basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P3

FEBRUARY/MARCH 2013

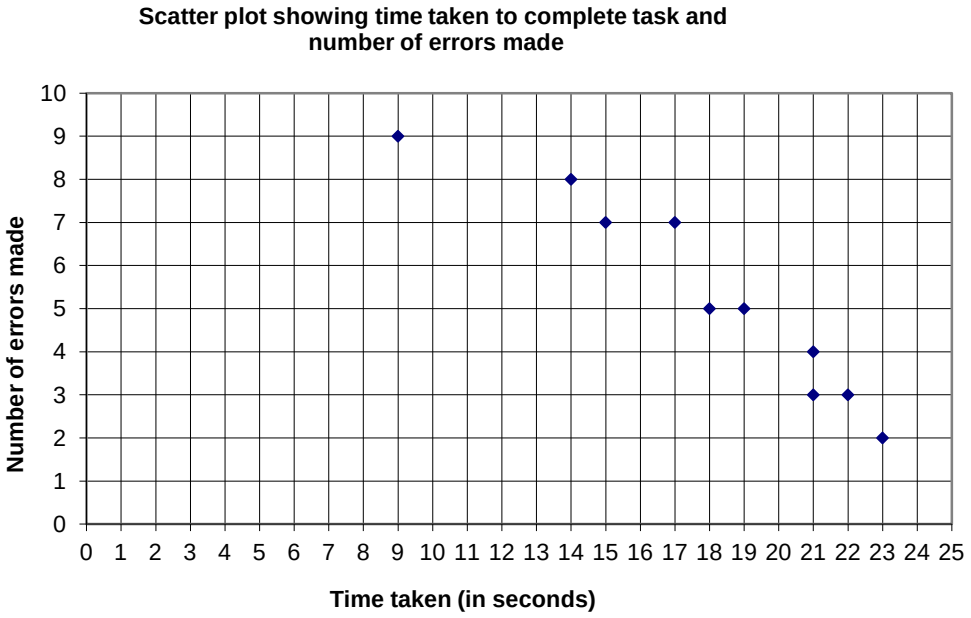
MEMORANDUM

MARKS: 100

This memorandum consists of 11 pages.

QUESTION 1

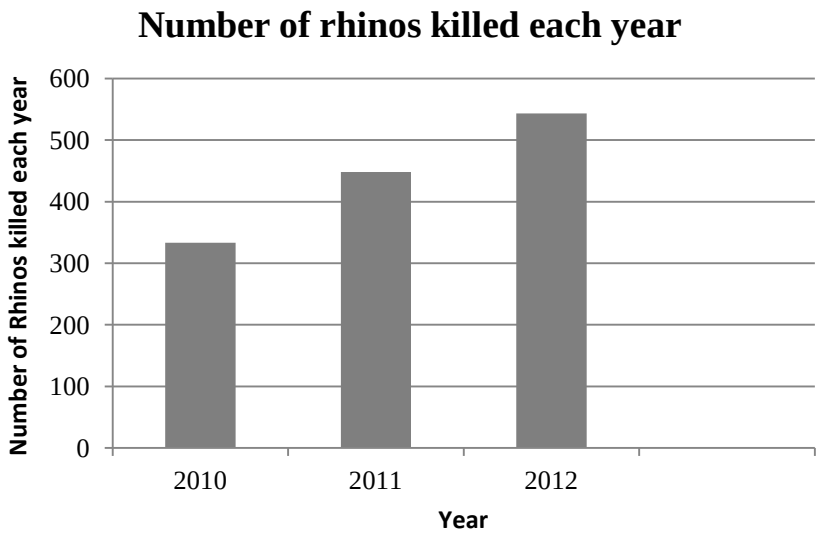
Time taken to complete task (in seconds)	23	21	19	9	15	22	17	14	21	18
Number of errors made	2	4	5	9	7	3	7	8	3	5

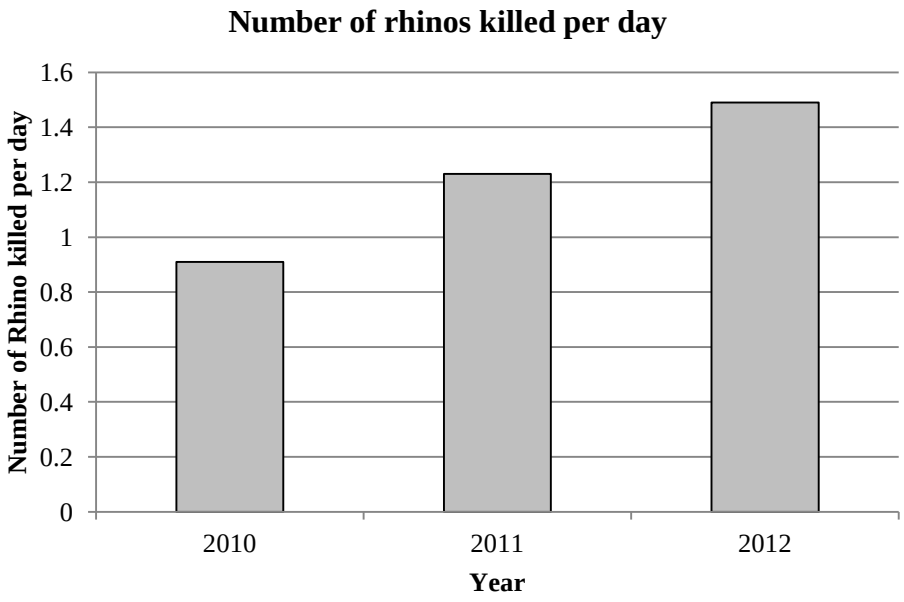


1.1	See scatter plot above.	✓✓✓ all 10 points plotted correctly. 2 marks if 5–9 points are plotted correctly. 1 mark if 1–4 points are plotted correctly. (3)
1.2	When more time is taken to complete the task, the learners make fewer errors. **OR** When less time is taken to complete the task, the learners make more errors.	✓ explanation (1)
1.3	$a = 14{,}71$ (14,705811...) $b = -0{,}53$ (– 0,525464...) $\hat{y} = 14{,}71 - 0{,}53x$	✓✓ a ✓ b ✓ equation (4)
1.4	$r = -0{,}96$ (–0,959074...)	✓✓ answer (2)

1.5	$\hat{y} \approx 14{,}71 - 0{,}53(13)$ $\approx 7{,}82$ ≈ 8	✓ substitution ✓ answer (2)
1.6	There is a strong negative relationship between the variables.	✓ strong negative (1) **[13]**

QUESTION 2

2.1	The bar graph shows a significant decrease in the number of rhino killed in 2012. This creates the impression that there is no crisis in the number of rhino killed by poachers. Instead, it suggests that the problem is under control.	✓ no crisis (1)
2.2	The first two bars show the number of rhino killed in a full year. The bar for 2012 reflects the number of rhino killed in the first 113 days of the year. Therefore, this graph cannot be used to make a comparison of the number of rhinos killed each year.	✓ 2012 bar is not for a full year (1)
2.3.1	You can use the existing figures for 2012 to project the total number of rhinos that will be killed in 2012. If the rate at which rhinos are killed remains constant for the year, then $\frac{168}{113} \times 365 = 543$ rhino will be killed in 2012. **OR** You can calculate the number killed per day and represent this information on a graph.	✓ project total number for the year (1)
2.3.2	 **OR**	✓ correct scaling of *y*-axis ✓ correct height of bars (2)



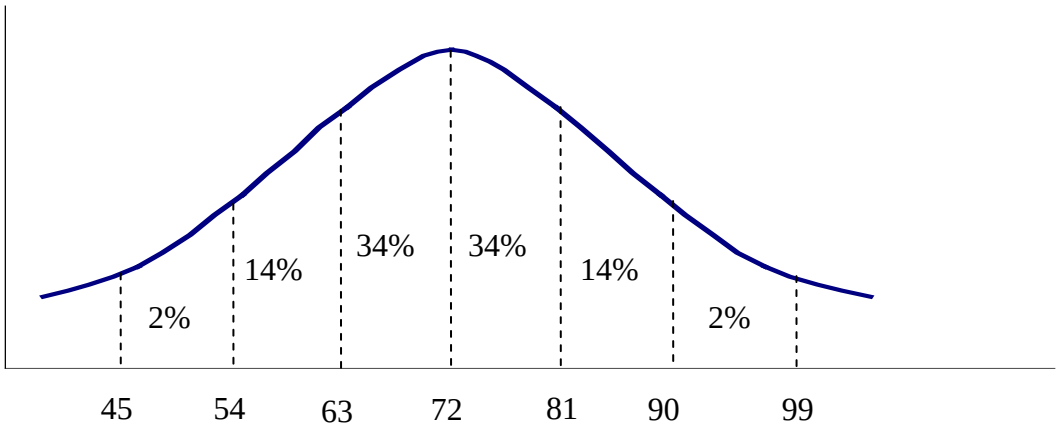
✓ correct scaling of *y*-axis

✓ correct height of bars

(2)
[5]

QUESTION 3

3.1	Let the number of learners who were first measured be x. The total measure of all heights is $1,6x$. Let the height of the last learner be y. $\frac{1,6x+1,45+1,63+y}{x+3}=1,6$ $1,6x+3,08+y=1,6x+4,8$ $y=1,72$ **OR** Since the mean does not change $\frac{y+1,45+1,63}{3}=1,6$ $y=1,72$	✓ $1,6x$ ✓equation ✓ 1,72 (3) ✓✓equation ✓ 1,72 (3)



3.2.1	$90 = 72 + 2(9)$ $\therefore$ 90 lies at 2 standard deviations to the right of the mean. $\Rightarrow$ 48% of the students scored between 72 and 90 marks.	✓2 sd from mean ✓48% (2)
3.2.2	$45 = 72 - 3(9)$ $\therefore$ 45 lies at 3 standard deviations to the left of the mean. $63 = 72 - 9$ $\therefore$ 63 lies at 1 standard deviation to the left of the mean. The area between 1 sd and 3 sd is approximately 16%. $\therefore$ 16% of 184 = approximately 29 students scored between 45 and 63 marks.	✓calculating the number of sds from mean ✓16% ✓29 (3) **[8]**

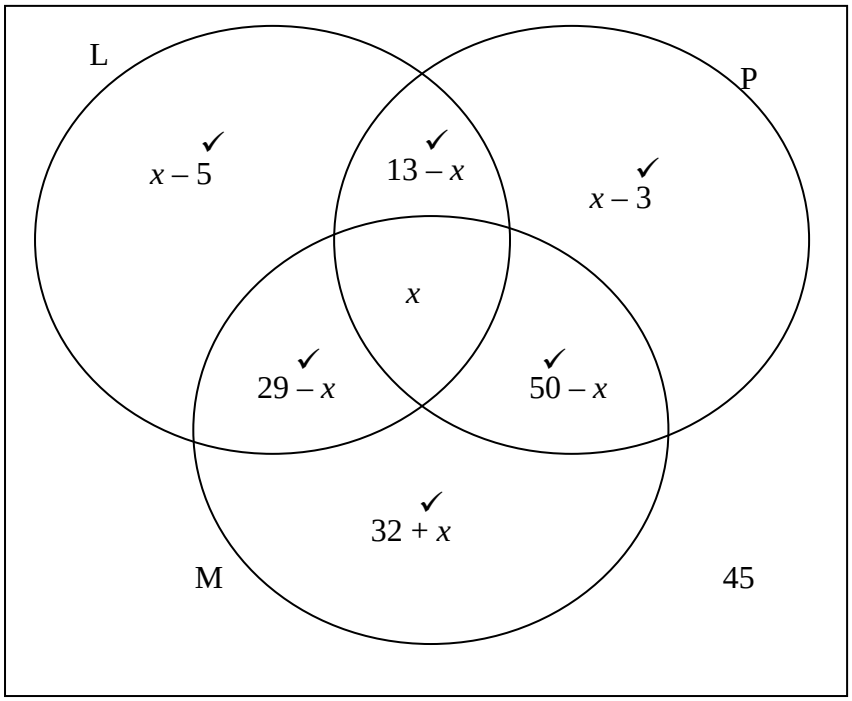
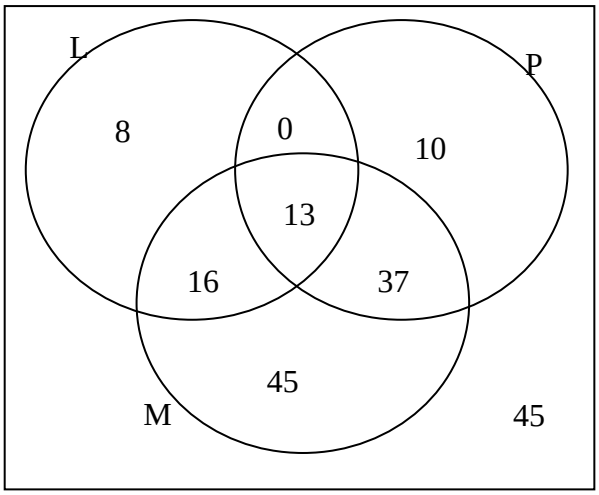
QUESTION 4

4.1	Since A and C are mutually exclusive, there is no intersection of A and C ∴ P(A and C) = 0.	✓✓0 (2)
4.2	Since B and C are independent, P(B and C) = P(B).P(C). P(B and C) = (0,4)(0,2) = 0,08	✓ P(B and C) = P(B).P(C). ✓0,08 (2)
4.3	Since A and B are independent, P(A and B) = P(A).P(B). P(A and B) = (0,3)(0,4) = 0,12 P(A or B) = P(A) + P(B) – P(A and B) = 0,3 + 0,4 – 0,12 = 0,58	✓0,12 ✓formula ✓substitution ✓0,58 (4) **[8]**

QUESTION 5

5.1	Number of arrangements = 7! = 5040	✓7 ✓7! (2)
5.2	Number of arrangements = 5! = 120	✓5 ✓5! (2)
5.3	Number of arrangements = 3! × 5! = 720	✓ 3! ✓ 5! ✓ answer (3) **[7]**

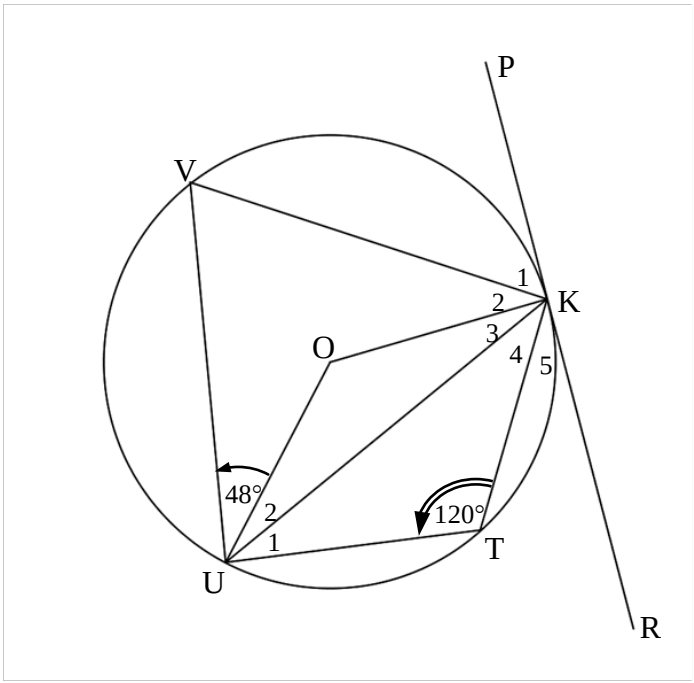
QUESTION 6

6.1		✓ $x-5$ ✓ $13-x$ ✓ $x-3$ ✓ $29-x$ ✓ $50-x$ ✓ $32+x$ (6)
6.2	$x-5+13-x+x-3+x+29-x+50-x+32+x+45=174$ $x+161=174$ $x=13$	✓addition ✓ 174 ✓ simplification (3)
		
6.3.1	P(M and P not L) = $\frac{37}{174}=0,21$ (0,21264...)	✓37 ✓ 174 (2)
6.3.2	P(only M or P or L) = $\frac{8+10+45}{174}=\frac{21}{58}=0,36$	✓8 + 10 + 45 ✓ answer (2) **[13]**

QUESTION 7

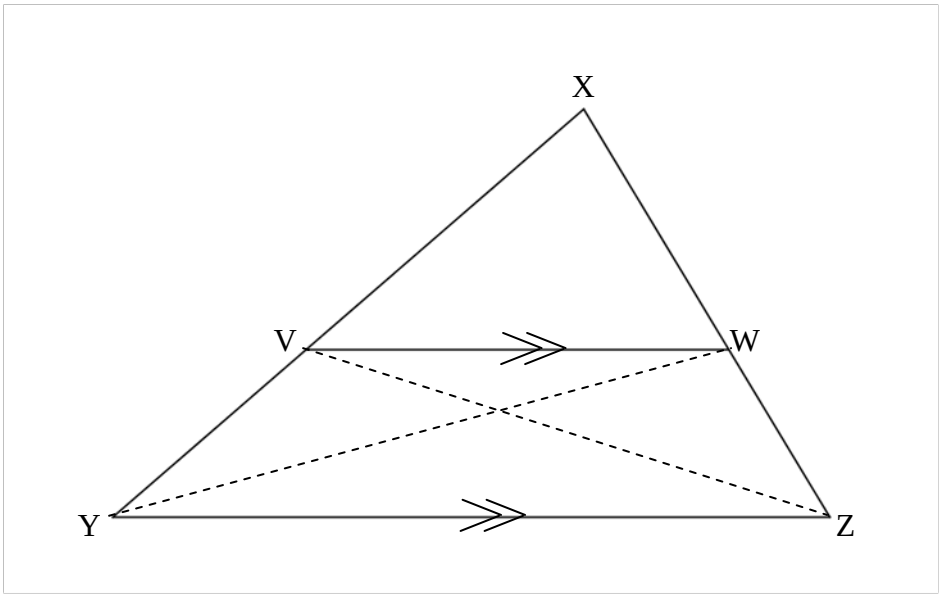
	$T_1 = -1$; $T_2 = 5$.	
	$T_3 = T_1 + 3T_2 - 4 = -1 + 3(5) - 4 = 10$	✓ substitution ✓ 10
	$T_4 = T_2 + 3T_3 - 4 = 5 + 3(10) - 4 = 31$	✓ 31
	$T_5 = T_3 + 3T_4 - 4 = 10 + 3(31) - 4 = 99$	✓ 99 **[4]**

QUESTION 8

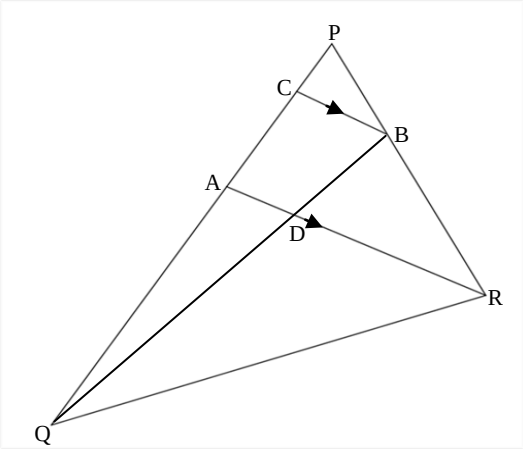


8.1	$\hat{V} = 180° - 120° = 60°$ [Opp angles of cyclic quad are supp]	✓60° ✓ reason (2)
8.2	$K\hat{O}U = 2(60°) = 120°$ [Angle at centre = twice angle at circum.]	✓120° ✓ reason (2)
8.3	$\hat{U}_2 = \frac{180° - 120°}{2} = 30°$ [Base angles of isosceles ΔUOS; OU = OK = radii]	✓30° ✓ reason (2)
8.4	$\hat{K}_1 = 48° + 30° = 78°$ [tan-chord theorem]	✓78° ✓ reason (2)
8.5	$\hat{K}_2 = 90° - 78° = 12°$ [tan ⊥ radius]	✓12° ✓ reason (2) **[10]**

QUESTION 9

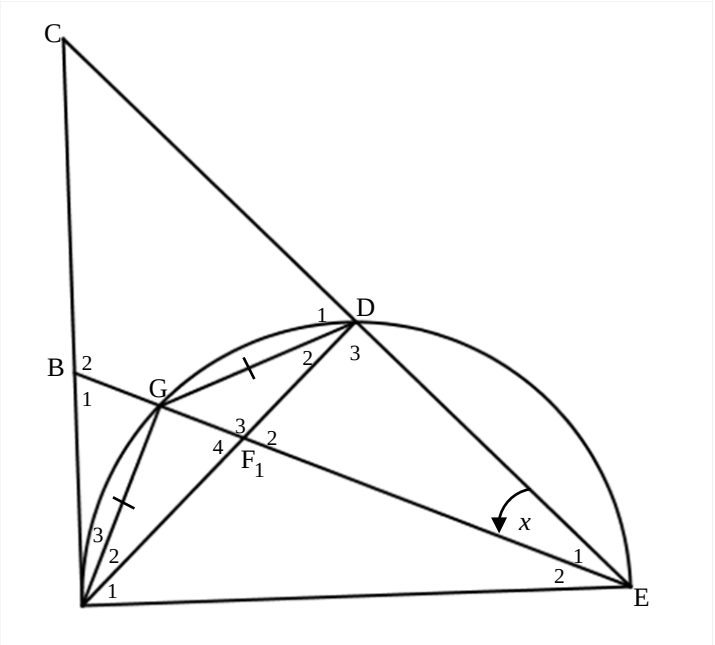


9.1	Construct VZ and WY $\frac{\text{area } \Delta XVW}{\text{area } \Delta VWY} = \frac{XV}{VY}$ (equal altitudes) $\frac{\text{area } \Delta XVW}{\text{area } \Delta WVZ} = \frac{XW}{WZ}$ (equal altitudes) area ΔYVW = area ΔVWZ (VW ‖ YZ) area ΔXVW is common $\frac{XW}{WZ} = \frac{XV}{VY}$	✓ construction ✓ $\frac{\text{area } \Delta XVW}{\text{area } \Delta VWY} = \frac{XV}{VY}$ ✓ $\frac{\text{area } \Delta XVW}{\text{area } \Delta WVZ} = \frac{XW}{WZ}$ ✓ area ΔYVW = area ΔVWZ ✓ VW ‖ YZ ✓ conclusion (6)



9.2.1	$\frac{\text{area } \Delta PRA}{\text{area } \Delta QRA} = \frac{PA}{QA}$ (equal altitudes) $\frac{\text{area } \Delta PRA}{\text{area } \Delta QRA} = \frac{3}{5}$	✓ $\frac{\text{area } \Delta PRA}{\text{area } \Delta QRA} = \frac{PA}{QA}$ ✓ answer (2)
9.2.2	$\frac{BD}{DQ} = \frac{CA}{AQ}$ (AR ∥ CB) $\frac{PC}{CA} = \frac{1}{2}$ (AR ∥ CB) PC = y units CA = $2y$ units CQ = $5y$ units $\frac{BD}{BQ} = \frac{2}{7}$	✓ $\frac{BD}{DQ} = \frac{CA}{AQ}$ ✓ reason ✓ $\frac{PC}{CA} = \frac{1}{2}$ ✓ CQ = $5y$ units ✓ $\frac{BD}{BQ} = \frac{2}{5}$ (5) **[13]**

QUESTION 10



10.1	$\hat{A}_2 = x$ (∠s in same seg) $\hat{D}_2 = x$ (∠s opp = sides) $\hat{E}_2 = x$ (= chs = ∠s) or (∠s in same seg) $\hat{A}_3 = x$ (tan-chord theorem)	✓ $\hat{A}_2 = x$ ✓ reason ✓ $\hat{D}_2 = x$ ✓ reason ✓ $\hat{E}_2 = x$ ✓ reason ✓ $\hat{A}_3 = x$ ✓ reason (8)
10.2	In Δ ABE and ΔDFE 1. $\hat{E}_2 = \hat{E}_1$ $(= x)$ 2. $\hat{D}_3 = 90°$ (∠s in semicircle) $B\hat{A}E = 90°$ (tan ⊥ rad) $B\hat{A}E = \hat{D}_3$ Δ ABE ||| ΔDFE (∠∠∠) $\frac{BE}{FE} = \frac{AE}{DE}$ (||| Δs) BE.DE = AE.FE	✓ $\hat{E}_2 = \hat{E}_1$ ✓ $\hat{D}_3 = 90°$ ✓ reason ✓ $B\hat{A}E = 90°$ ✓ reason ✓ $\frac{BE}{FE} = \frac{AE}{DE}$ ✓ ||| Δs (7)
10.3	$\hat{D}_1 = 90° - x$ (∠s on str line) $\hat{B}_1 = 90° - x$ (∠ sum Δ) $\hat{B}_1 = \hat{D}_1$	✓ $\hat{D}_1 = 90° - x$ ✓ reason ✓ $\hat{B}_1 = 90° - x$ ✓ reason (4) **[19]**

TOTAL: 100