



**MAKTAB RENDAH SAINS MARA**  
**PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSMA**  
**2025**

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**PERATURAN PEMARKAHAN**

**FIZIK**

**KERTAS 3**

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Peraturan pemarkahan ini mengandungi 3 halaman bercetak

| Soalan<br>Questions                                                                                            |                                                                                      | Jawapan<br>Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Markah<br>Mark                                                                                                 |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----|------|----|------|----|------|----|------|----|------|----------------------------|
| (a)                                                                                                            | (i)                                                                                  | Suhu, $\theta$<br><i>Temperature, <math>\theta</math></i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                                                                                              |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
|                                                                                                                | (ii)                                                                                 | Isipadu, $V$ turus udara terperangkap // panjang turus udara terperangkap, $l$ di dalam tiub kapilari<br><i>The volume, <math>V</math> of trap air column // the length in the trapped air column, <math>l</math> capillary tube</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                                                                                                              |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
|                                                                                                                | (iii)                                                                                | Tekanan gas // jisim gas<br><i>Gas pressure // mass of air</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                                                                                                              |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| (b)                                                                                                            |                                                                                      | Semakin bertambah suhu, semakin bertambah Panjang turus udara terperangkap.<br><i>The temperature increases, length of trapped air column, <math>l</math> capillary tube increases // the larger the volume of trapped air increases</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                                                                                                              |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| (c)                                                                                                            |                                                                                      | <table><tr><th>Suhu, <math>\theta</math> / <math>^{\circ}\text{C}</math><br/><i>Temperature, <math>\theta</math> / <math>^{\circ}\text{C}</math></i></th><th>Panjang turus udara, <math>l</math> / cm<br/><i>Length of column of air, <math>l</math> / cm</i></th></tr><tr><td>40</td><td>20.3</td></tr><tr><td>50</td><td>20.7</td></tr><tr><td>60</td><td>21.3</td></tr><tr><td>70</td><td>22.1</td></tr><tr><td>80</td><td>23.1</td></tr></table> <p>Mesti mempunyai 2 lajur. Kuantiti fizik dan unit untuk suhu, <math>\theta</math> dan panjang turus, <math>l</math> yang betul.<br/><i>Have 2 column. Physical quantity and unit for <math>\theta</math> and <math>l</math> are correct.</i></p> <p>Semua nilai <math>l</math> betul dengan 1 titik perpuluhan (nilai <math>l</math> semakin meningkat)<br/><i>All values of <math>l</math> are correct with 1 decimal place (value of <math>l</math> must be increased)</i></p> <p>Julat perbezaan panjang turus dari 2.5 cm – 3.0 cm (Rujuk kepada data pelajar. Panjang turus udara awal bagi setiap pelajar yang digunakan tidak sama)<br/><i>Range of the reading from 2.5 cm to 3.0 cm (Based on student's data. Initial length of column of air used is different for every student)</i></p> | Suhu, $\theta$ / $^{\circ}\text{C}$<br><i>Temperature, <math>\theta</math> / <math>^{\circ}\text{C}</math></i> | Panjang turus udara, $l$ / cm<br><i>Length of column of air, <math>l</math> / cm</i> | 40 | 20.3 | 50 | 20.7 | 60 | 21.3 | 70 | 22.1 | 80 | 23.1 | <p>1</p> <p>1</p> <p>1</p> |
| Suhu, $\theta$ / $^{\circ}\text{C}$<br><i>Temperature, <math>\theta</math> / <math>^{\circ}\text{C}</math></i> | Panjang turus udara, $l$ / cm<br><i>Length of column of air, <math>l</math> / cm</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| 40                                                                                                             | 20.3                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| 50                                                                                                             | 20.7                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| 60                                                                                                             | 21.3                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| 70                                                                                                             | 22.1                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |
| 80                                                                                                             | 23.1                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                |                                                                                      |    |      |    |      |    |      |    |      |    |      |                            |

|        |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |    |       |    |       |    |     |    |   |
|--------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----|-------|----|-------|----|-----|----|---|
| (d)    |      | <div>✓ Labelkan panjang turus udara, <math>l</math> (paksi -x) dan suhu, <math>\theta</math> (paksi -y)<br/><i>Label length of column of air, <math>l</math> (x-axis) and temperature, <math>\theta</math> (y-axis)</i></div> <div>✓ Betul unit pada paksi -y dan paksi-x<br/><i>correct unit on y-axis and x-axis</i></div> <div>✓ Skala seragam<br/><i>Uniform scale</i></div> <div>✓✓ 5 titik diplot dengan betul<br/><i>5 points plotted correctly</i></div> <div>✓ 3,4 titik diplot dengan betul<br/><i>3,4 points plotted correctly</i></div> <div>✓ Garis lurus terbaik dan seimbang<br/><i>Best fit line / balanced straight line</i></div> <div>Rubrik / rubric</div> <table><tr><td>6 ✓</td><td>4m</td></tr><tr><td>4-5 ✓</td><td>3m</td></tr><tr><td>2-3 ✓</td><td>2m</td></tr><tr><td>1 ✓</td><td>1m</td></tr></table> | 6 ✓    | 4m | 4-5 ✓ | 3m | 2-3 ✓ | 2m | 1 ✓ | 1m | 4 |
| 6 ✓    | 4m   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |    |       |    |       |    |     |    |   |
| 4-5 ✓  | 3m   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |    |       |    |       |    |     |    |   |
| 2-3 ✓  | 2m   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |    |       |    |       |    |     |    |   |
| 1 ✓    | 1m   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |    |       |    |       |    |     |    |   |
| (e)    | (i)  | $l$ bertambah secara linear dengan $\theta$ (berdasarkan graf pelajar)<br><i><math>l</math> is increase linearly to <math>\theta</math> (based on student's graph)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1      |    |       |    |       |    |     |    |   |
|        | (ii) | menunjukkan nilai $l$ pada graf secara interpolasi<br>$l = 18.4$ cm (bergantung kepada graf pelajar)<br><i>show the value of <math>l</math> on the graph by interpolation</i><br>$l = 18.4$ cm (depending on the student's graph)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1<br>1 |    |       |    |       |    |     |    |   |
| (f)    |      | Air mestilah sentiasa dikacau supaya haba disebar dengan sekata // suhu air meningkat secara seragam // Pastikan kedudukan mata beserenjang dengan skala termometer untuk mengelakkan ralat paralaks.<br><i>The water is stirred continuously so that the heat distributed evenly // temperature of water increases uniformly // Make sure the position of eye is perpendicular to the scale of thermometer to avoid parallax error.</i>                                                                                                                                                                                                                                                                                                                                                                                           | 1      |    |       |    |       |    |     |    |   |
| Jumlah |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 15     |    |       |    |       |    |     |    |   |