臺北市 109 學年度市立國民中學正式教師聯合甄選

理 化（雙語）科 題 本

請不要翻到次頁！

讀完本頁的說明，聽從監試委員的指示才開始作答

※請先確認你的答案卡、准考證與座位號碼是否一致無誤。

請閱讀以下測驗作答說明

測驗說明：

這是臺北市 109 學年度市立國民中學正式教師聯合甄選理化(雙語)科題本，題本採雙面印刷，共 90 題，每題只有一個正確或最佳的答案。測驗時間共 100 分鐘，作答開始與結束請聽從監試委員的指示。

注意事項：

1. 所有試題均為四選一的選擇題，答錯不倒扣。
2. 依試場規則規定，答案卡上不得書寫姓名及任何標記。故意污損答案卡、損壞試題本，或在答案卡上顯示自己身份者，該科測驗不予計分。

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新聞稿用卷

壹、教育專業科目

選擇題（共 50 題，每題 0.8 分，共 40 分）

1. 教育理論是教師發展教學論述的力量，請問以下那位學者倡導「做中學」的學習理論(The theory of learning by doing)，並進而組成其實踐、行動與實用價值的教育學說？
   (A)詹姆士(William James, 1842-1910)
   (B)皮爾斯(Charles sanders Pierce, 1839-1914)
   (C)杜威(John Dewey, 1859-1952)；
   (D)赫爾巴特(Johann Friedrich Herbart, 1776-1841)
2. 教師熟稔教育社會學的研究有助於帶班與教學，請問以下何者**不是**Parson(1964)所提出導致現代社會進步的要素？
   (A)民主結社　(B)法律系統　(C)科學研究　(D)科層體制
3. 後現代主義學者的研究指出：透過溝通來使不同族群或團體能互相了解，為達此目的，溝通者要具有「溝通美德」。請判斷以下何種較**不屬於**「溝通美德」？
   (A)包容　(B)聆聽　(C)安靜　(D)尊重異己
4. 在教育社會學研究發現：領導者運用重視工作的完成，也注意成員的需求的「工作任務能完成，成員需求能滿足」模式，比較能夠鼓勵彼此合作，在相互信賴與尊重中為達成目標而努力。請判斷以下何種是「工作任務能完成，成員需求能滿足」的最佳型態？
   (A)高關懷高倡導　(B)低關懷高倡導　(C)高關懷低倡導　(D)低關懷低倡導
5. 混沌理論對於九〇年代之後的社會科學，產生許多觀念的啓發與影響，因此被應用到學校行政工作與教師班級經營的領域，請問以下何者是混沌理論中所提到主要概念？
   (A) 蝴蝶效應　(B)全面品質　(C)優勢領導　(D)煮蛙效應
6. 下列那一項**不是**彼得聖吉（Peter Senge）學習型組織所倡導的策略？
   (A)組織發展　(B)團隊學習　(C)自我超越　(D)系統思考
7. 在學校行政管理工作之中，下列哪一種學校組織文化塑造的方法，是指經常重複出現的活動，且是為了表彰組織最為重視的價值觀、最重要的目標、最出色的員工及最值得慶祝與投注的事物？
   (A)實質象徵　(B)故事　(C)儀式　(D)語言
8. 邁向新世紀的教育趨勢之中，「基本學力指標」乃是我國推動教育改革與政策之關注焦點，其中又以3R's為核心的基礎學科及其內容，請問「3R's」的具體內容為以下何者？
   (A)讀、聽、算　(B)讀、說、算　(C)讀、寫、算　(D)讀、思、算

9. 知識管理(Knowledge Management,KM)的理論，認為組織創新有賴於知識的創造。因此，做好知識管理對於教師教學創新有其重要性。請判斷下列四種不同的知識取得方式，那一種的價值最高？

(A)資料　(B)資訊　(C)知識　(D)智慧

10. 教育部揭櫫我國未來的教育政策，強調精緻、創新、公義、永續四大主軸發展施政重點。請判斷「關懷弱勢群體的教育政策」是屬於下列那一種「教育施政主軸」的項目？

(A)精緻　(B)創新　(C)公義　(D)永續

11. 教育部依據教育基本法之規定，宣布推動十二年國民基本教育，期望促進教育機會均等，實現社會公平正義，提昇國民素質。請問下列何者**不是**推動「十二年國民基本教育」的原則？

(A)免試　(B)免學區　(C)免學費　(D)非強迫

12. 我國教育學術團體聯合年會公佈「教育人員信條」作為教育人員工作的倫理守則，其中”不斷的進修與研究，促進專業成長，以提高教學效果”係屬於哪方面的教師倫理守則？

(A)對專業　(B)對學生

(C)對學校　(D)對學生家庭與社會

13. 中央相關部會成立了「輔導中途輟學學生專案督導小組」，透過會議協調相互支援事宜，並建立中輟學生通報系統，適時掌握學生輟學狀態，且教育部與內政部警政署合作，透過警網協尋行蹤不明學生，預防中小學學生中輟，是貫徹以下那項教育價值？

(A)關懷弱勢　(B)零拒絕　(C)重視人權　(D)犯罪防治

14. 班級經營是教師的重要能力，請問以下那一種班級教師與家長溝通的策略，最被教師普遍使用，且最能使家長瞭解其子女每日在校的情況、教學進度、家庭作業及常規表現？

(A)家庭聯絡簿　(B)電話溝通　(C)家庭訪視　(D)班級通訊

15. 學生自治活動組織是學生學習邁向理想民主社會團體組織的雛型，請問以下那一種學生自治組織幹部負責的工作是：「辦理本班教室整潔、學校環境衛生及收發各類器材」？

(A)風紀股長　(B)康樂股長　(C)服務股長　(D)事務股長

16. 安排教室環境是佈建優良學習的策略，請問以下那一種教室課桌椅的佈置與利用的模式，最適合進行「專題討論」，提高學生的學習興趣，增進同儕互動及師生關係？

(A)行列式　(B)馬蹄型　(C)圓環式　(D)小組式

17. 教師領導技巧是支持優質班級經營的重要力量，請問以下班級經營的情境：「從學生的眼神、動作、言談、作業等，解讀出學生的情緒，並能感同身受」。依此，教師在進行班級經營時會採用那一種技巧，來進行其班級經營？
(A)敏銳洞察的技巧　(B)情緒控制的技巧
(C)人際關係的技巧　(D)角色轉換的技巧

18. 在諮商輔導的理論中，"自由聯想(free association)"是哪一個諮商治療學派會使用的技術？
(A)現實治療學派　(B)精神分析治療學派
(C)完形治療學派　(D)家族系統治療學派

19. 在諮商輔導的理論中，下列何者是阿德勒治療學派的理論中，人類奮鬥向上的原動力？
(A)自信心　(B)自卑感　(C)自尊　(D)自大

20. 1980年代以後，歐美社會出現「後次文化理論」（post-subcultural theory），用以解釋青少年文化越來越多元化，請問下列關於「後次文化理論」的描述何者**不正確**？
(A)偏重結構化的因素　(B)強調成員組成的多變性
(C)主張以生活風格取代次文化　(D)指出人際關係越來越不穩定

21. 國中導師認為小玉的學業成績不理想，主要是因為她來自勞工家庭的受教養方式，缺少一種能幫助她成功的主流文化。請問這是依據以下何種理論的解釋？
(A)文化差異論　(B)文化剝奪論
(C)文化生態論　(D)文化要素論

22. 劉校長認為若要改變校內的教師文化，應該鼓勵教師參加專業學習社群（PLC）活動，享有參與主導學校教育革新的權力。此種觀點較符合以下何種概念的意涵？
(A)績效責任　(B)權威領導　(C)增權賦能　(D)自我實現

23. 1980年代以後，世界多國積極推動教育改革以增強全球化的競爭實力，其中新自由主義（neo-liberalism）的觀點，已成為許多國家教育改革的理念。請問下列何者**並非**新自由主義的教育主張？
(A)主張市場機制
(B)提高績效責任
(C)降低政府管制
(D)增加教育預算

24. 現代社會的教育制度和國家的關聯至為明顯，當權者會透過學校課程內容來教化人民，塑造符合當權者意志的價值觀與態度，使得優勢群體能夠持續宰制弱勢群體。請問這種說法是屬於以下何種文化概念？
(A)文化衝突　(B)文化擴張　(C)文化霸權　(D)文化創生

25. 蔡教授主張學校是宰制與從屬團體進行權力爭鬥的場域，教師必須具備解放的權威，運用「提問式」（problem-posing）教學，培養學生成為具批判力的公民。請問這是屬於以下何種理論的觀點？
(A)現象社會學 (B)後現代主義 (C)結構功能論 (D)批判教育學

26. 何老師發現班上學生的家長若願意花時間陪孩子寫作業，並且積極參與學校相關活動和事務，往往能為孩子營造出更有利的學習環境。請問以上敘述符合下列何種資本的特徵？
(A)人力資本 (B)社會資本 (C)象徵資本 (D)經濟資本

27. 英國教育社會學者威利斯（Paul Willis）在《學習做勞工》（*Learning to Labour*）書中，提及「勞工階級學生最終成為勞工命運」的現象，但他更主張學校內部存在許多矛盾、轉化與變革。請問這種說法是屬於以下何種論點？
(A)文化創生 (B)經濟再製 (C)反智主義 (D)文化再製

28. 我國《十二年國民基本教育課程綱要總綱》中校訂課程的跨領域統整性探究課程，與下列何學派課程設計的理念最為相近?
(A)文化學派 (B)進步主義 (C)永恆主義 (D)精粹主義

29. 下列有關杜威（J. Dewey）教育理念，何者最為正確?
(A)完全贊同兒童中心教育觀
(B)忽視教師在教學時對學生的指導功能
(C)重視傳統經典的教育價值
(D)強調努力與興趣並重的學習方式

30. 臨時工家庭的小孩接受高等教育後能找到好工作，並改善其家庭社會地位，是屬於以下何項教育的功能？
(A)家庭功能 (B)政治功能 (C)社會功能 (D)文化功能

31. 杜威（J. Dewey）曾經訪華講學兩年，影響我國教育思想很深。但因社會和文化環境差異，他的學生陶行知將他的話調整順序後，發現非常適合我國情境。以下何者**不是**陶行知對杜威思想的轉化？
(A)生活即教育 (B)社會即學校 (C)教學做合一 (D)生長即教育

32. 以下何項目的是屬於教育的「內在目的」？
(A)自我實現 (B)揚名顯親 (C)成為好公民 (D)服務人群

33. 我國103年通過實驗教育三法後，實驗學校數量與接受實驗教育的學生數量均大增，請問以下何者較**不符合**實驗教育精神？
(A)保障學生受教權 (B)增進教育多元發展
(C)削弱國家教育掌控權 (D)發展適性教育的機會

34. 下列何者**不是**學生網路成癮者的典型徵兆？
(A)每日長時間使用電腦來解決問題
(B)一旦上網很難自行關機或下線，造成日常生活失能
(C)上網的時間越來越長，並從中得到正常活動無法達到的欣快感
(D)因過度使用電腦而出現健康、人際和學習等適應問題

35. 陳老師入班觀課，協助張老師發現與自己本身有關但平常不會察覺或注意的行為舉止，例如個人未意識到的說話習慣或口頭禪。此一作法，最能縮小張老師在「周哈里窗(Johari Window)」的哪一個區域？
(A)開放自我　(B)盲目自我　(C)隱藏自我　(D)未知自我

36. 臺灣於2013年成立「橄欖枝中心」（The Olive Branch Center, OBC）非營利組織，將修復式正義的概念，應用在校園霸凌與衝突事件。有關此一概念的敘述，下列何者正確？
(A)協助達成協定　(B)落實懲罰錯誤
(C)聚焦雙方對話　(D)確認事實真相

37. 設計單元教學活動時，有關學習目標的撰寫，下列何者較為正確？
(A)重點應在學生的「學」而非教師的「教」
(B)應涵蓋九項核心素養
(C)應以認知目標為主，情意與技能目標為輔
(D)應以學習內容為主，學習表現為輔

38. 王老師採用布魯納(J. S. Bruner)提倡的「發現教學法」來進行教學，則他會希望學生從教學過程中發現？
(A)價值規範　(B)意識型態　(C)知識結構　(D)解題技巧

39. 教材組織若是以兒童經驗為出發點，會比較偏向哪種教材組織方式？
(A)橫向組織　(B)心理組織　(C)論理組織　(D)縱向組織

40. 張老師在教導新單元的內容時，明確地提示學生這個單元的學習目標。依據蓋聶(R. M. Gagné)的觀點，張老師的這種教學可以引發學生何種內在歷程？
(A)形成期望　(B)引起注意　(C)引發表現　(D)選擇知覺

41. 古老師對學生說：「如果小組的實驗報告寫得很完整正確，這個單元我們就不考試。」請問，古老師這種做法屬於哪一種刺激--反應的方式？
(A)活動增強　(B)負增強　(C)正增強　(D)撤除增強

42. 德國教育學者赫爾巴特(J. F. Herbart)主張教學應依「明瞭、聯絡、系統、應用」的程序，才能增進學生瞭解和接受的程度。其中的「明瞭」與「聯絡」階段與哪項教學原則的意涵相近？
(A)自動原則　(B)同時學習原則　(C)類化原則　(D)熟練原則

43. 因應近年來的公開觀課趨勢，李校長鼓勵校內教師每學年至少公開授課一次，李校長就觀課經驗與教師回饋中，發現學生在公開觀課中的學習情緒與表現皆較佳。這種現象與下列何種現象最接近？

(A)霍桑效應　(B)比馬龍效應　(C)尖角效應　(D)月暈效應

44. 下列何者為提升選擇題命題品質的有效做法？

(A)分析接受教學、未接受教學兩組學生測驗結果差異

(B)分析學生作答，力求每個選項答對率超過50%

(C)調整題幹敘寫方式，長題幹應一律修改為題組形式

(D)調整選項誘答力，使得選擇誘答項之高分組高於低分組

45. 甲、乙兩班各有5個學生，每班5個學生的考試分數分別為：

甲班（5、7、10、13、15）；乙班（8、9、10、11、12），以下的描述統計值相關敘述，何者錯誤？

(A)乙班的全距較大　(B)兩班的中數一樣

(C)甲班的標準差較大　(D)兩班的平均數差值為0

46. 鍾老師想要分析學生抽菸與否和性別之間的關聯性，應使用下列何種分析方法？

(A)卡方檢定　(B) t 考驗　(C)迴歸分析　(D)變異數分析

47. 證據為本(evidence-based)，就學生認知發展來說，下列何種評量提供最少的證據？

(A)放聲思考　(B)作品評量　(C)軼事記錄　(D)自陳量表

48. 臺北市政府教育局推動 e 酷幣，善用虛擬貨幣作為學習獎勵，以激勵學生參與線上學習活動，請問這是何種策略的運用？

(A)素養策略　(B)認知策略　(C)情意策略　(D)動機策略

49. 宋老師發展教材時強調要合乎學生身心發展歷程，並採用引導的方式培養學生自主學習，請問她的做法符合何種教育規準？

(A)合價值性　(B)合認知性　(C)合自願性　(D)合發展性

50. 潛在課程的敘述，何者最正確？

(A)潛在課程就是懸缺課程

(B)潛在課程屬於正式課程

(C)教師的身教屬於潛在課程

(D)潛在課程是負面的學習結果

貳、理化(雙語)

選擇題（共 40 題，每題 1.5 分，共 60 分）

51. When 10 cm^3 of a gaseous hydrocarbon is burned in excess oxygen, the products consist of 30 cm^3 of carbon dioxide and 30 cm^3 of water vapor, measured under the same conditions of temperature and pressure. Determine the molecular formula of the hydrocarbon C_xH_y.

(A) x=2, y=4 (B) x=3, y=6 (C) x=4, y=8 (D) x=5, y=10

52. What information about the structure of a hydrogen atom can be gained from its emission spectrum?

(A) The electron in the hydrogen atom is held near the nucleus.

(B) The electron may exist in any of several energy levels.

(C) Most of the mass of the atom is in its nucleus.

(D) A hydrogen atom contains one proton and one electron.

53. Which of the following compound is the most ionic?

(A) Al_2O_3 (B) $MgCl_2$ (C) HCl (D) KF

54. The following reaction achieves equilibrium at 400K:

$4H_{2(g)} + 2NO_{(g)} \rightarrow 2H_2O_{(g)} + N_{2(g)}$

At constant temperature, increasing the volume of the reaction vessel will

(A) increase the reaction rate. (B) condense water vapor into liquid.

(C) produce more hydrogen gas. (D) produce less nitrogen monoxide.

55. Which methods will help us to distinguish between equimolar solutions of a strong base and a strong acid?

I. Add magnesium to each solution and look for the formation of gas bubbles .

II. Add aqueous sodium hydroxide to each solution and measure the temperature change.

III. Measure the electrical conductivity of each solutions.

(A) I and II only (B) I and III only (C) II and III only (D) I, II, and III

56. The data in the table below were obtained for the reaction A + B → C. Which of the following is the rate law for the reaction?

Experiment	Initial [A]	Initial [B]	Initial rate of formation of C
1	0.02	0.01	2.0×10^{-6}
2	0.04	0.01	2.0×10^{-6}
3	0.04	0.02	4.0×10^{-6}
4	0.02	0.04	8.0×10^{-6}

(A) Rate = k[A] (B) Rate = k[A][B] (C) Rate = k $[A][B]^2$ (D) Rate = k[B]

57. During the electrolysis of a molten salt, which statement is **not** correct?

(A) The ions only move when a current flows.

(B) Positive ions are attracted to the negative electrode.

(C) Positive ions gain electrons at the negative electrode.

(D) Negative ions lose electrons at the positive electrode.

58. $Sn(s) + 2Fe^{3+}(aq) \rightarrow Sn^{2+}(aq) + 2Fe^{2+}(aq)$

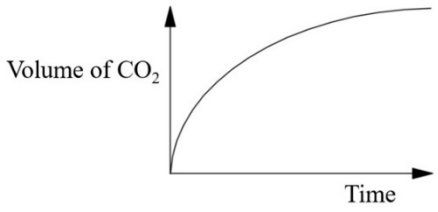
Tin metal reacts with aqueous Fe^{3+} ions according to the equation above. Which of the following factors will increase the rate of this reaction?

I. Increasing the ion concentration Fe^{3+}

II. Decreasing the size of the tin pieces

(A) I only (B) II only (C) Both I and II (D) Neither I nor II

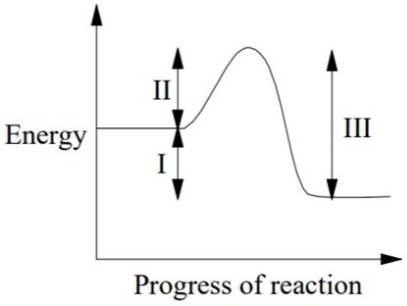
59.



The curve above is obtained for the reaction of an excess of $CaCO_3$ with hydrochloric acid. How and why does the rate of reaction change with time?

	Rate of reaction	Reason
(A)	decreases	the HCl becomes more dilute
(B)	decreases	the pieces of $CaCO_3$ become smaller
(C)	increases	the temperature increases
(D)	increases	the CO_2 produced acts as a catalyst

60.



Which energy value(s) will change when a catalyst is added?

(A) I only (B) II only (C) II and III only (D) I, II and III

61. Which set of coefficients properly balances the equation for the combustion of ethane?

__ethane$_{(g)}$ + __oxygen$_{(g)}$ → __carbon dioxide$_{(g)}$ + __water$_{(g)}$

(A) 1, 7, 2, 3 (B) 1, 2, 1, 2 (C) 2, 7, 4, 6 (D) 1, 4, 1, 2

62. Which of the following are state functions?

(A) Work, enthalpy (B) Heat, enthalpy

(C) Enthalpy, internal energy (D) Work, heat

63. What is the valence electron configuration of S?

(A) $1s^2 2s^2 2p^6$ (B) $1s^2 2s^2 2p^6 3s^1 3p^5$ (C) $4s^2 4p^4$ (D) $3s^2 3p^4$

64. Which of the following statements is true for a monatomic ideal gas?

(A) $C_v < C_p$ (B) $C_v > C_p$

(C) $C_v = C_p$ (D) More information is needed

65. Assume ψ is a solution to the Schrödinger equation. If $H\Psi=E\Psi$ for a system, the quantity $\Psi\Psi^* d\tau$ is interpreted as _____.

(A) the energy of the system.

(B) the probability of finding the system at some particular configuration.

(C) the momentum of the system.

(D) the orbit of the system.

66. Which of the following chemical or physical changes is an endothermic process?

(A) The mixing of nitric acid and water (B) The freezing of water

(C) The evaporation of water (D) The combustion of methane

67. How could you convert an unsaturated fatty acid into a saturated fatty acid?

(A) $KMnO_4$, H_3O^+, heat (B) $NaBH_4$, H_2O, heat; then H_3O^+

(C) H_2, Ni, pressure (D) H_3O^+, H_2O, heat

68. The enthalpy of formation of an element in its standard state is _____.

(A) the enthalpy of its reaction with oxygen. (B) determined by its melting point.

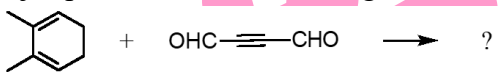
(C) the enthalpy of its reaction with carbon. (D) zero.

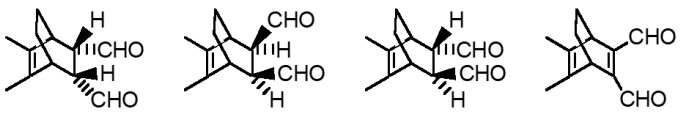
69. Which order reaction in the following is the half-life of the reaction independent of the initial concentration of the reactant(s)?

(A) Zero order (B) First order

(C) Second order (D) More information is needed

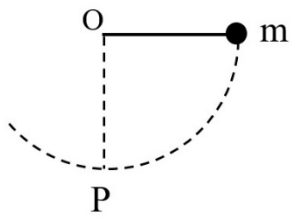
70. Which is the major product of the following reaction?





I II III IV

(A) I (B) II (C) III (D) IV

71. 

A small object of mass m is suspended from a fixed point O by a light, inextensible cord. The object is raised until the cord is horizontal and then released. It moves in an arc of a circle as shown in the figure above. When it passes through its lowest position at point P, the tension in the cord is _____.

(A) 3mg. (B) 2mg. (C) 1mg. (D) 0mg.

72. A small object of mass *m* at 100℃ is placed into an equal mass of water at 0℃ in a calorimeter. The specific heat of the object is half that of the water. Assuming there are no energy transfer to the environment or to the calorimeter, the final equilibrium temperature of the object plus water will be _____.

(A) 25℃. (B) 33℃. (C) 50℃. (D) 67℃.

73. Two identical objects A and B fall from rest from different heights to the ground. Assume the air resistance can be neglected. If object B takes twice as long as object A to reach the ground, what is the ratio of the heights (h_A/h_B) from which A and B fell?

(A) $h_A/h_B = \frac{1}{\sqrt{2}}$ (B) $h_A/h_B = 1/2$ (C) $h_A/h_B = 1/4$ (D) $h_A/h_B = 1/8$

74. Suppose that a car traveling to the west (the -*x* direction) begins to slow down as it approaches a traffic light. Which statement concerning its acceleration in the *x* direction is correct?

(A) Its acceleration is positive but its velocity is negative.
(B) Its acceleration is negative but its velocity is positive.
(C) Both its acceleration and its velocity are positive.
(D) Both its acceleration and its velocity are negative.

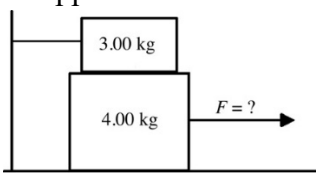
75. For a general projectile motion, when the projectile is at the highest point of its trajectory, _____.

(A) its acceleration is zero.
(B) its velocity is perpendicular to the acceleration.
(C) the horizontal component of its velocity is zero.
(D) the horizontal and vertical components of its velocity are zero.

76. A string is attached to the rear-view mirror of a car. A ball is hanging at the other end of the string. The car is driving around in a circle, at a constant speed. Which of the following lists gives all of the forces directly acting on the ball?

(A) Tension
(B) Tension and gravity
(C) Tension, gravity, and the centripetal force
(D) Tension, gravity, the centripetal force, and friction

77. A 4.00 kg block rests between the floor and a 3.00 kg block as shown in the figure below. The 3.00 kg block is tied to a wall by a horizontal rope. If the coefficient of static friction is 0.800 between each pair of surfaces in contact, what horizontal force F must be applied to the block to make it move?

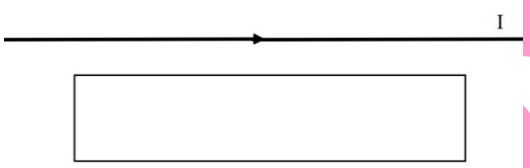


(A) 16.2 N (B) 23.5 N (C) 54.9 N (D) 78.4 N

78. The current definition of the standard second of time is based on _____.
(A) the earth's rotation rate.
(B) the duration of one year.
(C) the frequency of radiation emitted by cesium atoms.
(D) the oscillation of a particular pendulum kept in France.

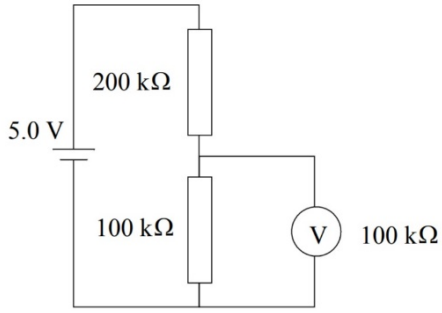
79. Two stones, one of mass m and the other of mass $2m$, are thrown directly upward with the same velocity at the same time from ground level. Assume the air resistance can be neglected. Which statement about these stones is true?
(A) Both stones will reach the same height because they initially had the same amount of kinetic energy.
(B) The heavier stone will go twice as high as the lighter one because it initially had twice as much kinetic energy.
(C) At their highest point, both stones will have the same gravitational potential energy because they reach the same height.
(D) At its highest point, the heavier stone will have twice as much gravitational potential energy as the lighter one because it is twice as heavy.

80. A long straight wire is in the plane of a rectangular conducting loop of wire. The straight wire carries a constant current I as shown in the figure below and is moved towards the rectangular loop.



While the wire is being moved towards the rectangular loop, the current in the loop _____.
(A) is always zero.
(B) flows clockwise around the loop.
(C) flows counterclockwise around the loop.
(D) alternates, first one way then the opposite way around the loop.

81. In the diagram below the voltmeter V has a resistance of 100 kΩ and is connected such as to measure the potential difference across the 100 kΩ resistor. The battery has an emf of 5.0 V and negligible internal resistance.



The reading on the voltmeter will be _____.

(A) 4.0V. (B) 2.5V. (C) 1.0V. (D) 0V.

82. When light goes from one material into another material with a higher index of refraction, _____.

(A) its speed, wavelength, and frequency all decrease.

(B) its speed and wavelength decrease, but its frequency stays the same.

(C) its speed decreases but its wavelength and frequency both increase.

(D) its speed decreases but its frequency and wavelength stay the same.

83. When a rocket is traveling toward a mountain at 100 m/s, the sound waves from this rocket's engine approach the mountain at speed of V. If the rocket doubles its speed to 200 m/s, the sound waves from the engine will now approach the mountain at speed of _____.

(A) $4V$. (B) $2V$. (C) $\sqrt{2}V$. (D) V.

84. Assume water is an incompressible fluid. If you double the pressure on the surface of a can of water, the buoyant force on a stone placed in that water will _____.

(A) double.

(B) not change.

(C) increase, but not double.

(D) decrease, but not by one-half.

85. An object is placed in front of a lens which forms an image of the object.

(A) If the lens is convex, the image cannot be virtual.

(B) If the image is real, then it is also inverted.

(C) If the image is real, then it is also upright.

(D) If the image is virtual, then it is also inverted.

86. An electron, moving toward the west, enters a uniform magnetic field. Because of this field the electron curves upward. The direction of the magnetic field is _____.

(A) upward. (B) downward.

(C) towards the north. (D) towards the south.

87. John is pushing a heavy box up a ramp at a constant speed. There is friction between the ramp and the box. The box _____.

(A) is gaining potential energy but losing kinetic energy.

(B) is gaining potential energy and kinetic energy.

(C) is only gaining potential energy.

(D) gains no energy.

88. A man pushes a car along a road. He exerts a force F on the car. In this situation, what is the equal and opposite force to F (i.e., 'reaction' force) as referred to in Newton's third law?

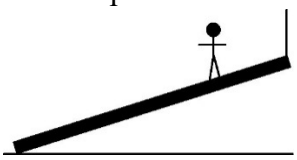
(A) The force exerted on the person by the car

(B) The force of friction on the car by the road

(C) The force of gravity on the car by the earth

(D) There is no reaction force if the car moves in the direction of F

89. A 20.0 kg uniform plank is supported by the floor at one end and by a vertical rope at the other as shown in the figure below. A 50.0 kg mass person stands on the plank a distance three-fourths of the length plank from the end on the floor. What is the tension in the rope?



(A) 165.5N (B) 265.5N (C) 365.5N (D) 465.5N

90. Consider the waves on a vibrating guitar string and the sound waves the guitar produces in the surrounding air. The string waves and the sound waves must have the same _____.

(A) wavelength. (B) velocity. (C) frequency. (D) amplitude.

試題結束

新聞稿用卷