many teachers, the content-area textbook is a treasured **asset**. The book may be one that you helped select, after an extensive search process –reviewing all the competition, making a thoughtful match-up with your curriculum, and (if you served on the adoption committee) even lobbying for this book over others. The textbook may have become a trusted companion over the years, traveling with you through your career. By now, you know its chapters, charts, diagrams, photographs, and study questions backwards and forwards. You may even have seen the book evolve through several editions, and once in a while you may have enviously fantasized about the royalty checks piling up in the authors' mail boxes.

On the other hand, the textbook used in your classes may be less of a choice and more of an **imposition**. The book may have been selected by others, as a departmental or district adoption that you had no voice in, or that was already picked when you joined the faculty. Maybe this particular text doesn't suit your teaching style, or your way of approaching the field, or your idea of what's really important. Perhaps the book has flaws, gaps, and problems that drive you nuts. Maybe it skimps on the information

in a key area, or introduces vocabulary too fast, or it just plan out of date. It might be somebody else's favorite –but not yours. In fact, if you think about it, none of us ever finds the absolutely perfect textbook, even when we pick it ourselves.

So, love them or hate them, textbooks are a very big part of our reality in school. They may not be perfect, they may not be the books we would choose, they may require all sorts of supplementing, working-around, and clarifying. But they are here to stay. Yes, a few publishing companies and authors are experimenting with Web-based materials. But those hefty, shiny textbooks will probably continue to be the main storage system for the content of our courses for a long time to come.

36. What is the main idea of this passage?
    (A) There has been a long history of textbook use in schools.
    (B) Teachers should be given the rights to choose their own textbooks.
    (C) Teachers should review textbooks so that they may choose the best one for their students.
    (D) Textbooks have been playing a big role in school and will continue to be so for some time.

37. What is the first paragraph of the passage about?
    (A) The content-area textbook is highly valued by all teachers.
    (B) Textbooks are a basic part of life for all teachers.
    (C) Teachers have the chance to see how textbooks evolve.
    (D) Textbook authors are usually quite rich.

38. What's the second paragraph of the passage about?
    (A) Most teachers can't choose their own textbooks.
    (B) Textbooks usually do not suit teachers' teaching style.
    (C) There are no perfect textbooks.
    (D) The best way to use textbooks is having teachers to choose their own favorites.

39. What does the word **asset** in paragraph one mean?
    (A) resource   (B) contest
    (C) research   (D) aspiration

40. What does the word **imposition** in paragraph two mean?
    (A) obligation   (B) impossibility
    (C) accident   (D) security

41. What does the expression "drive you nuts" mean?
    (A) make you happy   (B) make you hungry
    (C) make you crazy   (D) make you calm

（背面尚有試題）

42. According to the passage, the search processes of textbooks usually involve

    (A) becoming a trusted companion over the years.

    (B) reviewing all the competition.

    (C) traveling with you through your career.

    (D) making charts and diagrams.

43. What does this passage imply about authors of textbooks?

    (A) They like to fantasize.   (B) They are envious of others.

    (C) They like to receive mails.   (D) They make a lot of money.

44. What does the author of this passage think about Web-based teaching materials?

    (A) They are here to stay.

    (B) They won't replace textbooks any time soon.

    (C) They need to be experimented.

    (D) They will be the main storage system for the content of courses.

    Teachers need to make the classroom a community, a place where students feel safe to take the risks involved in learning, where they see it connected with their lives, and where they help and learn from one another instead of working only as isolated individuals. And we do this not just to make students feel good, but to give reading in our subjects the full meaning it deserves.

    Teachers have many ways to build community, but we know that students respond strongly when they sense that the teacher knows something about them as individuals. Humor helps break a lot of the ice. Surveys of students show that giving them choices, even in small things, helps students feel respected and viewed as people who are maturing and worthy of trust. While some might think this means a loose or disorganized classroom, it's really quite the opposite. A class where students work well together and respect one another needs to be an orderly group. And the results are not just a better climate, but greater learning. Students who know each other well and have been taught to listen to one another are more likely to take risks and stretch beyond their comfort level as they learn.

    It may seem like the simplest truism to say that all learning takes place in a context that colors everything taking place. However, it's a major issue that must be factored in every teaching activity we plan; whatever strategies we try to teach, they won't work if kids are **turned off** to school, or are just passively waiting for the teacher to give them the answers. Schools need to be a place where students feel some ownership and control, where they have the confidence to recognize and work on their confusions, where they take responsibility and learn how to help one another and why

it is important to do so, and where they **inquire** into the big questions that matter for them. Otherwise, even when we teach strategies to help students deepen their understanding, they will only learn them mechanically, not recognizing when or why such strategies are needed.

45. What is the main idea of the passage?
    (A) It is important for teachers to form their own community and learn from one another.
    (B) By helping their students build community, teachers can make students better learners.
    (C) Classrooms are like a community, both for teachers and for students.
    (D) All of the above.

46. Which of the following is **NOT** the characteristic of a classroom as a community?
    (A) Students work as isolated individuals.
    (B) Students feel safe to take risks.
    (C) Learning is connected to students' lives.
    (D) Reading in subjects is meaningful.

47. According to the passage, what do surveys of students show?
    (A) Students respond strongly when teachers know something about them as individuals.
    (B) Students respond positively to humor as it helps to break a lot of ice.
    (C) Giving students choices helps them feel respected and worthy of trust.
    (D) Giving student choices means a loose or disorganized classroom.

48. According to the passage, what kind of classroom can help students work well together?
    (A) A loose or disorganized classroom
    (B) A quiet classroom
    (C) An orderly classroom
    (D) None of the above

49. What does the expression **turned off** in paragraph three mean?
    (A) put off   (B) taken away
    (C) kicked off   (D) made up

50. Which of the following can best replace the word **inquire** in paragraph three?
    (A) ask   (B) probe
    (C) reply   (D) acquire

國立臺中教育大學 108 學年度教師專業碩士學位學程招生考試

音樂專業試題

【本考科得以鉛筆作答】

一、試比較古典時期與浪漫時期歌劇的差異，並各舉出一位代表作曲家作品，對於後來歌劇發展之影響。(10%)

二、請分析歌曲《願》並回答下列問題。
　　1.分析每小節之和聲。(12%)
　　2.第 13 小節鋼琴左手彈奏的曲調屬於何種音階？ (3%)
　　3.描述此曲轉調前，四次「我願……」動機的特性。(6%)

願

（背面尚有試題）

春　天；　　我　願　是　繁　星，　　捨　給　一　個　夏　天　的

夜　晚。　　　　　　　我　願　是　千　萬　條　江　河，　　流

向　唯　一　的　海　洋，　我　願　是　那　月，　　為

你　再　一　次　圓　滿。　　　　　　　　　　　如

三、十二年國教藝術領域課綱中，在核心素養「系統思考與解決問題」項目的國民小學教育階段具體內涵中揭示「認識設計思考，理解藝術實踐的意義」（藝-E-A2）。請說明什麼是「設計思考」？並請舉例說明如何在小學音樂課中，透過教學讓學生瞭解並體會「設計思考」。(8%)

四、請以下面的譜例（搖呀搖）編寫一節（40分鐘）高年級的音樂教學活動教案。教學內容必須涵蓋(1)認識 6/8 拍；(2)認識中國五聲音階；(3)使用中國五聲音階創作。教案格式必須包括：單元目標、具體目標、教學活動、評量方式等項目。(15%)

搖呀搖

中國念謠
呂泉生 曲

慢板

搖 呀 搖，搖 呀 搖 船 兒 搖 到 外 婆 橋，

外 婆 好，外 婆 好，外 婆 對 我 嘻 嘻 笑。

五、試述多元文化音樂教育(Multicultural Music Education)的意涵？請舉例說明音樂教師如何進行多元文化音樂教育？可能會面臨哪些挑戰？解決方法為何？(12%)

六、試述達克羅茲(Dalcroze)音樂教學法和奧福(Orff-Schulwerk)音樂教學法關於音樂創作教學之主張？請擇一上述教學法設計音樂創作教學活動。(14%)

七、解釋名詞
  1.音樂教學法(4%)
  2.差異化教學(4%)

（背面尚有試題）

八、請閱讀以下期刊摘要，試說明其研究目的、研究方法與研究結果。(12%)

This study extends Zimmerman's research on children's music conservation to adult listeners, investigating participants' ability to conserve melody under different harmonic conditions. Specifically, I investigated whether listeners in the study could identify melody when primary, diatonic, and secondary chords were added (Task 1) and when melody was harmonized differently (Task 2).

Additionally, could they dissociate melody from harmony (Task 3)? Participants (N=80) listened to 34 pairs of examples and identified if the melody was the same or different in each pair. Results indicated that (a) listeners could conserve melody with addition of harmony regardless of harmonic conditions, (b) they could conserve melody when harmony was changed but were significantly better conserving melody when harmony was changed from primary to diatonic chords than from primary to secondary chords, and (c) they could dissociate melody from harmony but were significantly better with diatonic chords than secondary chords. As Task 3 was the reverse of Task 1, the finding that adult listeners conserved in one direction (Task 1) but not necessarily in the opposite direction (Task 3) and vice versa may suggest the existence of musical reversibility.

題號	作答區

題號	

題號	作答區
	第 6 頁，共 8 頁
題號	作答區

題號	作答區
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題號	作答區

國立臺中教育大學 108 學年度教師專業碩士學位學程招生考試

健康與體育專業試題

一、選擇題（每題 3%，共 30%）

1.十二年國教在體育課中採用何種概念作為課程改革及評量發展的目標？
　(A)身體意識
　(B)身體素養
　(C)身體質量
　(D)身體能力
　(E)以上皆非

2.優質課程的步驟首重計畫，而在適應體育課程計畫中，主要目的應為使學生達到？
　(A)互惠共好
　(B)優質轉銜
　(C)自我實現
　(D)技能成長
　(E)以上皆是

3.體適能訓練 FITT 原則，針對改善心肺耐力及身體組成的運動建議為？
　(A)運動時心跳率應達最大心跳率 60% 以上
　(B)能產生輕微疲勞負荷為原則
　(C)每次訓練 8-10 個身體部位，每週至少運動 2 次
　(D)伸展運動需做到關節角度末端，不可有過度疼痛的感覺
　(E)以上皆是

4.運動員因訓練而使身體能力與心理素質提升，展現出平常人無法做出的高難度動作技巧、戰術應用，屬於運動欣賞中的？
　(A)人性美
　(B)形態美
　(C)力與美
　(D)機能美
　(E)社會美

（背面尚有試題）

5.下列何者為健身運動行為的理論與模式？
   (A)社會認知理論
   (B)合理行動理論
   (C)跨理論模式
   (D)健康信念模式
   (E)以上皆是

6.施力點在支點與施力點中間的槓桿為第幾類槓桿？
   (A)第四類
   (B)第三類
   (C)第二類
   (D)第一類
   (E)第五類

7.棒球比賽中打擊者為增大棒球離棒瞬時速度可主動採行的策略中**不包含**下列哪一項？
   (A)減輕棒球質量
   (B)條件允許下，選擇較重球棒
   (C)選擇快速之球
   (D)增大揮棒速度
   (E)以上皆非

8.人體解剖學上垂直於前後軸的解剖面稱為：
   (A)矢狀面
   (B)非常面
   (C)水平面
   (D)橫狀面
   (E)額狀面

9.體操及跳水選手團身比直體較易旋轉，其原因為何？
   (A)截面積較小
   (B)角衝量較大
   (C)轉動慣量較小
   (D)體積較小
   (E)重量較輕

10.理論上，在赤道上推鉛球會比在南、北極推鉛球的成績如何？
   (A)一樣
   (B)無法比較
   (C)較差
   (D)較佳
   (E)以上皆非

二、依據美國健康教育體育休閒舞蹈學會(AAHPERD)對適能(fitness)的觀點，對健康提出了整體性的概念，認為真正完整的健康應由五個安適狀態(well-being)所構成，請敘述之。(10%)

三、計算題：
   自行車由坡頂滑下，坡高 10 公尺，車到坡底時具有的速度為 12 公尺／秒，問在此過程中摩擦力作了多少功？（人和車共重 70 公斤，重力加速度以 10 公尺／秒^{2}計之）(10%)

四、請論述國際職業運動員運動勞力遷徙(sports labor migration)類型。(25%)

五、請說明心理技能訓練(psychological skill training, PST)的定義(4%)， PST 的三個訓練階段與目的(9%)，何時是實施 PST 計畫的最佳時機(4%)，為什麼？(2%)若你是教師，應如何在體育教學中實施 PST，例如時間、次數、初學者需要多久時間才能獲得心理技能。(6%)

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國語文專業試題

一、解釋名詞（每題 4%，共 20%）
　　1.語言癌
　　2.促進國際閱讀素養研究（英文縮寫 PIRLS）閱讀理解歷程
　　3.句子語氣
　　4.蠶頭雁尾
　　5.近體詩

二、簡答題(20%)
　　1.何謂集中識字法？(2%)其優點(4%)及缺點(4%)為何？
　　2.何謂倒敘法？(5%)並請舉例說明之？(5%)

三、問答題(60%)
　　1.請以下列四幅圖解說教導低年級學童看圖說故事的步驟。(20%)
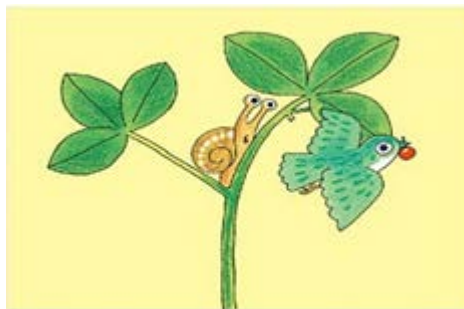
（取自信誼出版 我會說：解決問題篇 45 張故事圖卡　曹俊彥/繪圖）

（背面尚有試題）

2.請根據十二年國教國語文領域第三學習階段所見「學習重點」之內容，針對以下所列生字，設計一份教學活動簡案。(20%)
恐、陶、逢、怯、艙、哄、淹、櫃、檯、蹙、籟、濡、恢、筒、援（康軒六下〈迷途〉）

3.請寫出譬喻句的組成結構(6%)，各造一句明喻、暗喻、借喻語句(6%)，並條列說明指導學生造譬喻句的策略。(8%)

國立臺中教育大學 108 學年度教師專業碩士學位學程招生考試

資訊專業試題

一、選擇題（每題 2%，共 60%）

1. C 語言的程式碼如下方所示，其運算結果 x 為何？

```
//*************
    int x=0;
    x=31/( 19% 5 +1);
//*************
```

(A) 2　　　　(B) 4　　　　(C) 6　　　　(D) 8　　　　(E)不正確的敘述，無法算出結果

2. C 語言的程式碼如下方所示，其運算結果 a 及 d 的值各為何？

```
//*************
    int a=0,b=2,c=2,d=0;
    a=b+c++;
    d-=b+c;
//*************
```

(A) a=4, d=4　　　　(B) a=4, d=-5　　　　(C) a=4, d=-4

(D) a=5, d=-5　　　　(E)不正確的敘述，無法算出結果

3. C 語言的程式碼如下方所示，其運算結果 result 的值為何？

```
//*************
    int a, result=0;
    for(a=10;a<15;a++)
        result=result+a;
//*************
```

(A)15　　　　(B)55　　　　(C)60　　　　(D)75　　　　(E)以上皆非

4. C 語言的程式碼如下方所示，其運算結果輸出為何？

```
//*************
    int x,y,z=0;
    for(x=5;x>=1;x--)
        for(y=1;y<=x;y++)
            z=z+y;
    printf("%d", z);
//*************
```

(A)20　　　　(B)25　　　　(C)30　　　　(D)35　　　　(E)40

（背面尚有試題）

5. C 語言的程式碼如下方所示，其運算結果輸出為何？

```
//*************
int p=0,q=0;
for(;;) {
    int r=0, s=5;
    if (p++<=200) {
        q++; p++; r=r+s;
    }
    else {
        r=r-s; break;
    }
}
printf("%d",q);
//*************
```

(A)100　　　(B)101　　　(C)215　　　(D)200　　　(E)201

6. C 語言的程式碼如下方所示，其運算結果輸出為何？

```
//*************
int numbers[10]={1,2,3,4,5,6,7,8,9,10};
int i=0,j=0;
while (i <10)
{
    j=j+numbers[i];
    i=i+2;
}
printf("%d", j);
//*************
```

(A)10　　　(B)25　　　(C)30　　　(D)20　　　(E)55

7. C 語言的程式碼如下方所示,當輸入 9 時,執行程式變數 result 輸出結果為何?

```
//**************
#include<stdio.h>
int myFun(int);
int main()
{
    int x,result;
    printf("Enter an integer:");
    scanf("%d",&x);
    result= myFun(x);
    printf("%d",result);
    return 0;
}
int myFun(int n)
{
    int flag=1;
    if (n <=1) flag =0;
    for (int i = 2; i <= n / 2; i++) {
            if (n % i == 0) {
                    flag = 0;
                    break;
            }
        }
    return flag;
}
//**************
```

(A) 1　　　　(B) 0　　　　(C) 2　　　　(D) 9　　　　(E)以上皆非

8. 同上一題,當輸入 29 時,執行程式輸出結果為何?

(A) 1　　　　(B) 0　　　　(C) 2　　　　(D) 29　　　　(E)以上皆非

9. 下列有關 Java 語言的敘述,何者**有誤**?

(A) Java 語言原始檔案在經過編譯後會產生 byte code

(B) Java 的程式需要 Java 虛擬機器來執行

(C) Java 語言是一種物件導向的語言

(D)一般而言,Java 語言的執行效率比 C 語言好

10. 撰寫物件導向程式時,宣告子類別的方法時,若所宣告的方法與父類別的方法有相同的名字、相同的參數型態及參數數量時,我們稱之為?

(A) Overloading　　(B) Overnaming　　(C) Overlooking　　(D) Overwriting　　(E) Overriding

(背面尚有試題)

11.下列哪一個標準**不屬於**無線傳輸環境的區域網路？
(A) 802.3　　　(B) Bluetooth　　　(C)802.11　　　(D)以上皆是

12.下列哪一層會將大的資料分成幾個小的片段？
(A)會議層　　　(B)傳輸層　　　(C)網路層　　　(D)資料連結層

13.雙絞線真正共有幾條是提供乙太網路傳輸之用？
(A)8　　　(B)6　　　(C)4　　　(D)2

14.下列何者為實體位址？
(A)廣播位址　　　(B) Email 位址　　　(C) IP 位址　　　(D) MAC 位址

15.在 IP 位址數量有限的環境下，提供有效的 IP 位址分派工作的機制稱為？
(A) DNS　　　(B) CIDR　　　(C) Multicast　　　(D) DHCP

16.下列何種位址是用於偵測自己的 TCP/IP 設定是否正常運作？
(A) 10.0.0.2
(B) 127.0.0.1
(C) 172.16.1.1
(D) 192.168.30.7

17.下列關於 TCP 與 UDP 比較的敘述何者**錯誤**？
(A) TCP 處理時間較短
(B) TCP 協定屬於高可靠度
(C)有些服務類型的埠編號可以由 TCP 和 UDP 共用
(D) TCP 傳輸不容許有差錯發生

18.下列何者是將 IP 位址映射為 MAC 位址的協定？
(A) ARP　　　(B) RARP　　　(C) ICMP　　　(D) RIP

19. ADSL 在 OSI 資料連結層的部分，以下列何項協定使其得以在乙太網路上運行？
(A) PPP　　　(B)PPPoE　　　(C)IPSec　　　(D)P2P

20.通訊連線前先辨認身分，以避免冒充身分者的破壞或入侵為？
(A)防火牆　　　(B)加密　　　(C)認證　　　(D)檢驗

21. 1 Terabyte (TB) 等於 _____ Gigabytes (GB)？
(A) 100　　　(B) 2^{10}　　　(C) 2^{20}　　　(D) 2^{30}　　　(E) 2^{40}

22.二進位數字 101011110100 等於以下哪一個十六進位數字？
(A) AF4　　　(B) 4635　　　(C) 5364　　　(D) C74　　　(E) A74

23.針對右圖，下列哪一個敘述**有誤**？

(A)具有 Euler path

(B)具有 Euler circuit

(C)具有 Hamilton path

(D)具有 Hamilton circuit

(E) 為 planar graph
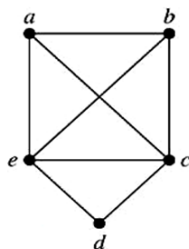
24.下列何者是下圖的一組以 g 為起點的深度優先搜尋(Depth-First Search)拜訪順序？

(A) $g \to h \to e \to c \to b \to a \to f \to d$

(B) $g \to h \to f \to e \to c \to d \to b \to a$

(C) $g \to e \to c \to b \to a \to h \to f \to d$

(D) $g \to f \to e \to c \to b \to a \to d \to h$

(E) $g \to f \to h \to e \to c \to b \to d \to a$
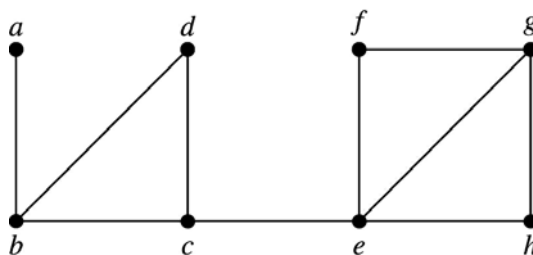
25.以插入排序法(Insertion Sort)將數列(7, 2, 9, 3, 5, 4, 6)依遞增順序排序，總共需___次比較？

(A) 13　　(B) 14　　(C) 15　　(D) 16　　(E) 17

26.對已排序數列(9, 13, 15, 25, 32, 39, 46, 58)以二元搜尋法(Binary Search)搜尋任意數字最多需___次比較？

(A) 2　　(B) 3　　(C) 4　　(D) 5　　(E) 8

27.下列何者為 Public-Key Cryptosystem？

(A) DES　　(B) IDEA　　(C) RC4　　(D) AES　　(E) RSA

28.若 Bob 使用 Alice 的 public key 加密訊息 M 後得到密文 C，則當 Alice 收到 C 之後須使用哪一支 key 解密？

(A) Alice 的 private key

(B) Alice 的 public key
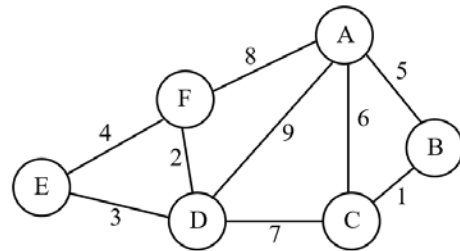
(C) Bob 的 private key

(D) Bob 的 public key

(E) 以上皆非

29.AES(Advanced Encryption Standard)密碼系統中最長的 Key 之長度為 _____ 位元？

(A) 128　　(B) 192　　(C) 256　　(D) 512　　(E) 1024

（背面尚有試題）

30.要驗證一個訊息的數位簽章(Digital Signature)，驗證者須使用以下哪一支 key？

(A)驗證者的 private key

(B)驗證者的 public key

(C)驗證者的 secret key

(D)簽章者的 private key

(E)簽章者的 public key

二、問答題(10%)

以 Kruskal 演算法找出下圖之最小生成樹(Minimum Spanning Tree)，圖示建構過程並計算此最小生成樹的權重(weight)。

三、簡答題（每題 5%，共 30%）

1.十進位的 255，寫出其相對的(a)二進位寫法；(b)八進位寫法。

2.請說明何謂 IoT？並舉一個應用實例說明。

3.請說明機器學習(machine learning)中監督式學習(supervised learning)與非監督式學習(unsupervised learning)的差別。

4.請說明 TCP/IP 中 ICMP 協定主要處理的工作為何？

5.請說明 OS 中的 race condition。

6. OS 中的 scheduling algorithms 包括 FCFS、SJF、RR 等，上述三個演算法中，理論上，哪個產生最短的平均等待時間？它在實際運用上有什麼問題或困難。

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數學專業試題

【本考科得以鉛筆作答】

一、填充題（每題 4%，共 100%）

1. 設 $a, b \in \mathbb{R}$，$a^2 + b^2 = 1$ 是 $a = 1, b = 0$ 之 _____ 條件。（填入「充分而非必要」、「必要而非充分」、「充要」或「非充分且非必要」）

2. $[26, 15, 48, 169] = 2^a \times 3^b \times 5^c \times 7^d \times 13^e$，$a \cdot b \cdot c \cdot d \cdot e = $ _____ 。

3. a, b 為二個連續整數，若 $a < \sqrt{19} \times \sqrt{37} < b$，則 $a + b = $ _____ 。

4. 設 $\sqrt{18 - 4\sqrt{14}}$ 的整數部分為 a、小數部分為 b，則 $\frac{1}{a-b} + \frac{1}{b+7} = $ _____ 。

5. $4001^3 + 3999^3 - 2 \times 4000^3 = $ _____ 。

6. 設 a、b、c 為正整數，若 $a \log_{396} 2 + b \log_{396} 3 + c \log_{396} 11 = 4$，則 $a + b + c = $ _____ 。

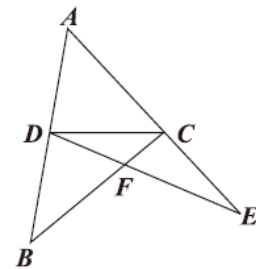7. 已知 $(2a + 3b - c)^7$ 展開式中 a^3bc^3 項的係數為 k，則 $k = $ _____ 。

8. 將 $f(x) = x^{100} + 2019$ 除以 $x^2 - 2x + 1$ 可得餘式 _____ 。

　　　　　　（背面尚有試題）

9. 設 d 與 e 為方程式 $x^2 - 3x + 1 = 0$ 的兩根，則 $(d+1)(e+1) = $ _____ 。

10. 有一塔高 90 公尺，樹 A 在塔的正西方，樹 B 在塔的西 30°南，某人從塔的頂端測得樹 A 底部的俯角為 60°、樹 B 底部的俯角為 45°，則樹 A 和樹 B 的距離為 _____ 。

11. 在 $\begin{cases} x + 2y \le 8 \\ 3x + y \le 9 \\ x \ge 0, y \ge 0 \end{cases}$ 的限制條件下，$5x + 4y$ 的最大值為 _____ 。

12. 如右圖，$\triangle ABC$、$\triangle ADE$ 中，C、D 兩點分別在 $\overline{AE}$、$\overline{AB}$ 上，$\overline{BC}$ 與 $\overline{DE}$ 相交於 F 點。若 $\overline{BD} = \overline{CD} = \overline{CE}$，$\angle ADC + \angle ACD = 114°$，則 $\angle DFC = $ _____ °。

13. 已知 $\triangle ABC$ 中，$\overline{AB} = 6, \overline{BC} = 4, \overline{CA} = 5$，若 H 是 $\triangle ABC$ 的垂心且 $\overrightarrow{AH} = m\overrightarrow{AB} + k\overrightarrow{AC}$（其中 m, k 為實數），則 $k = $ _____ 。

14. $ABCD$ 為平行四邊形，其中 $A(2,1,4)$、$B(5,-2,6)$、$C(4,3,2)$，D 點坐標為 _____ 。

15. 已知 $y = f(x) = 2x^3 - 3x^2 + 5$，若利用 $y = f(x)$ 之圖形可找出合成函數 $y = \log_{\frac{1}{2}} f(x)$ 的圖形會在 a 點產生最大值，則 a 點的坐標為 _____ 。

16. 曲線 $\left|\sqrt{x^2+y^2-10x-24y+169}-\sqrt{x^2+y^2+10x+24y+169}\right|=13$ 之同一分支的頂點與焦點，分別作為一拋物線的頂點與焦點。若此曲線和拋物線正焦弦長分別為 a 和 b，試求 $a+b=$ _____。

17. 在空間座標中，若設 O 為原點，球面 $S:x^2+y^2+z^2=27$，點 a 在 S 上且位於第一卦限，過 a 之切平面交 x,y,z 軸正向於 A,B,C，則四面體 $O-ABC$ 最小的體積為 _____（約分至最簡分數）。

18. 有一個小球，剛開始時半徑幾乎為 0 公分，半徑以每秒鐘 2 公分的速度增加，當半徑增加到 10 公分時，瞬間的體積增加率為 _____ 立方公分。

19. 已知 $i=\sqrt{-1}$ 且 $z^4=-8+8\sqrt{3}i$，則 $z=$ _____。

20. 一等差數列之前 n 項和為 9，前 $2n$ 項和為 12，則前 $5n$ 項之和為 _____。

21. 設甲、乙兩箱中，甲箱內有 1 黃球 1 黑球，乙箱內有 1 黃球 2 黑球。一局的規定為「每次先從甲箱中隨機取一球放入乙箱中，再從乙箱中隨機取一球放入甲箱中。」試求在第二局結束後，有 2 黑球在甲箱中的機率為 _____。

22. 在數線上，動點 P 由原點出發，依下列規則移動：投擲一枚均勻硬幣，若出現正面，則向右移動 3 單位；若出現反面，則向左移動 1 單位。若連續投擲均勻硬幣 10 次，則最後動點 P 落在坐標為 -2 的機率為 _____。

23. 設 $\{a_n\}$ 為無窮數列，若對任意正整數 n，不等式
$4n^2-5\le(3n^2+2)a_n\le4n^2+3n+5$ 恆成立，則 $\lim\limits_{n\to\infty}a_n=$ _____。

24. 已知$f(x) = \dfrac{2019(x+1)(x+2)(x+3)}{(x+4)(x+5)(x+6)}$，則$f(x)$在$x = -1$的導數為 _____ 。

25. 設矩陣$A = \begin{bmatrix} a & 2 \\ 3 & 5 \end{bmatrix}$、$B = \begin{bmatrix} 4 & 2 \\ 3 & b \end{bmatrix}$，若$(A+B)^2 = A^2 + 2AB + B^2$成立，則

$a + b = $ _____ 。