This memorandum consists of 16 pages.
**NOTE:**
- If a candidate answered a question TWICE, mark the FIRST attempt ONLY.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed out question.
- Consistent accuracy applies in ALL aspects of the memorandum.

**QUESTION 1**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1.1 | The number of times the CD was played.  
  Afrikaans: Getalkerewat die CD gespeel is. | ✓ answer (1) |
| 1.2 | ![Scatter plot showing the number of times a CD was played vs the CD sales in the following week](chart.png) | ☑️ all 10 points plotted correctly  
  2 marks if 5–9 points are plotted correctly  
  1 mark if 1–4 points are plotted correctly. (3) |
| 1.3 | \( a = 293,06 \) \((293,057554...\))  
  \( b = 74,28 \) \((74,28057554...\))  
  \( \hat{y} = 293,06 + 74,28x \)  
  ✓ calculating \( a \) and \( b \)  
  ✓ equation (4) |
| 1.4 | \( r = 0,95 \) \((0,9458185...\)) | ✓ answer (2) |
| 1.5 | \( \hat{y} \approx 293,06 + 74,28(45) \)  
  \( \approx 3635,66 \)  
  \( \approx 3635 \)  
  \( \approx 3650 \) (to the nearest 50)  
  ✓ substitution  
  ✓ answer (2) |
| 1.6 | There is a very strong positive relationship between the number of times that a CD was played and the sales of that CD in the following week. | ✓ strong (1) [13] |

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*Note:* Penalise 1 mark for incorrect rounding off.
QUESTION 2

2.1 Yes. The events Pass and Fail are mutually exclusive. It is not possible for pass and fail to take place at the same time. There is no intersection between the two sets. P(Pass and Fail) = 0

OR

\[
P(\text{Pass}) = 0.59 \\
P(\text{Fail}) = 0.41 \\
P(\text{Pass}) + P(\text{Fail}) \\
= 0.59 + 0.41 \\
= 1 \\
P(\text{Pass and Fail}) = 0 / No intersection of the sets 
\]

The events Pass and Fail are mutually exclusive.

Note: If a candidate answers ‘No’ then award 0 marks

2.2

<table>
<thead>
<tr>
<th></th>
<th>PASS</th>
<th>FAIL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>46</td>
<td>32</td>
<td>78</td>
</tr>
<tr>
<td>Females</td>
<td>72</td>
<td>50</td>
<td>122</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>82</td>
<td>200</td>
</tr>
</tbody>
</table>

\[
P(\text{Male}) = \frac{78}{200} = 0.39 \\
P(\text{Pass}) = \frac{118}{200} = 0.59 \\
P(\text{Male and Pass}) = \frac{46}{200} = 0.23 \\
P(\text{Male}) \times P(\text{Pass}) = 0.39 \times 0.59 \\
= 0.23 \quad (0.2301) \\
\therefore P(\text{Male}) \times P(\text{Pass}) = P(\text{Male and Pass}) \\
\therefore Passing the competency test is independent of gender.
\]

Note: If a candidate answers ‘No’ then award 0 marks

Conclusion (4)

Yes
P(Pass and Fail) = 0 / no intersection between the sets.

Ja
P(Slaag en Druip) = 0 / geen snyding

P(Male) = \frac{78}{200} = 0.39 or
P(\text{Pass}) = \frac{118}{200} = 0.59

P(Male and Pass) = 0.23
P(\text{Male}) \times P(\text{Pass}) = 0.23

Conclusion

Yes
P(Pass and Fail) = 0 / no intersection between the sets.

Ja
P(Slaag en Druip) = 0 / geen snyding

If a candidate answers ‘No’ then award 0 marks
OR

\[ P(\text{Female}) = \frac{122}{200} = 0.61 \]
\[ P(\text{Pass}) = \frac{118}{200} = 0.59 \]
\[ P(\text{Female and Pass}) = \frac{72}{200} = 0.36 \]
\[ P(\text{Female}) \times P(\text{Pass}) = 0.61 \times 0.59 \]
\[ = 0.36 \]
\[ = (0.3599) \]

\[ \therefore P(\text{Female}) \times P(\text{Pass}) = P(\text{Female and Pass}) \]
\[ \therefore \text{Passing the competency test is independent of gender.} \]

\[ \checkmark P(\text{Female}) = \frac{120}{200} = 0.61 \text{ or} \]
\[ P(\text{Pass}) = \frac{118}{200} = 0.59 \]
\[ \checkmark P(\text{Female and Pass}) = 0.36 \]
\[ \checkmark P(\text{Female}) \times P(\text{Pass}) = 0.36 \]
\[ \checkmark \text{conclusion} \]

(4) [6]
**QUESTION 3**

3.1 Histogram showing the frequency of the lifespan of a television (years)

- 3 bars correct
- 6 bars correct

(3)

3.2

<table>
<thead>
<tr>
<th>Lifespan (in years)</th>
<th>Frequency</th>
<th>Midpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,95 ≤ x&lt; 5,65</td>
<td>2</td>
<td>5,3</td>
</tr>
<tr>
<td>5,65 ≤ x&lt; 6,35</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6,35 ≤ x&lt; 7,05</td>
<td>18</td>
<td>6,7</td>
</tr>
<tr>
<td>7,05 ≤ x&lt; 7,75</td>
<td>17</td>
<td>7,4</td>
</tr>
<tr>
<td>7,75 ≤ x&lt; 8,45</td>
<td>5</td>
<td>8,1</td>
</tr>
<tr>
<td>8,45 ≤ x&lt; 9,15</td>
<td>2</td>
<td>8,8</td>
</tr>
</tbody>
</table>

\[
\bar{x} = \frac{2 \times 5,3 + 6 \times 6 + 18 \times 6,7 + 17 \times 7,4 + 5 \times 8,1 + 2 \times 8,8}{50} \\
= \frac{351,1}{50} \\
= 7,02 \text{ years} \\
(\bar{x} = 7,022)
\]

(3)

Note: If candidate works out average (\(\bar{x}\)) of midpoints, answer is 7,05 then 0 marks

3.3 The required area is 98% to the right of some value. This value is at 2 standard deviations on the left of the mean.

\[
\bar{x} - 2\sigma \\
= 7,02 - 2(0,76) \\
= 5,5 \text{ years}
\]

(3)
### 3.4

<table>
<thead>
<tr>
<th>English</th>
<th>Afrikaans</th>
</tr>
</thead>
<tbody>
<tr>
<td>They can issue a 5-year guarantee.</td>
<td>Hulle kan 'n 5 jaar-waarborguitreik.</td>
</tr>
<tr>
<td>The average lifespan of a set is 7,02 years - which is in excess of 5</td>
<td>Die gemiddelde lewens duur van 'n televisiestel is 7,02 jaar –wat</td>
</tr>
<tr>
<td>years. 98% of the sets lasted for more than 5,5 years. Very few sets</td>
<td>5 jaar oorskry. 98% van die stelle het langer as 5,5jaargehou.</td>
</tr>
<tr>
<td>have lasted less than 5 years. The number of sets of this brand that</td>
<td>'n Klein aantal stelle het vir minder as 5 jaar gehou. Die aantal stelle</td>
</tr>
<tr>
<td>will be returned should be minimal if a 5-year guarantee is issued.</td>
<td>wat terug geneem sal moet word sal minimal wees indien 'n 5 jaar-</td>
</tr>
<tr>
<td></td>
<td>waarborg uitgereik word.</td>
</tr>
</tbody>
</table>

- Issue the 5-year guarantee
- reason

- kan 'n 5 jaar-waarborg uitreik
- rede

(2)

[11]
QUESTION 4

4.1

- Sunny branch
- Rainy branch
- Cycle, drive, train branches on both weather types
- Probabilities listed
- Outcomes listed

(Sunny, cycle) $\frac{7}{10}$
(Sunny, drive) $\frac{1}{5}$
(Sunny, train) $\frac{1}{10}$
(Rainy, cycle) $\frac{1}{9}$
(Rainy, drive) $\frac{5}{9}$
(Rainy, train) $\frac{1}{3}$

OR

(Sunny, cycle) $0.7$
(Sunny, drive) $0.2$
(Sunny, train) $0.1$
(Rainy, cycle) $0.111111...$
(Rainy, drive) $0.5555...$
(Rainy, train) $0.3333...$
4.2.1 \( P(\text{Rainy, Cycle}) \)
\[
= \frac{3}{7} \times \frac{1}{9} \\
= \frac{1}{21}
\]
OR
\( P(\text{Rainy, Cycle}) \)
\[
= 0,428... \times 0,111... \\
= 0,04761904762 \\
\approx 0,05 \\
\text{or } 4,76\%
\]

4.2.2 \( P(\text{Train}) \)
\[
= \frac{4}{7} \times 0,1 + \frac{3}{7} \times \frac{1}{3} \\
= \frac{1}{5} \\
= 0,2 \\
= 20\% \\
\]
OR
\( P(\text{Train}) \)
\[
= \frac{4}{7} \times 0,1 + \frac{3}{7} \times \frac{1}{3} \\
= 0,05714... + 0,1428... \\
= \frac{1}{5} \\
= 0,2 \\
= 20\%
\]

4.3 \( P(\text{Drive}) = \frac{4}{7} \times 0,2 + \frac{3}{7} \times \frac{5}{9} \)
\[
= \frac{37}{105} \\
= 0,35238... \\
\text{Vusi drives for } \frac{37}{105} \times 245 = 87 \text{ days} \quad (86,333...) \\
\text{Accept: 86 days}
\]
OR
\( P(\text{Drive}) = \frac{4}{7} \times 0,2 \times 245 + \frac{3}{7} \times \frac{5}{9} \times 245 \)
\[
= 28 + 58,333 \\
= 87 \text{ days} \quad (86,333...) \\
\text{Accept: 86 days}
\]
### QUESTION 5

#### 5.1.1
Number of PIN codes

\[
\begin{align*}
\text{Number of PIN codes} &= 10 \times 10 \times 10 \times 10 \times 10 \\
&= 10^5 \\
&= 100 000 
\end{align*}
\]

- ✓ 10
- ✓ answer

(2)

#### 5.1.2
Number of PIN codes

\[
\begin{align*}
\text{Number of PIN codes} &= 10 \times 9 \times 8 \times 7 \times 6 \\
&= 30 240 
\end{align*}
\]

- ✓ multiplication
- ✓ answer

(2)

OR
Number of PIN codes

\[
\begin{align*}
\text{Number of PIN codes} &= \frac{10!}{5!} \\
&= 30 240 
\end{align*}
\]

- ✓ multiplication
- ✓ answer

(2)

#### 5.2
Number of PINs that DO NOT contain 9s

\[
\begin{align*}
\text{Number of PINs that DO NOT contain 9s} &= 9 \times 9 \times 9 \times 9 \times 9 \\
&= 59 049 
\end{align*}
\]

- ✓ 9
- ✓ 59 049

\[
\begin{align*}
P(\text{at least one 9}) &= 1 - P(\text{no 9s}) \\
&= 1 - \frac{59049}{100000} \\
&= 0.41 
\end{align*}
\]

- ✓ 1 - \frac{59049}{100000}
- ✓ answer

(4)

OR
Number of PINs that DO NOT contain 9s

\[
\begin{align*}
\text{Number of PINs that DO NOT contain 9s} &= 9 \times 9 \times 9 \times 9 \times 9 \\
&= 59 049 
\end{align*}
\]

- ✓ 9
- ✓ 59 049

Number of PINs that contain AT LEAST one 9

\[
\begin{align*}
\text{Number of PINs that contain AT LEAST one 9} &= 100 000 - 59 049 \\
&= 40 951 
\end{align*}
\]

- ✓ 40951

\[
\begin{align*}
P(\text{at least one 9}) &= \frac{40951}{100000} \\
&= 0.41 
\end{align*}
\]

- ✓ answer

(4)
QUESTION 6

6.1 \[ T_{k+1} = 2T_k + 3 \text{ where } T_1 = 1, \ k \geq 1 \]

OR

\[ T_{k+1} = T_k + 2^{k+1} \text{ where } T_1 = 1, \ k \geq 1 \]

OR

\[ T_{k+2} = 2(T_{k+1} - T_k) + T_{k+1} \text{ where } T_1 = 1, \ T_2 = 5, \ k \geq 1 \]

6.2

\[
\begin{array}{cccccc}
4 & 7 & 13 & 24 & 44 & \text{?} \\
2 + 1 & 2^2 + 2 & 2^3 + 3 & 2^4 + 4 & & \\
\end{array}
\]

The next term of the sequence is

\[ 44 + 2^5 + 5 = 81 \]

OR

\[
\begin{array}{cccccc}
4 & 7 & 13 & 24 & 44 & 79 \\
3 & 6 & 11 & 20 & 35 & \\
3 & 5 & 9 & 15 & 6 & \\
2 & 4 & & & & \\
\end{array}
\]

The next term of the sequence is 79.

Note:

This sequence can be represented by the following recursive formula:

\[ T_{n+1} = T_n + \frac{1}{3}n^3 - n^2 + \frac{11}{3}n \text{ where } T_1 = 4 \text{ and } n \geq 1 \]

\[ \text{(2, 6)} \]
**QUESTION 7**

7.1 Draw a point P on FG such that FP = LM and a point Q on FH such that FQ = LN.

In ∆FPQ and ∆LMN

1. \( \hat{F} = \hat{L} \) (given)
2. FP = LM (construction)
3. FQ = LN (construction)

\[ \therefore \triangle FPQ \cong \triangle LMN \text{ (SAS)} \]

\( \hat{F}PQ = \hat{L}MN \) (\( \cong \Delta s \))

But \( \hat{F}GH = \hat{L}MN \) (given)

\( \hat{F}PQ = \hat{F}GH \)

PQ || GH (corresponding angles =)

\[
\begin{align*}
\frac{FP}{FG} &= \frac{FQ}{FH} & \text{(PQ || GH ; Prop Th)} \\
\frac{LM}{FG} &= \frac{LN}{FH}
\end{align*}
\]

<table>
<thead>
<tr>
<th>Task</th>
<th>Marking Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot P on FG and Q on FH such that FP = LM and FQ = LN.</td>
<td>✓ construction</td>
</tr>
<tr>
<td>In ∆FPQ and ∆LMN</td>
<td>✓ All three statements must be given</td>
</tr>
<tr>
<td>1. ( \hat{F} = \hat{L} ) (given)</td>
<td>✓ ∆FPQ ( \cong ) ∆LMN (SAS)</td>
</tr>
<tr>
<td>2. FP = LM (construction)</td>
<td>✓ FPQ = L( \hat{M} )N</td>
</tr>
<tr>
<td>3. FQ = LN (construction)</td>
<td>✓ FPQ = F( \hat{G} )H</td>
</tr>
<tr>
<td>( \therefore \triangle FPQ \cong \triangle LMN \text{ (SAS)} )</td>
<td>✓ PQ</td>
</tr>
<tr>
<td>( \frac{FP}{FG} = \frac{FQ}{FH} )</td>
<td>✓ \frac{FP}{FG} = \frac{FQ}{FH}</td>
</tr>
</tbody>
</table>

**Note:** No construction constitutes a breakdown, hence no marks.
### 7.2

| VP  | VT   | (PT || RK; Prop Th) |
|-----|------|---------------------|
| PR  | TK   |                     |
| 2x - 10 | 4  |                     |
| 9  | 6   |                     |
| 2x - 10 = 6 |       |
| 2x = 16 |    |
| x = 8 |     |

**OR**

| VP  | VT   | (PT || RK; Prop Th) |
|-----|------|---------------------|
| VR  | VK   |                     |
| 2x - 10 | 4  |                     |
| 2x - 1 | 10  |
| 20x - 100 = 8x - 4 |  |
| 12x = 96 |    |
| x = 8 |     |

\[
(x + 2) (x + 10) = 0
\]

\[
x = 0, -10
\]

\[
(x - 1) (x + 2) = 0
\]

\[
x = 1, -2
\]
**QUESTION 8**

<table>
<thead>
<tr>
<th>8.1</th>
<th>... equal to the angle subtended by the chord in the alternate segment.</th>
<th>✓ answer (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2</td>
<td><img src="image" alt="Diagram" /></td>
<td>✓ a = 29°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ QÊPR = 34°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ ∠s in same seg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ c = 41°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ b = 76°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Œi = 76°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ d = 105°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ ext∠ cyclic quad (9)</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>✓ a = 29°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Œi = c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ c + 34° = 75°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ c = 41°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ b = 76°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ d = 105°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ a = 29°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Œi = c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ c + 34° = 75°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ tan ch. thm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ c = 41°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ b = 76°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ d = 105°</td>
</tr>
</tbody>
</table>

OR

An alternative solution for calculating d:

\( \hat{Q}_1 = \hat{RPT} = 76° \)  (∠s in same seg)

\[ d + R\hat{T}Q = P\hat{Q}T + Q\hat{P}R + R\hat{P}T \]  (ext∠ Δ)

\[ d + 34° = 29° + 34° + 76° \]

\[ d = 105° \]
### QUESTION 9

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **9.1** | AÔB = 2x  
∠circ centre = 2 ∠ circumference  
\( \hat{T} = 180^\circ - 2x \)  
(opp ∠ cyclic quad suppl) | ✓ AÔB = 2x  
✓ ∠circ centre = 2 ∠ circumference  
✓ opp ∠ cyclic quad suppl |
| **9.2** | CÂT = x  
(∠ sum Δ)  
\( \hat{K}_1 = x \)  
(ext ∠ cyclic quad)  
CÂT = \( \hat{K}_1 \)  
BK || AC  
(corresponding ∠s =)  

**OR**  
\( \hat{K}_1 = \hat{C} = x \)  
(ext ∠ cyclic quad)  
\( \hat{B}_4 = x \)  
(∠ sum Δ)  
\( \hat{B}_4 = \hat{C} = x \)  
BK || CA  
(corresponding ∠s =)  

**OR**  
CÂT = x  
(∠ sum Δ)  
BKA = 180° – x  
(opp ∠ cyclic quad)  
CÂT + BKA = 180°  
BK || AC  
(co-int ∠s supp) | ✓ CÂT = x  
✓ ∠ sum Δ  
✓ \( \hat{K}_1 = \hat{C} = x \)  
✓ ext ∠ cyclic quad  
✓ \( \hat{B}_4 = x \)  
✓ ∠ sum Δ  
✓ corresponding ∠s = |
|   |   |   |
| **(5)** |   |   |
|   |   |   |
### 9.3

<table>
<thead>
<tr>
<th>In $\triangle BKT$ and $\triangle CAT$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\hat{C}A\hat{T} = \hat{K}\hat{I}$  ($= x$)</td>
</tr>
<tr>
<td>2. $\hat{T}$ is common</td>
</tr>
<tr>
<td>3. $\hat{A}\hat{C}T = \hat{B}\hat{I}_1$ ($\angle \text{sum } \triangle$)</td>
</tr>
<tr>
<td>$\triangle BKT \parallel \triangle CAT$ ($\angle \angle \angle$)</td>
</tr>
</tbody>
</table>

- $\triangle C\hat{A}T = \triangle \hat{K}\hat{I}_1$
- $\hat{T}$ is common
- $\angle \angle \angle$

### 9.4

<table>
<thead>
<tr>
<th>$\frac{AC}{KB} = \frac{AT}{KT}$ ($\parallel \Delta s$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{AC}{KB} = \frac{7}{2}$</td>
</tr>
</tbody>
</table>

- $\frac{AC}{KB} = \frac{AT}{KT}$
- $\parallel \Delta s$
- Answer

---

[3] [14]
## QUESTION 10

![Diagram](image)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10.1</strong></td>
<td><strong>DC = 13x</strong></td>
<td>✓ <strong>CD = 13x</strong> <em>(1)</em></td>
</tr>
<tr>
<td><strong>10.2</strong></td>
<td><strong>OD = (\frac{13}{2}x)</strong></td>
<td>✓ <strong>OD = (\frac{13}{2}x)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>OM = (\frac{5}{2}x)</strong></td>
<td>✓ <strong>answer</strong> <em>(2)</em></td>
</tr>
<tr>
<td><strong>10.3</strong></td>
<td><strong>BO = OD</strong> (radii) <strong>AM = MB = 12 units</strong> <em>(line from circ cent (\perp)ch)</em></td>
<td>✓ <strong>MB = 12</strong></td>
</tr>
<tr>
<td></td>
<td><strong>[12^2 + \left(\frac{5}{2}x\right)^2 = \left(\frac{13}{2}x\right)^2]</strong> <em>(Pythagoras)</em></td>
<td>✓ <strong>12^2 + \left(\frac{5}{2}x\right)^2 = \left(\frac{13}{2}x\right)^2</strong></td>
</tr>
<tr>
<td></td>
<td><strong>or 12^2 + 6.25x^2 = 42.25x^2</strong></td>
<td>or <strong>12^2 + \frac{25}{4}x^2 = \frac{169}{4}x^2</strong></td>
</tr>
<tr>
<td></td>
<td><strong>or 12^2 + \frac{25}{4}x^2 = \frac{169}{4}x^2</strong></td>
<td>✓ <strong>answer</strong></td>
</tr>
<tr>
<td></td>
<td><strong>or 12^2 + \frac{25}{4}x^2 = \frac{169}{4}x^2</strong></td>
<td>✓ <strong>answer</strong> <em>(4)</em></td>
</tr>
<tr>
<td></td>
<td><strong>The radius = (\frac{13}{2})</strong> <em>(2)</em></td>
<td>✓ <strong>answer</strong></td>
</tr>
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<td></td>
<td><strong>= 13 units.</strong></td>
<td>✓ <strong>answer</strong> <em>(7)</em></td>
</tr>
</tbody>
</table>