



JOHANNESBURG EAST

CONTROLLED TEST

GRADE 11

TERM 3

MATHEMATICS

MARKS: 50

DURATION: 1 hour

Examiner: K.M

INSTRUCTIONS TO CANDIDATES:

- 1) This test consists of **4** questions.
- 2) Answer **ALL** questions on the writing material provided.
- 3) Clearly show **ALL** calculations, diagrams, graphs etcetera that you used to determine the answers.
- 4) Answers only will **NOT** necessarily be awarded full marks.
- 5) If necessary, round off answers to **TWO** decimal places, unless stated otherwise.
- 6) You may use an approved scientific calculator (non-programmable and non- graphical).
- 7) Write neatly and legibly.



QUESTION 1

The following were maximum daily temperatures (in °C) recorded by Weather Bureau in Gauteng in the month of August.

14	16	17	17	18	19
20	20	20	21	22	23
23	24	24	25	26	27
27	28	29	30	31	32
32	33	33	34	35	37

- 1.1. Calculate the mean temperature. (2)
- 1.2. Write down standard deviation. (1)
- 1.3. What is the percentage of daily temperatures which fall below first standard deviation? (2)
- 1.4. Use the diagram sheet to draw Box and Whiskers diagram. Draw the line below the box which illustrates the interquartile range. (4)
- 1.5. Tell whether there is outlier in the dataset. Use calculations to justify your answer. (3)

[12]

QUESTION 2

American tourists visited Waterfront in Cape Town. They booked accommodation in the hotels based on expensiveness and distance from Waterfront Beach. The frequency table below illustrates the distance from the hotels to the beach vs number of Tourists booked in various hotels.

Distances (in metres)	Frequency
$100 \leq d < 200$	4
$200 \leq d < 300$	7
$300 \leq d < 400$	9
$400 \leq d < 500$	12
$500 \leq d < 600$	15
$600 \leq d < 700$	11
$700 \leq d < 800$	8
$800 \leq d < 900$	5
$900 \leq d < 1000$	3

- 2.1 Complete the cumulative frequency table on the attached diagram sheet. (2)
- 2.2 Use the diagram sheet attached to draw cumulative frequency graph (Ogive) for the data. (3)
- 2.3 Use the ogive to estimate the mean distance. (1)
- 2.4 Calculate the estimate mean distance of the data. (2)

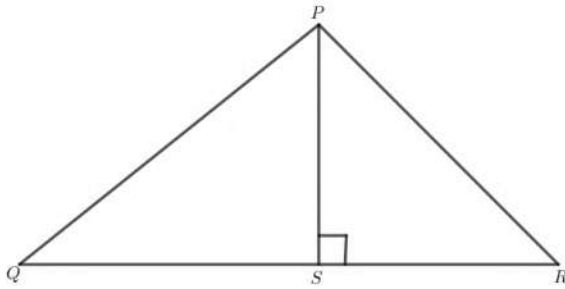
2.5 Comment on the skewness of the data.

(2)

[10]

QUESTION 3

3.1 In $\triangle PQR$, $PS \perp QR$.



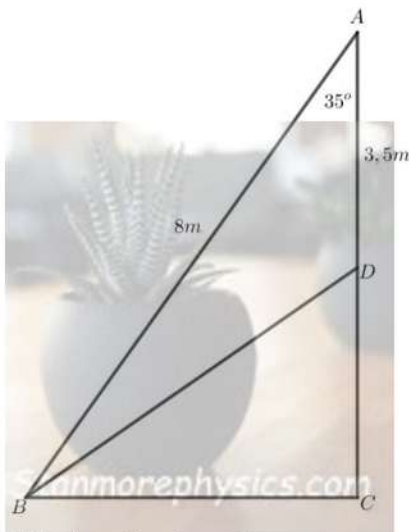
3.1.1 Express SR in terms of p .

(1)

3.1.2 Hence or otherwise, prove that $q^2 = p^2 + r^2 - 2pr \cos Q$.

(4)

3.2 In the figure below, AC and BC are vertical and horizontal lines respectively. $AB = 8m$, $\hat{BAD} = 35^\circ$ and $AD = 3,5m$



Calculate the size of:

3.2.1 BD

(3)

3.2.2 $\hat{ABD}$

(3)

3.2.3 Area of $\triangle ABD$

(2)

3.2.4 BC

(3)

[16]

QUESTION 4

4.1 Out of 35 soccer fans in the bus, the following English premierships football clubs were chosen as favourite clubs.

- 6 chose Brighton (B), but not Chelsea(C) and not Arsenal (A).
- 12 chose Chelsea.
- 15 chose Arsenal.
- 3 chose Brighton and Chelsea but not Arsenal.
- 5 chose Chelsea and Arsenal.
- 7 chose Brighton and Arsenal.
- 7 chose none of the three clubs.
- x passengers chose all the three clubs.

4.1.1 Draw a Venn diagram to illustrate the above information. (4)

4.1.2 How many fans chose the three teams as their favourites? (4)

4.1.3 Calculate the probability that fans chose exactly 2 clubs as their favourite. (1)

4.2 Grade 12 learners of JHB School are as follows in terms of gender and race.

Gender	African	Indian	Coloured	Total
Boy	26	22	48	96
Girl	14	18	32	64
Total	40	40	80	160

4.2.1 If the learner is chosen randomly, tell whether being a girl in this grade 12 class is independent from being a coloured. Justify your answer with calculations. (3)

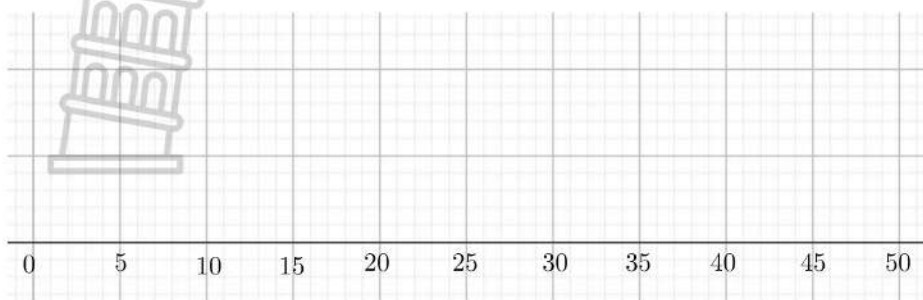
[12]

Total = 50 marks

Diagram Sheet

Learner's Name: _____

1.4



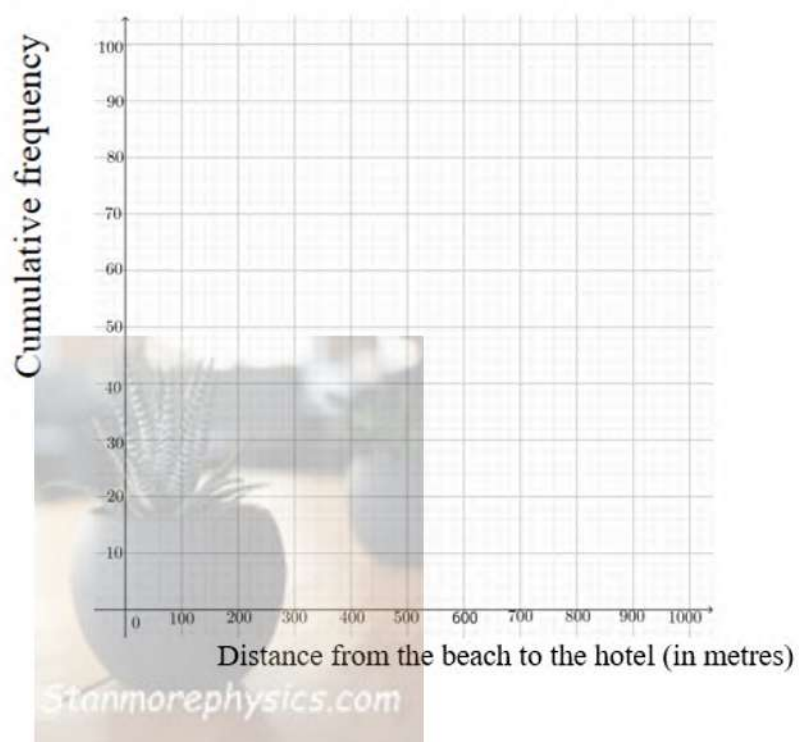
2.1

Distances (in metres)	Frequency	Cumulative frequency
$100 \leq d < 200$	4	
$200 \leq d < 300$	7	
$300 \leq d < 400$	9	
$400 \leq d < 500$	12	
$500 \leq d < 600$	15	
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2.2

Cumulative Frequency graph (Ogive)





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GRADE 11

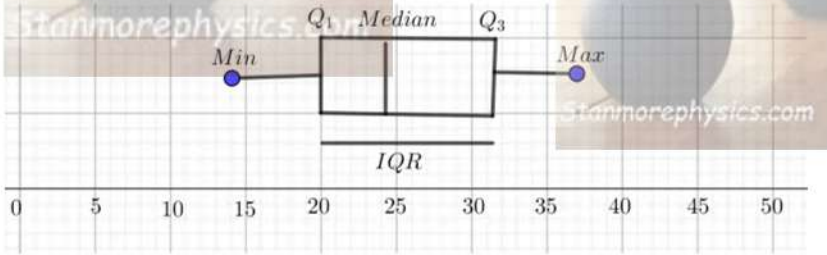
TERM 3

MATHEMATICS

MARKING GUIDELINES

Examiner: K.M

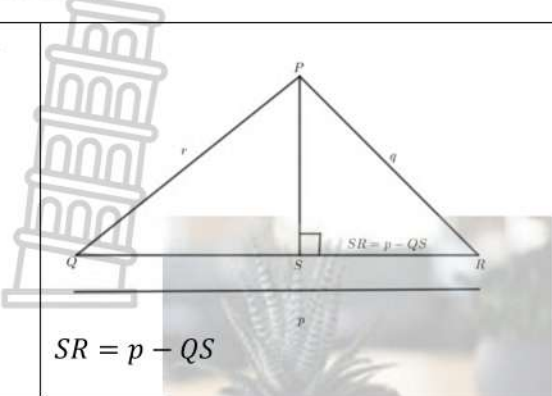
QUESTION 1

1.1.	$\bar{x} = \frac{757}{30}$ $= 25.23$	✓ 757 ✓ 25.23 Answer only: $\frac{2}{2}$	(2)
1.2	$\sigma = 6.24$	✓ Answer	(1)
1.3	$\text{Lower limit} = 25.23 - 6.24 = 18.99$ $\frac{5}{30} \times 100 = 16,67\%$	✓ Lower limit ✓ Answer	(2)
1.4	$\text{Min} = 14$ $\text{Position of } Q_1 = \frac{30 + 1}{4} = 7,75 \therefore Q_1 = \frac{20 + 20}{2} = 20$ $\text{Position of Median} = \frac{30 + 1}{2} = 15,5 \therefore \text{Median} = \frac{24 + 25}{2} = 24.5$ $\text{Position of } Q_3 = \frac{3(30 + 1)}{4} = 23,25 \therefore Q_3 = \frac{31 + 32}{2} = 31.5$ $\text{Max} = 37$ 	✓ Min and Max ✓ Q_1 , Q_2 and Q_3 ✓ Diagram ✓ IQR line	(4)
1.5	$IQR = 31.5 - 20 = 11.5$ $\text{Lower fence} = 20 - 1.5 \times 11.5 = 2.75$ $\text{Upper fence} = 31.5 + 1.5 \times 11.5 = 48.25$ No outlier. None of the daily maximum temperatures falls outside the fences	✓ IQR ✓ Fences ✓ No outlier	(3)
			[12]

QUESTION 2

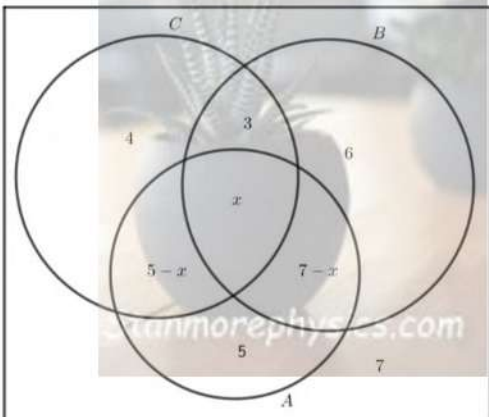
2.1	<table><thead><tr><th>Distances (in metres)</th><th>Frequency</th><th>Cumulative frequency</th></tr></thead><tbody><tr><td>$100 \leq d < 200$</td><td>4</td><td>4</td></tr><tr><td>$200 \leq d < 300$</td><td>7</td><td>11</td></tr><tr><td>$300 \leq d < 400$</td><td>9</td><td>20</td></tr><tr><td>$400 \leq d < 500$</td><td>12</td><td>32</td></tr><tr><td>$500 \leq d < 600$</td><td>15</td><td>47</td></tr><tr><td>$600 \leq d < 700$</td><td>11</td><td>58</td></tr><tr><td>$700 \leq d < 800$</td><td>8</td><td>66</td></tr><tr><td>$800 \leq d < 900$</td><td>5</td><td>71</td></tr><tr><td>$900 \leq d < 1000$</td><td>3</td><td>74</td></tr></tbody></table>	Distances (in metres)	Frequency	Cumulative frequency	$100 \leq d < 200$	4	4	$200 \leq d < 300$	7	11	$300 \leq d < 400$	9	20	$400 \leq d < 500$	12	32	$500 \leq d < 600$	15	47	$600 \leq d < 700$	11	58	$700 \leq d < 800$	8	66	$800 \leq d < 900$	5	71	$900 \leq d < 1000$	3	74	✓ 1st 5 cumulative frequencies ✓ last 4 cumulative frequencies	(2)
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2.2	Cumulative Frequency graph (Ogive) ✓ grounded at 100 ✓ plots 200 – 100 correct ✓ Shape	(3)																															
2.3	540m	✓ Answer Accept: 530 – 550	(1)																														
2.4	$\bar{x} = \frac{(150 \times 4) + (250 \times 7) + \dots + (850 \times 5) + (950 \times 3)}{74}$ $= \frac{39400}{74}$ $= 532.43$	✓ $(150 \times 4) + \dots + (950 \times 3) / 39400$ ✓ Answer Answer only: Full marks	(2)																														
2.5	Skewed to the left / Negatively skewed. <i>Mean < median</i>	✓ Skewness ✓ Reason	(2)																														
			[10]																														

QUESTION 3

3.1.1	 $SR = p - QS$	✓ $SR = p - QS$	(1)
3.1.2	$q^2 = PS^2 + SR^2$ $q^2 = PS^2 + (p - QS)^2$ $= PS^2 + p^2 - 2pQS + QS^2$ But $PS^2 + QS^2 = r^2$ $\therefore q^2 = p^2 + r^2 - 2pQS$ $\cos Q = \frac{QS}{r}$ $QS = r \cos Q$ $\therefore q^2 = p^2 + r^2 - 2pr \cos Q$	✓ $q^2 = PS^2 + SR^2$ ✓ Subst. $p - QS$ ✓ $PS^2 + QS^2 = r^2$ ✓ $QS = r \cos Q$	(4)
3.2.1	$a^2 = b^2 + d^2 - 2bd \cos A$ $BD^2 = 3,5^2 + (8)^2 - 2(3,5)(8) \cos 35^\circ$ $BD = \sqrt{3,5^2 + (8)^2 - 2(3,5)(8) \cos 35^\circ}$ $= 5,51 \text{ m}$	✓ cosine rule ✓ Correct subst. ✓ Answer	(3)
3.2.2	$\frac{\sin \hat{A}BD}{b} = \frac{\sin \hat{B}AD}{a}$ $\frac{\sin \hat{A}BD}{3,5} = \frac{\sin 35^\circ}{5,51}$ $\sin \hat{A}BD = \frac{3,5 \times \sin 35^\circ}{5,51}$ $\hat{A}BD = 21,37^\circ$	✓ sine rule ✓ Correct subst. ✓ Answer	(3)
3.2.3	Option 1 Area $\triangle ABD = \frac{1}{2} b d \sin A$ $= \frac{1}{2} (3,5)(8) \sin 35^\circ$	✓ subst. into area rule ✓ Answer	

	$= 8,03\text{m}^2$ Option 2 $\text{Area } \triangle ABD = \frac{1}{2}bd\sin A$ $= \frac{1}{2}(5.51)(8)\sin 21.37^\circ$ $= 8,03\text{m}^2$		(2)
3.2.4	Option 1 $\widehat{CBD} + 35^\circ + 21.37^\circ + 90^\circ = 180^\circ$ sum of $\angle$'s of a $\triangle$ $\widehat{CBD} = 33.63^\circ$ $\cos \widehat{CBD} = \frac{BC}{BD}$ $\cos 33.63^\circ = \frac{BC}{5.51}$ $BC = 5.51 \times \cos 33.63^\circ = 4.59\text{m}$ Option 2 $\widehat{BDC} = 35^\circ + 21.37^\circ$ Ext $\angle$ of a $\triangle$ $\widehat{BDC} = 56.37^\circ$ $\sin \widehat{CBD} = \frac{BC}{BD}$ $\sin 56.37^\circ = \frac{BC}{5.51}$ $BC = 5.51 \times \sin 56.37^\circ = 4.59\text{m}$	Option 1 $\checkmark \widehat{CBD}$ $\checkmark$ Subst. into trig ratio $\checkmark BC = 4.59\text{m}$ Option 2 $\checkmark \widehat{BDC}$ $\checkmark$ Subst. into trig ratio $\checkmark BC = 4.59\text{m}$	(3)
			[16]

QUESTION 4

4.1.1		$\checkmark 4, 3, 6$ and x $\checkmark x, 5 - x,$ and $7 - x$ $\checkmark 5$ and 7 $\checkmark$ Venn diagram	(4)
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4.1.2	$4 + 3 + 6 + x + 5 - x + 7 - x + 5 + 7 = 35$ $-x = -2$ $x = 2$ This means 2 fans chose all the three clubs as their favourite clubs.		(4)
4.1.3	$P(2 \text{ clubs}) = \frac{3 + 3 + 5}{35} = \frac{11}{35} \text{ or } 0.31$	Answer	(1)
4.2	$P(\text{Coloured Girl}) = \frac{32}{160} = \frac{1}{5}$ $P(\text{Girl}) \times P(\text{coloured}) = \frac{64}{160} \times \frac{80}{160} = \frac{1}{5}$ They are independent $P(\text{Coloured Girl}) = P(\text{Girl}) \times P(\text{coloured})$	✓ P(Coloured Girl) ✓ P(Girl) × P(coloured) ✓ Conclusion If the learners just said independent / not independent without justification. 0/3	(3)
			[12]
		Total = 50 marks	

