This memorandum consists of 8 pages.
# QUESTION 1

1.1 313 ; 633

1.2

\[
13 = 2 \times 3 + 7 \\
33 = 2 \times 13 + 7 \\
73 = 2 \times 33 + 7
\]

\[T_{n+1} = 2T_n + 7, \quad T_1 = 3 \quad (n \geq 1)\]

\[OR \quad T_n = 2T_{n-1} + 7, \quad T_1 = 3 \quad (n \geq 2)\]

\[
13 = 3 + 10 \\
33 = 13 + 20 \\
73 = 33 + 40
\]

\[T_{n+1} = T_n + 10.2^{n-1}, \quad T_1 = 3 \quad (n \geq 1)\]

\[OR \quad T_n = T_{n-1} + 10.2^{n-2}, \quad T_1 = 3 \quad (n \geq 2)\]

# QUESTION 2

2.1 Yes. All three graphs represent the annual profits for the same company (2005 – R60 million; 2006 – R100 million and 2007 – R180 million). There are, however, differences in the way the information is presented – the scale on the vertical axis has been changed in graph 2 and the order of the years reversed in graph 3.

\[\text{graph 2 - annual profit is levelling off or shows a slight increase year on year.} \]

\[\text{graph 3 - annual profit is decreasing.}\]

2.2 In graph 2, the impression created is that the annual profit is levelling off or shows a slight increase year on year. In graph 3, the impression created is that the annual profit is decreasing.

2.3 Graph 1.

This graph shows a substantial increase in annual profits year on year.

# QUESTION 3

3.1 39 minutes

3.2

The standard deviation is 8 minutes.

\[m = 39 + 2(8) = 55\]

\[n = 39 - 3(8) = 15\]

3.3 20 learners represent 16% of total number

\[\text{Total number} = \frac{20 \times 100}{16} = 125\]

3.4 The library assistant should be employed for one hour each afternoon. There is a small percentage (< 2%) of learners who spend more than more than 1 hour in the library.
QUESTION 4

4.1 \( P(A \text{ or } B) = 0,3 + 0,5 \)
\[= 0,8 \]
\( \checkmark \text{ addition} \)
\( \checkmark \text{ answer} \)
(2)

4.2 Since A and B are independent
\( P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) \)
\[= 0,3 + 0,5 - 0,15 \]
\[= 0,65 \]
\( \checkmark P(A \text{ and } B) = 0,15 \)
\( \checkmark 0,3 + 0,5 - 0,15 \)
\( \checkmark \text{ answer} \)
(3)

QUESTION 5

5.1
\[\begin{array}{cc}
\text{R} & \text{C} \\
100 - x & 70 - x \\
16 & 10 \\
6 & 100 - x - 6 - 16 \end{array}\]
\[\begin{array}{cc}
\text{B} & \\
26 & 26 \end{array}\]
\( \checkmark 16 \)
\( \checkmark 6 \text{ and } 10 \)
\( \checkmark 26 \text{ (inside B only), } 100 - x \text{ and } 70 - x \)
\( \checkmark 26 \text{ (outside)} \)
(4)

5.2 \[100 - x + x + 16 + 6 + 26 + 10 + 70 - x + 26 = 240 \]
\[254 - x = 240 \]
\[x = 14 \]
\( \therefore \text{ Number of learners playing rugby and cricket } = 30. \)
\( \checkmark \text{ set up equation} \)
\( \checkmark \text{ answer } x = 14 \)
\( \checkmark \text{ answer } = 30 \)
(3)

5.3.1 \( P(\text{play basketball only}) = \frac{26}{240} \)
\[= 0,108 \]
\( \checkmark \frac{26}{240} \)
\( \checkmark \text{ answer} \)
(2)

5.3.2 \( P(\text{does not play cricket}) = \frac{144}{240} \)
\[= 0,600 \]
\( \checkmark 144 \)
\( \checkmark \text{ answer} \)
(2)

5.3.3 \( P(\text{plays at least 2 sports}) = \frac{14 + 6 + 10 + 16}{240} \)
\[= \frac{46}{240} \]
\[= 0,192 \]
\( \checkmark \text{ method} \)
\( \checkmark \text{ answer} \)
(2)
**QUESTION 6**

| 6.1 | Number of ways in which performances take place: 
|     | \(= 7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1\)  
|     | \(= 5040\) | ✓ multiplication rule  
|     | ✓ answer | (2) |

| 6.2 | Since first and last performance are fixed, the number of different ways performances can be arranged in 5 cities 
|     | \(= 1 \times 5! \times 1 = 5 \times 4 \times 3 \times 2 \times 1\)  
|     | \(= 120\) | ✓ 5 cities  
|     | ✓ multiplication rule  
|     | ✓ answer | (3) |

| 6.3 | The different ways the coastal cities tours can take place 
|     | \(= 4!\)  
|     | \(= 24\)  
|     | Total number of ways the itinerary can be arranged 
|     | \(= 4! \times 4!\)  
|     | \(= 24 \times 24\)  
|     | \(= 576\) | ✓ coastal cities \(= 4!\)  
|     | ✓ ✓ \(4! \times 4!\)  
|     | ✓ ✓ answer | (4) [9] |
**QUESTION 7**

<table>
<thead>
<tr>
<th>7.1 &amp; 7.3</th>
<th>Scatter Plot of North Latitude vs Mean Maximum Temperature for April</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Scatter Plot" /></td>
<td>Mean Maximum Temperature (degree Celsius) vs North Latitude</td>
</tr>
</tbody>
</table>

| 7.1 | ✓✓✓ plotting points |
| 7.3 | ✓ gradient correct  |
|     | ✓ x-intercept        |

| 7.2 | \(a = 39.94\) (39.94369425…)
|     | \(b = -0.52\) (–0.5235636749…) |
|     | Equation of regression line \(y = 39.94 - 0.52x\) |
|     | ✓ a-value |
|     | ✓ b-value |
|     | ✓ equation |

| 7.4 | The y-intercept represents the mean maximum temperature for April at the equator. |
|     | ✓ answer |

| 7.5 | Mean maximum temperature for April in Madrid
|     | \(= 39.94 - 0.52(40)\)
|     | \(= 19.14 ^\circ C\) |
|     | ✓ substitution
|     | ✓ answer |

| 7.6 | \(r = -0.91\) (–0.9129015212…)
|     | ✓ ✓ answer |

| 7.7 | The value of \(r\) is close to –1 and suggests that there is a very strong relationship between distance from the equator and the mean maximum temperature for April. The further one moves away from the equator, the colder it gets. |
|     | ✓ very strong and further away from the equator, the colder it gets |

[15]
QUESTION 8

8.1 Equal to 360° ✓ answer

8.2.1 reflex \( \hat{O} = 360° - 100° = 260° \) (\( \angle \)'s round a point)
\[
2 \angle L\hat{M}N = \text{reflex } \hat{O} \quad (\angle \text{ circ centre } = 2 \angle \text{ circumference})
\]
\[
\therefore \angle LMN = \frac{260°}{2} = 130°
\]
✓ reflex \( \hat{O} = 260° \)
✓ reason
✓ \( \angle LMN = 130° \)

8.2.2 \( \angle N_1 = \frac{180° - 130°}{2} = 25° \) (base angles \( \angle LM = \angle MN \))
\[
\therefore \angle \hat{K} = 25°
\]
✓ = 25°
✓ answer
✓ reason

QUESTION 9

9.1 Is equal to the angle subtended by the chord in the alternate segment ✓ answer

9.2.1 \( \hat{A}_2 = x \) (tangent chord theorem)
\( \hat{A}_4 = x \) (vertically opp. angles)
\( \hat{P}_2 = x \) (tangent chord theorem)
✓ answer ✓ reason
✓ answer ✓ answer ✓ reason

9.2.2 PT = TA (tangents drawn from same point)
\( \hat{P}_1 = \hat{A}_1 \) (angles opp equal sides); PT = TA
\( \hat{A}_3 = \hat{A}_6 \) (vertical opp angles)
\( \hat{A}_6 = \hat{R}_2 \) (tangent chord theorem)
\( \therefore \hat{P}_1 = \hat{R}_2 \)
\[
\therefore \text{APTR is a cyclic quadrilateral} \quad \text{(converse: ext angle of cycl. quad.)}
\]
✓ statement
✓ statement
✓ statement
✓ equal angles ✓ reason

QUESTION 10

| 10.1 | **OC = OB** (radii) | ✓ | **OC = OB** conclusion and reason (2) |
|      | Hence **AE = BE** (midpoint theorem) | ✓ | **OE = C = 90°** conclusion and reason (2) |
|      | **OR** | | |
|      | **CAB = 90°** (diameter subtends right angle) | ✓ | **OEB = CAB = 90°** conclusion and reason (2) |
|      | **OEB = CAB = 90°** (corresponding angles AC//OE) | ✓ | **OEB = CAB = 90°** conclusion and reason (2) |
|      | \( \therefore AE = BE \) (line drawn from centre, perpend. to chord or midpoint theorem) | ✓ | **AE = BE** (proven) |
| 10.2 | In \( \triangle AED \) and \( \triangle CEB \) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( \overparen{AD} = \overparen{CE} \) (vertically opp. angles) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( \hat{D} = \hat{B} \) (angles in same segment) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( \hat{A}_2 = \hat{C}_1 \) (angles in same segment) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( \therefore \triangle AED \parallel \triangle CEB \) (equi - angular) | ✓ | **AE = CE** conclusion and reason (3) |
| 10.3 | \( \frac{AE}{DE} = \frac{CE}{BE} \) (deduction) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( AE.BE = DE.CE \) (proven) | ✓ | **AE = CE** conclusion and reason (3) |
|      | \( \therefore AE^2 = DE.CE \) | ✓ | **AE = CE** conclusion and reason (3) |
| 10.4 | \( AE.BE = DE.CE \) | ✓ | **AE.BE = DE.CE** conclusion and reason (3) |
|      | But \( AE.BE = EF.CE \) | ✓ | **AE.BE = DE.CE** conclusion and reason (3) |
|      | \( \therefore DE.CE = EF.CE \) | ✓ | **AE.BE = EF.CE** conclusion and reason (3) |
|      | \( DE = EF \) | ✓ | **AE.BE = EF.CE** conclusion and reason (3) |
|      | \( \therefore E \) is the midpoint of DF | ✓ | **AE.BE = EF.CE** conclusion and reason (3) |

**OR**

\( AE^2 = DE.CE \) \( AE.BE = EF.CE \) \( \Rightarrow AE^2 = EF.CE \) \( \therefore EF.CE = DE.CE \) \( EF = DE \) \( \therefore E \) is the midpoint of DF
### QUESTION 11

#### 11.1

In $\triangle BDA$ and $\triangle CDB$

- $\hat{BDA} = \hat{CDB} = 90^\circ$
- $\hat{B} = \hat{C}$ (both $= x$)
- $\hat{A} = \hat{B}_2$ (remaining angles)

$\triangle BDA \parallel \triangle CDB$ (equiangular)

- $\Box BDA = \Box CDB$
- $\Box B = \Box C$
- $\Box A = \Box B_2$

(3)

#### 11.2

$AD : DC = 3 : 2$

- $\therefore CD = \frac{2}{3} \times 15 = 10$
- $\therefore BD = \frac{AD}{BD}$
- $\therefore BD^2 = AD \cdot CD$
- $BD^2 = 15.10$
- $BD = \sqrt{150}$

$\Box BD$ (3)

#### 11.3

$AB^2 = (\sqrt{150})^2 + (15)^2$ (Theorem of Pythagoras)

- $AB = \sqrt{375} = 375$
- $\hat{E} = \hat{ABC} = 90^\circ$
- $\therefore BC // DE$
- $\frac{AE}{AB} = \frac{AD}{AC}$ (proportion theorem)
- $\Box AE = \frac{AD}{AB}$
- $\Box AC$

$AE = \frac{15 \times \sqrt{375}}{25} = \sqrt{135} = 3\sqrt{15}$

$\Box AE$ (6)

TOTAL : 100