
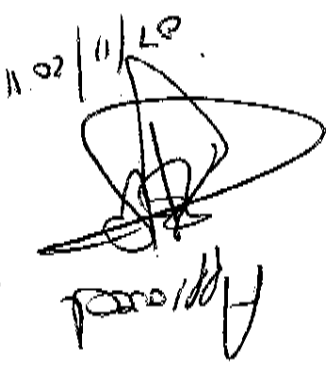
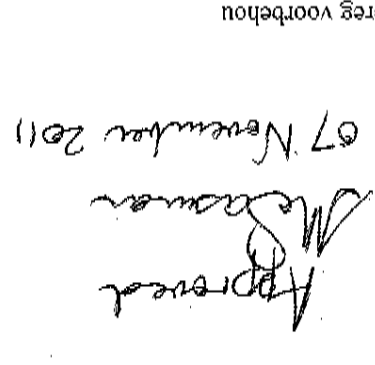


Blaai om asseblief

Kopiereg voorbehou

Hierdie memorandum bestaan uit 14 bladsye.

PUBLIC EXAMINATIONS
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2011 - 11 - 02
DEPARTMENT OF BASIC EDUCATION

PUNTE: 100

WISKUNDE V3
 NOVEMBER 2011
 MEMORANDUM

GRADE 12

NASIONALE SENIOR SERTIFIKAT

Department: Basic Education
REPUBLIC OF SOUTH AFRICA

basic education



<p>1.1</p> <p>$T_{k+1} = T_k - 2; k \geq 1; T_1 = 12$</p> <p>$T_1 = 12$ $T_2 = 12 - 2 = 10$ $T_3 = 10 - 2 = 8$ $T_4 = 8 - 2 = 6$</p> <p>✓ 10 ✓ 8 ✓ 6</p> <p>(3)</p>	<p>1.2</p> <p>$12 + 10 + 8 + 6 + 4 + 2 + 0 + (-2) + (-4) + (-6) + (-8) + (-10) + (-12)$</p> <p>LET WEL: : 13 terme = 0</p> <p>As 'n leering $12 + 10 + 8 + 6 + 4 + 2 + 0$ neerskryf: 1/3 punte</p> <p>LET WEL: Sleigs antwoord: VOLPUNTE</p> <p>OF</p> <p>Daar is 6 positiewe terme voor die 7de term, wat 0 is. Ons benodig 6 negatiewe terme van gelyke waarde tot die positiewe terme sodat die som nul is.</p> <p>6 positiewe terme + 1 nulterm + 6 negatiewe terme = 13 terme</p> <p>OF</p> <p>$\frac{n}{2}[2(12) + (n-1)(-2)] = 0$ $\frac{n}{2}[24 + 2 - 2n] = 0$ $\frac{n}{2}[26 - 2n] = 0$ $13n - n^2 = 0$ $n(13 - n) = 0$ $n \neq 0$ or $n = 13$</p>	<p>1.2</p> <p>12 + 10 + 8 + 6 + 4 + 2 + 0 + (-2) + (-4) + (-6) + (-8) + (-10) + (-12)</p> <p>LET WEL: : 13 terme = 0</p> <p>As 'n leering $12 + 10 + 8 + 6 + 4 + 2 + 0$ neerskryf: 1/3 punte</p> <p>LET WEL: Sleigs antwoord: VOLPUNTE</p> <p>OF</p> <p>Daar is 6 positiewe terme voor die 7de term, wat 0 is. Ons benodig 6 negatiewe terme van gelyke waarde tot die positiewe terme sodat die som nul is.</p> <p>6 positiewe terme + 1 nulterm + 6 negatiewe terme = 13 terme</p> <p>OF</p> <p>$\frac{n}{2}[2(12) + (n-1)(-2)] = 0$ $\frac{n}{2}[24 + 2 - 2n] = 0$ $\frac{n}{2}[26 - 2n] = 0$ $13n - n^2 = 0$ $n(13 - n) = 0$ $n \neq 0$ or $n = 13$</p>
<p>✓ 13 terme</p> <p>✓ $\frac{n}{2}[26 - 2n] = 0$</p> <p>formule</p> <p>rekenkundige som-</p> <p>▼ verang in</p> <p>(3)</p> <p>✓ 13 terme</p> <p>✓ $T_7 = 0$</p> <p>✓ 12 terme</p> <p>utbreiding</p> <p>(3)</p>	<p>utbreiding</p> <p>(3)</p> <p>utbreiding</p> <p>(3)</p>	<p>utbreiding</p> <p>(3)</p> <p>utbreiding</p> <p>(3)</p>

VRAAG 1

- As 'n kandidaat 'n vraag TWEE keer beantwoord, merk net die EERSTE poging.
- As 'n kandidaat 'n antwoord deurmaal en nie oordoen nie, merk die deurgehaalde antwoord.
- Deurlopende Akkuraatheid (DA) moet deurgaans in die memorandum toegepas word.
- 'n Kandidaat kan nie iets bewys met dit wat nog bewys moet word nie.

LET WEL:

VRAAG 2

2.1	42 - 28 = 14	✓ antwoord	(1)	
2.2	Ongeveer 88 kg	✓ antwoord	(1)	
2.3	15 leiders in die steekproef het 'n gewig van minder as 80 kg. 'n Mens verag dat $\frac{15}{50} \times 250 = 75$ leiders in die graad het 'n gewig van minder as 80 kg.	<p>✓ Kumulatiewe frekwensie waarde grafies afgeles met gewig minder as 80 antwoord</p> <p>(2)</p>	(2)	
2.4	15 leiders in die steekproef het 'n gewig van minder as 80 kg. 'n Mens verag dat $15 \times 5 = 75$ leiders in die graad het 'n gewig van minder as 80 kg.	<p>LET WEL:</p> <ul style="list-style-type: none"> • Aanvaar $\frac{50}{14} \times 250 = 70$ • Antwoord as persentasie: 1/2 punte • Sleigs antwoord: 2/2 punte 	<p>✓ bevooroordeld/partydig</p> <p>Hierdie steekproefmetode is bevooroordeld/partydig teenoor die wat vroeg op 'n Maandagmôre opdag. Op hierdie wyse/manier het al die leiders in die graad nie dieselfde kans om vir die steekproef gekies te word nie.</p>	(1)

VRAAG 3

3.1	Vir onderling uitslutende gebeurtenisse	<p>LET WEL:</p> <p>Sleigs antwoord: VOLPUNTE</p> <p>✓ $0,7 = 0,4 + k$</p> <p>✓ antwoord</p> <p>(2)</p>	<p>Indien die kandidaat $k = 1 - 0,7 = 0,3$ neerskryf: 0/2 punte</p>
3.2	Vir onafhanklike gebeurtenisse	<p>LET WEL:</p> <ul style="list-style-type: none"> • Sleigs antwoord: 1/4 punte • Verkeerde formule: 0/4 punte 	<p>OF</p> <p>$P(A \text{ en } B) = P(A) \cdot P(B)$</p> <p>$0,4k = 0,4k$</p> <p>$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$</p> <p>$0,7 = 0,4 + k - 0,4k$</p> <p>$0,3 = 0,6k$</p> <p>$k = 0,5$</p>

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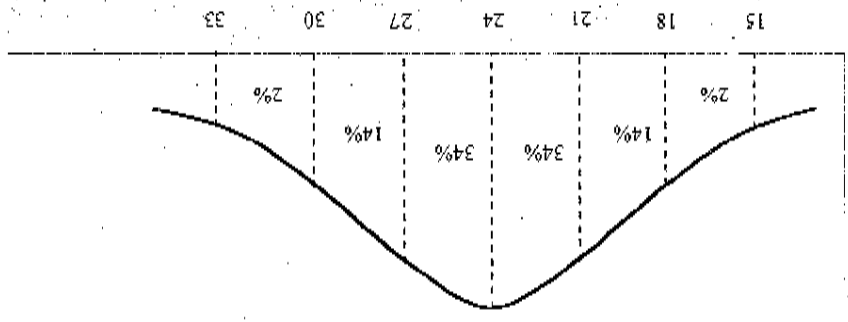
Kopiereg voorbehou

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5.1	Getal unieke kodes $7 \times 7 \times 7 = 7^3 = 343$	LET WEL: Slegs antwoord: VOLPUNTE	✓ $7 \times 7 \times 7$ antwoord	(2)
5.2	Getal unieke kodes sonder herhaling $7 \times 6 \times 5 = 210$	LET WEL: Slegs antwoord: VOLPUNTE	✓ $7 \times 6 \times 5$ antwoord $\frac{7!}{4!}$ $\frac{4!}{4!}$	(2)
5.3	Getal kodes met herhaling wat groter as 300 en deelbaar deur 5 is $4 \times 7 \times 2 - 1 = 55$ $4 \times 7 \times 2 - 1 = 55$ OF Vir 100 getalle is daar 14 getalle wat deelbaar deur 5 is $14 \times 4 = 56$ $56 - 1 = 55$	LET WEL: • Geen DA by nasien nie. • Slegs antwoord: VOLPUNTE	✓ $4 \times 7 \times 2$ antwoord $\frac{4!}{1!}$ $\frac{1!}{1!}$ $\frac{1!}{1!}$	(3)

VRAAG 5

4.1	21 minute is 1 standaardwyking van die gemiddelde $\therefore 34\%$ van die pizzas word tussen 21 en 24 minute afgelewer	LET WEL: Slegs antwoord: VOLPUNTE	✓ 1 standaard-afwyking $\frac{34\%}{2} = 17\%$	(2)
4.2	15 minute is 3 standaardwykings na links van die gemiddelde $\therefore 50\%$ 27 minute is 1 standaardwyking na regs van die gemiddelde $\therefore 34\%$ 84% van die pizzas word tussen 15 en 27 minute afgelewer	LET WEL: Slegs antwoord: VOLPUNTE	✓ 50% $\frac{34\%}{2} = 17\%$ $\frac{34\%}{2} = 17\%$ $\frac{84\%}{2} = 42\%$	(3)
4.3	Die vereiste 2% is die gedeelte regs van die 2 standaardwykings reeds aan die regterkant van die gemiddelde. Maksimum vir aflewering moet $24 + 2(3) = 30$ minute wees	LET WEL: Slegs antwoord: VOLPUNTE	✓ 2 standaard-afwykings $24 + 2(3) = 30$	(3)



VRAAG 4

VRAAG 6

<p>6.1</p> <p>✓ $79 - x$ ✓ 20 ✓ $19 - x$ ✓ 11 ✓ 16 ✓ $40 - x$</p> <p>(6)</p>		<p>6.2</p> <p>✓ optelling ✓ 173 ✓ antwoord</p> <p>(3)</p>	<p>OF 232 klages en 173 mense in totaal 94 klages vanaf 47 mense 138 klages van oorblywende 126 mense Vir die twee om gelyk te wees $126 - x = 138 - 3x$ $2x = 12$ $x = 6$</p> <p>OF $110 + 55 + 67 = 232$ $2x + 20 + 11 + 16 = 232 - 173$ $2x + 47 = 59$ $2x = 12$ $x = 6$</p> <p>(3)</p>	<p>6.3</p> <p>P (ten minste twee klages) $\frac{11 + 20 + 6 + 16}{173}$ $= \frac{53}{173}$ $= 0,31$ OF 30,64% (0,30635838...)</p> <p>(3)</p>	<p>6.3</p> <p>✓ $11 + 20 + 6 + 16$ ✓ 173 ✓ antwoord</p> <p>(3)</p>
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Kopiereg voorbehou

MS

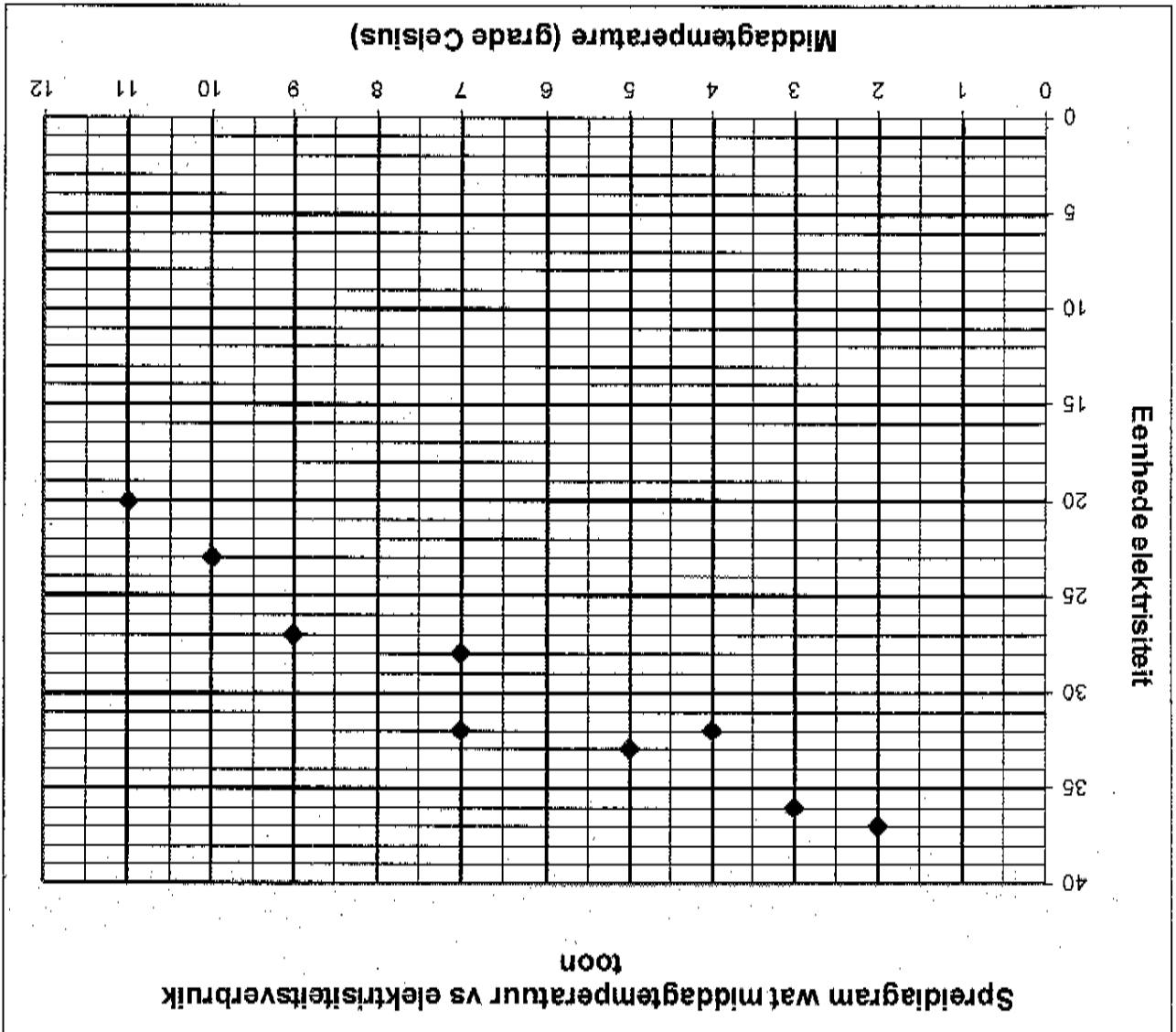
(3)

✓✓ al 9 punte is korrek
geplot
2 punte indien 5 - 8 punte
korrek geplot is.
1 punt indien 1 - 4 punte
korrek geplot is.

LET WEL:
Ignoreer die punt (0 : 41) asschliet.

Sien spreidiagram hierbo

7.1



Midagtemperature (in °C)	Eenhede elektrisiteit gebruik
11	20
10	23
9	27
7	28
7	32
5	33
4	32
3	36
2	37

<p>7.2</p> <p>$a = 40,97$ $b = -1,74$ $f = 40,97 - 1,74x$</p> <p>LET WEL: • Penaliseer met 1 punt vir verkeerde afronding tot 1 desimaal in 7.2 of 7.3 • Siegs antwoord: VOLPUNTE</p> <p>Indien die kandidaat die koëffisiënt van b met die hand metode bereken, is $b = \frac{-204,2}{117,6}$: 2 punte vir b.</p> <p>LET WEL: Indien die kandidaat die koëffisiënt van b met die hand metode</p> <p>✓✓ a ✓ b ✓ vergelyking</p> <p>(4)</p>	<p>7.3</p> <p>$r = -0,97$ $(-0,9699269087...)$</p> <p>LET WEL: Indien die kandidaat aantoon dat $b = \frac{6,139218}{3,42928}r$ en nie verder vereenvoudig nie: 1 punt.</p> <p>✓✓ antwoord</p> <p>(2)</p>	<p>7.4</p> <p>Daar is 'n sterk negatiewe korrelasie/verwantskap tussen die middagtemperatuur en die eenhede elektrisiteit wat gebruik is.</p> <p>OF</p> <p>Soos wat die middagtemperatuur toeneem, neem die eenhede elektrisiteit wat gebruik word af.</p> <p>OF</p> <p>Soos wat die middagtemperatuur afneem, neem die eenhede elektrisiteit wat gebruik word toe.</p> <p>✓ sterk ✓ negatiewe</p> <p>✓✓ middagtemp toeneem en elektrisiteit afneem</p> <p>(2)</p> <p>✓✓ middagtemp afneem en elektrisiteit toeneem</p> <p>(2)</p>	<p>7.5</p> <p>$f \approx 40,97 - 1,74(8)$ $\approx 27,05$</p> <p>OF</p> <p>$f \approx 27,0799 \approx 27,08$</p> <p>LET WEL: • Siegs antwoord: 2/2 punte • Aanvaar die interval van 26,5 – 27,5 indien die lyn van beste passing geteken is en die antwoord daarna afgelees is: 2/2 punte</p> <p>✓ veranring ✓ antwoord</p> <p>[13] (2)</p>
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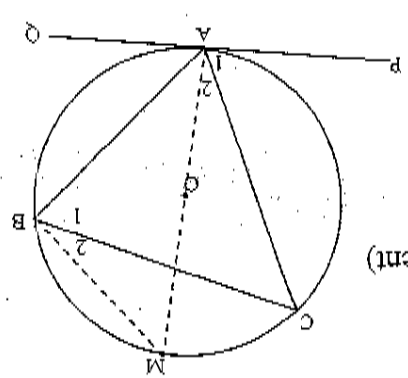
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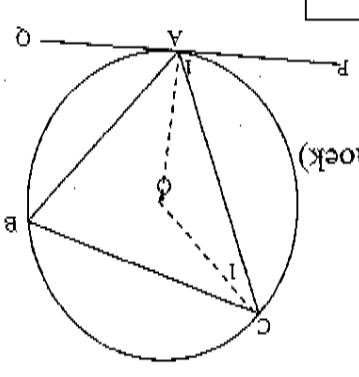
8.1

Teken middellyn AM en verbind M met B.
 $\hat{A}_1 + \hat{A}_2 = 90^\circ$ (raaklyn \perp radius)
 $\hat{B}_1 + \hat{B}_2 = 90^\circ$ (\angle in $\frac{1}{2}$ sirkel)
 $\hat{B}_2 = \hat{A}_2$ (\angle in dieselfde \odot segment)
 $\hat{B}_1 = \hat{A}_1$



OF

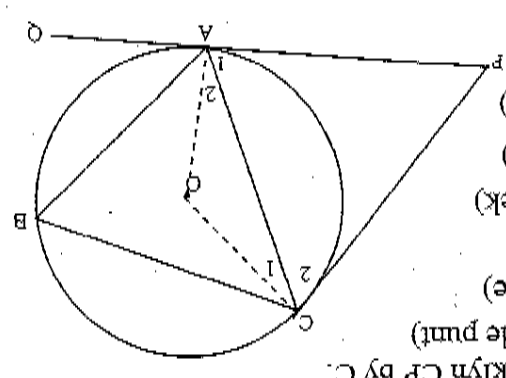
Teken OC en OA
 Let $\hat{A}_2 = x$
 $\hat{C}_1 = x$ (OC = OA; gelykbenige Δ)
 $\hat{A}_1 = 90^\circ - x$ (radius \perp raaklyn)
 $\hat{A}OC = 180^\circ - 2x$ (\angle van Δ)
 $\hat{A}BC = 90^\circ - x$ (middelpuntshoek = 2 x omtrekshoek)
 $\hat{A}BC = \hat{A}_1$ ($= 90^\circ - x$)



LET WEL:
 • Geen konstruksie: 0 / 5 punte
 • As 'n kandidaat die benoemings verander en stel "Soortgelyk kan bewys word": volpunte

OF

Teken QA verleng tot P. Teken raaklyn CP by C.
 $PC = PA$ (raaklyne vanaf dieselfde punt)
 $\hat{C}_2 = \hat{A}_1$ (\angle teenoor gelyke sye)
 $\hat{C}OA = 2\hat{A}BC$
 (middelpuntshoek = 2 x omtrekshoek)
 $\hat{A}_1 + \hat{A}_2 = 90^\circ$ (raaklyn \perp radius)
 $\hat{C}OA = 180^\circ - (90^\circ - \hat{A}_1 + 90^\circ - \hat{C}_2)$
 $= \hat{A}_1 + \hat{C}_2$
 $= \hat{A}_1 + \hat{A}_1$
 $= 2\hat{A}_1$
 $\hat{A}_1 = \frac{1}{2} \hat{C}OA$
 $= CBA$



(5)

✓ konstruksie
 ✓ S/R
 ✓ $\hat{A}_1 + \hat{A}_2 = 90^\circ$
 ✓ raaklyn \perp radius

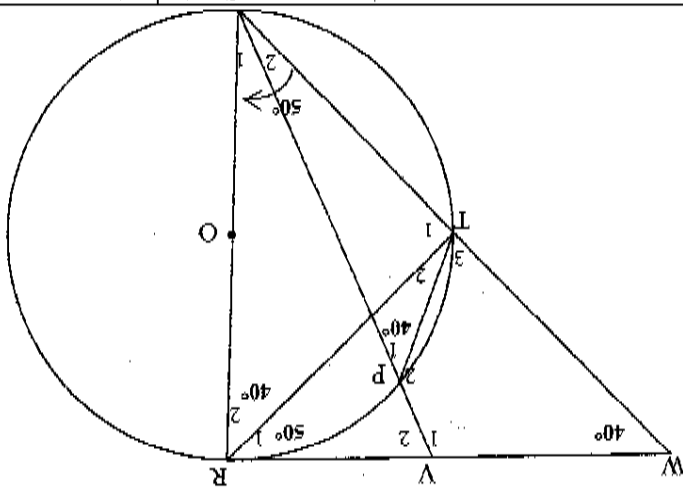
OF

✓ konstruksie
 ✓ S/R
 $\hat{B}_1 + \hat{B}_2 = 90^\circ$
 \angle in $\frac{1}{2}$ sirkel
 ✓ S/R

(5)

✓ konstruksie
 ✓ $\hat{A}_1 = 90^\circ - x$
 ✓ radius \perp raaklyn
 ✓ S/R
 ✓ S/R

<p>Blaai om asseblief</p>	<p>Kopiereg voorbehou</p>
<p>(3)</p> <p>✓ $\angle e$ in dieselfde \odot segment ✓ $R_2 = 40^\circ$ ✓ $P_1 = 40^\circ$</p>	<p>8.2.3</p> <p>✓ $R_2 = 40^\circ$ ✓ $P_1 = 40^\circ$ ($\angle e$ in dieselfde \odot segment)</p>
<p>(2)</p> <p>✓ S/R ✓ $W = 40^\circ$</p>	<p>8.2.2</p> <p>✓ $RST = 50^\circ$ (\angle tussen raaklyn en koord) ✓ $W = 40^\circ$ ($\angle e$ van Δ) OF ✓ $T_1 = 90^\circ$ (\angle in $\frac{1}{2}$ sirkel) ✓ $W + R_1 = T_1$ (buitehoek \angle van Δ) ✓ $W = 40^\circ$</p>
<p>(1)</p> <p>✓ S</p>	<p>8.2.1</p> <p>✓ $WRS = 90^\circ$ (raaklyn \perp radius)</p>



<p>(5)</p> <p>✓ konstruksie ✓ S/R ✓ S/R ✓ $A_1 + A_2 = 90^\circ$ ✓ raaklyn \perp radius</p>	<p>OF</p> <p>Teken middellyn en verbind M met C $MCA = 90^\circ$ (\angle in $\frac{1}{2}$ sirkel) $AMC + A_2 = 90^\circ$ ($\angle e$ van Δ) $A_1 + A_2 = 90^\circ$ (radius \perp raaklyn) $AMC = A_1$ $AMC = B$ $A_1 = B$</p>
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<p>(4) $P_1 = W$</p> <p>✓ WPT is 'n koordvierhoek (buite $\angle =$ teenoorst binne \angle)</p> <p>✓ buite $\angle =$ teenoorst binne \angle</p> <p>✓ buite \angle van kvh</p> <p>(4)</p> <p>✓ \angle in $\frac{1}{2}$ sirkel</p> <p>✓ \angle in dieselfde \odot segment</p> <p>✓ $T_2 = S_1$</p> <p>✓ $PTS = 90^\circ + T_2$</p> <p>✓ $W + P_2 = 180^\circ$</p> <p>✓ WPT is 'n koordvierhoek</p> <p>✓ teenoorstaande hoeke suppl</p> <p>✓ buite \angle van koordvierhoek</p> <p>(4)</p> <p>OF</p> <p>$P_2 = 140^\circ$ (\angle op reguitlyn)</p> <p>$W + P_2 = 180^\circ$</p> <p>WPT is 'n koordvierhoek (teenoorstaande hoeke suppl)</p> <p>$V_1 = PTS$ (buite \angle van koordvierhoek)</p> <p>OF</p> <p>$V_1 = R_1 + R_2 + S_1$ (buitehoek \angle van Δ)</p> <p>$V_1 = 90^\circ + S_1$</p> <p>$PTS = 90^\circ + T_2$</p> <p>maar $T_2 = S_1$ (\angle in dieselfde \odot segment)</p> <p>$V_1 = PTS$</p> <p>OF</p> <p>In ΔPTS en ΔWVS is</p> <p>$P_1 = W$ ($= 40^\circ$)</p> <p>S_2 is gemeenskaphik</p> <p>$V_1 = PTS$ (\angle van Δ)</p> <p>(4) [15]</p>	<p>8.2.4</p> <p>$P_1 = W$</p> <p>WPT is 'n koordvierhoek (buite $\angle =$ teenoorst binne \angle)</p> <p>$V_1 = PTS$ (buite \angle van koordvierhoek)</p> <p>OF</p> <p>$T_1 = 90^\circ$ (\angle in $\frac{1}{2}$ sirkel)</p> <p>$PTS = 90^\circ + T_2$</p> <p>$T_2 = S_1$ (\angle in dieselfde \odot segment)</p> <p>$PTS = 90^\circ + S_1$</p> <p>$V_1 = 90^\circ + S_1$ (buitehoek \angle van Δ)</p> <p>$V_1 = PTS$</p> <p>OF</p> <p>$V_1 = R_1 + R_2 + S_1$ (buitehoek \angle van Δ)</p> <p>$V_1 = 90^\circ + S_1$</p> <p>$PTS = 90^\circ + T_2$</p> <p>maar $T_2 = S_1$ (\angle in dieselfde \odot segment)</p> <p>$V_1 = PTS$</p> <p>OF</p> <p>In ΔPTS en ΔWVS is</p> <p>$P_1 = W$ ($= 40^\circ$)</p> <p>S_2 is gemeenskaphik</p> <p>$V_1 = PTS$ (\angle van Δ)</p>
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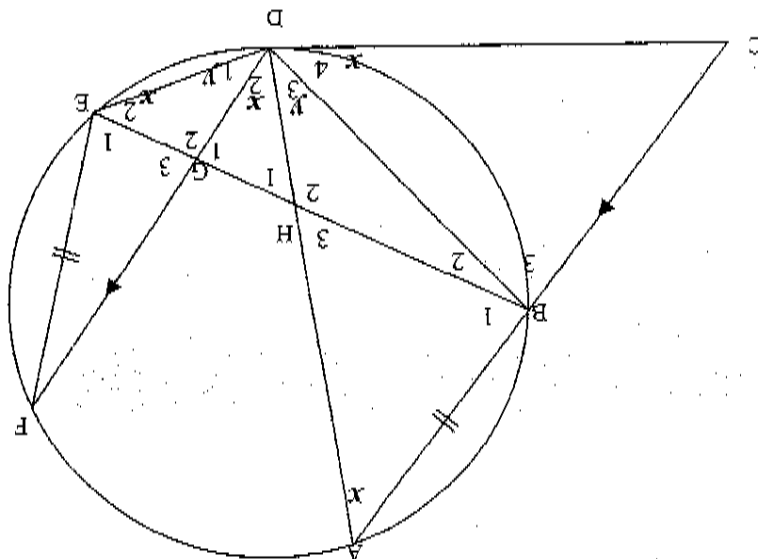
<p>[5] ✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ loodlyn uit middelpunt sirkel na koord ✓ $OE = 6$ cm ✓ $ED = 4$ cm</p> <p>✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ omgekeerde middelpuntstelling ✓ $OE = 6$ cm ✓ $ED = 4$ cm</p> <p>✓ $\angle C = 90^\circ$ ✓ $BC = 12$ cm ✓ rede</p> <p>✓ $OE = \frac{1}{2} BC$ ✓ $ED = 4$ cm</p> <p>[5] ✓ $\angle C = 90^\circ$ ✓ $BC = 12$ cm ✓ rede</p> <p>✓ $OE = \frac{1}{2} BC$ ✓ $ED = 4$ cm</p> <p>[5] ✓ $\angle C = 90^\circ$ ✓ $OE = 6$ cm ✓ $ED = 4$ cm</p>		<p>(\angle in $\frac{1}{2}$ sirkel) $\angle OEA = 90^\circ$ $OE \parallel BC$ $OE \parallel BC$ (gegece) $OA = OB$ (radiusse) $AE = EC$ (omgekeerde middelpuntstelling) $OE = \frac{1}{2} BC$ (middelpuntstelling) $ED = 10 - 6 = 4$ cm</p> <p>(\angle in $\frac{1}{2}$ sirkel) $\angle C = 90^\circ$ $BC^2 = (20)^2 - (16)^2$ $BC^2 = 144$ $BC = 12$ cm $OE \parallel BC$ (gegece) $OA = OB$ (radiusse) $AE = EC$ (omgekeerde middelpuntstelling) $OE = \frac{1}{2} BC$ (middelpuntstelling) $ED = 10 - 6 = 4$ cm</p> <p>(\angle in $\frac{1}{2}$ sirkel) $\angle C = 90^\circ$ $BC^2 = (20)^2 - (16)^2$ $BC^2 = 144$ $BC = 12$ cm $BC = 12$ cm $OE \parallel BC$ (gegece) $OA = OB$ (radiusse) $AE = EC$ (omgekeerde middelpuntstelling) $OE = \frac{1}{2} BC$ (middelpuntstelling) $ED = 10 - 6 = 4$ cm</p> <p>(\angle in $\frac{1}{2}$ sirkel) $\angle C = 90^\circ$ $\angle OEA = 90^\circ$ $OE \parallel BC$ (gegece) $OA = OB$ (radiusse) $AE = EC = 8$ cm (omgekeerde middelpuntstelling) $OE = 6$ cm (Pythagoras) $ED = 10 - 6 = 4$ cm</p> <p>(\angle in $\frac{1}{2}$ sirkel) $\angle C = 90^\circ$ $\angle OEA = 90^\circ$ $OE \parallel BC$ (gegece) $OA = OB$ (radiusse) $AE = EC = 8$ cm (loodlyn uit middelpunt sirkel na koord) $OE = 6$ cm (Pythagoras) $ED = 10 - 6 = 4$ cm</p>	<p>9.</p>
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VRAAG 9

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<p>[13]</p> <p>(2)</p> <p>✓ $\frac{FE}{FD} = \frac{BH}{BD}$</p> <p>✓ $FE = AB$</p>	<p>$\frac{FE}{FD} = \frac{BH}{BD}$ ($\parallel \Delta s$)</p> <p>But $FE = AB$ (gege)</p> <p>$\frac{AB}{FD} = \frac{BH}{BD}$</p> <p>$\frac{BH}{BD} = \frac{AB}{FD}$</p> <p>$AB, BD = FD, BH$</p>	<p>10.3</p>
<p>(5)</p> <p>✓ $B_2 = F$</p> <p>✓ \angle in dieselfde \odot segment</p> <p>✓ $D_3 = D_1$</p> <p>✓ omteks \angle</p> <p>onderspan deur</p> <p>gelyke koorde</p> <p>✓ \lll</p>	<p>In ΔBHD en ΔFED</p> <p>1. $B_2 = F$ (\angle in dieselfde \odot segment)</p> <p>2. $D_3 = D_1$ (omteks \angle onderspan deur gelyke koorde)</p> <p>$\Delta BHD \parallel \Delta FED$ (\lll)</p>	<p>10.2</p>
<p>(6)</p> <p>✓ $\hat{A} = x$</p> <p>✓ \angle tussen raaklyn en koord</p> <p>✓ $\hat{E}_2 = x$</p> <p>✓ rede</p> <p>✓ $D_2 = x$</p> <p>✓ verwisselende \anglees;</p> <p>$CA \parallel DF$</p>	<p>$\hat{A} = D_4 = x$ (\angle tussen raaklyn en koord)</p> <p>$\hat{E}_2 = x$ (\angle tussen raaklyn en koord) OF (\angle in dieselfde \odot segment)</p> <p>$D_2 = \hat{A} = x$ (verwisselende \anglees; $CA \parallel DF$)</p>	<p>10.1</p>



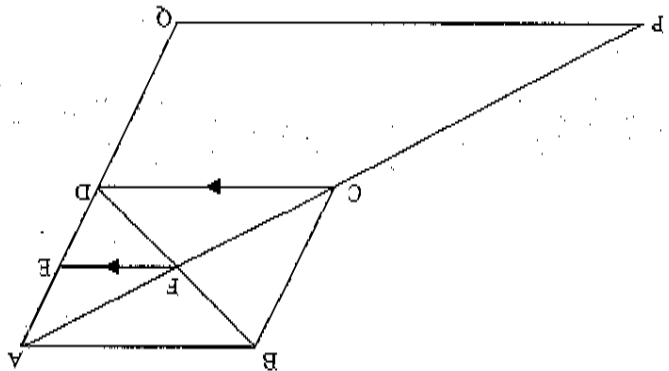
VRAAG 10

Blaai om asseblief

Kopiereg voorbehou

MSD

<p>11.1</p> <p>✓ AF = FC FE CD AE = ED</p>	<p>(hoeklynne van partn) (Ewredigheidstelling; FE CD) of (lyn uit middel-punt van een sy aan tweede sy halveer die derde sy) of (omgekeerde middelpuntstelling)</p>	<p>11.2</p>
<p>✓ AF = FC FE CD AE = ED</p> <p>✓ rede</p> <p>(2)</p>	<p>(gege)</p> <p>(omgekeerde ewredigheidstel) of (sye ewredig)</p> <p>CD PQ CD FE CD FE</p> <p>(gege)</p> <p>OF</p> <p>$\frac{AC}{1} = \frac{CP}{2} = \frac{AP}{3}$ $\frac{AD}{1} = \frac{DQ}{2} = \frac{AQ}{3}$ $\frac{AC}{AD} = \frac{CP}{DQ} = \frac{AP}{AQ}$</p>	<p>11.1</p>
<p>✓ verhoudings gelyk CD PQ rede: omgekeerde ewredigheidstelling en gevolgtrekking</p> <p>(3)</p>	<p>(gege)</p> <p>(omgekeerde ewredigheidstelling) of (sye ewredig)</p> <p>CD PQ CD FE CD FE</p> <p>(gege)</p> <p>OF</p> <p>$\frac{AC}{1} = \frac{AP}{3} = \frac{AQ}{6}$ $\frac{AD}{1} = \frac{AQ}{3} = \frac{AQ}{6}$ $\frac{AC}{AD} = \frac{AP}{AQ} = \frac{AQ}{AQ}$</p>	<p>11.2</p>
<p>✓ AF = 1 AP = 6 OF</p> <p>✓ $\frac{AF}{AE} = \frac{AP}{AQ}$ omgekeerde ewredigheidstelling</p> <p>(3)</p>	<p>(omgekeerde ewredigheidstelling)</p> <p>$\frac{AF}{1} = \frac{AP}{6} = \frac{AQ}{6}$ $\frac{AF}{AE} = \frac{AP}{AQ}$</p>	<p>11.1</p>



ms

TOTAL: 100

<p>(5) [10]</p> <p>✓ eerste paar hoeke gelijk met rede ✓ tweede paar hoeke gelijk met rede</p> <p>✓ $CD = \frac{1}{3} PQ$</p> <p>✓ $FE = \frac{1}{2} CD$</p> <p>✓ antwoord</p>	<p>In $\triangle ADC$ en $\triangle APQ$ \hat{A} is gemeenskaplik 1. $\hat{A} = \hat{A}$ 2. $\angle ADC = \angle APQ$ (oorenk \angle; $CD \parallel PQ$) 3. $\angle ACD = \angle APQ$ (oorenk \angle; $CD \parallel PQ$) $\therefore \triangle ADC \parallel \triangle APQ$ ($\angle\angle\angle$)</p> <p>$\frac{AC}{AD} = \frac{AP}{AQ} = \frac{1}{3}$ (\parallel Δs)</p> <p>$CD = \frac{1}{3} PQ$ $CD = 20 \text{ cm}$ $MAAT AF = FC$ $AE = ED$ $FE = \frac{1}{2} CD$ $FE = 10 \text{ cm}$</p> <p>(Middelpuntstelling)</p>	
<p>(5)</p> <p>✓ eerste paar hoeke gelijk met rede ✓ tweede paar hoeke gelijk met rede</p> <p>✓ $FE = \frac{AP}{AQ}$</p> <p>✓ $\frac{PQ}{AP} = \frac{AF}{AQ}$</p> <p>✓ $\frac{AF}{AP} = \frac{1}{6}$</p> <p>✓ antwoord</p>	<p>In $\triangle AEF$ en $\triangle APQ$ \hat{A} is gemeenskaplik 1. $\hat{A} = \hat{A}$ 2. $\angle AEF = \angle APQ$ (oorenk \angle; $FE \parallel PQ$) 3. $\angle AFE = \angle APQ$ (oorenk \angle; $FE \parallel PQ$) $\therefore \triangle AEF \parallel \triangle APQ$ ($\angle\angle\angle$)</p> <p>$\frac{FE}{AF} = \frac{PQ}{AP}$ (\parallel Δs)</p> <p>$\frac{FE}{1} = \frac{60}{6}$</p> <p>$FE = 10 \text{ cm}$</p> <p>LET WEL: As die gelykvoornigheid nie aangetoon is nie: maks 3/5 punte</p>	<p>11.3</p>

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Approved
7/11/2011

Approved
07/11/2011

07 November 2011

Approved
M/S Bawon

This memorandum consists of 14 pages.

PUBLIC EXAMINATIONS PRIVATE BAG X 110 PRETORIA 0001 2011-11-02
DEPARTMENT OF BASIC EDUCATION

MARKS: 100

MATHEMATICS P3
 NOVEMBER 2011
 MEMORANDUM

GRADE 12

NATIONAL SENIOR CERTIFICATE

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

basic education



NOTE:

- If a candidate answers a question TWICE and does not delete any attempt, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent Accuracy applies in ALL aspects of the marking memorandum.
- A learner cannot use what s/he must prove to prove it (i.e. the circular argument).

QUESTION 1

<p>1.1</p> <p>$T_k^{k+1} = T_k - 2; k \geq 1; T_1 = 12$</p> <p>$T_1 = 12$</p> <p>$T_2 = 12 - 2 = 10$</p> <p>$T_3 = 10 - 2 = 8$</p> <p>$T_4 = 8 - 2 = 6$</p> <p>✓ 10</p> <p>✓ 8</p> <p>✓ 6</p> <p>(3)</p>	<p>1.2</p> <p>$12 + 10 + 8 + 6 + 4 + 2 + 0 + (-2) + (-4) + (-6) + (-8) + (-10) + (-12)$</p> <p>$= 0$</p> <p>$\therefore 13$ terms</p> <p>OR</p> <p>There are 6 positive terms before the 7th term, which is 0. We need 6 negative terms of equal value to the positive terms so that the sum is zero</p> <p>6 positive terms + 1 zero term + 6 negative terms = 13 terms</p> <p>OR</p> <p>$\frac{n}{2}[2(12) + (n-1)(-2)] = 0$</p> <p>$\frac{n}{2}[24 + 2 - 2n] = 0$</p> <p>$\frac{n}{2}[26 - 2n] = 0$</p> <p>$13n - n^2 = 0$</p> <p>$n(13 - n) = 0$</p> <p>$n \neq 0$ or $n = 13$</p>	<p>1.1</p> <p>1.2</p>
<p>✓ expansion</p> <p>✓ 13 terms</p> <p>(3)</p>	<p>Note:</p> <p>If a learner writes out $12 + 10 + 8 + 6 + 4 + 2 + 0$ then 1/3 marks</p> <p>Note:</p> <p>Answer only: FULL marks</p>	<p>OR</p> <p>There are 6 positive terms before the 7th term, which is 0. We need 6 negative terms of equal value to the positive terms so that the sum is zero</p> <p>6 positive terms + 1 zero term + 6 negative terms = 13 terms</p> <p>OR</p> <p>$\frac{n}{2}[2(12) + (n-1)(-2)] = 0$</p> <p>$\frac{n}{2}[24 + 2 - 2n] = 0$</p> <p>$\frac{n}{2}[26 - 2n] = 0$</p> <p>$13n - n^2 = 0$</p> <p>$n(13 - n) = 0$</p> <p>$n \neq 0$ or $n = 13$</p>
<p>✓ substitution into the arithmetic sum formula</p> <p>✓ $\frac{n}{2}[26 - 2n] = 0$</p> <p>✓ 13 terms</p> <p>(3)</p>	<p>✓ 13 terms</p> <p>(3)</p>	<p>(3)</p>

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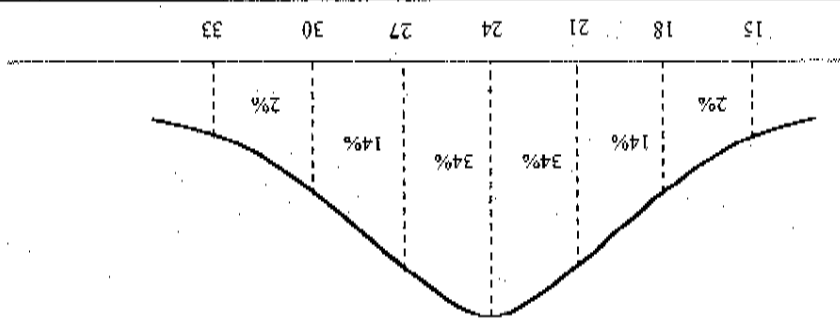
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<p>3.2 (4) ✓ answer $0,7 = 0,4 + k - 0,4k$ $0,3 = 0,6k$ $k = 0,5$</p>	<p>OR $P(A \text{ and } B) = P(A)P(B) = 0,4k$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,7 = 0,4 + k - 0,4k$ $0,3 = 0,6k$ $k = 0,5$</p>	<p>3.2 For independent events</p>
<p>3.1 (2) ✓ answer $0,7 = 0,4 + k$</p>	<p>NOTE: If the candidate writes down $k = 1 - 0,7 = 0,3$: 0/2 marks</p> <p>NOTE: Answer only: FULL marks</p> <p>For mutually exclusive events $P(A \text{ or } B) = P(A) + P(B)$ $0,7 = 0,4 + k$ $k = 0,3$</p>	<p>3.1 For mutually exclusive events</p>

QUESTION 3

<p>2.4 (1) ✓ sensible explanation of random sample</p>	<p>This sampling method is biased towards those who arrive early on a Monday morning. In this way all the learners in the Grade do not have the same chance of being selected for the sample.</p>	<p>2.4</p>
<p>2.3 (2) ✓ Cumulative Frequency value read off the graph when less than 80 ✓ answer</p>	<p>OR $15 \times 5 = 75$ learners in the grade to have a weight of less than 80 kg. One would expect 15 learners in the sample have a weight of less than 80 kg. $\frac{15}{50} \times 250 = 75$ learners in the grade to have a weight of less than 80 kg.</p>	<p>2.3</p>
<p>2.2 (1) ✓ answer</p>	<p>NOTE: Accept a range from 86 to 89 kg Approximately 88 kg</p>	<p>2.2</p>
<p>2.1 (1) ✓ answer</p>	<p>$42 - 28 = 14$</p>	<p>2.1</p>

QUESTION 2

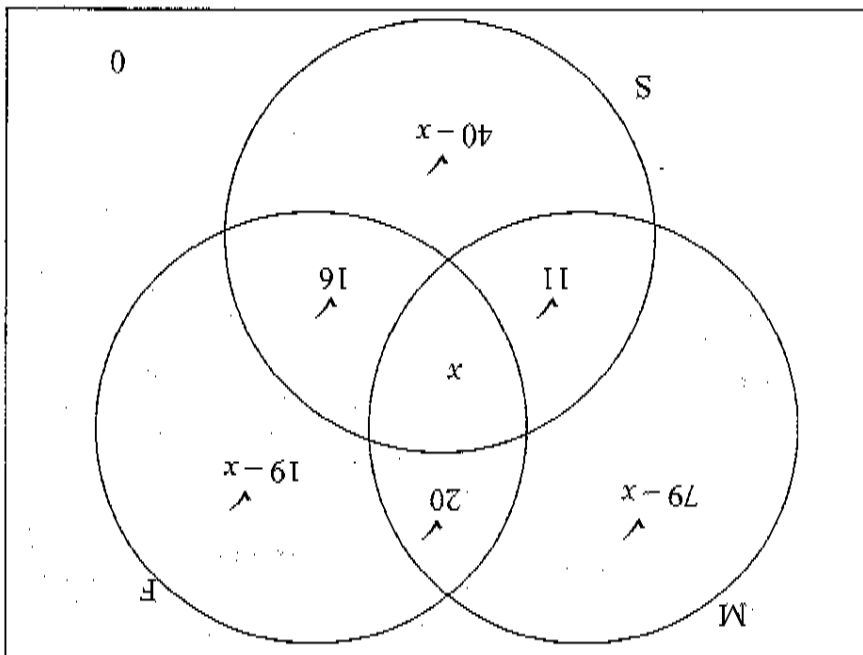


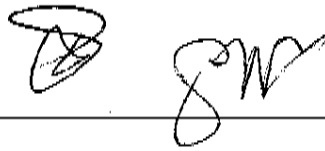
4.1	21 minutes is 1 standard deviation from the mean ∴ 34% of the pizzas are delivered between 21 and 24 minutes	Note: Answer only: FULL marks	✓ 1 standard deviation ✓ 34%	(2)
4.2	15 minutes is 3 standard deviations to the left of the mean ∴ 50% 27 minutes is 1 standard deviation to the right of the mean ∴ 34% 84% of the pizzas are delivered between 15 and 27 minutes	Note: Answer only: FULL marks	✓ 50% ✓ 34% ✓ 84%	(3)
4.3	The required 2% is the area found to the right of 2 standard deviations on the right hand side of the mean. Maximum for delivery should be $24 + 2(3) = 30$ minutes	Note: Answer only: FULL marks	✓ 2 standard deviations ✓ $24 + 2(3) = 30$	(3)

QUESTION 5

5.1	Number of unique codes $= 7 \times 7 \times 7 = 343$	Note: Answer only: FULL marks	✓ $7 \times 7 \times 7$ ✓ answer	(2)
5.2	Number of unique codes without repetition $= 7 \times 6 \times 5 = 210$	Note: Answer only: FULL marks	✓ $7 \times 6 \times 5$ ✓ $\frac{7!}{4!}$ ✓ answer	(2)
5.3	Number of codes with repetition that are greater than 300 and divisible by 5 $= 4 \times 7 \times 2 - 1 = 55$ OR For a 100 numbers there are 14 numbers divisible by 5 $14 \times 4 = 56$ $56 - 1 = 55$	Note: • No CA marking for the answer. • Answer only 3/3 marks	✓ $4 \times 7 \times 2$ ✓ -1 ✓ answer ✓ 14×4 ✓ -1 ✓ answer	(3)

QUESTION 6

<p>6.1</p>  <p> \checkmark 79 - x \checkmark 20 \checkmark 19 - x \checkmark 11 \checkmark 16 \checkmark 40 - x </p> <p>(6)</p>	<p>6.2</p> <p> $79 - x + 20 + x + 11 + 19 - x + 16 + 40 - x = 173$ $185 - 2x = 173$ $x = 6$ </p> <p> \checkmark addition \checkmark 173 \checkmark answer </p> <p>(3)</p>	<p>6.3</p> <p> OR 232 complaints and 173 people in total 94 complaints from 47 people 138 complaints from remaining 126 people For the two to be equal $126 - x = 138 - 3x$ $2x = 12$ $x = 6$ </p> <p> OR $110 + 55 + 67 = 232$ $2x + 20 + 11 + 16 = 232 - 173$ $2x + 47 = 59$ $2x = 12$ $x = 6$ </p> <p> P(at least two complaints) $= \frac{11 + 20 + 6 + 16}{173}$ $= \frac{53}{173}$ $= 0,31$ OR 30,64% (0,30635838...) </p> <p> Note: Check the reasonableness of the answer. </p> <p> \checkmark 126 - x and 138 - 3x \checkmark 126 - x = 138 - 3x \checkmark answer </p> <p>(3)</p>	<p>6.3</p> <p> P(at least two complaints) $= \frac{11 + 20 + 6 + 16}{173}$ $= \frac{53}{173}$ $= 0,31$ OR 30,64% (0,30635838...) </p> <p> \checkmark 11 + 20 + 6 + 16 \checkmark 173 \checkmark answer </p> <p>(3)</p> <p>[12]</p>
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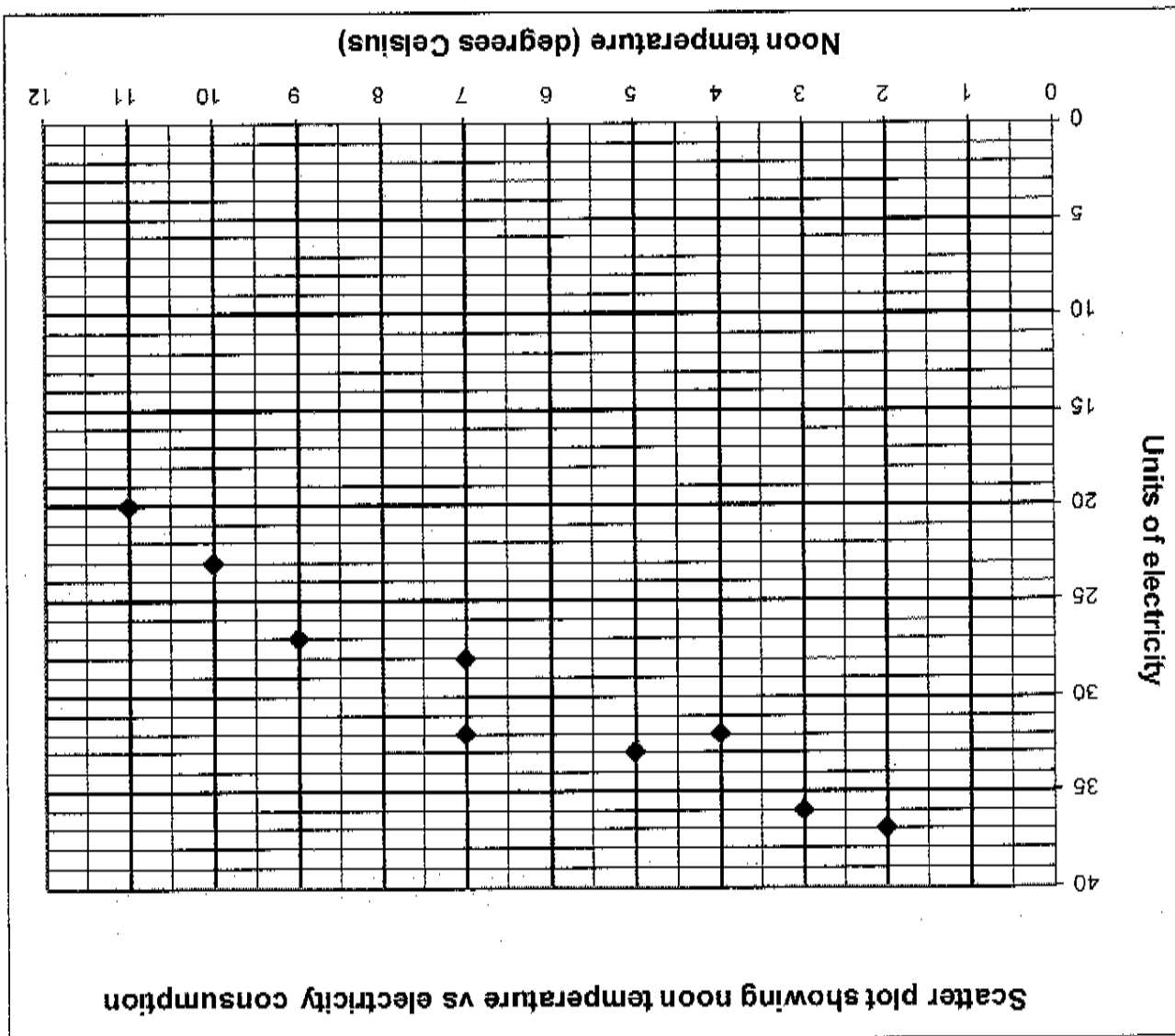
7.1

See scatter plot above

Note: Please ignore the point (0 ; 41).

✓✓ all 9 points plotted correctly
 2 marks if 5 - 8 points are plotted correctly
 1 mark if 1 - 4 points are plotted correctly.

(3)




Units of electricity used	Noon temperature (in °C)
2	37
3	36
4	32
5	33
7	32
7	28
9	27
10	23
20	11

QUESTION 7

<p>7.2</p> <p>$a = 40,97$ $b = -1,74$ $\hat{y} = 40,97 - 1,74x$</p> <p>Note:</p> <ul style="list-style-type: none"> • Penalise 1 mark for incorrect rounding to ONE decimal place in either 7.2 or 7.3 • Answer only: FULL marks <p>If the candidate works the coefficients out manually that $b = \frac{-204,2}{117,6}$ then 2 marks for b.</p> <p>✓✓ a ✓✓ b ✓ equation</p> <p>(4)</p>	<p>7.3</p> <p>$r = -0,97$ (-0,9699269087...)</p> <p>✓✓ answer</p> <p>(2)</p> <p>NOTE: If the candidate gives $b = \frac{6,139218}{3,42928}$ r and not simplified then 1 mark.</p>	<p>7.4</p> <p>OR</p> <p>As the noon temperature increases, the units of electricity used decreases.</p> <p>OR</p> <p>As the noon temperature decreases, the units of electricity used increases.</p> <p>OR</p> <p>There is a strong negative correlation between the noon temperature and the units of electricity used.</p> <p>✓✓ strong ✓ negative</p> <p>(2)</p> <p>✓✓ as noon temp increases & units decrease</p> <p>(2)</p> <p>✓✓ as noon temp decreases & units increases</p> <p>(2)</p>	<p>7.5</p> <p>$\hat{y} \approx 40,97 - 1,74(8)$ $\approx 27,05$</p> <p>OR</p> <p>$\hat{y} \approx 27,0799 \approx 27,08$</p> <p>Note:</p> <ul style="list-style-type: none"> • Answer only: 2/2 marks • Accept a range of 26,5 – 27,5 if the least squares regression line is drawn and the answer is read off: 2/2 marks <p>✓ substitution ✓ answer</p> <p>(2)</p> <p>[13]</p>
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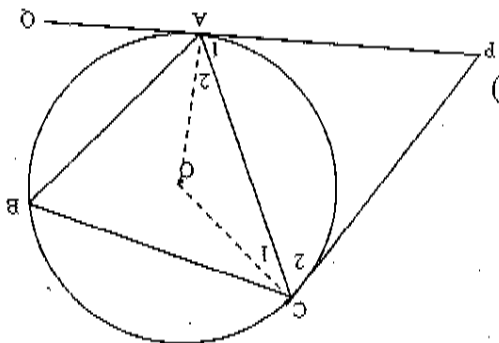
MS




OR

$$\begin{aligned} &= CBA \\ \hat{A}_1 &= \frac{1}{2} \text{COA} \\ &= 2\hat{A}_1 \\ &= \hat{A}_1 + \hat{A}_1 \\ &= \hat{A}_1 + \hat{C}_2 \end{aligned}$$

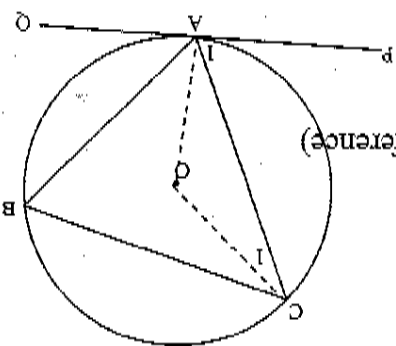
COA = 180° - (90° - \hat{A}_1 + 90° - \hat{C}_2)
 \hat{A}_1 + \hat{A}_2 = 90° (tan \perp radius)
 (\angle \text{circ cent} = 2 \angle \text{circumf})
 COA = 2\hat{A}BC
 \hat{C}_2 = \hat{A}_1 (\angle s \text{ opp} = \text{sides})
 PC = PA (tan from comm pt)



Draw QA extend to P. Draw tangent CP at C.
 OR

NOTE:
 If there is no construction: 0 / 5 marks
 If candidate changes lettering and states "Similarly": full marks

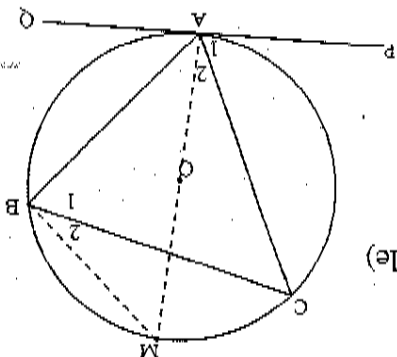
$$\begin{aligned} \text{Let } \hat{A}_2 &= x \\ \text{Draw radii OC and OA} \\ \hat{C}_1 &= x (\angle \text{opp} = \text{radii}) \\ \hat{A}_1 &= 90^\circ - x (\text{rad } \perp \text{tan}) \\ \hat{A}OC &= 180^\circ - 2x (\angle \text{sum } \Delta) \\ \hat{A}BC &= 90^\circ - x (\angle \text{circ cent} = 2 \angle \text{circumference}) \\ \hat{A}BC &= \hat{A}_1 (= 90^\circ - x) \end{aligned}$$



Draw radii OC and OA

OR

$$\begin{aligned} \hat{A}_1 + \hat{A}_2 &= 90^\circ (\text{rad } \perp \text{tangent}) \\ \hat{B}_1 + \hat{B}_2 &= 90^\circ (\angle s \text{ in a semi circle}) \\ \hat{B}_2 &= \hat{A}_2 (\angle s \text{ in same seg}) \\ \hat{B}_1 &= \hat{A}_1 \end{aligned}$$



Draw diameter AM and join M to B.

8.1

(5)

- ✓ construction
- ✓ S/R
- ✓ S/R
- ✓ \hat{A}_1 + \hat{A}_2 = 90°
- ✓ tan \perp radius

(5)

- ✓ construction
- ✓ \hat{A}_1 = 90° - x
- ✓ rad \perp tan
- ✓ S/R
- ✓ S/R

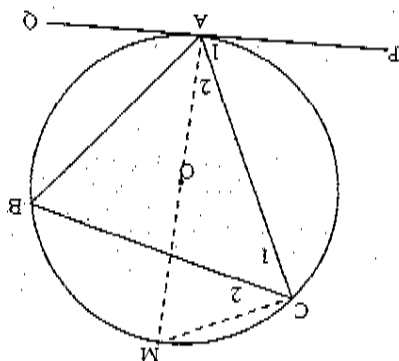
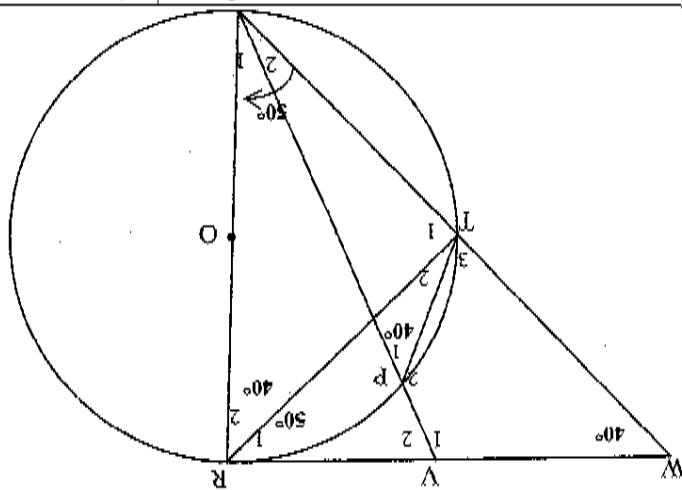
(5)

- ✓ construction
- ✓ S/R
- ✓ \hat{B}_1 + \hat{B}_2 = 90°
- ✓ \angle s \text{ in a semi circle}
- ✓ S/R

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<p>(1)</p> <p>✓ S/R</p> <p>✓ statement</p>	<p>8.2.1</p> <p>WRS = 90° (tan ⊥ radius)</p>	<p>8.2.1</p> <p>WRS = 90°</p>
<p>(2)</p> <p>✓ S/R</p> <p>✓ W = 40°</p> <p>✓ W + R₁ = T₁</p> <p>✓ W = 40°</p>	<p>8.2.2</p> <p>RST = 50° (tan ch th)</p> <p>W = 40° (∠ sum Δ)</p> <p>OR</p> <p>T₁ = 90° (∠s in semi circle)</p> <p>W + R₁ = T₁ (ext ∠ Δ)</p> <p>W = 40°</p>	<p>8.2.2</p> <p>RST = 50°</p> <p>W = 40°</p> <p>OR</p> <p>T₁ = 90°</p> <p>W + R₁ = T₁</p> <p>W = 40°</p>
<p>(3)</p> <p>✓ ∠s in same seg</p> <p>✓ R₂ = 40°</p> <p>✓ P₁ = 40°</p>	<p>8.2.3</p> <p>(tan ⊥ radius)</p> <p>∠s in same seg</p> <p>R₂ = 40°</p> <p>P₁ = 40°</p>	<p>8.2.3</p> <p>R₂ = 40°</p> <p>P₁ = 40°</p>



Draw diameter AM and Join M and C

MCA = 90° (∠s in semi circle)

AMC + A₂ = 90° (∠ sum Δ)

A₁ + A₂ = 90° (rad ⊥ tangent)

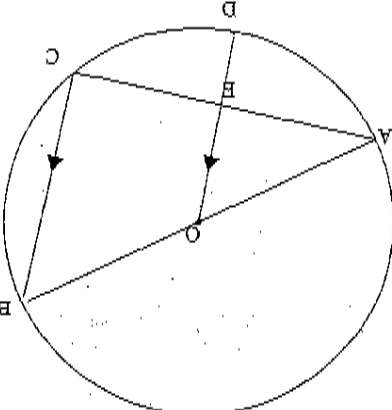
AMC = A₁

AMC = B (∠s in same seg)

A₁ = B

<p>(4) ✓ $P_1 = W$ ✓ WVPT is a cyclic quadrilateral ✓ $\angle = \text{int opp}$ ✓ ext \angle cyclic quad</p> <p>(4) ✓ \angles in semi circle ✓ \angles in same seg ✓ $T_2 = S_1$ ✓ $PTS = 90^\circ + T_2$</p> <p>(4) ✓ $P_2 = 140^\circ$ (\angles on str line) ✓ $W + P_2 = 180^\circ$ ✓ WVPT is cyclic quad (opp \angles suppl) ✓ opp \angle suppl ✓ ext \angle cyclic quad</p> <p>(4) ✓ \angles in same seg ✓ $T_2 = S_1$ ✓ $PTS = 90^\circ + T_2$</p> <p>(4) ✓ $P_1 = W$ ✓ WVPT is a cyclic quadrilateral ✓ \angles in same seg ✓ S_2 is common ✓ \angle sum Δ</p>	<p>(4) ✓ $P_1 = W$ ($= 40^\circ$) ✓ $P_1 = W$ ✓ S_2 is common ✓ \angle sum Δ</p> <p>(4) ✓ $P_1 = W$ ✓ $P_2 = 140^\circ$ (\angles on str line) ✓ $W + P_2 = 180^\circ$ ✓ WVPT is cyclic quad (opp \angles suppl) ✓ $V_1 = PTS$ (ext \angle cyclic quad)</p> <p>(4) ✓ $P_1 = W$ ✓ $P_2 = 140^\circ$ (\angles on str line) ✓ $W + P_2 = 180^\circ$ ✓ WVPT is cyclic quad (opp \angles suppl) ✓ $V_1 = PTS$ (ext \angle cyclic quad)</p> <p>(4) ✓ $P_1 = W$ ✓ $P_2 = 140^\circ$ (\angles on str line) ✓ $W + P_2 = 180^\circ$ ✓ WVPT is cyclic quad (opp \angles suppl) ✓ $V_1 = PTS$ (ext \angle cyclic quad)</p> <p>(4) ✓ $P_1 = W$ ✓ $P_2 = 140^\circ$ (\angles on str line) ✓ $W + P_2 = 180^\circ$ ✓ WVPT is cyclic quad (opp \angles suppl) ✓ $V_1 = PTS$ (ext \angle cyclic quad)</p>	<p>8.2.4</p>
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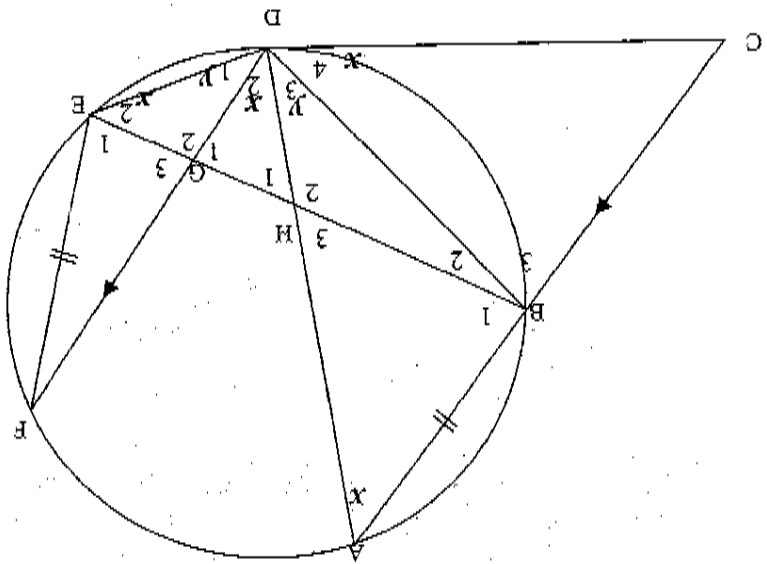
<p>[5]</p> <p>✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ midpoint theorem ✓ $OE = 6$ cm ✓ $ED = 4$ cm</p> <p>[5]</p> <p>✓ $\angle C = 90^\circ$ ✓ $BC = 12$ ✓ reason ✓ $OE = 6$ cm ✓ $ED = 4$ cm</p>	 <p>✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ line from circ cent \perp ch bis ch (Pythagoras) ✓ $AE = 8$ cm ✓ $OE = 6$ cm ✓ $ED = 10 - 6 = 4$ cm</p> <p>OR</p> <p>✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ $OE \parallel BC$ (given) ✓ $OA = OB$ (radii) ✓ $AE = EC = 8$ cm (midpoint theorem) ✓ $OE = 6$ cm (Pythagoras) ✓ $ED = 10 - 6 = 4$ cm</p> <p>OR</p> <p>✓ $\angle C = 90^\circ$ ✓ $\angle OEA = 90^\circ$ ✓ $OE \parallel BC$ (corres \angles; $OD \parallel BC$) ✓ \angles in semi circle ✓ $OE = \frac{1}{2} BC$ (midpoint theorem) ✓ $OD = 10$ cm ✓ $ED = 10 - 6 = 4$ cm</p> <p>OR</p> <p>✓ $\angle C = 90^\circ$ ✓ \angles in semi circle ✓ $BC^2 = (20)^2 - (16)^2 = 144$ ✓ $BC = 12$ ✓ $OE = \frac{1}{2} BC$ (midpoint theorem) ✓ $OE = 6$ cm ✓ $ED = 10 - 6 = 4$ cm</p>	<p>9.</p>
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QUESTION 9



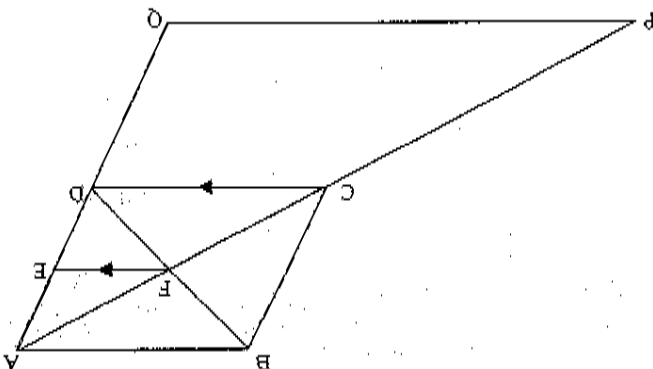
Handwritten marks: a circle and the letters 'MS'.

<p>[13]</p> <p>(2)</p> <p>$\checkmark \frac{FE}{FD} = \frac{BH}{BD}$</p> <p>$\checkmark FE = AB$</p>	<p>$\frac{FE}{FD} = \frac{BH}{BD}$ ($\parallel \Delta s$)</p> <p>But $FE = AB$ (given)</p> <p>$\frac{AB}{FD} = \frac{BH}{BD}$</p> <p>$AB \cdot BD = FD \cdot BH$</p>	<p>10.3</p>
<p>(5)</p> <p>$\checkmark \angle B_2 = \hat{F}$</p> <p>$\checkmark \angle s$ in same seg</p> <p>$\checkmark \hat{D}_3 = \hat{D}_1$</p> <p>$\checkmark =$ chs subt = $\angle s$</p> <p>$\checkmark \angle \angle \angle \angle$</p>	<p>In ΔBHD and ΔFED</p> <p>1. $\hat{B}_2 = \hat{F}$ ($\angle s$ in same seg)</p> <p>2. $\hat{D}_3 = \hat{D}_1$ (= chs subt = $\angle s$)</p> <p>$\Delta BHD \parallel \Delta FED$ ($\angle \angle \angle$)</p>	<p>10.2</p>
<p>(6)</p> <p>$\checkmark \hat{A} = x$</p> <p>\checkmark tan ch th</p> <p>$\checkmark \hat{E}_2 = x$</p> <p>\checkmark reason</p> <p>$\checkmark \hat{D}_2 = x$</p> <p>\checkmark alt $\angle s$; $CA \parallel DF$</p>	<p>$\hat{A} = \hat{D}_4 = x$ (tan ch th)</p> <p>$\hat{E}_2 = x$ (tan ch th) OR ($\angle s$ in same seg)</p> <p>$\hat{D}_2 = \hat{A} = x$ (alt $\angle s$; $CA \parallel DF$)</p>	<p>10.1</p>



QUESTION 10

Handwritten marks/signatures



<p>(3) ✓ ratios equal</p> <p>✓ CD PQ</p> <p>✓ reason: converse</p> <p>prop th and conclusion (3)</p> <p>✓ $\frac{AF}{AP} = \frac{1}{6}$</p> <p>✓ $\frac{AF}{AE} = \frac{AF}{AP} = \frac{1}{6}$</p> <p>✓ $\frac{AF}{AE} = \frac{AQ}{AP}$</p> <p>✓ conv prop theorem</p>	<p>OR</p> <p>$\frac{AF}{AP} = \frac{1}{6}$</p> <p>$\frac{AF}{AE} = \frac{1}{6}$</p> <p>$\frac{AQ}{AP} = \frac{1}{6}$</p> <p>$\frac{AF}{AE} = \frac{AQ}{AP}$</p> <p>OR</p> <p>$\frac{AC}{1} = \frac{AF}{3}$</p> <p>$\frac{AD}{1} = \frac{AQ}{3}$</p> <p>$\frac{AC}{AD} = \frac{AF}{AQ}$</p> <p>CD PQ (converse proportionality theorem)</p> <p>CD FE (given)</p> <p>∴ PQ FE</p> <p>OR</p> <p>$\frac{AC}{1} = \frac{AF}{3}$</p> <p>$\frac{AD}{1} = \frac{AQ}{3}$</p> <p>$\frac{AC}{AD} = \frac{AF}{AQ}$</p> <p>CD PQ (converse proportionality theorem)</p> <p>CD FE (given)</p> <p>∴ PQ FE</p>
<p>✓ AF = FC</p> <p>✓ reason</p> <p>(2)</p>	<p>11.1 AF = FC</p> <p>FE CD</p> <p>AE = FD</p> <p>(diags of parallelogram bisect)</p> <p>(Prop Th: FE CD) OR (Midpoint Theorem)</p> <p>11.2 $\frac{AC}{1} = \frac{AF}{2}$</p> <p>$\frac{AD}{1} = \frac{DQ}{2}$ (given)</p> <p>$\frac{AC}{AD} = \frac{AF}{DQ}$</p> <p>CD PQ</p> <p>CD FE (given)</p> <p>∴ PQ FE</p>

QUESTION 11

MS

TOTAL: 100

<p>(5) [10]</p> <p>✓ first pair of angles equal with reason ✓ second pair of angles equal with reason ✓ answer</p> <p>✓ $AF = \frac{1}{6} AP$ ✓ $\frac{AP}{AF} = \frac{6}{1}$ ✓ $\frac{PQ}{AP} = \frac{FE}{AF}$ ✓ answer</p>	<p>In $\triangle AEF$ and $\triangle APQ$</p> <p>1. \hat{A} is common 2. $\hat{AFE} = \hat{APQ}$ (corres \angles; $FE \parallel PQ$) 3. $\hat{AEF} = \hat{APQ}$ (corres \angles; $FE \parallel PQ$) $\therefore \triangle AEF \parallel \triangle APQ$ ($\angle\angle\angle$)</p> <p>$\frac{FE}{AF} = \frac{PQ}{AP}$ (\parallel Δs)</p> <p>$\frac{60}{1} = \frac{6}{1}$ $60 = 6$ FE = 10 cm</p> <p>NOTE: If the similarity has not been proven, then max 3/5 marks</p>	<p>11.3</p>
<p>(5)</p> <p>✓ first pair of angles equal with reason ✓ second pair of angles equal with reason ✓ answer</p> <p>✓ $CD = \frac{1}{3} PQ$ ✓ $FE = \frac{1}{2} CD$ ✓ answer</p>	<p>In $\triangle ADC$ and $\triangle APQ$</p> <p>1. \hat{A} is common 2. $\hat{ADC} = \hat{APQ}$ (corres \angles; $CD \parallel PQ$) 3. $\hat{ACD} = \hat{APQ}$ (corres \angles; $CD \parallel PQ$) $\therefore \triangle ADC \parallel \triangle APQ$ ($\angle\angle\angle$)</p> <p>$\frac{AC}{AD} = \frac{AP}{AQ} = \frac{1}{3}$ (\parallel Δs)</p> <p>$CD = \frac{1}{3} PQ$ $CD = 20$ cm But $AF = FC$ $AE = ED$ (Midpoint Theorem) $FE = \frac{1}{2} CD$ FE = 10 cm</p>	<p>OR</p>