



**MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN**

**PERCUBAAN SPM
2022**

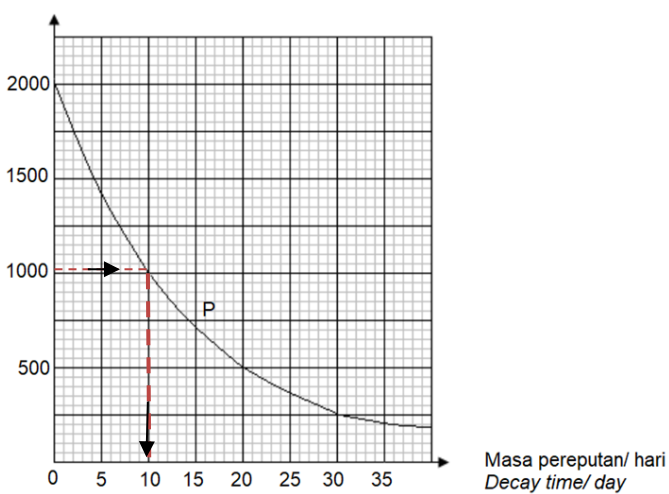
**FIZIK
KERTAS 2**

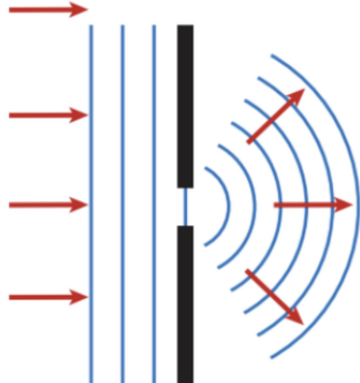
UNTUK KEGUNAAN PEMERIKSA SAHAJA

**SKEMA
PEMARKAHAN**

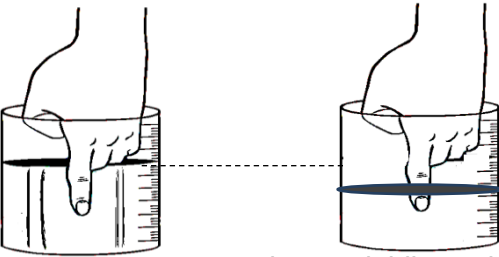
PEPERIKSAAN PERCUBAAN SPM 2022
SKEMA PEMARKAHAN FIZIK KERTAS 2

BAHAGIAN A

| NO | BHG | SKEMA | SUB-MARK | TOTAL MARK |
|---------------|---------------|---|----------|------------|
| 1 | (a) | Foton ialah paket tenaga // kuantum tenaga cahaya yang boleh dipindahkan <i>Photon is packet of energy// light energy transferred in quantum of energy</i> | 1 | 1 |
| | (b) | Kesan fotoelektrik <i>Photoelectric effect</i> | 1 | 1 |
| | (c) | Lebih daripada frekuensi ambang <i>Greater than threshold frequency</i> | 1 | 1 |
| | (d) | Bertambah <i>Increases</i> | 1 | 1 |
| | JUMLAH | | | |
| 2 | (a) | Masa yang diambil untuk separuh daripada bilangan asal nukleus radioaktif bagi satu sampel radioaktif mereput <i>The time taken for half of the original number of radioactive nuclei in radioactive sample to decay</i> | 1 | 1 |
| | (b) | Bilangan nukleus radioaktif <i>Number of radioactive nuclei</i>  | | 2 |
| | | M1 : Tunjuk pada graf/ <i>show on the graph</i> | 1 | |
| | | M2 : Jawapan dan unit betul/ <i>correct answer and unit</i> $T_{1/2} = 10$ hari/ <i>days</i> | 1 | |
| | (c) (i) | Q | 1 | 1 |
| | (ii) | Semakin pendek masa separuh hayat semakin tinggi kadar reputan <i>The shorter the half-life, the higher the decay rate</i> | 1 | 1 |
| JUMLAH | | | | 5 |

| | | | | |
|---|---------------|--|-------------|----------|
| 3 | (a) | Pembelauan <i>Diffraction</i> | 1 | 1 |
| | (b) | <p>M1 : panjang gelombang $\lambda_1 = \lambda_2$ <i>wavelength $\lambda_1 = \lambda_2$</i></p> <p>M2 : corak belauan dan arah perambatan yang betul <i>diffraction pattern and direction of propagation are correct</i></p>  | 1 1 | 2 |
| | (c) | <p>M1 : Gantian yang betul <i>Correct substitution</i></p> $F = \frac{v}{\lambda} = \frac{3 \times 10^8}{500 \times 10^{-9}}$ <p>M2 : Jawapan dengan unit betul $= 6 \times 10^{14} \text{ Hz}$</p> | 1 1 | 2 |
| | (d) | corak pembelauan kurang ketara// kurang terbelau <i>Diffraction pattern less obvious// less diffraction</i> | 1 | 1 |
| | JUMLAH | | | 6 |
| 4 | (a) | Kawasan sekitar suatu zarah bercas di mana sebarang cas elektrik yang berada dalam kawasan tersebut akan mengalami daya elektrik <i>The region around a charged particle where any electric charge in the region will experience an electric force.</i> | 1 | 1 |
| | (b) | $Q = It$ $= 0.5 \text{ A} \times 240 \text{ s}$ $= 120 \text{ As / C}$ | 1 1 | 2 |
| | (c) | $E = V / d$ $= (2000) / (20 \times 10^{-2})$ $= (2000) / (0.2)$ $= 10000 \text{ V m}^{-1}$ (jawapan dengan unit betul) | 1 1 1 | 3 |
| | (d) | <p>M1: Nyalaan lilin mengion molekul udara kepada ion positif dan ion negatif <i>// The flame ionises the air molecules into positive and negative ions</i></p> | 1 | 3 |

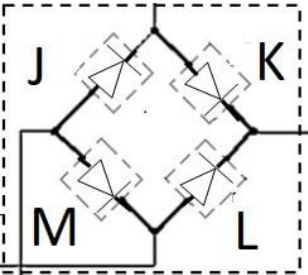
| | | | | |
|---------------|----------|---|---|----------|
| | | <p>M2: Ion positif tertarik kepada plat negatif (Plat X) dan ion negative tertarik kepada plat positif (Plat Y) <i>// Positive ions are attracted to the negative plate (Plate X) and negative ions are attracted to the positive plate (Plate Y)</i></p> <p>M3 : Nyalaan lilin yang mengandungi ion positif lebih tersebar ke plat negatif kerana jisim ion positif adalah lebih besar daripada ion negatif // <i>The candle flame which contains positive ions spread more to negative plate because the mass of positive ions are larger than the negative ions</i></p> | 1 | |
| | | | 1 | |
| JUMLAH | | | | 9 |
| 5 | (a) | Satelit Bukan Geopegun Non-Geostationary satellite | 1 | 1 |
| | (b)(i) | Jarak dari pusat Bumi satelit K > satelit L // <i>Distance of satellite K from centre of the earth > satellite L</i> | 1 | 3 |
| | (b)(ii) | Magnitud daya graviti yang bertindak ke atas satelit L > satelit K // <i>Magnitude of gravitational force act on satellite L > satellite K</i> | 1 | |
| | (b)(iii) | Laju linear dalam orbit satelit L > satelit K // <i>Linear speed of satellite L > satellite K</i> | 1 | |
| | (c)(i) | Magnitud daya graviti yang bertindak ke atas satelit bertambah, jarak dari pusat Bumi berkurang // <i>Magnitude of gravitational force acting on this satellite increases, distance from centre of the earth decreases.</i> | 1 | 2 |
| | (c)(ii) | Magnitud daya graviti yang bertindak ke atas satelit bertambah , laju linear satelit bertambah // <i>Magnitude of gravitational force acting on the satellite increases, linear speed of the satellite increases.</i> | 1 | |
| | (d) | Menjauhi Bumi dengan satu garis lurus //Terlepas dari orbit <i>Move away from the earth in a straight line // out from orbit</i> | 1 | 1 |
| | (e) | $\frac{T_1^2}{T_2^2} = \frac{r_1^3}{r_2^3} \quad // \quad \frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3} \quad (\text{Hukum Kepler Ke-3})$ | | |

| | | | | |
|----------|---------------|--|--------|----------|
| | | <p>M1 : Gantian rumus // <i>Formula substitution</i></p> $\frac{(41.33)^2}{(T_2)^2} = \frac{(543000000)^3}{(359000000)^3}$ <p>M2 = 22.22 jam (jawapan dengan unit betul, min 2 t.p) 22.22 hours</p> | 1 | 2 |
| | JUMLAH | | | 9 |
| 6 | (a) | Daya apungan /daya julangan// Daya tujah ke atas <i>Bouyant force// uptrust</i> | 1 | 1 |
| | (b)(i) | Bilangan jari Rajah 6.1(b) < Rajah 6.1(c) // sebaliknya <i>Number of fingers in Diagram 6.1(b) < Diagram 6.1(c) // vice versa</i> | 1 | |
| | (b)(ii) | Beza paras air x< y / sebaliknya // Beza paras air Rajah 6.1(b) < Rajah 6.1(c) // sebaliknya <i>Water level difference in x<y / vice versa // Water level difference in Diagram 6.1(b) < Rajah 6.1(c) // vice versa</i> | 1 | |
| | (b)(iii) | Isipadu air tersesar dalam Rajah 6.1(b) < Rajah 6.1(c) / sebaliknya <i>Volume of water displaced in Diagram 6.1(b) < Diagram 6.1(c) / vice versa</i> | 1 | |
| | (c) (i) | Bilangan jari bertambah, daya bertambah // sebaliknya <i>Number of fingers increased, force increased // vice versa</i> | 1 | 2 |
| | (c) (ii) | Daya bertambah, isipadu air tersesar bertambah // sebaliknya <i>Force increase, volume of water increased // vice versa</i> | 1 | |
| | (d) (i) |  <p>Catatan : Dimana-mana paras air yang lebih rendah Note : Any water level that is lower</p> | 1 | 3 |
| | (d)(ii) | <p>M1 : (1 300)(9.81)(0.15)</p> <p>M2 : 1 912.95 N (jawapan dengan unit betul, min 2 t.p)</p> | 1 1 | |
| | JUMLAH | | | 9 |
| 7 | (a) | Kuantiti haba yang diperlukan untuk menaikkan suhu sebanyak 1°C bagi jisim 1 kg bahan <i>The quantity of heat required to raise the temperature of 1°C of 1 kg substance.</i> | 1 | 1 |

| | | | | |
|---------------------------------|---------------|--|--------|-----------|
| | (b) | $Pt = mc\theta$ $48(5 \times 60) = 1(c)(42 - 27)$ $c = 960\text{J kg}^{-1} \text{ }^\circ\text{C}^{-1}$ (jawapan dengan unit betul) | 1 1 | 2 |
| | (c) | Mengelakkan haba terbebas ke persekitaran <i>Prevent heat from being released to the environment</i> | 1 | 1 |
| | (d) (i) | Styrofoam Muatan haba tentu besar, tidak mudah panas // penebat haba yang baik // ketumpatan rendah, tidak terlalu berat <i>High specific heat capacity, not easily heated // good thermal insulation // low density, not too heavy</i> | 1 1 | 2 |
| | (ii) | Vakum <i>Vacuum</i> Untuk mengelakkan pemindahan haba dari persekitaran ke cawan <i>To avoid transfer of heat energy from the surrounding to the cup</i> | 1 1 | 2 |
| | (iii) | R | 1 | 1 |
| | JUMLAH | | | 9 |
| 8 | (a) | Penghasilan d.g.e. aruhan merentasi suatu konduktor apabila terdapat gerakan relatif antara konduktor itu dengan suatu medan magnet atau apabila konduktor itu berada di dalam medan magnet yang berubah. <i>// Production of an induced e.m.f in a conductor when there is relative motion between the conductor and magnetic field or when the conductor is in a changing magnetic field.</i> | 1 | 1 |
| | (b) | $E = Pt$ M1 : Gantian $= 40 (10 \times 60)$ M2 = 24000J (Jawapan dengan unit betul) | 1 1 | 2 |
| | (c) (i) | M1 : Kuprum // Copper M2: Rintangan rendah// arus aruhan tinggi <i>Low resistance// high induced current</i> | 1 1 | 2 |
| | (ii) | M1 : Tebal // Thick M2 : Kurangkan rintangan // arus aruhan tinggi <i>Reduces the resistance of the coil // high induced current</i> | 1 1 | 2 |
| | (iii) | M1 : Kasar // Rough M2 : daya geseran tinggi// halaju putaran tinggi // arus aruhan tinggi <i>High resistance // high speed of rotation // high induced current</i> | 1 1 | 2 |
| | JUMLAH | | | 9 |
| JUMLAH MARKAH BAHAGIAN A | | | | 60 |

BAHAGIAN B

| NO | BHG | SKEMA | SUB MARK | TOTAL MARK |
|--------|---|---|--------------|------------|
| 9 | (a) | Pembiasan <i>Refraction</i> | 1 | 1 |
| | (b) | M1 - Letakkan kanta cembung dan skrin putih dalam satu garisan menghala ke tingkap terbuka. <i>Place the convex lens and the white screen in a line pointing to the open window.</i> | 1 | 4 |
| | | M2 - Sinar cahaya selari dari luar tingkap akan melalui kanta dan menumpu dititik fokus. <i>Parallel light rays from outside the window will pass through the lens and converge at the focal point.</i> | 1 | |
| | | M3 - Laraskan skrin putih sehingga imej tajam terbentuk. <i>Adjust the white screen until a sharp image is formed.</i> | 1 | |
| | | M4 - Kedudukan imej adalah sama dengan titik fokus. <i>The image position is same as the focal point of the lens.</i> | 1 | |
| | M5 - Jarak imej ke pusat optik merupakan panjang fokus kanta. <i>The distance of the image to the optical center is the focal length of the lens.</i> | 1 | Max 4 | |
| (c)(i) | $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$ M1 : Substitution $\frac{1}{v} = \frac{2}{10} - \frac{1}{10}$ M2 : Answer with correct unit $v = 10 \text{ cm}$ | 1 1 | 5 | |
| (ii) | $M = \frac{v}{u}$ M1 : Substitution $= \frac{10}{10}$ M2 : Answer (No unit) $= 1$ | 1 1 | | |
| (iii) | $M = \frac{h_i}{h_o}$ M1 : Substitution $h_i = M \times h_o = 1 \times 2 = 2 \text{ cm}$ | 1 | | |
| (d) | M1 - Pemilihan kanta sebagai kanta objek dan kanta mata // <i>Selection of lenses as objective lens and eyepiece:</i> Kanta objek / <i>objective lens</i> - Y Kanta mata / <i>eyepiece</i> - X | 1 | | |

| | | | | |
|-----------|------------|---|--------------------------------------|-----------|
| | | <p>M2 - Sebab : menghasilkan imej yang besar <i>Reason : produced bigger image</i></p> <p>M3 - Perbandingan antara panjang fokus kanta objek dan kanta mata // <i>Comparison between the focal length of objective lens and eyepiece:</i> $f_o > f_e$</p> <p>M4 - Sebab : menghasilkan imej yang besar <i>Reason : produced bigger image</i></p> <p>M5 - Jarak antara kanta objek dan kata mata / <i>The distance between objective lens and eyepiece:</i> $= f_o + f_e$</p> <p>M6 - Sebab : Pelarasan normal / hasilkan imej yang tajam <i>Reason : Normal adjustment / produced sharp image</i></p> <p>M7 - Diameter kanta objek / <i>Diameter of the objective lens:</i> Besar / <i>Big</i></p> <p>M8 - Sebab - banyak cahaya boleh masuk <i>Reason - more light can enter</i></p> <p>M9 - Pilihan: Kaedah // <i>Method R</i></p> <p>M10 - Sebab: Kanta objek Y dan Kanta mata X, $f_o > f_e$, jarak antara kanta objek dan kata mata = $f_o + f_e$ dan diameter kanta objek besar. <i>Reason: Objective lens Y and eyepiece X $f_o > f_e$, distance between objective lens and eyepiece = $f_o + f_e$ and diameter of the objective lens big.</i></p> | 1 1 1 1 1 1 1 1 | 10 |
| | | JUMLAH | | 20 |
| 10 | (a) | Proses untuk menukar arus ulang-alik kepada arus terus // <i>process convert alternating current to direct current.</i> | 1 | 1 |
| | (b) | <p>M1 : Susunan diod yang betul</p>  | 1 | 5 |

| | | | |
|----------------|---|--------|----|
| | M2 : Separuh kitar positif, arus melalui diod K ke R dan melalui diod M untuk melengkapkan litar // <i>Positif half cycle, current flow to diode K to R and to diode M to complete the circuit.</i> | 1 | |
| | M3 : Separuh kitar negatif, arus melalui diod L ke R dan melalui diod J untuk melengkapkan litar // <i>Negative half cycle, current flow to diode L to R and to diode J to complete the circuit.</i> | 1 | |
| | M4 : Kapasitor // <i>Capasitor</i> M5 : disambung secara selari dengan perintang R // <i>connected parallel with resistor R</i> | 1 1 | |
| (c)(i) | M1 : $6 - 4 // 2 \text{ V}$ | 1 | |
| (c)(ii) | M1 : $V_T = \frac{R_T}{10 + R_T} (6)$ | 1 | 4 |
| | M2 : $2 (10 + R_T) = 6 R_T$ | 1 | |
| | M3 : $5 \text{ k}\Omega$ (<i>dengan unit betul</i>) | 1 | |
| (d) | M1 : PPC pada litar tapak // <i>LDR at base circuit</i> | 1 | 10 |
| | M2 : V tapak tinggi / V_B tinggi / I_B mengalir / I_c mengalir // <i>V base high / V_B high/ I_B flow / I_c flow</i> | 1 | |
| | M3 : Ada R // <i>Has R</i> | 1 | |
| | M4 : Menghadkan arus tapak melalui transistor / Mengurangkan I_B / Elak transistor rosak/terbakar // <i>To limit I_B/ Reduce I_B / Prevent transistor damage/ burnt</i> | 1 | |
| | M5 : Terminal positif bateri disambung ke terminal pengumpul transistor/ Rajah // <i>Positive terminal of the battery connected to collector terminal of transistor / Diagram</i> | 1 | |
| | M6 : Pincang hadapan / hidupkan transistor/ arus boleh mengalir dari pengumpul ke pengeluar / hidupkan litar // <i>forward biased / transistor on / Current can flow from collector to emitter / circuit on //</i> | 1 | |
| | M7 : Suis geganti // <i>relay</i> | 1 | |
| | M8 : Untuk menghidupkan litar sekunder // <i>Complete the secondary circuit</i> | 1 | |
| | M9 : W | 1 | |
| | M10 : Kombinasi dari M1, M3, M5, M7 atau M2, M4, M6, M8 atau M1, M4, M5, M8 | 1 | |
| JUMLAH | | | 20 |

BAHAGIAN C

| NO | BHG | SKEMA | SUB - MARK | TOTAL MARK |
|----|---------|---|------------|------------|
| 11 | (a) | Sifat bahan yang membolehkan suatu objek kembali kepada bentuk asalnya selepas daya yang bertindak ke atasnya dialihkan. <i>The property of a material that allows an object to return to its original shape after the force acting on it is removed</i> | 1 | 1 |
| | (b)(i) | Pemalar spring adalah sama / Pemalar spring dalam Rajah 11.1(a) = Rajah 11.1(b) <i>// The spring constant is the same / Spring constant in Diagram 11.1(a) = Diagram 11.1(b)</i> | 1 | 5 |
| | | Berat beban Rajah 11.1(b) lebih besar dari Rajah 11.1(a) / Rajah 11.1(b) > Rajah 11.1(a) <i>// Weight of load of Diagram 11.1(b) is greater than Diagram 11.1(a) / Diagram 11.1(b) > Diagram 11.1(a)</i> | 1 | |
| | | Pemanjangan spring dalam Rajah 11.1(b) > Rajah 11.1(a) <i>// Spring extension in Diagram 11.1(b) > Diagram 11.1(a)</i> | 1 | |
| | (b)(ii) | Semakin bertambah berat beban, semakin bertambah pemanjangan spring / berkadar langsung. <i>// The more the weight of load, the more the extension of the spring / directly proportional.</i> | 1 | |
| | | Hukum Hooke <i>// Hooke's Law.</i> | 1 | |
| | (c) | Kekerasan spring diukur dari pemalar spring <i>// Spring stiffness is measured from the spring constant</i> | 1 | 4 |
| | | Pemalar spring = kecerunan graf <i>// Spring constant = gradient of graph</i> | 1 | |
| | | Pemalar spring , $k = F/x$ <i>// Spring constant, $k = F/x$</i> | 1 | |
| | | Tenaga = Luas di bawah graf pada F dan x tertentu / $E = \frac{1}{2} Fx$ <i>// Energy = Area under the graph at a certain F and x / $E = \frac{1}{2} Fx$</i> | 1 | |

| (c) | <table border="1"> <thead> <tr> <th>Aspek</th> <th>Alasan</th> </tr> </thead> <tbody> <tr> <td>Saiz sangkar yang besar // <i>Big size of nest</i></td> <td>Boleh muat beban yang besar // <i>Can put big size of load</i></td> </tr> <tr> <td>Bahan tiang yang kuat / keluli // <i>Material of pole is strong / Steel</i></td> <td>Tidak patah / tahan lasak // <i>Not break / Durable</i></td> </tr> <tr> <td>Saiz tapak lebar // <i>Size of base wider</i></td> <td>Lebih stabil / tidak mudah terbalik // <i>more stable / not easy to fall</i></td> </tr> <tr> <td>Spring keluli // <i>Steel spring</i></td> <td>Kuat / tidak berkarat // <i>Strong / non-rusting</i></td> </tr> <tr> <td>Spring yang pendek // <i>Short spring</i></td> <td>Spring lebih keras/ pemalar spring lebih besar/ // pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i></td> </tr> <tr> <td>Diameter spring yang kecil // <i>Small diameter of spring</i></td> <td>Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i></td> </tr> <tr> <td>Diameter dawai spring besar/tebal // <i>Diameter of spring wire larger / thicker</i></td> <td>Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil // <i>Spring is stiffer /larger spring constant / spring extension is small.</i></td> </tr> </tbody> </table> | Aspek | Alasan | Saiz sangkar yang besar // <i>Big size of nest</i> | Boleh muat beban yang besar // <i>Can put big size of load</i> | Bahan tiang yang kuat / keluli // <i>Material of pole is strong / Steel</i> | Tidak patah / tahan lasak // <i>Not break / Durable</i> | Saiz tapak lebar // <i>Size of base wider</i> | Lebih stabil / tidak mudah terbalik // <i>more stable / not easy to fall</i> | Spring keluli // <i>Steel spring</i> | Kuat / tidak berkarat // <i>Strong / non-rusting</i> | Spring yang pendek // <i>Short spring</i> | Spring lebih keras/ pemalar spring lebih besar/ // pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i> | Diameter spring yang kecil // <i>Small diameter of spring</i> | Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i> | Diameter dawai spring besar/tebal // <i>Diameter of spring wire larger / thicker</i> | Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil // <i>Spring is stiffer /larger spring constant / spring extension is small.</i> | 1, 1 | 1, 1 | 1,1 | 1,1 | 1,1 | 1,1 | 10 |
|--|---|---|--------|--|--|---|---|---|--|--------------------------------------|--|---|---|---|--|--|---|------|------|-----|-----|-----|-----|----|
| | Aspek | Alasan | | | | | | | | | | | | | | | | | | | | | | |
| | Saiz sangkar yang besar // <i>Big size of nest</i> | Boleh muat beban yang besar // <i>Can put big size of load</i> | | | | | | | | | | | | | | | | | | | | | | |
| | Bahan tiang yang kuat / keluli // <i>Material of pole is strong / Steel</i> | Tidak patah / tahan lasak // <i>Not break / Durable</i> | | | | | | | | | | | | | | | | | | | | | | |
| | Saiz tapak lebar // <i>Size of base wider</i> | Lebih stabil / tidak mudah terbalik // <i>more stable / not easy to fall</i> | | | | | | | | | | | | | | | | | | | | | | |
| | Spring keluli // <i>Steel spring</i> | Kuat / tidak berkarat // <i>Strong / non-rusting</i> | | | | | | | | | | | | | | | | | | | | | | |
| | Spring yang pendek // <i>Short spring</i> | Spring lebih keras/ pemalar spring lebih besar/ // pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i> | | | | | | | | | | | | | | | | | | | | | | |
| | Diameter spring yang kecil // <i>Small diameter of spring</i> | Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil. <i>Spring is stiffer/ larger spring constant/ spring extension is small.</i> | | | | | | | | | | | | | | | | | | | | | | |
| Diameter dawai spring besar/tebal // <i>Diameter of spring wire larger / thicker</i> | Spring lebih keras/ pemalar spring lebih besar/ pemanjangan spring kecil // <i>Spring is stiffer /larger spring constant / spring extension is small.</i> | | | | | | | | | | | | | | | | | | | | | | | |
| Max= 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| JUMLAH | | | | | | | 20 | | | | | | | | | | | | | | | | | |
| JUMLAH MARKAH BAHAGIAN B | | | | | | | 40 | | | | | | | | | | | | | | | | | |
| JUMLAH BAHAGIAN A+B+C | | | | | | | 100 | | | | | | | | | | | | | | | | | |