education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P2

NOVEMBER 2009(1)

MEMORANDUM

MARKS: 150

This memorandum consists of 25 pages.

- Consistent Accuracy will apply as a general rule.
- If a candidate does a question twice and does not delete either, mark the FIRST attempt.
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QUESTION 1

1.1	Mean = $\frac{522,5}{12} = 43,5$ **ANSWER ONLY:** Full marks	✓ 522,5 ✓ answer (2) No penalty for Rounding: Accept 43,54 ; 44
1.2	Ordered Data 9,3 14,9 15 23,6 26,1 28 32,5 60,9 65,7 71,9 76,4 98,2 Median = $\frac{28+32,5}{2} = 30,3$ Lower quartile = $\frac{15+23,6}{2} = 19,3$ Upper quartile = $\frac{65,7+71,9}{2} = 68,8$ The five number summary is (9,3 ; 19,3 ; 30,25 ; 68,8 ; 98,2) OR If they use the formula: Ordered Data 9,3 14,9 15 23,6 26,1 28 32,5 60,9 65,7 71,9 76,4 98,2 Position of median: $P_{50} = \frac{12+1}{2} = 6,5$ $\therefore Q_2 = \frac{28+32,5}{2} = 30,3$ Position of lower quartile: $P_{25} = \frac{13}{4}$ $\therefore Q_1 = 15 + (0,25(23,6-15)) = 17.15$ Position of upper quartile: $P_{75} = 0,75(13) = 9,75$ $\therefore Q_3 = 65,7 + (0,75(71,9-65,7)) = 70,35$ Min = 9,3 Max = 98,2 Accept any one of these five number summaries: (9,3 ; 19,3 ; 30,3 ; 68,8 ; 98,2) (9,3 ; 15 ; 30,3 ; 71,9 ; 98,2) (9,3 ; 17,2 ; 30,3 ; 70,4 ; 98,2)	✓ 9,3 ✓ 19,3 ✓ 30,3 ✓ 68,8 ✓ 98,2 (5) If indicated on the box and whisker diagram in 1.3 – 5 marks

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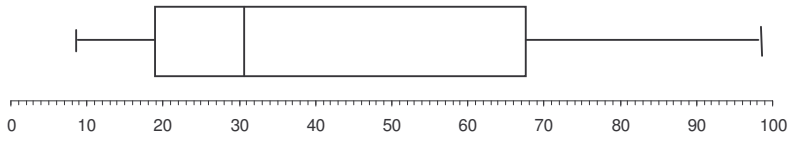
1.3



Note:
If just a box and whisker without any reference to the numbers: 1/3

✓ minimum and maximum values
✓ quartiles and median
✓ whiskers with median line
(3)

1.4

The data is skewed to the right (positively skewed).
This suggests that there was a large difference between the median and the maximum rainfall (some months had exceptionally high rainfall in that year).

Die data is skeef na regs (positief skeef)
Dit dui daarop dat daar 'n groot verskil is tussen die mediaan en die maksimum reënval (sommige maande het ongewoon hoë reënval gehad gedurende die jaar.

✓ ✓ comment about rainfall.
(2)
Note:
Skewed to right 1/2

✓ ✓ verwysing na reënval
(2)

1.5

By using the calculator, $\sigma = 28{,}19$. (28,19058256)

OR Pen and Paper method (not recommended)
Mean = 43,54 (43,54166667)

x	$x-\bar{x}$	$(x-\bar{x})^2$
60,9	17,36	301,3696
14,9	-28,64	820,2496
9,3	-34,24	1172,378
28,0	-15,54	241,4916
71,9	28,36	804,2896
76,4	32,86	1079,78
98,2	54,66	2987,716
65,7	22,16	491,0656
26,1	-17,44	304,1536
32,5	-11,04	121,8816
23,6	-19,94	397,6036
15,0	-28,54	814,5316
Sum		9536,509

$\sigma = \sqrt{\frac{9536{,}509}{12}} = 28{,}19$ (28,19059…..)

✓✓✓answer
Accept: 28 ; 28,2 ; 28,1
(3)

✓headings correct
✓sum of the squares of the mean deviations

✓ answer
(3)
[15]

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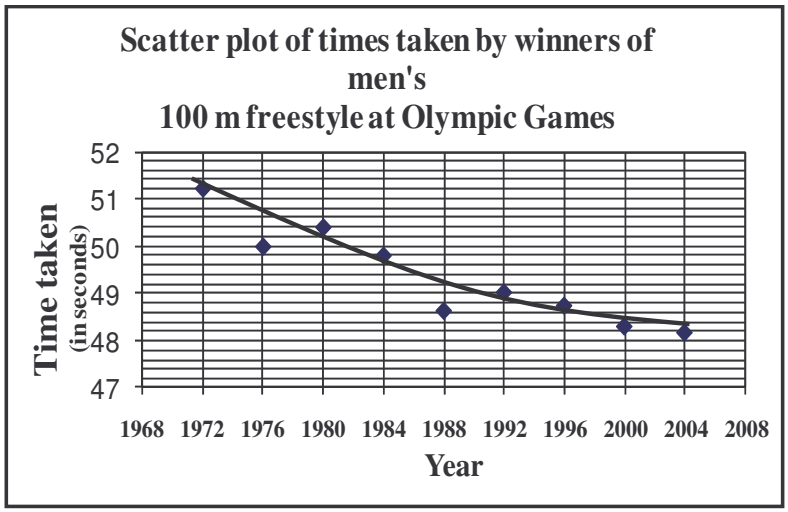
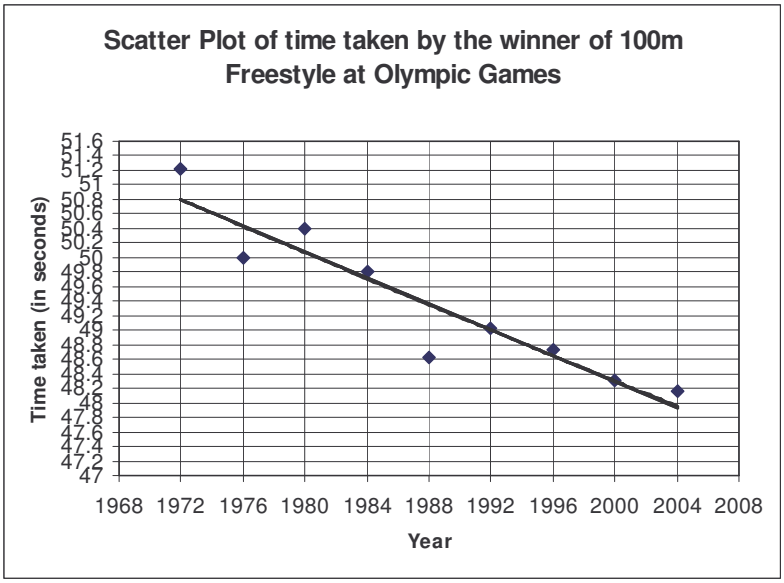
QUESTION 2

2.1	Linear or Exponential	✓ answer (1)
2.2	  For this set of data we will accept the straight line.	✓ ✓line of best fit (2)

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2.3	The scatter plot shows an overall decrease in the time taken by the winner since 1972. *Die spreidiagram dui 'n algehele afname in tye aangeteken deur die wenners vanaf 1972.* OR Times are faster. *Tye is vinniger.* OR Negative correlation between year and time. *Negatiewe korrelasie tussen jaar en tyd.*	✓ decrease/afname (1)
2.4	The top athletes of the world have turned professional. This allows them to train at the best facilities and receive the best coaching available. Also, equipment manufacturers are in competition with each other. In this case, manufacturers are designing swimsuits that assist swimmers Swimmers train harder and put in more effort. *Die top atlete van die wêreld het professionele atlete geword. Dit laat hulle toe om by die beste fasiliteite te oefen en die beste afrigting te ontvang.* *Vervaardigers van voorraad is in kompetisie met mekaar. Hul onwerp dus swembroeke wat die swemmers help.* *Swemmers oefen harder en gebruik meer tyd om te oefen.*	✓ any acceptable reason relating to the trend (1) ✓ *enige aanvaarbare rede wat verband hou met die neiging.* (1)
2.5	In the context of the times around these two observations, one can consider the efforts of 1976 and 1988 to be outliers. This shows that these athletes were exceptionally good swimmers at the time. *Binne die konteks van tye gedurende hierdie twee waarnemings, kan die poging van 1976 and 1988 gesien word as uitskieters. Dit dui daarop dat hierdie atlete uitstekende swemmers was daardie tyd.*	✓✓acceptable reason in context (2) ✓✓aanvaarbare rede binne die konteks (2)
2.6	Winning time of 2008 is expected to be about 47,6 seconds. Accept answer from candidate's graph.	✓answer from graph (1) **[8]**

QUESTION 3

3.1	50	✓ answer (1)
3.2	Cut–off mark of 56% (37 students)or 58% (38 students) Accept interval: 55% - 60%	✓ answer read off from ogive (1)

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3.3	<table><tr><th>Marks (out of 100)</th><th>Frequency (f)</th></tr><tr><td>$0 \le$ marks <10</td><td>1</td></tr><tr><td>$10 \le$ marks <20</td><td>3</td></tr><tr><td>$20 \le$ marks <30</td><td>4</td></tr><tr><td>$30 \le$ marks <40</td><td>11</td></tr><tr><td>$40 \le$ marks <50</td><td>12</td></tr><tr><td>$50 \le$ marks <60</td><td>9</td></tr><tr><td>$60 \le$ marks <70</td><td>5</td></tr><tr><td>$70 \le$ marks <80</td><td>4</td></tr><tr><td>$80 \le$ marks <90</td><td>1</td></tr><tr><td>$90 \le$ marks <100</td><td>0</td></tr></table>	✓ class intervals Accept 0 – 10 ; 10 – 20 Or $0 <$ marks ≤ 10 Or Between 0 and 10 Or From 0 to 10 If the intervals not in tens, the mark for intervals not given ✓method ✓ accuracy of five answers (3) **[5]**

QUESTION 4

4.1	$\tan 45° = m_{AB}$ $= 1$ OR $m_{AB} = \frac{3-0}{1-t} = \frac{3}{1-t}$	✓ $\tan 45°$ ✓ answer (2) Answer only: full marks
4.2	$\frac{3-0}{1-t} = \tan 45° = 1$ $1-t = 3$ $t = -2$ OR $y = mx + c$ $3 = (1)(1) + c$ $c = 2$ $y = x + 2$ $(t;0)$ in $y = mx + 2$ $0 = t + 2$ $t = -2$	✓equating ✓value (2) ✓c=2 ✓value (2) Answer only: full marks

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4.3	$\sqrt{(1-p)^2+(3+4)^2}=\sqrt{50}$ $(1-p)^2+(3+4)^2=50$ $1-2p+p^2+49=50$ $p^2-2p=0$ $p(p-2)=0$ $p\neq 0$ or p = 2 OR $(1-p)^2+(3+4)^2=50$ $(1-p)^2=50-49$ $(1-p)^2=1$ $1-p=1$ or $1-p=-1$ $p\neq 0$ $p=2$ OR *Let* $p=2$ $AC=\sqrt{(1-2)^2+(3+4)^2}$ $=\sqrt{1+49}$ $=\sqrt{50}$ which is true $\therefore p=2$	✓ substitution into distance formula ✓ expansion ✓factors ✓answer Note: If an answer was not chosen: 3/4 (4) ✓ substitution into distance formula ✓ expansion ✓factors ✓answer (4) If gradient of BC assumed as -1 and p calculated correctly: 0/4 Answer only: 1/4 ✓ substitution into distance formula ✓ $\sqrt{50}$ ✓which is true(justification) ✓answer (4) If equating to $\sqrt{50}$ from the start, then 3/4
4.4	midpoint of BC $=\left(\frac{-2+2}{2};\frac{0-4}{2}\right)$ midpoint of BC $=(0;-2)$	✓ x-value ($x=\frac{t+p}{2}$) ✓y-value (2)
4.5	Gradient of line = $m_{AB}=1$ Equation of line is: $y+4=1(x-2)$ $y=x-6$ OR $y=mx+c$ $y=x-p-4$	✓ gradients are equal ✓substitution of (p;-4) ✓equation in any form (3) **[13]**