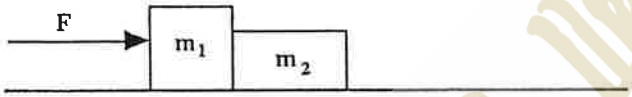
一、選擇題，共 50 題，每題 2 分，共 100 分。

1. Dagwood and Blondie are driving two identical cars. Blondie is passing Dagwood at twice his speed. They apply their brakes with equal constant force and stop on the level road. Dagwood travels a distance D in a time T while braking. How long does Blondie take to stop?
(A)T (B)1.4T (C)2T (D)2.8T (E)4T.

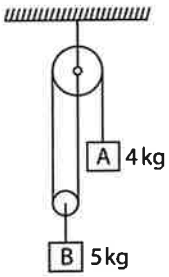
2. On a distant planet where the gravitational constant g = 6.0 m/s^2, Sherlock Holmes dropped his pipe from the roof of a building. Dr. Watson, in a room below, noticed the pipe flash past a window, taking 0.30 seconds to cover the 1.5 m vertical dimension of the window. Exactly 1.4 seconds after passing the bottom of the window on the way down, it passed it again on the way up, having made a perfectly elastic collision with the level ground below. Calculate the height of the building.
(A) 7.1 m (B) 11.6 m (C) 9.4 m (D) 4.8 m (E) 8.5 m.

3. Two blocks are in contact on a frictionless table. A horizontal force is applied to one block as shown. If m_1 = 2.0 kg, m_2 = 1.0 kg, and F = 3.0 N, find the force of contact between the two blocks.

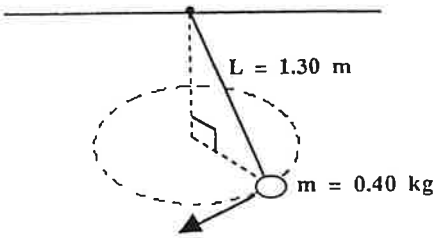


(A) 1 N (B) 2 N (C) 3 N (D) 6 N (E) 9 N.

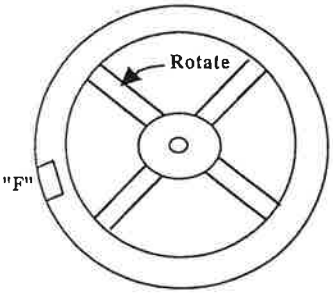
4. The accelerations of the blocks A and B respectively as seen in the situation shown in the figure are (pulleys and strings are massless and pulleys are frictionless, acceleration due to gravity is g)?
(A) 2g/3 downward, g/3 upward (B) 2g/7 downward, g/7 upward
(C) 2g/5 downward, g/5 upward (D) 10g/13 downward, 5g/13 upward
(E) A and B are at rest.



5. For the conical pendulum shown, the 0.40 kg mass has a periodic time of 1.90 s. What is the tension in the string? (Answer in N.)
(A) 3.92 (B) 4.37 (C) 5.69 (D) 6.48 (E) 7.85.



6. An astronaut, spaced out as usual, sits in her room at position "F" on the outer rim of a wheel-shaped station as shown. Gravitational forces are negligible. The station rotates about its axis 100 times each hour as shown. She weighed 900 N on earth. Her mass has not changed, but when she stands on a spring scale at "F" it correctly reads 1000 N. Calculate the radius of the station. Answers in meters.
(A) 400 (B) 360 (C) 330 (D) 280 (E) 260.

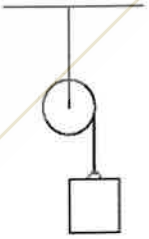


7. A piece of thin uniform wire of mass m and length $3b$ is bent into an equilateral triangle. Find the moment of inertia of the wire triangle about an axis perpendicular to the plane of the triangle and passing through one of its vertices.
(A)$2mb^2/3$ (B) $7mb^2/4$ (C) $1mb^2/3$ (D) $1mb^2/4$ (E) $1mb^2/2$.

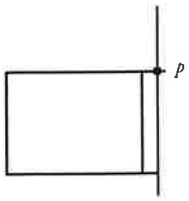
8. A uniform solid sphere of mass M and radius R rotates with an angular speed ω about an axis through its center. A uniform solid cylinder of mass M, radius R, and length $2R$ rotates through an axis running through the central axis of the cylinder. What must be the angular speed of the cylinder so it will have the same rotational kinetic energy as the sphere?
(A)$2\omega/5$ (B) $\sqrt{2/5}\omega$ (C) $4\omega/5$ (D) $2\omega/\sqrt{5}$ (E) $\omega/\sqrt{5}$.

9. A record is dropped vertically onto a freely rotating (undriven) turntable. Frictional forces act to bring the record and turntable to a common angular speed. If the rotational inertia of the record is 0.54 times that of the turntable, what percentage of the initial kinetic energy is lost?
(A) 10% (B) 35% (C) 18% (D) 46% (E) 60%.

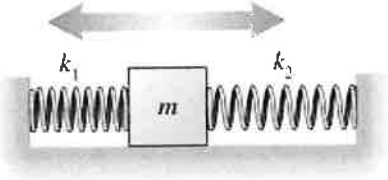
10. In the figure, a mass of 31.77 kg is attached to a light string that is wrapped around a cylindrical spool of radius 10.0 cm and moment of inertia 4.00 kg · m^2. The spool is suspended from the ceiling, and the mass is then released from rest a distance 5.70 m above the floor. How long does it take to reach the floor?
(A) 10.83 s (B) 3.98 s (C) 1.14 s (D) 5.59 s (E) 7.89 s.



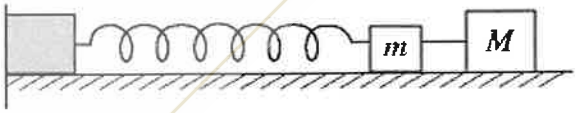
11. A uniform sign is supported against a wall at point P as shown in the figure. If the sign is a square 0.4 m on a side and its mass is 4.0 kg, what is the magnitude of the horizontal force that the wall at P experiences?
(A) 5.8 N (B) 10.0 N (C) 20 N (D) 98 N (E) 75 N.



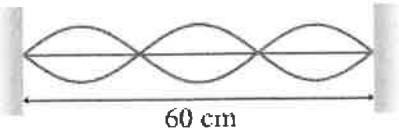
12. A 2.0 kg block on a frictionless table is connected to two ideal massless springs with spring constants k_1 and k_2 whose opposite ends are fixed to walls, as shown in the figure. What is the angular frequency of the oscillation if k_1=7.6 N/m and k_2=5.0 N/m?
(A) 2.5 rad/s (B) 3.5 rad/s (C) 0.40 rad/s (D) 0.56 rad/s (E) 5.5 rad/s.



13. In the figure, two masses, M = 16 kg and m = 12.8 kg, are connected to a very light rigid bar and are attached to an ideal massless spring of spring constant 100 N/m. The system is set into oscillation with an amplitude of 78 cm. At the instant when the acceleration is at its maximum, the 16-kg mass separates from the 12.8-kg mass, which then remains attached to the spring and continues to oscillate. What will be the amplitude of oscillation of the 12.8-kg mass?
(A) 35 cm (B) 62 cm (C) 78 cm (D) 98 cm (E) 110 cm.



14. A standing wave is oscillating at 690 Hz on a string, as shown in the figure. What is the speed of traveling waves on this string?
(A) 140 m/s (B) 210 m/s (C) 280 m/s (D) 340 m/s (E) 410 m/s.



15. A violin with string length 32 cm and string density 1.5 g/cm resonates with the first overtone from a 2.0 m long organ pipe with one end closed and the other end open. What is the tension in the string?
(A) 56 N (B) 110 N (C) 450 N (D) 1000 N (E) 1500 N.

16. Consider a very small hole in the bottom of a tank 20.0 cm in diameter filled with water to a height of 50.0 cm. Find the speed at which the water exits the tank through the hole.
(A) 1.8 m/s (B) 3.13 m/s (C) 5.10 m/s (D) 9.4 m/s (E) 14.9 m/s.

17. A 7.8-kg solid sphere, made of metal whose density is 2500 kg/ m^3, is suspended by a cord. When the sphere is immersed in water (of density 1000 kg/m^3), what is the tension in the cord?
(A) 16 N (B) 30 N (C) 46 N (D) 61 N (E) 72 N.

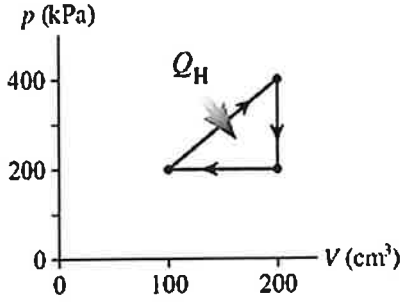
18. A heat conducting rod, 0.90m long, is made of an aluminum section that is 0.10 m long, and a copper section that is 0.8 m long. Both sections have cross-sectional areas of 0.0004 m^2. The aluminum end is maintained at a temperature of 40 °C and the copper end is at 150 °C. The thermal conductivity of aluminum is 205 W/m·K and of copper is 385 W/m·K. Steady state has been reached, and no heat is lost through the well-insulated sides of the rod. The temperature of the aluminum-copper junction in the rod is closest to
(A) 61°C. (B) 48°C. (C) 56°C. (D) 34°C. (E) 70°C.

19. Some properties of glass are listed here:
Density: 2300 kg/m^3
Specific heat: 840 J/kg·C°
Coefficient of linear thermal expansion: 8.5×10^{-6} $(C°)^{-1}$
Thermal conductivity: 0.80 W/(m·C°)
A glass window pane is 2.7 m high, 2.4 m wide, and 2.0 mm thick. The temperature at the inner surface of the glass is 22°C and at the outer surface 4.0°C. How much heat is lost each hour through the window under steady state conditions?
(A) 1.7×10^5 J (B) 1.7×10^6 J (C) 4.7×10^7 J (D) 1.7×10^8 J (E) 4.7×10^9 J.

20. If we double the root-mean-square speed (thermal speed) of the molecules of a gas, then
(A) its temperature must increase by a factor of 4.
(B) its temperature must increase by a factor of 2.
(C) its temperature must increase by a factor of $\sqrt{2}$.
(D) its pressure must increase by a factor of 2.
(E) its pressure must increase by a factor of 4.

21. An ideal gas in a balloon is kept in thermal equilibrium with its constant-temperature surroundings. How much work is done by the gas if the outside pressure is slowly reduced, allowing the balloon to expand to 6.0 times its original size? The balloon initially has a pressure of 645.0 Pa and a volume of 0.1 m^3. The ideal gas constant is $R = 8.314$ J/mol · K.
(A) 60 J (B) 115 J (C) 160 J (D) 200 J (E) 250 J.

22. The graph in the figure shows a cycle for a heat engine for which $Q_H = 35$ J.
What is the thermal efficiency of this engine?
(A) 14 % (B) 21 % (C) 29 % (D) 35 % (E) 49 %.

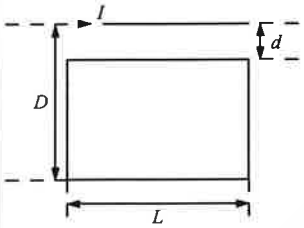


23. The second law of thermodynamics leads us to conclude that
(A) the total energy of the universe is constant.
(B) the total energy in the universe is decreasing with time.
(C) it is theoretically impossible to convert work into heat with 100% efficiency.
(D) the total energy in the universe is increasing with time.
(E) disorder in the universe is increasing with the passage of time.

24. A crane lifts a 425 kg steel beam vertically a distance of 117m. How much work does the crane do on the beam if the beam accelerates upward at 1.8 m/s^2? Neglect frictional forces.
(A) 1.8×10^5 J (B) 3.4×10^5 J (C) 4.0×10^5 J (D) 4.9×10^5 J (E) 5.8×10^5 J.

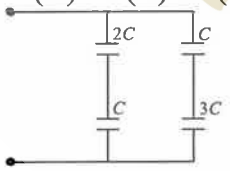
25. A certain spherical asteroid has a mass of 3.5×10^{16} kg and a radius of 8.8 km. What is the minimum speed needed to escape from the surface of this asteroid? ($G = 6.67 \times 10^{-11}\text{N} \cdot \text{m}^2/\text{kg}^2$)
(A) 223 m/s (B) 126 m/s (C) 52 m/s (D) 34 m/s (E) 23 m/s.

26. A loop of wire (resistance = 2.0 mΩ) is positioned as shown with respect to a long wire that carries a current. If $d = 1.0$ cm, $D = 6.0$ cm, and $L = 1.5$ m, what current in mA is induced in the loop at an instant when the current in the wire is increasing at a rate of 100 A/s?
(A) 34 (B) 30 (C) 27 (D) 38 (E) 0.50.



27. Current enters a circular loop as shown below. At point P, where $x = a$, the magnetic field has the value $B_x\hat{\mathbf{i}}$. The value of the magnetic field at $x = -a$ is:
(A) 0 (B) $-B_x\hat{\mathbf{i}}$ (C) $B_x\hat{\mathbf{i}}$ (D) $-B_y\hat{\mathbf{i}}$ (E) $B_y\hat{\mathbf{i}}$.

28. Determine the equivalent capacitance in pF for the network shown when $C = 12$ pF.
(A) 34 (B) 17 (C) 51 (D) 68 (E) 21.



29. By what factor is the drift velocity in a conductor changed if the voltage is doubled?
(A) 1 (B) 2 (C) 3 (D) 1/2 (E) 1/4.

30. The distance from an antinode to a node nearest to that antinode is
(A) $\frac{\lambda}{4}$ (B) $\frac{\lambda}{2}$ (C) λ (D) 2λ (E) 3λ.

31. A flute player holding a tone with a frequency of 520 Hz approaches a wall at 2 m/s on a day when the speed of sound in air is 340 m/s. The frequency in Hz he hears coming back to him from the wall is (A) 260 (B) 517 (C) 520 (D) 523 (E) 526.

32. The *xy* plane is "painted" with a uniform surface charge density equal to 40 $\mathrm{nC/m^2}$. Consider a spherical surface with a 4.0 cm radius that has a point in the *xy* plane as its center. What is the electric flux in $\mathrm{Nm^2/C}$ for that part of the spherical surface for which $z > 0$?
($\varepsilon_o = 8.85 \times 10^{-12}\ \mathrm{C^2/Nm^2}$)
(A) 14 (B) 11 (C) 17 (D) 20 (E) 23.

33. A charged conductor has the oval shape shown below. When we compare the potential at points A and B, we find that: (A) $V_A > V_B$ (B) $V_A = V_B$ (C) $V_A < V_B$ (D) $V_A \le V_B$ (E) we must first determine the charge distribution on the surface before we can calculate the potential difference between two points on the surface.

34. Three charges, the outer two $+q$, and the inner one $-q$, are placed in a line, as shown below. The potential energy of these charges is

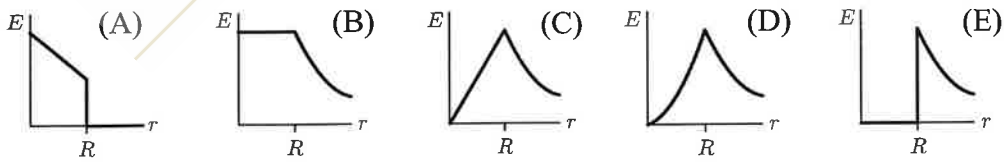
(A) $-\frac{5}{2}\frac{k_e q^2}{r}$ (B) $-\frac{3}{2}\frac{k_e q^2}{r}$ (C) $-\frac{k_e q^2}{r}$ (D) $+\frac{3}{2}\frac{k_e q^2}{r}$ (E) $+\frac{5}{2}\frac{k_e q^2}{r}$.

35. Two long parallel wires carry unequal currents in the same direction. The ratio of the currents is 3 to 1. The magnitude of the magnetic field at a point in the plane of the wires and 10 cm from each wire is 4.0 μT. What is the larger of the two currents in A? (A) 5.3 (B) 3.8 (C) 4.5 (D) 3.0 (E) 0.5.

36. A 30 turn square coil (length of side = 12 cm) with a total resistance of 2.5 Ω is placed in a uniform magnetic field directed perpendicularly to the plane of the coil. The magnitude of the field varies with time according to $B = Ae^{8t}$, where $A = 50$ mT and t is measured in seconds. What is the magnitude in V of the induced *emf* in the coil at $t = 0$?
(A) 0.31 (B) 0.27 (C) 0.17 (D) 0.20 (E) 22 x 10^{-3}.

37. Charge Q is spread uniformly along the circumference of a circle of radius R. A point particle with charge q is placed at the center of this circle. The total force exerted on the particle can be calculated by Coulomb's law:
(A) just use R for the distance (B) just use 2R for the distance (C) just use 2πR for the distance (D) the result of the calculation is zero (E) none of the above.

38. A solid insulating sphere of radius R contains positive charge that is distributed with a volume charge density that does not depend on angle but does increase with distance from the sphere center. Which of the graphs below might give the magnitude E of the electric field as a function of the distance r from the center of the sphere?



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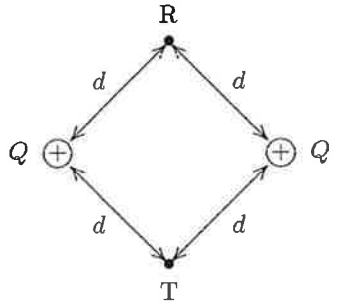
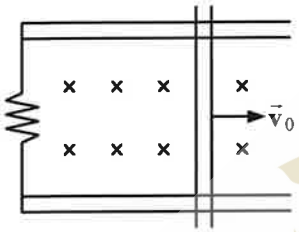
39. If the electric field is in the positive x direction and has a magnitude given by $E = Cx^2$, where C is a constant, then the electric potential is given by V =
(A) 2Cx (B) -2Cx (C) $Cx^3/3$ (D)- $Cx^3/3$ (E) $-Cx^3$.

40. Points R and T are each a distance d from each of two particles with equal positive charges as shown. If $k_e = 1/4\pi\epsilon_0$, the work required to move a particle with charge q from R to T is:
(A) 0 (B) k_eQq/d^2 (C) k_eQq/d (D) $k_eQq/(\sqrt{2}d)$ (E) $k_eQq/(2d)$.

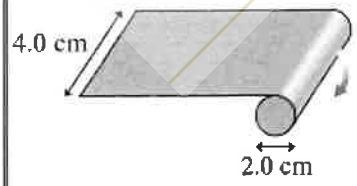


41. A metal bar sliding on parallel rails a length ℓ apart from one another is given initial velocity v_0 to the right. The rails are connected by a resistor of resistance R at their left. If a constant magnetic field B is directed into the page, what is the magnitude of the force on the rod?
(A) $B\ell v$ (B)$B^2\ell^2 v$ (C) $\frac{B\ell v}{R}$ (D) $\frac{B^2\ell^2 v}{R}$ (E) $\frac{B^2\ell^2 v}{mR}$.



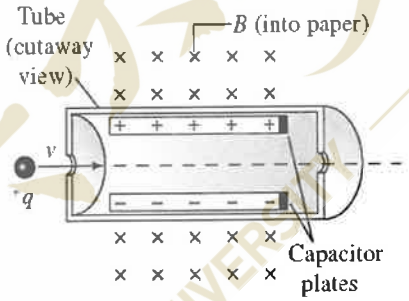
42. An alpha particle is a nucleus of helium. It has twice the charge and four times the mass of the proton. When they were very far away from each other, but headed toward directly each other, a proton and an alpha particle each had an initial speed of $0.0030c$, where c is the speed of light. What is their distance of closest approach? ($c = 3.00 \times 10^8$ m/s, $k_e = 1/4\pi\varepsilon_0 = 8.99 \times 10^9$ N · m^2/C^2, $e = 1.60 \times 10^{-19}$ C, $m_{proton} = 1.67 \times 10^{-27}$ kg)
(A) 2.1×10^{-13} m (B) 3.3×10^{-13} m (C) 2.6×10^{-13} m (D) 2.9×10^{-13} m (E) 4.2×10^{-13} m.

43. The figure shows a 2.0-cm diameter roller that turns at 90 rpm. A 4.0-cm wide plastic film is being wrapped onto the roller, and this plastic carries an excess electric charge having a uniform surface charge density of 5.0 nC/cm^2. What is the current of the moving film?
(A) 190 nA (B) 23 μA (C) 30 nA (D) 11 μA (E) 16 nA.

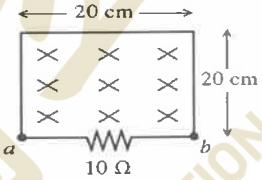


44. The heater element of a particular 120-V toaster is a 8.9-m length of nichrome wire, whose diameter is 0.86 mm. The resistivity of nichrome at the operating temperature of the toaster is $1.3 \times 10^{-6}\ \Omega \cdot$ m. If the toaster is operated at a voltage of 120 V, how much power does it draw?
(A) 720 W (B) 700 W (C) 750 W (D) 770 W (E) 800 W.

45. The figure shows a velocity selector that can be used to measure the speed of a charged particle. A beam of particles is directed along the axis of the instrument. A parallel plate capacitor sets up an electric field E, which is oriented perpendicular to a uniform magnetic field B. If the plates are separated by 2.0 mm and the value of the magnetic field is 0.60 T, what voltage between the plates will allow particles of speed 5.0×10^5 m/s to pass straight through without deflection?
(A) 94 V (B) 1900 V (C) 3800 V (D) 190 V (E) 600 V.



46. As shown in the figure, a wire and a 10-Ω resistor are used to form a circuit in the shape of a square, 20 cm by 20 cm. A uniform but nonsteady magnetic field is directed into the plane of the circuit. The magnitude of the magnetic field is decreased from 1.50 T to 0.50 T in a time interval of 63 ms. The average induced current and its direction through the resistor, in this time interval, are closest to
(A) 63 mA, from b to a (B) 38 mA, from b to a (C) 63 mA, from a to b (D) 38 mA, from a to b (E) 95 mA, from a to b.



47. A man is nearsighted and cannot see things clearly beyond 110 cm from his eyes. What is the focal length of the contact lenses that will enable him to see very distant objects clearly?
(A) 50 cm (B) -50 cm (C) -110 cm (D) 110 cm (E) -30 cm.

48. Light of wavelength 500 nm illuminates a round 0.50-mm diameter hole. A screen is placed 6.3 m behind the slit. What is the diameter of the central bright area on the screen?
(A) 15 mm (B) 270 μm (C) 7.7 mm (D) 3800 μm (E) 5 mm.

49. Given that the wavelengths of visible light range from 400 nm to 700 nm, what is the highest frequency of visible light? ($c = 3.0 \times 10^8$ m/s)
(A) 3.1×10^8 Hz (B) 7.5×10^{14} Hz (C) 2.3×10^{20} Hz (D) 4.3×10^{14} Hz (E) 5.0×10^8 Hz.

50. What resistance should be added in series with a 3.0-H inductor to complete an LR circuit with a time constant of 4.0 ms?
(A) 20 Ω (B) 0.75 k Ω (C) 12 Ω (D) 0.75 Ω (E) 2.5 Ω.

科目：物理

題號	答案	題號	答案	題號	答案	題號	答案	題號	答案	題號	答案	題號	答案
1.	C	16.	B	31.	E	46.	A	61.		76.		91.	
2.	E	17.	C	32.	B	47.	C	62.		77.		92.	
3.	A	18.	A	33.	B	48.	A	63.		78.		93.	
4.	B	19.	D	34.	B	49.	A	64.		79.		94.	
5.	C	20.	A	35.	D	50.	B	65.		80.		95.	
6.	B	21.	B	36.	C	51.		66.		81.		96.	
7.	E	22.	C	37.	D	52.		67.		82.		97.	
8.	D	23.	E	38.	D	53.		68.		83.		98.	
9.	B	24.	E	39.	D	54.		69.		84.		99.	
10.	B	25.	E	40.	A	55.		70.		85.		100.	
11.	C	26.	C	41.	D	56.		71.		86.			
12.	A	27.	C	42.	A	57.		72.		87.			
13.	C	28.	B	43.	A	58.		73.		88.			
14.	C	29.	B	44.	A	59.		74.		89.			
15.	D	30.	A	45.	E	60.		75.		90.			

國立中興大學 112 學年度學士後醫學系招生考試

試題參考答案疑義釋疑公告

科目	題號	疑義答覆	釋疑結果
英文	32	本題重點為測試考生篇章結構能力，第 4 段開頭的句子倒數第 2 個字是否誤植，並不影響答案為 D 的明確性，本題問題為“Where does the following sentence best belong?”, 故考生應在所列選項中選出最適合的選項，又因“Often the diagnosis is straightforward.”無法放置於篇章當中第四段以外的其他段落，因此不變更參考答案。	維持原答案(D)

科目	題號	疑義答覆	釋疑結果
物理	1	考題為單選題，且一般而言，汽車的質量(~1000-1500 公斤)跟兩個人的質量差(<30 公斤)相差很多，若把此誤差考慮進去，答案還是(C)。	維持原答案(C)
	6	$F=m*R*\varpi^2$ $m=900[N]/10[m/s^2]=90kg$ $F=1000[N]$ $R=F/(m*\varpi^2)=1000/(90*(2\pi*100/3600)^2)\approx360$ 答案為(B)。	維持原答案(B)
	10	答案會因取重力加速度的不同有所不同，但答案(B)誤差在範圍之內，且其他答案已設計與(B)有很大的差距，故維持正確原答案(B)。	維持原答案(B)
	15	本題未提供聲速 344m/s，本題送分。	本題送分
	38	The key sentence is “the volume charge density does **increase** with distance from the sphere center”. From Gauss’s law: $4\pi r^2 \cdot E(r) = \frac{1}{\epsilon}\int_0^r 4\pi r'^2 dr' \rho(r')$ Therefore, outside the sphere, the E field falls like the square of the distance from the center. By Gauss’ law, if the charge distribution were constant, then the E field would rise linearly from the center (Qenc $\propto r^3$and E = kQenc /r^2). However, here the volume charge density increases with distance from the center, therefore the enclosed charge rises more slowly from the center, which is described only by (D).	維持原答案(D)
	39	Electric potential difference is defined as the potential difference between **two points.**	維持原答案(D)

物理		However, problem 39 is not the case, it asked for a general form of electric potential, and no any two points were mentioned.	
	49	本題為正確答案誤植，答案更正為(B)。	答案更正為(B)

科目	題號	疑義答覆	釋疑結果
化學	33	根據題意上說明，正確答案應為(C)而非(D)。	答案更正為(C)
	47	根據題意上說明，正確答案應為(C)或(D)或(E),三者任一皆可給分。	答案更改為(C)或(D)或(E)

科目	題號	疑義答覆	釋疑結果
普通生物及生化概論	8	2,3-BPG 是 Hb 的 inhibitor，會抑制 Hb 結合氧氣。新生胎兒的 Hb 的 His143 易突變為 Ser，造成新生兒 Hb 對 2,3-BPG 結合力下降，反而會造成新生兒 Hb 對氧氣的親和力上升。	維持原答案(B)
	9	一般來說，Keratin 5 及 14 蛋白突變會發生 Epidermolysis bullosa，但近年文獻指出 Keratin K18 突變會造成 cystic fibrosis.	答案更改為(A)或(C)
	10	在無氧呼吸(anaerobic respiratory)的狀態下，葡萄糖會先經過 Glycolysis 轉換成 pyruvate，並產生兩個 ATP 分子。隨後 pyruvate 會被 LDH 酵素催化還原成 lactate，並產生氧化態 NAD+。LDH 也會逆向反應將 lactate 氧化成 pyruvate，但前提是 NAD+及 lactate 的濃度夠高的狀態，此過程的條件並非是氧氣濃度高所造成。故第 10 題答案仍維持(C)。	維持原答案(C)
	11	slope 單位分子分母寫反，故此題無正確答案。	本題送分
	16	phospholipids, sphingolipids, and cholesterol 為兩性分子，並且皆存在於細胞膜。	答案更改為(A)或(C)
	19	AChR 可以分為 nAChR 及 mAchR，前者為 channel，後者為 GPCR。	答案更改為(A)或(B)
	20	本題 D 選項的敘述，最大的問題點在於 G protein 在訊息傳遞的機制中，會停留在細胞膜上，不是扮演細胞內訊號分子(intracellular signalling molecules)的角色。故不選 D。	維持原答案(C)
	31	根據所提供之課本圖例下方之說明（1）已	維持原答案(A)

普通生物及生化概論		經很清楚的註明為 cytosol 了，所以答案（B）並無不妥，因此答案仍維持為所公布之參考答案（A）為唯一選項。	
	46	本題所列選項嚴格來說並無正確的答案 由於亦無以上皆非之選項，所以本題建議送分。	本題送分
	55	選項 B DNA duplication occurs during prophase before mitosis and meiosis I，DNA 複製發生在 interphase，此選項非正確答案。故此題無正確答案。	本題送分
	59	選項 C 異形核子通常不具有貧血的病徵，僅有在極端環境，如高海拔才會影響血紅素攜帶氧氣的能力。因而，一般情形下，異形核子通常不會患有鐮刀型貧血症並且可以正常生活。此外，sickle cell trait 並非一種疾病，而是泛指帶有鐮刀型貧血症基因的異形核子族群。故選項 C 非正確答案。 選項 E 鐮刀型貧血患者如果有嚴重貧血，通常會在年輕的時候因為貧血緣故早逝。因而選項 E 並非答案。鐮刀型貧血患者並非全部患有嚴重貧血，患者可能會隨著年紀增長貧血情形漸趨嚴重。就 E 選項敘述 severe symptoms lead to death at the elderly population，先決條件是假設患有嚴重貧血的話，患者通常無法活到老年，而是在年輕就病逝，因而 E 選項並非正確答案。	維持原答案(B)
	60	選項(D) a useful tool for specific gene knockdown，綜觀期刊論文研究，利用 CRISPR-Cas9 進行 gene knockdown 是可行的。在細胞模式中有其他方法可以取代 CRISPR-Cas9 來執行 gene knockdown，可以利用 siRNA 或是 shRNA 達到一樣的效果。現行 CRISPR-Cas9 為一有效率進行基因剔除 (gene knockout) 的方法，並且為大多數人所利用，但 CRISPR-Cas9 在 gene knockdown 研究也提供一種新的方式進行此實驗。但就效率而言，CRISPR-Cas9 需要花費較久的時間，對比 siRNA 或是 shRNA 則是可以快速達到 gene knockdown 的	答案更正為(E)

普通生物及生化概論		目的。就實驗目的而言，CRISPR-Cas9 是針對 genome 進行改造，而 siRNA 及 shRNA 的目標是 mRNA，所以就僅有 CRIPSR-Cas9 系統改造過後的細胞能夠保有 gene knockdown 特徵的遺傳物質，不會因為細胞複製而喪失。	
	65	基本四大組織為上皮組織、結締組織、肌肉組織以及神經組織。雖然脂肪組織為結締組織的一種，但題目有明確指出下列何者並非四種基本組織，因而選項僅有脂肪組織符合題意所圈選出的答案。	維持原答案(C)
	71	All of the above factors can contribute to genetic variation in a population, making option E the correct answer. (D 負面的影響也是影響)。	維持原答案(E)
	72	Option A is incorrect because seed plants did not evolve from ferns. Instead, both groups evolved from a common ancestor but diverged into distinct lineages.	維持原答案(C)
	73	Answer: E is incorrect because although some fungi are single-celled, others have complex multicellular structures. But Its life cycle is not single-celled.	維持原答案(C)
	76	Answer: B. 0.2 Explanation: The frequency of the resistance gene in the population can be calculated as the number of individuals with the gene divided by the total number of individuals in the population. In this case, there are 10 individuals with the gene, and a total of 50 individuals in the population. Therefore, the frequency of the gene is: Frequency = Number of individuals with gene / Total number of individuals Frequency = 10 / 50 Frequency = 0.2 Therefore, the frequency of the gene in the population is 0.2, or 20%. 未明確說明是「同型合子」或「異型合子」，故 A、B 兩個答案都給分。	答案更正為(A)或(B)
	77	C: It’s not only at the tips of stems and roots	答案更正為(C)或(E)

	78	本題因考題資訊不足，本題送分。	本題送分
	79	題目已經明確告知 A, B 兩物種的染色體數目，而且已告知為單選，故認為仍維持原答案。	維持原答案(C)