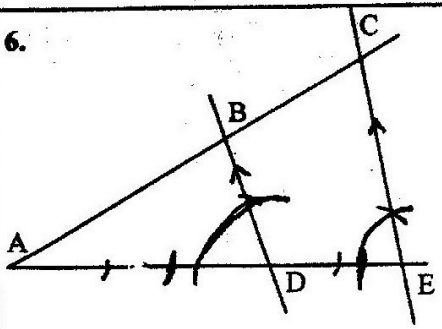
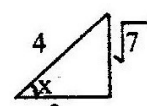
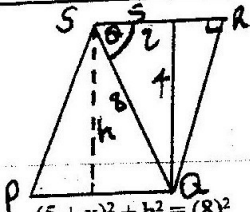
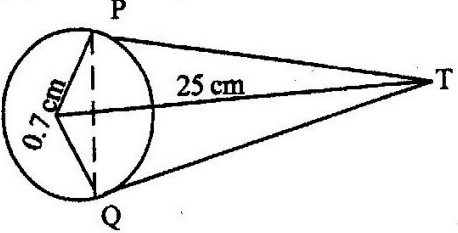




SOLUTION	MARKS	ALTERNATIVE METHOD
<p>6.</p> 	<p>3</p>	<ul style="list-style-type: none"> <li>* Division of AE into 5 equal parts B1</li> <li>* Joining BD and drawing a line through E parallel to BD B1</li> <li>* identification of point C or Equivalent proc. Construction marks must be seen</li> </ul>
<p>7.</p> $\frac{30 \times 1.8 \times 10^6}{100} = 540000$ $\frac{120\,000 \times 540\,000}{1800\,000 \times 1800\,000}$ <p>= 1/50 or 0.02 or 2%</p>	<p>M1</p> <p>M1</p> <p>A1</p>	$\frac{30 \times 120\,000}{100 \times 180\,000}$ <p>M1 M1</p> <p>= 1/50 or 0.02 or 2</p>
<p>8.</p> $3 \times 1.485 + 13 \times 6.410$ $= 4.455 + 83.33$ $= 87.785$	<p>M1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p>Reciprocals seen adding the product</p> <p>130 + 130</p> <p>0.735 1.56</p> <p>30 x 0.1485 + 130 x 0.641</p> <p>4.655 + 83.33 M1</p> <p>= 87.785 A1</p>
<p>9.</p> $8(1 - \cos 2x) + 2 \cos x - 5 = 0$ $8 \cos^2 x - 2 \cos x - 3 = 0$ $(2 \cos x + 1)(4 \cos x - 3) = 0$ $\cos x = 3/4$ <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 20px;"> <math>\tan x = \frac{\sqrt{7}}{3}</math> </div>  </div> $(\tan 41.41) = 0.8519$ $(\tan 41.4) = 0.9316$	<p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>4</p>	<p>(substitution)</p> <p>or <math>(2p + 1)(4p - 3)</math> M1</p> <p>Disqualify <math>\cos x = -1/2</math></p> <p><math>x = 41.412</math></p> <p>41.4 or 41.42 or 41</p> <p><math>\tan x = 0.8819</math> B1</p> <p><math>\tan 41.42 = 0.8822</math></p> <p><math>\tan 41^\circ 25' = 0.8821</math></p>

SOLUTION	MARKS	ALTERNATIVE METHOD										
<p>10. <math>480\,000 \times \frac{100}{96} = 500\,000</math>  <math>800\,000 (1 - \frac{r}{100}) = 500\,000</math>  <math>(\frac{1-r}{100})^5 = \frac{5}{8} = 0.625</math>  <math>1 - \frac{r}{100} = \sqrt[5]{0.625}</math>  <math>= 9.103 \times 10^{-1}</math>  <math>\frac{r}{100} = 1 - 0.9103</math>  <math>= 0.0897</math>  <math>r = 8.97\%</math></p>	<p>M1 M1 M1 A1 4</p>	<p><math>A = 480\,000 \frac{100}{96}</math> M1  <math>800\,000 (1 - r)^5 = 480\,000 \times \frac{100}{96}</math>  <math>(1 - r)^5 = \frac{480\,000 \times 100}{800\,000 \times 96}</math>  <math>\frac{1-r}{100} = \sqrt[5]{0.625}</math> M  <math>\frac{r}{100} = 8.97\%</math> A1  <math>T. \frac{7959}{5} = 1.95918</math>    if <math>480\,000 \times \frac{100}{96}</math>  <math>\text{Log } \frac{5}{8} = 5 \log (1 - \frac{r}{100})</math> M  <math>T. 7959 = 5 \log (1 - \frac{r}{100})</math>  <math>0.9103 = 1 - \frac{r}{100}</math>  <math>r = (1 - 0.9103) 100</math>  <math>= (1 - 0.9103) \times 100</math>  <math>= 0.0887 \times 100</math>  <math>= 8.87\%</math> A1</p>										
<p>11. (a) <table border="1" data-bbox="370 1087 792 1182"> <tr> <td>x</td> <td><math>1\frac{1}{2}</math></td> <td><math>2\frac{1}{2}</math></td> <td><math>4\frac{1}{2}</math></td> <td><math>5\frac{1}{2}</math></td> </tr> <tr> <td>y</td> <td><math>3\frac{1}{4}</math></td> <td><math>9\frac{1}{4}</math></td> <td><math>23\frac{1}{4}</math></td> <td><math>33\frac{1}{4}</math></td> </tr> </table></p> <p>(b) Midordinates <math>3\frac{1}{4}, 5\frac{1}{4}, 9\frac{1}{4}, 15\frac{1}{4}, 23\frac{1}{4}, 33\frac{1}{4}</math>  Area = <math>1 (3\frac{1}{4} + 5\frac{1}{4} + 9\frac{1}{4} + 15\frac{1}{4} + 23\frac{1}{4} - 33) = 89\frac{1}{2}</math></p>	x	$1\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	y	$3\frac{1}{4}$	$9\frac{1}{4}$	$23\frac{1}{4}$	$33\frac{1}{4}$	<p>M1 M1 A1 4</p>	<p>Can be implied  If BO is legitimate than M1 M1 then M1 M1 AO</p>
x	$1\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$								
y	$3\frac{1}{4}$	$9\frac{1}{4}$	$23\frac{1}{4}$	$33\frac{1}{4}$								
<p>12. </p> <p><math>(5+x)^2 + h^2 = (8)^2</math>  <math>25 + 10x + x^2 + h^2 = 64</math>  <math>x^2 + h^2 = 16</math>  <math>25 + 10x + 16 = 64</math>  <math>10x = 64 - 11</math>  <math>10x = 23</math>  <math>x = 2.3</math></p>		<p>(b) Area of PQS  <math>= \frac{1}{2} \times 10 \times 3.273</math> M1  <math>= 5 \times 3.273</math>  <math>= 16.365 \text{ cm}^2</math> A1</p> <p>Q 12  (a) <math>\tan \frac{1}{2} \theta = \frac{(8-5-5)(8.5-8)}{8.5(8.5-4)}</math>  <math>= \frac{3.5}{8.5 \times 4.5}</math>  <math>= \frac{3.5}{76.5}</math></p>										

SOLUTION	MARKS	ALTERNATIVE METHOD
$h = 16 - x^2$ $= 16 - (2b)^2$ $= 16 - 5.251$ $= 10.71$ $= 3.273$ <p>(a) <math>\tan \theta = 3.273</math></p> $\frac{7.3}{8}$ $= 0.4484 \text{ 1.11}$ $\theta = 24.15^\circ \text{ A1}$ $\theta = 24.15^\circ$ <p>or <math>\cos \theta = \frac{7.3}{8} = 0.9125</math></p> $\frac{8}{8}$ <p>or <math>\sin \theta = \frac{3.273}{8} = 0.409</math></p> $= 24.15^\circ$		$\tan \frac{1}{2} = 0.04575$ $= 0.2139$ $\frac{1}{2} = \tan^{-1}(0.2139)$ $= 12.07 \times 2 \text{ M1}$ $= 24.14^\circ \text{ A}$ $(24.13^\circ)$ $(24.15^\circ)$
<p>12. (a) Let <math>\angle QSE = \theta</math></p> $42 = 52 + 82 - 2 \times 5 \times 8 \cos \theta$ $\cos \theta = \frac{89 - 16}{80} = \frac{73}{80} = 0.9125$ $\theta = 24^\circ 9'$ $24^\circ 8'$ $24.10$ $24^\circ 10'$ $16.38 \text{ cm}^2$ <p>(b) Area of PQS</p> $= \frac{1}{2} \times 8 \times 10 \sin 24^\circ 9'$ $= 40 \times 0.4091$ $= 10.825 \text{ cm}^2$ $= 16.36 \text{ cm}^2$ $=$	<p>M1</p> <p>A1</p>	<p>(a) <math>S = \frac{1}{2} (5 + 8 + 4) = 8.5</math></p> <p>Area = <math>8.5 (3.5) (0.5) (4.5)</math></p> $\frac{1}{2} \times 5 \times 8 \sin \theta = 8.5 (3.5)(0.5)(4.5)$ <p>24.15°</p> <p>24.13°</p> <p>24.14</p> <p>24.15°</p> <p>Sin 24° 8</p> <p>40 x 0.4089</p> <p>= 16.36 cm<sup>2</sup></p> <p>= 16.364 cm<sup>2</sup></p>
<p>13. Area of equilateral</p> $= \frac{1}{2} \times 5 \times 5 \sin 60^\circ$ $= \frac{1}{2} \times 5 \times 5 \times 0.866$ $= 10.825 \text{ cm}^2$ <p>x - section area</p> $= 6 \times 10.825$ $= 64.95 \text{ cm}^2$ <p>Volume of the prism</p> $= 64.95 \times 20$ $= 1299 \text{ cm}^3$	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>Logs used 10.82</p> <p>6 x 10.82</p> <p>= 64.92 cm<sup>2</sup></p> <p>64.92 x 20 M1</p> <p>1298.4 cm<sup>3</sup> A1</p> <p>If logs used thro V = 13000</p> <p>(2 marks)</p>

SOLUTION	MARKS	ALTERNATIVE METHOD
 <p> <math>\cos \theta = \frac{7}{25}</math>  <math>= 73^\circ 44</math> or <math>73.74</math>  <math>PQ = 7 \times 2 \cdot \sin 73^\circ 44</math>  <math>= 14 \times 0.9600</math>  <math>= 13.44 \text{ cm}</math> </p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p> <math>\text{Att } \sin \theta = \frac{7}{25} \Rightarrow \theta = 73.74</math>  <math>\frac{PQ}{\sin 2\theta} = \frac{7}{\sin(180 - 2\theta)}</math>  <math>PQ = \frac{7 \sin 2\theta}{\cos \theta} = \frac{7 \sin 2\theta}{\cos \theta}</math>  <math>= 7 \sin 32.5</math>  <math>= \frac{7 \sin 32.5}{\cos 73.74}</math>  <math>= 13.44</math> </p> <p>Accept equivalent</p> <p> <math>\tan \theta = \frac{24}{7} \Rightarrow \sin \theta = \frac{24}{25}</math> until <math>\sin \theta = \frac{24}{25}</math> </p> <p>If logs used follow thro</p> <p> <math>\text{Alt } PT = \sqrt{(25)^2 - (7)^2}</math>  <math>= \sqrt{625 - 49} = 24</math>  <math>\cos \theta = \frac{24}{25}</math> M1 <math>PM = 6.75</math>  <math>PQ = 2 \text{ pm} = 2 \times 6.75 = 13.5</math> </p>
<p>15.</p> <p>Bisecting exterior angles or one external angle at x escribed circle</p> <p>Bisecting <math>\angle Zxy</math> and any external <math>\angle</math> circle to <math>YZ</math></p>	<p>B1 B1</p>	<p>Not radius = 4.6 cm construction are a Must be seen</p>
<p>16. Grad. <math>PQ = \frac{-4+2}{5+1} = \frac{-2}{6} = -\frac{1}{3}</math></p> <p>Midpoint of <math>PQ = \left(\frac{5+1}{2}, \frac{-4+2}{2}\right)</math></p> <p> <math>= (2, -3)</math>  <math>\frac{y+3}{x-2} = -\frac{1}{3}</math>  <math>y+3 = -\frac{1}{3}(x-2)</math>  <math>y = -\frac{1}{3}x - \frac{8}{3}</math> </p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>4</p>	<p> <math>y = mx + c</math>  <math>-3 = 3 \times 2 + c</math> M1  <math>-9 = c</math>  <math>y = 3x - 9</math> A1 </p>

**SOLUTION**

**MARKS**

**ALTERNATIVE METHOD**

**SECTION II (48 MARKS)**

17.(a) Total monthly income  
sh (20600 + 1200 + 2880 + 340)  
=sh 35820

(b) 1st 9680:  $\frac{10}{100} \times 9680 = 968$

2nd 9120:  $\frac{15}{100} \times 9120 = 1368$

3rd 9120:  $\frac{20}{100} \times 9120 = 1824$

4th 7900:  $\frac{25}{100} \times 7900 = 1975$

Total tax 6135  
Less relief - 1056

Monthly tax paid sh 5079

$$\frac{35820}{20} = -1791$$

- If monthly income wrongly calculator the (m marks) are

M1

A1

M1

M1

M1

M1

M1

A1

8

- Not scored if a m is lost.

18.(a) Turning points

$$\frac{d}{dx} (3x^2 + 8x)$$

$$3x^2 + 8x = 0$$

$$x(3x + 8) = 0$$

$$x = 0 \text{ or } -\frac{8}{3}$$

$$x = 0 \text{ or } -7.667$$

turning points are

(0, 2) and (-2.7, 7.5)

M1

A1

$$x = 0, -\frac{2}{3}$$

- 2.7 used in substitute gives  $y = 7.477$  or 7.  
apply PA -1

(b)

x	-4	-3	-2	-1	0	
y		7			-2	3

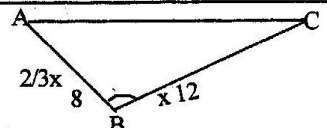
B1

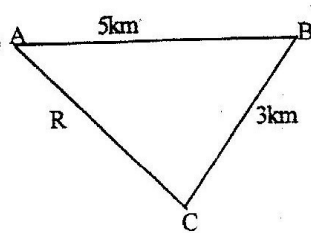
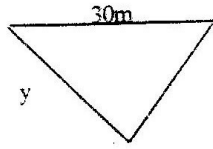
B1

SOLUTION	MARKS	ALTERNATIVE METHOD
<p>19 (a) area of hemispherical part  <math>= \frac{1}{2} \times 4\pi R^2</math>  <math>= 2 \times \frac{22}{7} \times 35 \times 35</math>  <math>= 7700\text{cm}^2</math></p> <p>(b) Slant height for original /zone  <math display="block">\frac{L}{L-60} = \frac{35}{14}</math> <math display="block">L = 100\text{ cm}</math></p> <p>(c) Surface area of frustum  <math>= \pi RL - \pi r^2</math>  <math>Ni = \frac{22 \times 35 \times 100 - \frac{22}{7} \times 14 \times 40}{7}</math>  <math>= 11000 - 1760</math>  <math>= 9240\text{cm}^2</math></p> <p>Total surface area  <math>= 7700 + 9240 + \frac{22}{7} \times 14^2</math>  <math>= 7700 + 9240 + 616</math>  <math>= 17556\text{cm}^2</math></p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>follow thru logs used <math>7698\text{cm}^2 - 755</math>  Smaller zone  <math display="block">\frac{x}{14} = \frac{x+60}{35}</math></p> <p><math>35x = 14x + 840</math>  <math>x = 40</math>  original zone is  <math>60 + 40 = 100\text{cm}</math></p> <p>(c) L.S.F. = 28570  A.S.F = 4:25  asf = 21:25 or 21.54  S.A of frustum = <math>\frac{21}{25} \times \frac{22}{7} \times 35 \times 100\text{m}</math>  or <math>21/4 \times 22/7 \times 14 \times 40 = 29240</math></p> <p>M. for <math>22 \times 14</math>  <math>\frac{A1}{8}</math>  for sum</p> <p>-3 (i) + 4p = 5 M1  Y = 2 A1</p>
<p>20 (a) <math>-3(1) + 4P = 5</math>  P = 2</p> <p><math>q(1)^2 - 5(1)(2) + (2)^2 = 0</math>  <math>q - 10 + 4 = 0</math>  q = 6</p> <p>(b) <math>6x^2 - 5x \frac{(3x+5)}{4} + \frac{(3x+5)^2}{4} = 0</math>  <math>6x^2 - 5x \frac{(3x+5)}{4} + \frac{(3x+5)^2}{4} = 0</math>  <math>96x - 20x(3x+5) + (3x+5)^2 = 0</math>  <math>65x^2 - 7x + 25 = 0</math>  <math>9x^2 - 14x + 5 = 0</math>  <math>(9x-5)(x-1) = 0</math>  <math>x = \frac{5}{9}</math> and <math>y = 1 \frac{2}{3}</math></p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>8</p>	<p>(b) <math>6x^2 - 5xy + y^2 = 0</math>  <math>(3x-y)(2x+y) = 0</math>  <math>x = 1/3y</math> or <math>x = 1y</math>  from eq (1) <math>y = \frac{5+3}{4}</math>  <math>x = \frac{1(5+3x)}{3 \cdot 4}</math> Mimimi  <math>x = \frac{5}{9}, y = 1 \frac{2}{3}</math> A1</p>

SOLUTION	MARKS	ALTERNATIVE METHOD
21 (a) $AB = DC$		
$\begin{pmatrix} 4 \\ 0 \end{pmatrix} - \begin{pmatrix} 2 \\ -4 \end{pmatrix} = \begin{pmatrix} 1 \\ 6 \end{pmatrix} - \begin{pmatrix} x \\ y \end{pmatrix}$	MI	
$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 6 \end{pmatrix} - \begin{pmatrix} 2 \\ -4 \end{pmatrix}$	MI	
D (-1, 2)	AI	
(b)	BI	
(i) $PR = \frac{3q - 1p}{2} - p$		
$= \frac{3q - 3p}{2}$	BI	
(ii) $RQ = \frac{q - 3q + 1p}{2}$	BI	
$= \frac{-1q + 1p}{2}$	BI	) share same duration and R or Q in a common.
$PR = \frac{3}{2}(q - p)$		
$RQ = -\frac{1}{2}(q - p)$		
$PR = 3 QR$		
$PR \parallel QR \text{ and R is a common point}$		
$\text{Hence P, Q, R are collinear}$		
(iii) $PQ = q - p$	BI	
$QR = \frac{1q - 1p}{2}$	5	
in PQ, OR = 2 : 1		

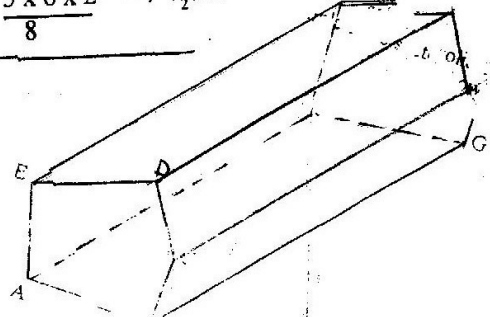


SOLUTION	MARKS	ALTERNATIVE METHOD
<p>22.(a) <math>\angle M &lt; \angle N = 40^\circ</math> Angles subtended by arc MN</p> <p>(b) <math>\angle OKN = 90^\circ - (40^\circ + 25^\circ)</math> <math>= 25^\circ</math> angle subtended by diameter</p> <p>(c) <math>\angle LNP = 40^\circ = 25^\circ = 65^\circ</math> angles in alternate segment</p> <p>(d) <math>\angle MPN = 180^\circ - 170^\circ</math> <math>= 10^\circ</math> angles of triangle KNP.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>or equivalent reason</p> <p>base isosceles D equal, in semicircle</p> <p><math>180^\circ - (40^\circ + 65^\circ + 65^\circ) = 10^\circ</math></p> <p><math>\angle</math> at centre is twice <math>\angle</math> at <math>O^\circ</math></p> <p><math>\angle</math> sum of triangle = 180</p> <p>Trial and error accepted AB : AC = 4 : 9</p>
<p>23. </p> <p>(a) Let BC = x <math>AB = \frac{2}{3}x</math> <math>AC = \frac{11}{2}x</math> <math>x + \frac{2}{3}x + \frac{11}{2}x = 38</math> <math>\frac{19}{6}x = 38</math> <math>x = \frac{38 \times 6}{19} = 12m</math></p> <p>(b) (i) <math>S = \frac{1}{2} \times 38 = 19</math> AB = 8 and AC = 18 <math>area = \sqrt{19(19-12)(19-8)(19-8)}</math> <math>= \sqrt{19 \times 7 \times 1 \times 11} = \sqrt{1463} = 38.25</math> <math>\frac{1}{2} \times 8 \times 12 \sin \theta = 38.25</math> <math>\sin \theta = \frac{38.25}{48} = 0.796875</math> <math>\theta = 52.50^\circ</math> <math>\theta = 127.50^\circ</math></p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p><math>4AC = 9AB</math> <math>AC = \frac{9}{4}AB</math> <math>= \frac{9}{4} \times \frac{2}{3} \times M</math></p> <p><math>\frac{3x + 2x + x}{2 \times 3} = 38m</math></p> <p><math>9x = 4x + 6x = 228</math> <math>19x = 228</math> <math>x = \frac{228}{19} = 12m</math></p> <p>(b) (ii) <math>182 = (12)^2 + 98^2 - 2 \times 12 \times 98</math></p> <p><math>\cos \theta = \frac{-24 + 144 + 64}{492} = \frac{7}{4}</math></p> <p><math>\cos \theta = -0.6042</math> <math>\theta = \cos^{-1}(-0.6042)</math> <math>52.83^\circ</math> <math>127.17^\circ</math> <math>\theta = \frac{127.17^\circ}{1}</math></p>

SOLUTION	MARKS	ALTERNATIVE METHOD
<p>24 (a) </p> <p>(i) <math>R^2 = 5^2 + 3^2</math>  <math>= 25 + 9</math>  <math>= 34</math>  <math>R = \sqrt{34}</math>  <math>= 5.831 \text{ km}</math></p> <p>(ii) <math>\tan \theta = \frac{3}{5} = 0.6</math>  <math>\theta = 30^\circ 58 \text{ or } 30.96^\circ</math></p> <p></p> <p>(b) <math>\cos 30.96 = \frac{30}{y}</math>  <math>y = \frac{30}{\cos 30.96}</math>  <math>= \frac{30}{0.8575}</math>  <math>= 34.99 \text{ m}</math></p> <p>(c) time <math>= \frac{34.99 \times 3600}{1000 \times 5.831}</math>  <math>= 21.6 \text{ seconds}</math></p> <p>(b) alternative (1) Distance Time  <math>5 \text{ km } 60 \times 60 \text{ sec.}</math>  <math>0.03 \text{ km } - ?</math>  <math>60 \times 60 \times 0.030 = 108 = 21.6</math>  sec.</p>	<p>M1 expression for radius</p> <p>A1</p> <p>M1 <math>\tan^{-1} \frac{3}{5}</math> M1</p> <p><math>\theta = 30.96^\circ</math> A1</p> <p><math>30.97^\circ</math> A1</p> <p>M1 <math>(30.57^\circ) = 30.95</math></p> <p>accept 34.98m</p> <p>M1 (c) speed <math>= 5.831 \text{ km}</math>  <math>= 5.831 \times 1000 \text{ m}</math></p> <p>M1 Time expressions <math>60 \times 60</math>  <math>= 1.62 \text{ m5}</math></p> <p>A1 <math>D = 34.99</math>  <math>T = D = 34.99 \text{ M1}</math>  s 1.62  <math>= 21.6 \text{ seconds FI}</math></p> <p>Speed <math>\frac{5000 \text{ M1M1}}{60 \times 60}</math>  <math>= 21</math>  <math>\frac{1}{3}</math></p> <p>Time = 21.6  <math>(25/3) = 21</math></p>	

**K.C.S.E 2004 MATHEMATICS PAPER 1/2/1 MARKING SCHEME**

SOLUTION	MARKS	ALTERNATIVE METHOD
<p>1.</p> $\begin{array}{r} 5.25 \rightarrow 0.7202 \\ 0.042 \rightarrow 2.6232 \quad \checkmark \\ \hline 1.3424 \\ \hline 1.6717 \quad \checkmark \\ 34.33 - 1.5357 \quad \checkmark \\ \hline 1.6717 \quad \checkmark \\ \hline 1.8640 \\ = 73.11 \quad \checkmark \end{array}$	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>	
<p>2.</p> $\frac{92 \times 400,000 \times 100}{100 \times 115} \quad \checkmark$ <p>= Sh. 320,000 <math>\checkmark</math></p>	<p>M1</p> <p>A1</p>	
<p>3.</p> $\begin{aligned} a &= 2, \quad d = 4 \\ S_n &= n(2 \times 2 + (n-1)4) = 800 \\ n(8 + (n-1)4) &= 1600 \quad \checkmark \\ 4n^2 &= 1600 \\ n^2 &= 400 \\ n &= 20 \quad \checkmark \end{aligned}$	<p>M1</p> <p>A1</p>	
<p>4.</p> $\begin{aligned} \text{Distance} &= 72 + 78 = 150 \text{ m} \quad \checkmark \\ \text{Speed} &= 108 + 72 = 180 \text{ km/h} \quad \checkmark \\ \text{Time} &= \frac{50 \times 60 \times 60}{80 \times 1000} \quad \checkmark \\ &= 3 \text{ sec} \quad \checkmark \end{aligned}$	<p>M1</p> <p>M1</p> <p>A1</p>	
<p>5.</p> $\begin{aligned} 2 \log_{10} 5 - \frac{1}{2} \log_{10} 16 + 2 \log_{10} 40 \\ \frac{\log(25 \times 40)}{4} = \log 10000 \quad \checkmark \\ = 4 \quad \checkmark \end{aligned}$		
<p>6.</p> $\begin{aligned} \frac{60 \times 2 + 75 \times 1 + 4 \times 4 + 66 \times 3}{10} = \checkmark \\ \frac{120 + 75 + 192 + 198}{10} = \checkmark \\ = \frac{585}{10} = 58.5\% \quad \checkmark \end{aligned}$	<p>M1</p> <p>A1</p>	

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<p>7. <math>4x + 3y = 18</math>  <math>5x - 2y = 11</math></p> $\begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\frac{-1}{23} \begin{pmatrix} 2 & -3 \\ 5 & 4 \end{pmatrix} \begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{23} \begin{pmatrix} 2 & -3 \\ -5 & 4 \end{pmatrix} \begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{-1}{23} \begin{pmatrix} 69 \\ -46 \end{pmatrix}$ $= \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ <p><math>x = 3 \quad y = 2</math></p>		
<p>8. <math>(1+x)^5 = 1 + 5x + 10x^2 + 10x^3 + 5x^4 + x^5</math></p> <p>(b) <math>x = -0.02</math></p> $1 + 5(-0.02) + 10(-0.02)^2$ $= 1 - 0.1 + 0.04$ $= 0.94$		
<p>9. <math>a = \frac{1}{\sqrt{(b-d)}}</math></p> $a^2 = \frac{b^2 d^2}{b^2 - d}$ $a^2 b^2 - a^2 d = b^2 d$ $a^2 b^2 - b^2 d^2 = a^2 d$ $b = \sqrt{\frac{a^2 d}{a^2 - d^2}}$		
<p>10. <math>\frac{5 \times 6 \times 2}{8} = 7 \frac{1}{2} \text{ hrs}</math></p>		
<p>11. </p>	<p>B2 B1</p>	

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<p>11. <math>0.7x + 450 = 0.9x</math> or <math>0.75(450 + x)</math>  <math>0.7x + 450 = 0.9x</math>  <math>0.9x - 0.75x = 450(0.75 - 0.7)</math>  <math>0.15x = 0.05 \times 450</math>  <math>x = \frac{0.05 \times 450}{0.15}</math>  <math>= 150</math></p>	<p>B1 M1 M1  A1</p>	
<p>13. <math>\frac{dy}{dx} = 3x^2 - 8x + 2</math>   <math>y = x^3 - 4x^2 + 2x + c</math>   At <math>x=0</math> <math>y=2</math> <math>2 = 0 - 0 + 0 + c</math>   <math>C = 2</math>  <math>\Rightarrow y = x^3 - 4x^2 + 2x + 2</math></p>	<p>M1 M1  A1</p>	
<p>14. Excess Ksh = <math>84.15 \times 500</math>  <math>= 420750</math>   Balance in Ksh = <math>420750 - 289850</math>   <math>= 130900</math>   Balance in Japan yen  <math>= \frac{130900 \times 100}{6545}</math>   <math>= 200,000</math></p>	<p>M1  M1   M1  A1</p>	
<p>15. <math>Y &gt; x</math>  <math>Y &lt; -x + 4</math>  <math>7 &lt; 3x + 3</math></p>		
<p>16.   <math>\frac{2}{3-7} - \frac{2}{3+7} = 2(3+\sqrt{7}) - 2(3-\sqrt{7})</math>  <math>= \frac{6 + 2\sqrt{7} - 6 + 2\sqrt{7}}{9 - 37 + 3\sqrt{7} - 3\sqrt{7}}</math>  <math>= \frac{4\sqrt{7}}{2} = 2\sqrt{7}</math></p>	<p>M1</p>	

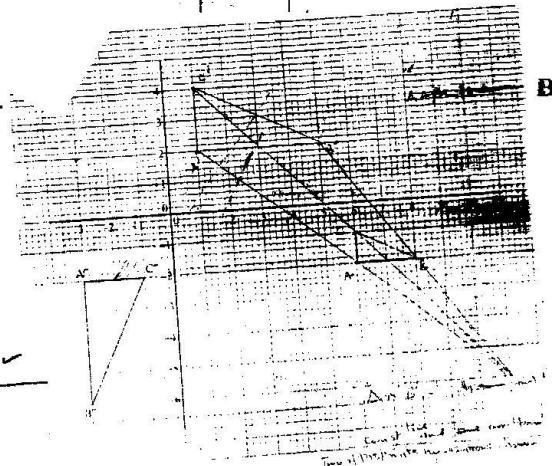
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<p><b>SECTION II</b></p> <p>17. A &amp; B in 1 hr = <math>\frac{1}{2\frac{1}{2}}</math></p> $= \frac{2}{5}$ <p>b) Part done in 1 hr 10 min</p> $= \frac{2 \times 7}{5 \times 6 \times 15} = \frac{7}{15}$ $\text{Remaining} = 1 - \frac{7}{15} = \frac{8}{15}$ <p>(c) 1hr A does <math>\frac{8 \times 1}{15 \times 4 \times 15} = \frac{2}{15}</math></p> <p>Time taken by A = 15 = <math>7\frac{1}{2}</math> hr</p> <p>Work done by B in 1 hr</p> $= \frac{2}{5} - \frac{2}{15} = \frac{4}{15}$ <p>Time taken by B = 15 = <math>3\frac{3}{4}</math> hr</p>	<p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p>	
<p>18. <math>Q1 = 39.5 + \frac{15 - 10}{12} \times 10</math></p> $= 43.67$ <p><math>Q3 = 59.5 + \frac{45 - 40}{17} \times 10</math></p> $= 62.44$ <p>Interquartile range</p> $= 62.44 - 43.67$ $= 18.77$ <p>b) Let x be no. of people in class 50 - 59 with ages &lt; 54.5</p> $49.5 + \frac{x}{18} \times 10 = 54.5$ $x = 9$ <p>Percentage = <math>\frac{22}{60} + 9 \times 100</math></p> $= 51.67\% (51\frac{2}{3}\%)$	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p>	

20. (a)	$A^{-1} = \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix}$ ✓	B1
(b)	i) $200x + 300y = 850,000$ ✓ $90x + 120y = 360,000$ ✓	B1 B1
	ii) $2x + 3y = 8500$ $3x + 4y = 12,000$	
	$x = \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix} \begin{pmatrix} 8500 \\ 12000 \end{pmatrix}$ ✓	M1
	$x = 2000$ and $y = 1500$ ✓	
c)	Discount on rice $2 \times 1,500 \times 360 = 10800$ ✓	A1
	100	
	% discount on sugar	M'
	$\frac{33300 - 10800}{225 \times 2000} \times 100$ ✓	A1
	= 5% ✓	

21)  $\begin{pmatrix} 2 & 4 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} P & Q & R \\ 5 & 6 & 4 \\ -1 & -1 & -0.5 \end{pmatrix}$  ✓

$= \begin{pmatrix} A & B & C \\ 6 & 8 & 6 \\ -2 & -2 & -1 \end{pmatrix}$  ✓

c) Centre (-3,2) angle of rotation  $270^\circ$  or  $-90^\circ$  ✓



22)  $V = \int (6t + 4) dt = 3t^2 + 4t + c$  ✓

At  $t = 0, 5 = 3 \times 0^2 + 4 \times 0 + c$  ✓

$C = 5$

$V = 3t^2 + 4t + 5$  ✓

b) at  $t = 3, V = 3 \times 3^2 + 4 \times 3 + 5$  ✓  
 $= 44 \text{ m/s}$  ✓

ii) distance from  $t = 2$  to  $t = 4$

$= \int_2^4 (3t^2 + 4t + 5) dt$

$\{t^3 + 2t^2 + 5t\}_2^4$ $= 4^3 + 2(4^2) + 5 \times 4 - (2^3 + 2 \times 2^2 + 5 \times 2)$ $= 116 - 26$ $= 90m$	MI MI AI	
<p>23 (a).</p> $p = KQ^2 / \sqrt{R}$ <p>when <math>Q=5</math>, and <math>R=9</math>, <math>P=20</math></p> $K5^2 = 20 \Rightarrow K = \frac{20 \times 3}{25} = 60 \text{ or } 2.4$ <p>when <math>Q=7</math> and <math>R=25</math></p> $P = \frac{4 \times 7^2}{\sqrt{25}} = 23.52$ <p>b)</p> $Q^1 = 2Q \text{ and } R^1 = 0.64R$ $P^1 = \frac{K(2Q)^2}{\sqrt{0.64R}}$ <p>Increase <math>= \frac{K(2Q)^2}{\sqrt{0.64R}} - \frac{KQ^2}{\sqrt{R}}</math></p> $\% \text{ increase} = \frac{1.44KQ^2 - KQ^2}{0.8\sqrt{R}} \times 100\%$ $= 80\%$	MI MI AI MI MI AI	
<p>24 a) (i)</p> $YM = \sqrt{14^2 - 7^2}$ $= \sqrt{147} = 12.12$ <p>ii). <math>YL = \sqrt{147 - 19^2}</math></p> $= 6.856$ <p>b) Identifying angle <math>\theta</math></p> $\tan \theta = \frac{6.856}{7}$ $= 0.9794$ <p>(.9804)</p> $\theta = 44^\circ 24'$ <p>c). <math>\tan x = \frac{7}{16}</math></p> $= 0.4375$ $x = 23^\circ 38' (23.63^\circ)$	BI AI BI MI	