

FINAL



KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

PREPARATORY EXAMINATION

SEPTEMBER 2024

MARKING GUIDELINES

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARKS: 150

These marking guidelines consist of 14 pages.

- If a candidate answered a QUESTION TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answer in order to solve a problem is unacceptable.

GEOMETRY	
S	A mark for a correct statement (A statement mark is independent of a reason.)
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
S/R	Award a mark if the statement AND reason are both correct.

QUESTION 1**Penalise only once for incorrect rounding in Question 1.**

1.1.1	$\text{Mean} = \frac{165\,500}{12}$ $= \text{R}13\,792$ Also accept: 13,79 thousand rand Answer only: Full marks If answer is given as 13,79 instead of R13 792, penalise in 1.1.1, but don't penalise again for this mistake in 1.1.2, 1.2 and 1.5.	✓ A 165 500 in numerator ✓ CA answer (2)
1.1.2	Standard deviation = R4 404	✓ A answer (1)
1.2	$\text{R}13\,792 + \text{R}4\,404 = \text{R}18\,196$ 2 employees earn a salary more than one standard deviation above the mean. Answer only: Full marks	✓ CA R18 196 ✓ CA 2 employees (2)
1.3	$a = 8,45$ $b = 0,45$ $\hat{y} = 0,45x + 8,45$ Answer only: Full marks	✓ A correct a value ✓ A correct b value ✓ CA answer (3)
1.4	$r = 0,94$	✓ A answer (1)
1.5	$\hat{y} = 0,45(30) + 8,45$ $\hat{y} = 21,95$ $\therefore \text{R}21\,950$ OR $\text{R}21\,804$ (calculator)	✓ CA substitution ✓ CA answer OR ✓✓ CA CA (2) (2)

1.6	Yes. $r = 0,94$ implies a strong correlation between employee experience and monthly salary and therefore a prediction would be reliable. OR Yes. $r = 0,94$, which is close to 1, and therefore implies a strong correlation between employee experience and monthly salary and therefore a prediction would be reliable.	✓CA answer ✓CA justification (2) OR ✓CA answer ✓CA justification (2)
		[13]

QUESTION 2

2.1	5500	✓A answer (1)
2.2	$Q_1 = 29$ (accept 28 – 29) $Q_3 = 39$ (accept 38 – 39) $IQR = 10$ (accept 9 – 11)	✓A value of Q_1 ✓A value of Q_3 ✓CA answer (3)
2.3	$\frac{650}{5500}$ (accept 620 – 700) $= 11,82\%$ (accept 11,27% – 12,73%)	✓A numerator in range 620 to 700 ✓CA answer (2)
		[6]

QUESTION 3

3.1	$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-2 - 4}{-6 - 0}$ $= 1$	✓A substitution ✓CA answer (2)
3.2	$m_{CD} = m_{AB} = 1$ $y = mx + c$ Substitute $(10 ; -1)$ and $m_{CD} = 1$: $-1 = 1(10) + c$ $c = -11$ $y = 1x - 11$	✓CA $m_{CD} = 1$ ✓CA substitution of gradient and point ✓CA answer (3)

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3.3	Midpoint of AC is the same as the midpoint of BD [diagonals of parm. bisect each other] $\therefore$ Midpoint of AC $= M\left(\frac{-6+10}{2}; \frac{-2-1}{2}\right)$ $= M\left(2; \frac{-3}{2}\right)$ Answer only: Full marks OR $C(4; -7)$ $\therefore$ Midpoint of AC $= M\left(\frac{0+4}{2}; \frac{4-7}{2}\right)$ $= M\left(2; \frac{-3}{2}\right)$	✓ A midpoint of BD ✓ CA x coordinate ✓ CA y-coordinate (3) OR ✓ A coordinates of C ✓ CA x coordinate ✓ CA y-coordinate (3)
3.4	$C(4; -7)$	✓ CA x coordinate ✓ CA y-coordinate (2)
3.5	$m_{AB} = 1$ $\tan \hat{AFG} = 1$ $\hat{AFG} = 45^\circ$ $m_{AD} = \frac{-1-4}{10-0}$ $= -\frac{1}{2}$ $\tan \hat{AHJ} = -\frac{1}{2}$ $\hat{AHJ} = 153,43^\circ$ $\hat{BAD} = 153,43^\circ - 45^\circ$ [exterior $\angle$ of ΔHAF] $= 108,43^\circ$ $\therefore \hat{BCD} = 108,43^\circ$ [opp $\angle$ s of a parm.]	✓ CA $\tan \hat{AFG} = 1$ ✓ CA $\hat{AFG} = 45^\circ$ ✓ A $m_{AD} = -\frac{1}{2}$ ✓ CA $\hat{AHJ} = 153,43^\circ$ ✓ CA $\hat{BAD} = 108,43^\circ$ ✓ CA $\hat{BCD} = 108,43^\circ$ (6)

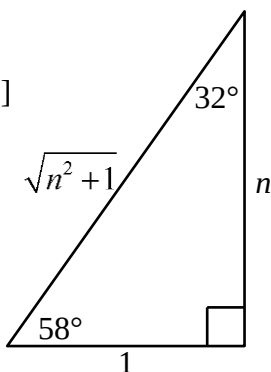
	OR $CD = \sqrt{(10-4)^2 + (-1+7)^2} = 6\sqrt{2}$ $BC = \sqrt{(-6-4)^2 + (-2+7)^2} = 5\sqrt{5}$ $BD = \sqrt{(-6-10)^2 + (-2+1)^2} = \sqrt{257}$ $BD^2 = BC^2 + CD^2 - 2 \cdot BC \cdot CD \cdot \cos \hat{BCD}$ $(\sqrt{257})^2 = (5\sqrt{5})^2 + (6\sqrt{2})^2 - 2 \cdot (5\sqrt{5}) \cdot (6\sqrt{2}) \cdot \cos \hat{BCD}$ $\therefore \cos \hat{BCD} = \frac{(5\sqrt{5})^2 + (6\sqrt{2})^2 - (\sqrt{257})^2}{2 \cdot (5\sqrt{5}) \cdot (6\sqrt{2})}$ $\hat{BCD} = 108,43^\circ$	OR ✓ CA length of CD ✓ CA length of BC ✓ A length of BD ✓ A use of cosine rule ✓ CA substitution into cosine rule ✓ CA answer (6)
		[16]

QUESTION 4

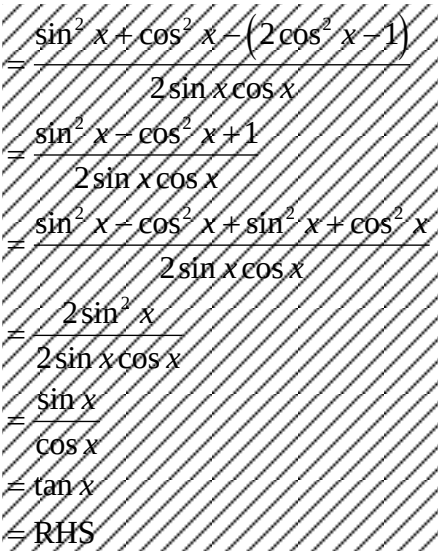
4.1.1	$r^2 = OJ^2 = 2^2 + (-1)^2$ $r = \sqrt{5}$	✓ A substitution ✓ A length of OJ (2)
4.1.2	$OK = OJ + JK = \sqrt{5} + 2\sqrt{5} = 3\sqrt{5}$ $(3\sqrt{5})^2 = (a-0)^2 + (-3-0)^2$ $45 = a^2 + 9$ $a^2 = 36$ $a = -6 \text{ or } a = 6$ N/A OR $OJ = \sqrt{5}$ $\therefore JK = 2\sqrt{5}$ $(2\sqrt{5})^2 = (a-2)^2 + (-3+1)^2$ $20 = a^2 - 4a + 4 + 4$ $a^2 - 4a - 12 = 0$ $(a-6)(a+2) = 0$ $a = 6 \text{ or } a = -2$ N/A	✓ A length of OK ✓ A substitution ✓ A a^2 subject of formula (3) OR ✓ A length of JK ✓ A substitution ✓ A standard form (3)
4.1.3	$(x-6)^2 + (y+3)^2 = 20$	✓ A $(x-6)^2 + (y+3)^2$ ✓ CA = 20 (2)

4.1.4	Substitute $(10; -4)$: $(10-6)^2 + (-4+3)^2$ $= 17$ $17 < 20,$ $\therefore$ the point lies inside the circle	✓ CA substitution ✓ CA $17 < 20$ ✓ CA conclusion (3)
4.1.5	$KO = \sqrt{5} + 2\sqrt{5} = 3\sqrt{5}$ In $\triangle POR$ and $\triangle PKS$: $\hat{P} = \hat{P}$ [common] $\hat{PRO} = \hat{PSK}$ [= 90°; tangent $\perp$ radius] $\hat{POR} = \hat{PKS}$ [remaining $\angle$s] $\triangle POR \parallel \triangle PKS$ [$\angle \angle \angle$] $\frac{PO}{PK} = \frac{OR}{KS}$ [$\parallel \Delta$s] $= \frac{OR}{2OR} = \frac{1}{2}$ $\therefore PO = \frac{1}{2} PK$ $PO = OK = 3\sqrt{5}$ $PK = 2(3\sqrt{5}) = 6\sqrt{5}$ $\hat{PSK} = 90^\circ$ [radius $\perp$ tangent] $PS^2 = PK^2 - KS^2$ [Theorem of Pythagoras] $= (6\sqrt{5})^2 - (2\sqrt{5})^2$ $= 160$ $\therefore PS = \sqrt{160} = 4\sqrt{10}$	✓ CA length of KO ✓ A $PO = \frac{1}{2} PK$ ✓ CA length of PK ✓ CA substitution in Theorem of Pythagoras ✓ CA answer (5)
4.2.1	$x^2 - 4x + 4 + y^2 + 5y + \frac{25}{4} = -d + 4 + \frac{25}{4}$ $(x-2)^2 + \left(y + \frac{5}{2}\right)^2 = -d + \frac{41}{4}$ Centre $\left(2; -\frac{5}{2}\right)$ Answer only: Full marks	✓ A completing the square ✓ A $(x-2)^2 + \left(y + \frac{5}{2}\right)^2$ ✓ CA x coordinate ✓ CA y coordinate (4)
4.2.2	diameter = 24 units, $\therefore$ radius = 12 units $-d + \frac{41}{4} = 144$ $d = -\frac{535}{4}$	✓ A radius = 12 units ✓ CA equating ✓ CA answer (3)
		[22]

QUESTION 5

5.1.1	$\tan 58^\circ = n$ $r^2 = x^2 + y^2$ [Theorem of Pythagoras] $r^2 = 1^2 + n^2$ $r = \sqrt{n^2 + 1}$ $\therefore \sin 58^\circ = \frac{n}{\sqrt{1 + n^2}}$		✓ A subst. in Theorem of Pythagoras ✓ A $r = \sqrt{n^2 + 1}$ ✓ CA answer (3)
5.1.2	$\sin 296^\circ$ $= -\sin 64^\circ$ $= -\sin 2(32^\circ)$ $= -2 \sin 32^\circ \cos 32^\circ$ $= -2 \cos 58^\circ \sin 58^\circ$ $= -2 \left(\frac{1}{\sqrt{1 + n^2}} \right) \left(\frac{n}{\sqrt{1 + n^2}} \right)$ $= \frac{-2n}{1 + n^2}$	✓ A $-\sin 64^\circ$ ✓ CA expansion ✓ CA co-functions ✓ CA answer (4)	
5.1.3	$\cos 2^\circ$ $= \cos(60^\circ - 58^\circ)$ $= \cos 60^\circ \cos 58^\circ + \sin 60^\circ \sin 58^\circ$ $= \frac{1}{2} \times \frac{1}{\sqrt{1 + n^2}} + \frac{\sqrt{3}}{2} \times \frac{n}{\sqrt{1 + n^2}}$ $= \frac{1 + \sqrt{3}n}{2\sqrt{1 + n^2}}$ OR $\cos 2^\circ$ $= \cos(32^\circ - 30^\circ)$ $= \cos 32^\circ \cos 30^\circ + \sin 32^\circ \sin 30^\circ$ $= \frac{n}{\sqrt{1 + n^2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{1 + n^2}} \times \frac{1}{2}$ $= \frac{\sqrt{3}n + 1}{2\sqrt{1 + n^2}}$	✓ A $\cos(60^\circ - 58^\circ)$ ✓ A expansion ✓ CA answer (3) OR ✓ A $\cos(32^\circ - 30^\circ)$ ✓ A expansion ✓ CA answer (3)	

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5.2.1	LHS $= \frac{1 - (1 - 2\sin^2 x)}{2\sin x \cos x}$ $= \frac{2\sin^2 x}{2\sin x \cos x}$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS}$ OR LHS  OR LHS $= \frac{\sin^2 x + \cos^2 x - (2\cos^2 x - 1)}{2\sin x \cos x}$ $= \frac{\sin^2 x - \cos^2 x + 1}{2\sin x \cos x}$ $= \frac{\sin^2 x - \cos^2 x + \sin^2 x + \cos^2 x}{2\sin x \cos x}$ $= \frac{2\sin^2 x}{2\sin x \cos x}$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS}$ OR LHS $= \frac{\sin^2 x + \cos^2 x - (\cos^2 x - \sin^2 x)}{2\sin x \cos x}$ $= \frac{2\sin^2 x}{2\sin x \cos x}$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS}$	✓A $1 - 2\sin^2 x$ ✓A $2\sin x \cos x$ ✓A simplification (3) OR ✓A $2\cos^2 x - 1$ ✓A $2\sin x \cos x$ ✓A simplification (3) OR ✓A $\cos^2 x - \sin^2 x$ ✓A $2\sin x \cos x$ ✓A simplification (3)
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5.2.2	$\tan 15^\circ$ $= \frac{1 - \cos 2(15^\circ)}{\sin 2(15^\circ)}$ $= \frac{1 - \cos 30^\circ}{\sin 30^\circ}$ $= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}}$ $= \left(1 - \frac{\sqrt{3}}{2}\right) \times \frac{2}{1}$ $= 2 - \sqrt{3}$	$\checkmark A \frac{1 - \cos 2(15^\circ)}{\sin 2(15^\circ)}$ $\checkmark A \text{ substitution of special angle values}$ $\checkmark CA \text{ answer} \quad (3)$
5.3	$\sin(360^\circ + x) \cdot \cos(90^\circ + x) - \frac{\sin x}{\cos(-x) \cdot \tan(360^\circ - x)}$ $= \sin x \cdot (-\sin x) - \frac{\sin x}{\cos x \cdot (-\tan x)}$ $= -\sin^2 x + 1$ $= \cos^2 x$	$\checkmark A \sin x \quad \checkmark A -\sin x$ $\checkmark A \cos x \quad \checkmark A -\tan x$ $\checkmark CA \ 1$ $\checkmark CA \text{ answer} \quad (6)$
5.4	$\cos 2x - \frac{1}{3} = \frac{1}{3} \sin x$ $1 - 2\sin^2 x - \frac{1}{3} = \frac{1}{3} \sin x$ $3 - 6\sin^2 x - 1 = \sin x$ $6\sin^2 x + \sin x - 2 = 0$ $(3\sin x + 2)(2\sin x - 1) = 0$ $\sin x = -\frac{2}{3}$ $\therefore x = 221,81^\circ + k \cdot 360^\circ \text{ or } x = 318,19^\circ + k \cdot 360^\circ, \ k \in \mathbb{Z}$ or $\sin x = \frac{1}{2}$ $\therefore x = 30^\circ + k \cdot 360^\circ \text{ or } x = 150^\circ + k \cdot 360^\circ, \ k \in \mathbb{Z}$	$\checkmark A \ 1 - 2\sin^2 x$ $\checkmark A \text{ standard form}$ $\checkmark CA \text{ factors}$ $\checkmark CA \ x = 221,81^\circ + k \cdot 360^\circ$ $\text{or } x = 318,19^\circ + k \cdot 360^\circ$ $\checkmark CA \ x = 30^\circ + k \cdot 360^\circ \text{ or } x = 150^\circ + k \cdot 360^\circ$ $\checkmark A \ k \in \mathbb{Z} \quad (6)$
5.5	$\sin(2x + 30^\circ) + k = 3$ $\sin(2x + 30^\circ) = 3 - k$ $\sin(2x + 30^\circ) < -1 \text{ or } \sin(2x + 30^\circ) > 1$ $3 - k < -1 \quad \text{or} \quad 3 - k > 1$ $k > 4 \quad \text{or} \quad k < 2$	$\checkmark A \sin(2x + 30^\circ) = 3 - k$ $\checkmark A \sin(2x + 30^\circ) < -1 \text{ or } \sin(2x + 30^\circ) > 1$ $\checkmark CA \ 3 - k < -1 \text{ or } 3 - k > 1$ $\checkmark CA \ k > 4$ $\checkmark CA \ k < 2 \quad (5)$
		[33]

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QUESTION 6

6.1	$b = \frac{1}{2}$	✓ A answer (1)
6.2	period = 360°	✓ A answer (1)
6.3	A ($30^\circ; 1$)	✓ A 30° ✓ A 1 (2)
6.4	$x = 160^\circ$	✓ A answer (1)
6.5	$-3 \leq y \leq 1$ OR $y \in [-3; 1]$	✓✓ AA OR ✓✓ AA (2)
		[7]

QUESTION 7

7.1	 $\frac{\sin y}{2b} = \frac{\sin x}{b}$ $\sin y = \frac{2b \sin x}{b}$ $\sin y = 2 \sin x$ OR $b \sin y = 2b \sin x$	✓ A substitution in sine rule ✓ A $\sin y = \frac{2b \sin x}{b}$ OR $b \sin y = 2b \sin x$ (2)
7.2	$\frac{AB}{BC} = \tan \theta$ $\therefore AB = BC \cdot \tan \theta$ $\hat{D} = 180^\circ - (x + y)$ $BC^2 = BD^2 + CD^2 - 2BD \cdot CD \cos \hat{D}$ $BC^2 = (2b)^2 + b^2 + 2(2b)(b) \cos [180^\circ - (x + y)]$ $BC^2 = (2b)^2 + b^2 + 2(2b)(b) \cos (x + y)$ $BC^2 = 5b^2 + 4b^2 \cos (x + y)$ $BC^2 = b^2 (5 + 4 \cos (x + y))$ $BC = b \sqrt{5 + 4 \cos (x + y)}$ $\therefore AB = b \tan \theta \sqrt{5 + 4 \cos (x + y)}$	✓ A $\frac{AB}{BC} = \tan \theta$ ✓ A $AB = BC \cdot \tan \theta$ ✓ A $\hat{D} = 180^\circ - (x + y)$ ✓ A substitution in cosine rule ✓ A $+ \cos (x + y)$ ✓ A simplification ✓ A taking square root on LHS and RHS (7)
7.3	$AB = 54,8 \tan 42,6^\circ \sqrt{5 + 4 \cos (31^\circ + 75,84^\circ)}$ $AB = 98,76 \text{ metres}$	✓ A substitution ✓ A answer (2)
		[11]

QUESTION 8

8.1.1	$\hat{A}_1 = \frac{1}{2}(\hat{C}\hat{O}\hat{E})$ $= 68^\circ$	$[\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$	✓R ✓A answer (2)
8.1.2	$\hat{E}_1 = \hat{A}_1$ $= 68^\circ$	[tan chord theorem]	✓R ✓CA answer (2)
8.1.3	$\hat{B}\hat{C}\hat{E} = \hat{E}_1$ $= 68^\circ$	[alt $\angle$ s; $DF \parallel CA$]	✓R ✓CA answer (2)
8.1.4	$\hat{G} = 180^\circ - \hat{B}\hat{C}\hat{E}$ $= 112^\circ$	[opp. $\angle$ s of cyclic quad]	✓R ✓CA answer (2)
8.2	$\hat{B}\hat{E}\hat{D} = 90^\circ$ $= \hat{B}_1$ $\therefore AB = \frac{1}{2} AC$ $= 7 \text{ units}$	[radius $\perp$ tangent] [co-interior $\angle$ s ; $DF \parallel CA$] [line from centre $\perp$ to chord]	✓S✓R ✓S/R ✓R ✓A answer (5)
	OR $\hat{B}\hat{E}\hat{D} = 90^\circ$ $\therefore \hat{E}_2 = 22^\circ$ $\therefore \hat{B}_1 = 180^\circ - (\hat{B}\hat{C}\hat{E} + \hat{E}_2)$ $= 180^\circ - (68^\circ + 22^\circ)$ $= 90^\circ$ $\therefore AB = \frac{1}{2} AC$ $= 7 \text{ units}$	[radius $\perp$ tangent] [sum of $\angle$ s of $\triangle BCE$] [line from centre $\perp$ to chord]	OR ✓S✓R ✓S/R ✓R ✓A answer (5)
			[13]

QUESTION 9

9.	In $\triangle QVS$: $\frac{QU}{UV} = \frac{QT}{TS} \quad [\text{prop. theorem; } UT \parallel VS] \text{ OR } [\text{line } \parallel \text{ one side of } \triangle]$ $= \frac{5}{2}$ $= \frac{5k}{2k}$ $\therefore 5k = 2x$; or: $x = \frac{5}{2}k$. And: $3x = \frac{15}{2}k$ In $\triangle UPR$: $\frac{PS}{PR} = \frac{UV}{UR} \quad [\text{prop. theorem; } UP \parallel VS] \text{ OR } [\text{line } \parallel \text{ one side of } \triangle]$ $= \frac{2k}{\frac{15}{2}k}$ $= \frac{4}{15}$ $\therefore \frac{PS}{SR} = \frac{4}{11}$	✓S ✓R ✓ x i.t.o. k ✓S ✓S ✓answer
		(6)
		[6]

QUESTION 10

10.1		
	Construct $AP = DE$ and $AQ = DF$ In $\triangle APQ$ and $\triangle DEF$: $AP = DE$ [from construction] $AQ = DF$ [from construction] $\hat{A} = \hat{D}$ [given] $\therefore \triangle APQ \equiv \triangle DEF$ [SAS] $\therefore \hat{P}_1 = \hat{E}$ [from $\equiv \Delta s$] But: $\hat{B} = \hat{E}$ [given] $\therefore \hat{P}_1 = \hat{B}$ $\therefore PQ \parallel BC$ [corresponding $\angle s$ are $=$] $\therefore \frac{AP}{AB} = \frac{AQ}{AC}$ [prop. theorem; $PQ \parallel BC$] $\therefore \frac{DE}{AB} = \frac{DF}{AC}$ [DE = AP; DF = AQ]	✓ construction ✓ $\triangle APQ \equiv \triangle DEF$ ✓ $\hat{P}_1 = \hat{E}$ ✓ S ✓ R ✓ S/R (6)
10.2.1	In $\triangle MKL$ and $\triangle MNP$: $\frac{MK}{MN} = \frac{40}{16} = 2,5$ $\frac{KL}{NP} = \frac{25}{10} = 2,5$ $\frac{ML}{MP} = \frac{30}{12} = 2,5$ $\therefore \triangle MKL \parallel \triangle MNP$ [sides of Δs in proportion]	✓ S ✓ S ✓ S ✓ R (4)

10.2.2	$\hat{NPM} = \hat{L}$ $\therefore$ KLNP is a cyclic quadrilateral OR $\hat{PNM} = \hat{K}$ $\therefore$ KLNP is a cyclic quadrilateral	[from $\parallel \Delta$ s] [converse: ext. $\angle$ of cyclic quadrilateral] OR [ext. $\angle$ of quad = int. opp. $\angle$] [from $\parallel \Delta$ s] [converse: ext. $\angle$ of cyclic quadrilateral] OR [ext. $\angle$ of quad = int. opp. $\angle$]	✓S ✓R ✓R OR ✓S ✓R ✓R (3)
10.3.1	In $\triangle BCE$ and $\triangle ADE$: 1. $\hat{E}_1 = \hat{E}_3$ 2. $\hat{C}_1 = \hat{D}_2$ 3. $\hat{B} = \hat{A}$ $\therefore \triangle BCE \parallel \triangle ADE$ $\therefore \frac{BC}{CE} = \frac{AD}{DE}$ $\therefore BC = \frac{AD \cdot CE}{DE}$	[vertically opp. $\angle$ s] [$\angle$ s in the same segment] [sum of $\angle$ s of Δ s] [$\angle \angle \angle$] [from $\parallel \Delta$ s]	✓ selecting triangles ✓S ✓S/R ✓ $\hat{B} = \hat{A}$ OR [$\angle \angle \angle$] ✓R ✓S/R (5)
10.3.2	In $\triangle ADE$ and $\triangle BDC$: 1. $\hat{D}_2 = \hat{D}_1$ 2. $\hat{A} = \hat{B}$ 3. $\hat{E}_3 = \hat{BCD}$ $\therefore \triangle ADE \parallel \triangle BDC$ $\therefore \frac{AD}{BD} = \frac{DE}{CD}$ $\therefore AD \cdot CD = DE \cdot BD$ $= DE \cdot (DE + BE)$ $= DE^2 + DE \cdot BE$	[given] [$\angle$ s in the same segment] [sum of $\angle$ s of Δ s] [$\angle \angle \angle$] [from $\parallel \Delta$ s]	✓ selecting triangles ✓S/R ✓ R ✓ S ✓ substitute DE + BE (5)
			[23]

TOTAL: 150