Graad 7 – Boek C

(Onderwysers Handleiding)

(Hersiene KABV uitgawe)

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Hierdie boek is in 2013 opgestel en verwerk deur E.J. Du Toit.
Hersiene uitgawe 2020. Nuutste uitgawe 2022.

Kontak: info@abcbooks.co.za

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ISBN 978-1-919957-28-9

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Hoofstuk C2

Meetkunde van 2-D vorms

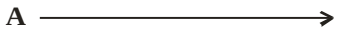
C2.1 Lyne en hoeke:

C2.1.1 Klassifikasie van lyne:

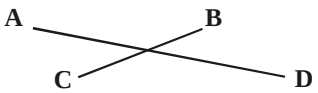
(1) Lyn: ′n Oneindige stel punte met geen definitiewe begin of eindpunt nie.

(2) Lynsegment: ′n Oneindige stel punte met ′n definitiewe begin en eindpunt.

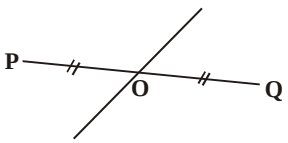
(3) Straal: ′n Oneindige stel punte met ′n definitiewe beginpunt maar geen definitiewe eindpunt nie.



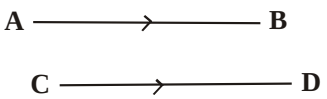
(4) Snylyne: Twee lyne wat mekaar sny.
∴ AD sny BC.



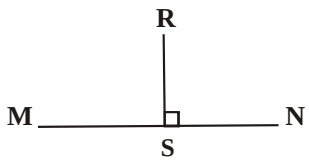
(5) Halveerlyne: Een lyn sny ′n ander lyn presies in die middel.
∴ PO = OQ.



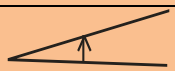
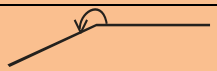
(6) Ewewydige lyne: Twee of meer lyne wat altyd ewe ver van mekaar af is. Die lyne sal dus nooit kruis nie. ∴ AB // CD.



(7) Loodregte lyne: ′n Lyn is loodreg op ′n ander lyn as dit ′n hoek van 90° maak met die lyn. ∴ RS ⊥ MN.



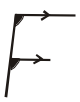
C2.1.2 Hoeke:

Tipe hoek:	Voorbeeld:	Hoekgrootte:
Skerphoek		Groter as 0° maar kleiner as 90°.
Regte hoek		Gelyk aan 90°.
Stomphoek		Groter as 90° maar kleiner as 180°.
Gestrekte hoek		Gelyk aan 180°.
Inspringende hoek		Groter as 180° maar kleiner as 360°.
Omwenteling		Gelyk aan 360°.

C2.1.3 Ewewydige lyne:

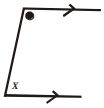
As twee lyne ewewydig aan mekaar is, sal die volgende geld:

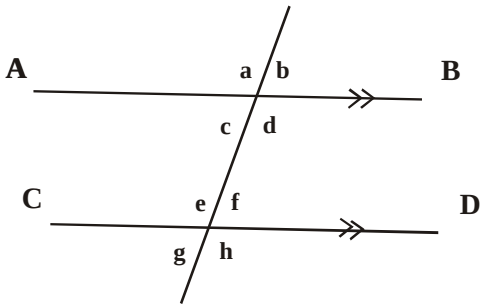
(1) Ooreenkomstige hoeke:
Bv. a = e ; b = f ;
c = g en d = h



(2) Verwisselende hoeke:
Bv. e = d ; c = f ;
a = h en b = g

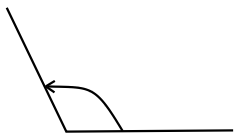
(3) Ko-binnehoeke:
Bv. c + e = 180° en
d + f = 180°



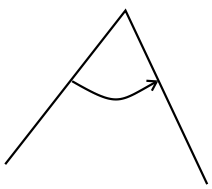


Oefening 1: Datum: _____

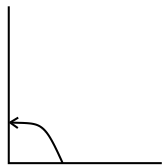
(1) Klassifiseer elk van die volgende hoeke sonder om dit te meet:

(a) 

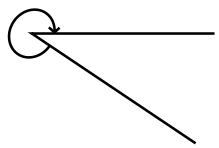
Stomphoek

(b) 

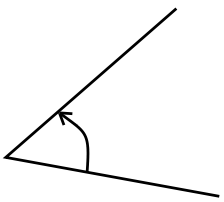
Skerphoek

(c) 

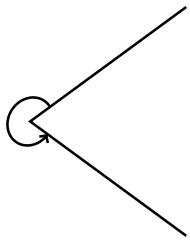
Regte hoek

(d) 

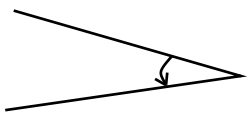
Inspringende hoek

(e) 

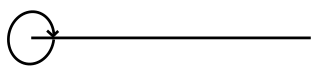
Skerphoek

(f) 

Inspringende hoek

(g) 

Skerphoek

(h) 

Omwenteling

(2) Klassifiseer die volgende pare hoeke as ooreenkomstig, verwissellend of ko-binnehoeke:

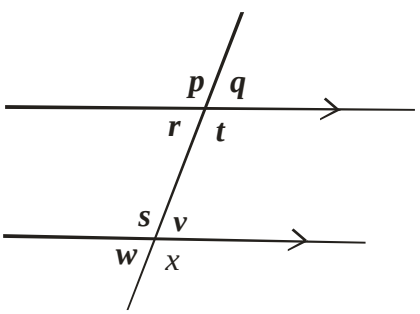
(a) p en s: **Ooreenkomstige hoeke**

(b) s en r: **Ko-binnehoeke**

(c) v en r: **Verwissellende hoeke**

(d) t en x: **Ooreenkomstige hoeke**

(e) q en v: **Ooreenkomstige hoeke**



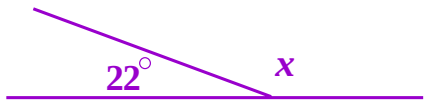
(3) Klassifiseer elk van die volgende hoeke:

(a) 56°	(b) 234°	(c) 180°
Skerphoek	**Inspringende hoek**	**Gestrekte hoek**
(d) 148°	(e) 200°	(f) 89°
Stomphoek	**Inspringende hoek**	**Skerphoek**
(g) 360°	(h) 4°	(i) 111°
Omwenteling	**Skerphoek**	**Stomphoek**

C2.1.4 Toepassings:

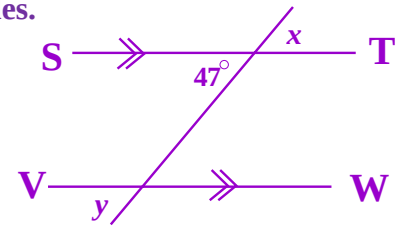
Vb.1 Bereken die waarde(s) van x en/of y. Gee volledige redes.

(a)



Bewering:	Rede:
$x = 180° - 22°$	Aang $\angle^e$ op reguitlyn
$\therefore x = 158°$	

(b)

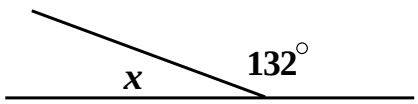


Bewering:	Rede:
$x = 47°$	Regoorstaande $\angle^e$
$y = 47°$	Ooreenkomstige $\angle^e$; ST//VW

Oefening 2: Datum: _____

Bereken die waarde(s) van x en/of y. Gee volledige redes

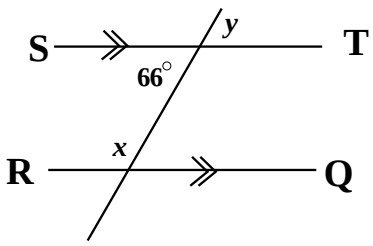
(1)



$x + 132° = 180°$ [Aang $\angle^e$ op reguitlyn]

$\therefore x = 180° - 132°$ $\rightarrow$ $x = 48°$

(2)



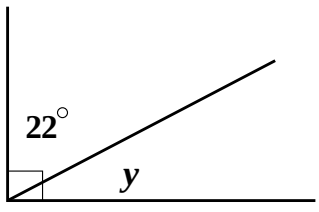
$y = 66°$ [Regoorstaande $\angle^e$]

$x + 66° = 180°$ [Ko-binne $\angle^e$ ST//RQ]

$\therefore x = 180° - 66°$

$\therefore x = 114°$

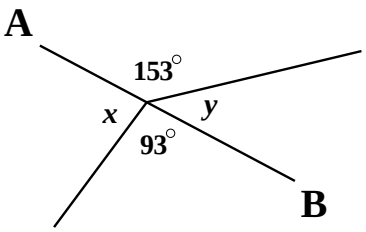
(3)



$y + 22° = 90°$ [Regtehoek]

$\therefore y = 90° - 22°$ $\rightarrow$ $x = 68°$

(4)



AB is ′n reguitlyn.

$y + 153° = 180°$ **[Aang ∠e op reguitlyn]**

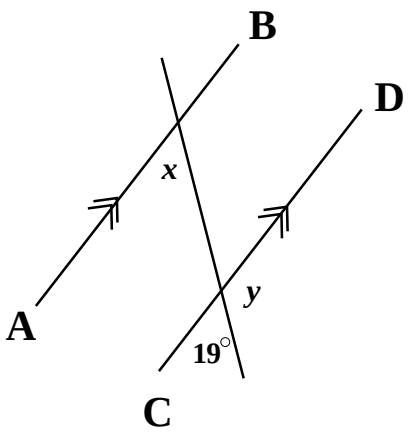
$\therefore\ y = 180° - 153° \rightarrow x = 27°$

$x + 153° + 27° + 93° = 360°$ **[Omwenteling]**

$\therefore\ x = 360° - 153° - 27° - 93°$

$\therefore\ x = 87°$

(5)



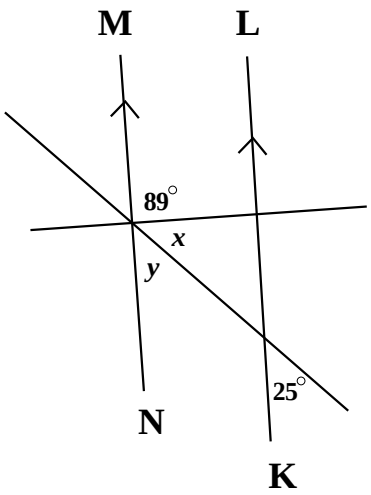
$x = 19°$ **[Ooreenk ∠e ; AB//CD]**

$y + 19° = 180°$ **[Aang ∠e op reguitlyn]**

$\therefore\ y = 180° - 19°$

$\therefore\ y = 161°$

(6)



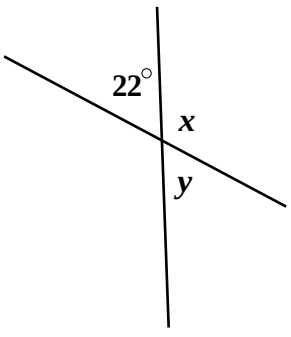
$y = 25°$ **[Ooreenk ∠e; MN//KL]**

$x + y + 89° = 180°$ **[Aang ∠e op reguitlyn]**

$\therefore\ x = 180° - 25° - 89°$

$\therefore\ x = 66°$

(7)



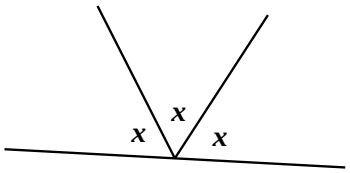
$y = 22°$ **[Regoorstaande ∠e]**

$x + 22° = 180°$ **[Aang ∠e op reguitlyn]**

$\therefore\ x = 180° - 22°$

$\therefore\ x = 158°$

(8)



$x + x + x = 180°$ **[Aang $\angle^{e}$ op reguitlyn]**

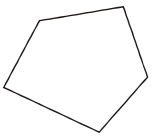
$\therefore 3x = 180°$

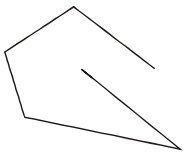
$\therefore \quad x = \frac{180°}{3}$

$\therefore \ x = 60°$

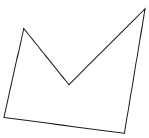
C2.2 Veelhoeke:

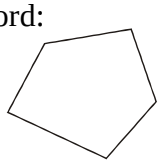
Veelhoeke is geslote figure met ′n sekere aantal sye en hoeke.

Geslote figuur: 

Nie geslote figuur: 

Veelhoeke kan dan ook as konkaaf of konveks geklassifiseer word:

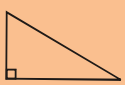
Konkaaf: 

Konveks: 

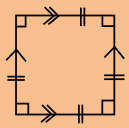
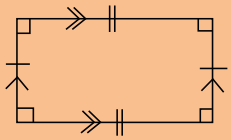
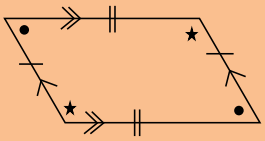
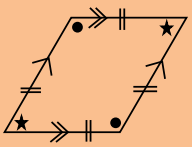
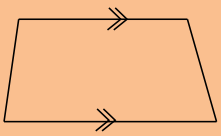
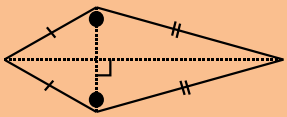
Veelhoeke word geklassifiseer volgens die aantal hoeke en sye wat dit het.

* Driehoeke is geslote figure met drie hoeke en drie sye.
* Vierhoeke is geslote figure met vier hoeke en vier sye.
* Vyfhoeke is geslote figure met vyf hoeke en vyf sye…..ens.

C2.2.1 Tipes driehoeke:

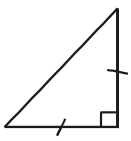
Tipe driehoek:	Voorbeeld:	Beskrywing:
Reghoekige driehoek		* Een hoek is gelyk aan 90°.
Skerphoekige driehoek		* Al die hoeke is skerphoeke.
Stomphoekige driehoek		* Een van die hoeke is ′n stomphoek.
Gelykbenige driehoek		* Twee van die sye is ewe lank. * Die hoeke teenoor die gelyke sye is ewe groot.
Gelyksydige driehoek		* Al drie die sye is ewe lank. * Al die hoeke is gelyk aan 60°.
Ongelyksydige driehoek		* Al drie die sye is verskillende lengtes.

C2.2.2 Tipes vierhoeke:

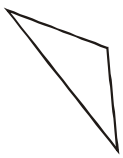
Tipe vierhoek:	Voorbeeld	Eienskappe:
Vierkant		* Al die sye is ewe lank. * Die teenoorstaande sye is ewewydig. * Al die hoeke is 90°.
Reghoek		* Teenoorstaande sye is ewe lank en ewewydig. * Al die hoeke is 90°.
Parallelogram		* Teenoorstaande sye is ewe lank en ewewydig. * Die teenoorstaande hoeke is ewe groot.
Ruit		* Al die sye is ewe lank. * Die teenoorstaande sye is ewewydig. * Die teenoorstaande hoeke is ewe groot.
Trapesium		* Slegs een paar teenoorstaande sye is ewewydig.
Vlieër		* Twee pare aangrensende sye is ewe lank. * Een paar teenoorstaande hoeke is ewe groot. * Hoeklyne is loodreg op mekaar.

Oefening 3: Datum: _____

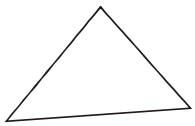
(1) Klassifiseer elk van die volgende driehoeke volgens hul hoeke:

(a) 

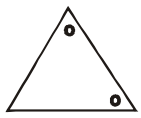
Reghoekige Δ

(b) 

Stomphoekige Δ

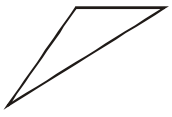
(c) 

Skerphoekige Δ

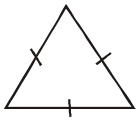
(d) 

Skerphoekige Δ

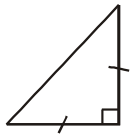
(2) Klassifiseer elk van die volgende driehoeke volgens hul sye:

(a) 

Ongelyksydige Δ

(b) 

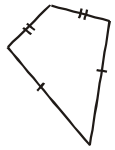
Gelyksydige Δ

(c) 

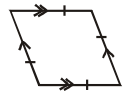
Gelykbenige Δ

(3) Klassifiseer elk van die volgende vierhoeke:

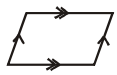
(a) **Reghoek**

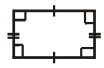
(b)  **Vlieër**

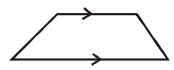
(c) **Trapesium**

(d)  **Ruit**

(e) **Vierkant**

(f)  **Parallelogram**

(g)  **Reghoek**

(h)  **Trapesium**

(4) Benoem elk van die volgende:

(a) Hoek A: **Regte hoek**

(b) Vierhoek ABCD: **Reghoek**

(c) Driehoek AEB: **Reghoekige driehoek**

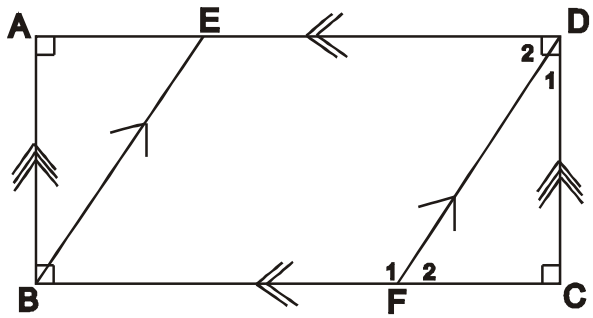
(d) Hoek $\hat{F}_1$: **Stomphoek**

(e) Vierhoek BEDF: **Parallelogram**

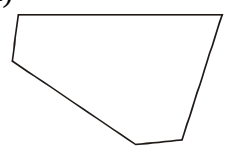
(f) Hoek $\hat{D}_1$: **Skerphoek**

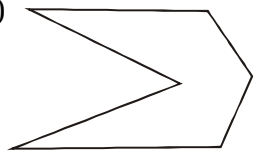
(g) Vierhoek EDCB: **Trapesium**

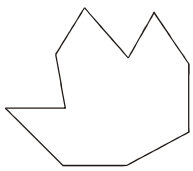
(h) Hoeke $\hat{D}_2$ en $\hat{F}_2$: **Verwissellende hoeke**

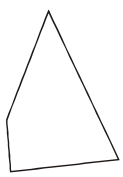


(5) Benoem die volgende veelhoeke: Bv. konkawe vyfhoek

(a)  **Konveks** **Vyfhoek**

(b)  **Konkaaf** **Seshoek**

(c)  **Konkaaf** **Tienhoek**

(d)  **Konveks** **Vierhoek**

(6) Voltooi die volgende:

(a) 'n Ruit is 'n parallelogram waarvan **al vier sye ewe lank is.**

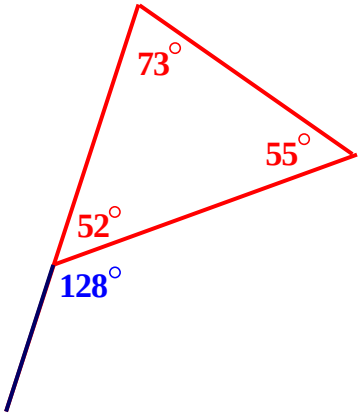
(b) 'n Vierkant is 'n reghoek waarvan **al die sye ewe lank is.**

(c) 'n Parallelogram is 'n vierhoek waarvan **die teenoorstaande sye ewewydig / ewe lank is.**

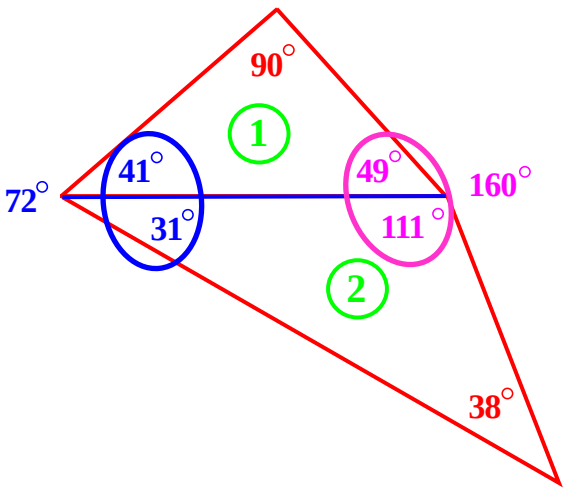
(d) 'n Vierkant is 'n ruit waarvan **al die hoek negentig grade (90°) is.**

(e) 'n Trapesium is 'n vierhoek waarvan **een paar teenoorstaande sye ewewydig is.**

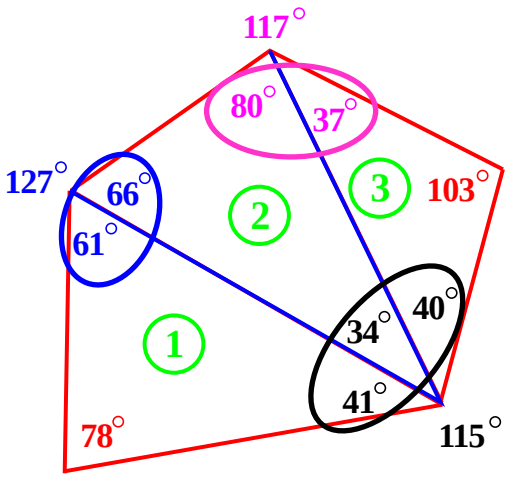
Oefening 3 nr.1(a) en (b)
Moontlike antwoord!



Oefening 3 nr.2(a) en (b)
Moontlike antwoord!



Oefening 3 nr.3(a) en (b)
Moontlike antwoord!



C2.2.3 Binnehoeke van veelhoeke:

Oefening 4: Datum: _____

(1) (a) Teken enige driehoek. Gebruik 'n gradeboog en meet al die binnehoeke van die betrokke driehoek. Bepaal dan die som van al die binnehoeke van die driehoek. [Sien bladsy 34.]

$73° + 52° + 55° = 180°$

(b) Verleng nou enige van die sye van die driehoek in (a). Dit vorm 'n buitehoek van die driehoek. Meet die buitehoek. Bepaal die verband tussen die buitehoek en die teenoorstaande binnehoeke. [Sien bladsy 34.]

Buitehoek = 128° en **Som van teenoorstaande binnehoeke = 73° + 55° = 128°**

Buitehoek = 128° = Som van teenoorstaande binnehoeke

(2) (a) Teken nou enige vierhoek. Gebruik 'n gradeboog en meet al die binnehoeke van die betrokke vierhoek. Bepaal dan die som van al die binnehoeke van die vierhoek.

$72° + 90° + 160° + 38° = 360°$

(b) Verdeel nou die vierhoek in (a) in twee driehoeke deur 'n hoeklyn in te trek. Meet elke driehoek se binnehoeke en bereken weer die som van die binnehoeke van elke driehoek.

Driehoek ① : $90° + 41° + 49° = 180°$
Driehoek ② : $31° + 111° + 38° = 180°$
} $360°$

(3) (a) Teken nou enige vyfhoek. Gebruik 'n gradeboog en meet al die binnehoeke van die betrokke vyfhoek. Bepaal dan die som van al die binnehoeke van die vyfhoek.

$127° + 117° + 103° + 115° + 78° = 540°$

(b) Verdeel nou die vyfhoek in (a) in die minste moontlike aantal driehoeke deur hoeklyne in te trek. Meet elke driehoek se binnehoeke en bereken weer die som van die binnehoeke van elke driehoek.

Driehoek ① : $78° + 61° + 41 = 180°$
Driehoek ② : $80° + 66° + 34° = 180°$
Driehoek ③ : $37° + 40° + 103° = 180°$
} $540°$

(4) Uit nommer 1 – 3 kan ons dan die volgende aflei:

(a) Die som van die binnehoeke van enige driehoek is altyd gelyk aan $\underbrace{3 \text{ (aantal hoeke in driehoek)} - 2}_{1} \times 180° = 180°$

(b) Die som van die binnehoeke van enige vierhoek is altyd gelyk aan $\underbrace{4 \text{ (aantal hoeke in vierhoek)} - 2}_{2} \times 180° = 360°$

(c) Die som van die binnehoeke van enige vyfhoek is altyd gelyk aan $\underbrace{5 \text{ (aantal hoeke in vyfhoek)} - 2}_{3} \times 180° = 540°$

(5) Voorspel die som van die binnehoeke van 'n agthoek sonder om enige skets te maak of te meet. Maak gebruik van die afleidings in nommer 4.

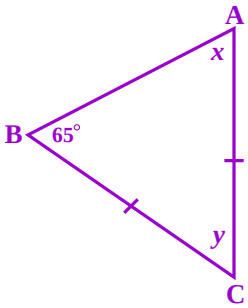
Agthoek $= (8 - 2) \times 180°$
$= 6 \times 180° = 1\,080°$

☺ **Elk van die volgende is sinonieme vir een of ander tipe veelhoek. Doen navorsing en vind uit watter tipe vierhoek dit is. Samel ook prente uit tydskrifte, koerante, die internet en ander bronne in van voorbeelde uit die daaglikse lewe van ten minste twee van die volgende tipes veelhoeke in.**
(1) heksagoon (2) tetragoon (3) pentagoon (4) oktogoon

C2.2.4 Toepassings:

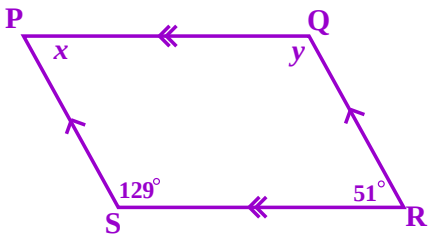
Vb.2 Bereken die waarde(s) van x en/of y. Gee volledige redes.

(a)



Bewering:	Rede:
$x = 65°$	$\angle^e$ teenoor gelyke sye
$y = 180° - 65° - 65°$	
$\therefore y = 50°$	binne $\angle^e$ van Δ

(b)

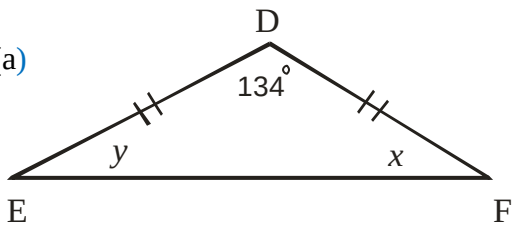


Bewering:	Rede:
$x = 51°$	oorst $\angle^e$ van parm
$y = 129°$	oorst $\angle^e$ van parm

Oefening 5: Datum: _____

(1) Bereken die waarde(s) van x en/of y. Gee volledige redes.

(a)



$y + x + 134° = 180°$ [Binne $\angle^e$ van Δ]

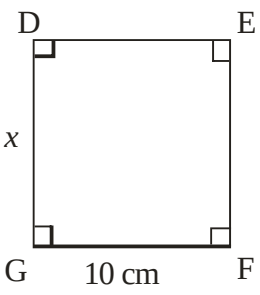
$\therefore y + x = 180° - 134°$

$\therefore y + x = 46°$

Maar $y = x$ [$\angle^e$ teenoor gelyke sye]

$\therefore y = x = 23°$

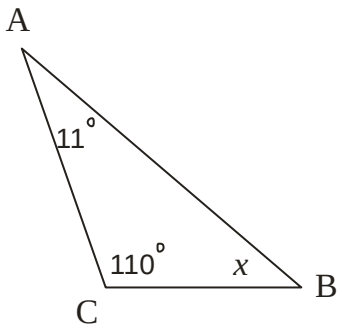
(b)



$x = 10$ cm [Sye van vierkant]

DEFG is 'n vierkant.

(c)

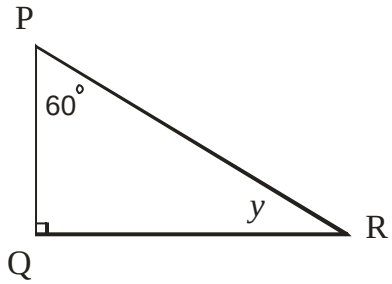


$11° + 110° + x = 180°$ **[Binne $\angle^e$ van Δ]**

$\therefore x = 180° - 11° - 110°$

$\therefore x = 59°$

(d)

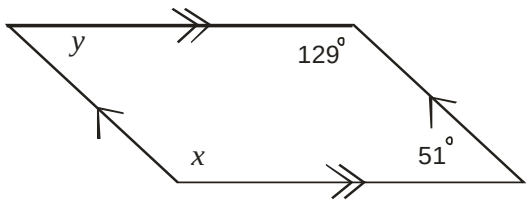


$60° + 90° + y = 180°$ **[Binne $\angle^e$ van Δ]**

$\therefore y = 180° - 60° - 90°$

$\therefore y = 30°$

(e)



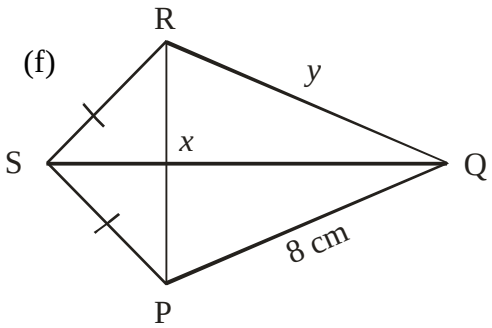
$x = 129°$

[Teenoorstaande hoeke van parallelogram]

$y = 51°$

[Teenoorstaande hoeke van parallelogram]

(f)



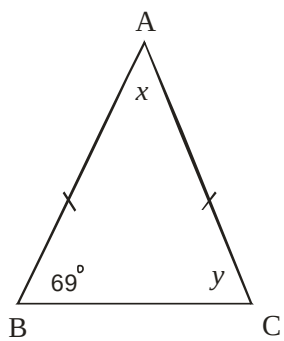
$x = 90°$

[Diagonale van vlieër $\perp$]

$y = 8$ cm

[Aangrensende sye van vlieër ewe lank]

(g)



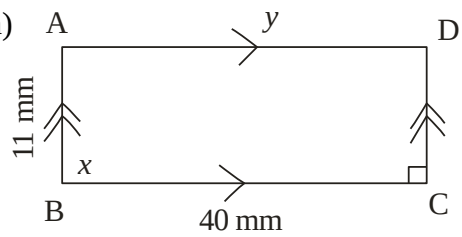
$y = 69°$ **[$\angle^e$ teenoor gelyke sye]**

$69° + 69° + x = 180°$ **[Binne $\angle^e$ van Δ]**

$\therefore x = 180° - 69° - 69°$

$\therefore x = 42°$

(h)

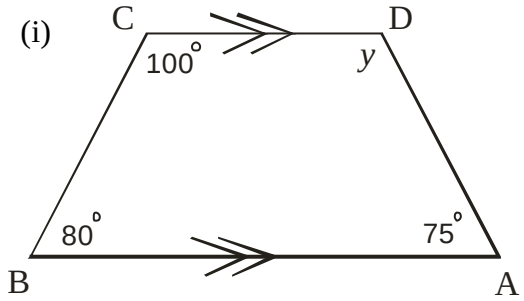


ABCD is 'n reghoek.

$x = 90°$ **[Hoeke van reghoek]**

$y = 40$ mm **[Teenoorstaande sye van reghoek]**

(i)



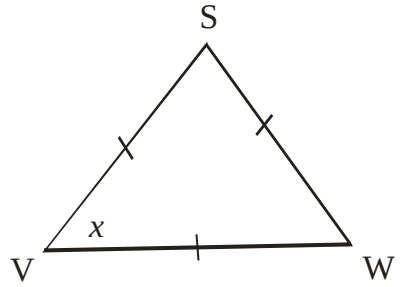
$100° + 80° + 75° + y = 360°$

$\therefore y = 360° - 100° - 80° - 75°$

$\therefore y = 105°$

[Binne $\angle^e$ van vierhoek / trapesium]

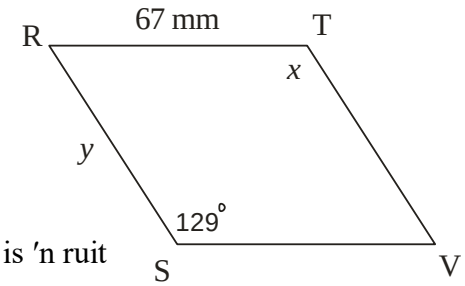
(j)



$x = 60°$

[Binne $\angle^e$ van gelyksydige Δ]

(k)



RSTV is 'n ruit

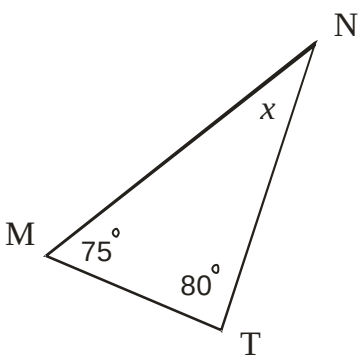
$x = 129°$

[Teenoorstaande hoeke van ruit]

$y = 67$ mm

[Alle sye van ruit ewe lank]

(l)



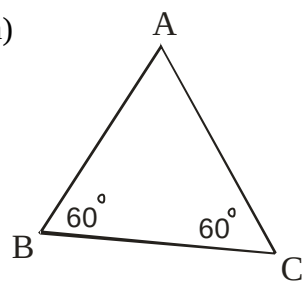
$75° + 80° + x = 180°$ **[Binne $\angle^e$ van Δ]**

$\therefore x = 180° - 75° - 80°$

$\therefore x = 25°$

(2) Is die volgende driehoeke gelykbenig, gelyksydig en/of reghoekig?

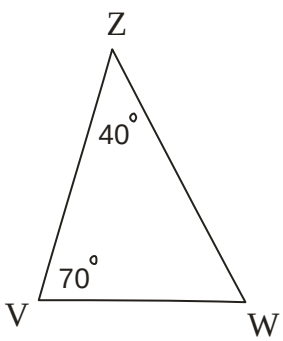
(a)



$\hat{A} = 60°$ **[Binne $\angle^e$ van Δ]**

$\therefore$ Gelyksydige Δ

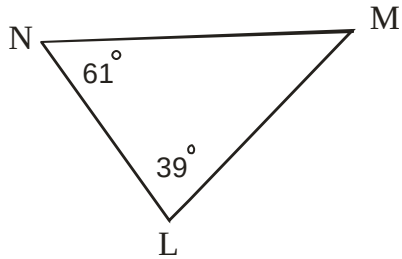
(b)



$\hat{W} = 70°$ **[Binne $\angle^e$ van Δ]**

$\therefore$ Gelykbenige Δ

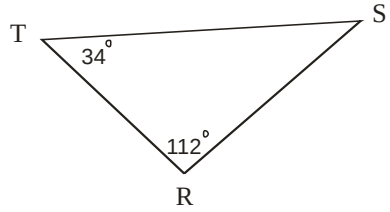
(c)



$\hat{M} = 80°$ **[Binne $\angle^e$ van Δ]**

$\therefore$ Geen

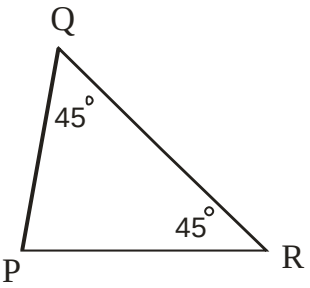
(d)



$\hat{S} = 34°$ [Binne $\angle^e$ van Δ]

∴ Gelyksydige Δ

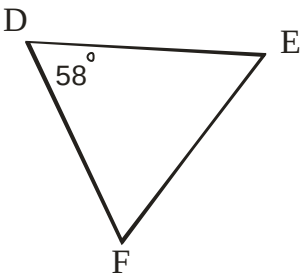
(e)



$\hat{P} = 90°$ [Binne $\angle^e$ van Δ]

∴ Reghoekige gelykbenige Δ

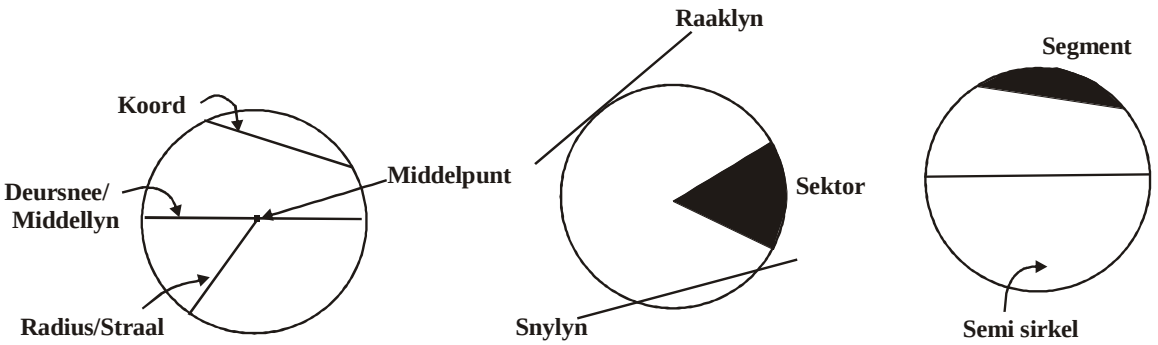
(f)



∴ Geen

Te min inligting

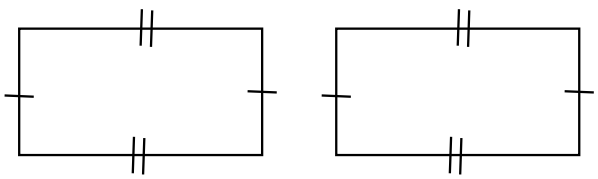
C2.3 Sirkels:



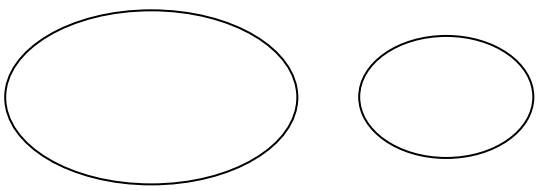
Onthou: * Konsentriese sirkels het dieselfde middelpunt, maar verskillende radiusse.
* Die radiusse in 'n sirkel is almal ewe lank.
* Die middellyn van 'n sirkel is twee maal so lank soos 'n radius van die sirkel.

C2.4 Kongruente en gelykvormige figure:

Kongruente figure is in alle opsigte presies dieselfde.
∴ Die figure het dieselfde vorm en grootte.
Die simbool ≡ word gebruik om kongruensie aan te toon.

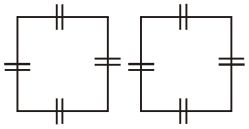


Gelykvormige figure is figure met dieselfde vorm, maar het nie noodwendig dieselfde grootte nie.
Die simbool /// word gebruik om gelykvormigheid aan te toon.

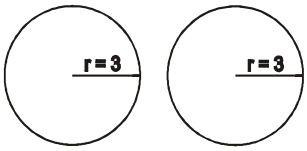


Oefening 6: Datum: _____

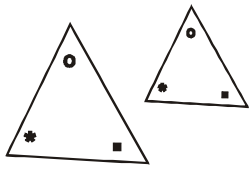
(1) Watter van die volgende pare figure is kongruent?

(a) 

Kongruent

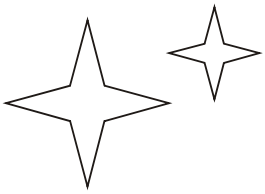
(b) 

Kongruent

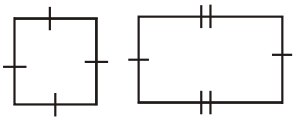
(c) 

Nie kongruent

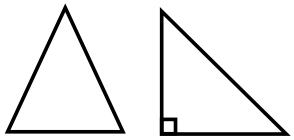
(2) Watter van die volgende pare figure is gelykvormig?

(a) 

Gelykvormig

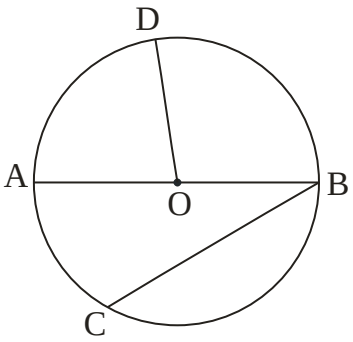
(b) 

Nie gelykvormig

(c) 

Nie gelykvormig

(3) Beskou die volgende sirkels en benoem die lyne soos gevra as 'n middellyn, 'n radius of 'n koord. O is die middelpunt.

(a) 

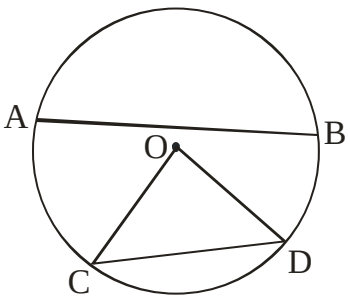
AB, BC, OD en AO

AB → Middellyn

BC → Koord

OD → Radius

AO→ Radius

(b) 

AB, OC, DC en OD

AB → Koord

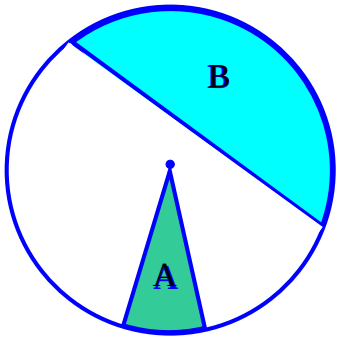
OC → Radius

DC → Koord

OD → Radius

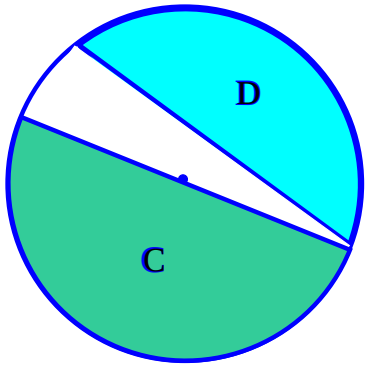
(3) Beskou die volgende sirkels en benoem die ingekleurde areas as ′n semi-sirkel, ′n sektor of ′n segment. O is die middelpunt..

(a)



Area A en area B.

(b)



Area C en area D.

Area A → Sektor

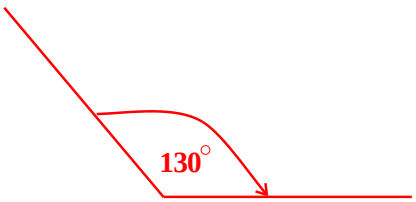
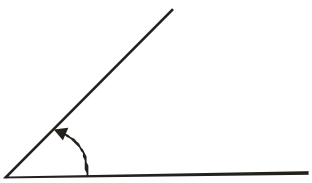
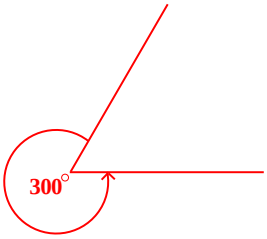
Area B → Segment

Area C → Semi-sirkel

Area D → Segment

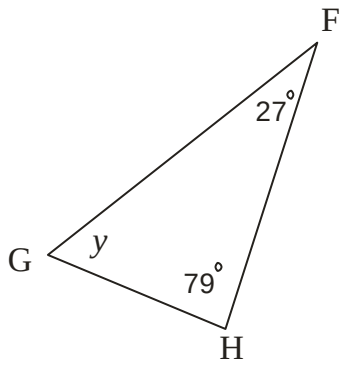
C2.5 HERSIENINGSOEFENING: Datum: _____

(1) Voltooi die volgende tabel:

	Tipe hoek:	Hoekgrootte:	Konstruksie van hoek:
(a)	Stomphoek	**130°** **Moontlike antwoord!**	
(b)	**Skerphoek**	**45°**	
(c)	**Inspringende hoek**	300°	

(2) Bereken die waarde(s) van x en/of y. Gee volledige redes.

(a)

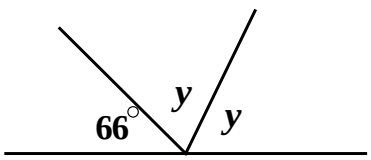


$y + 27° + 79° = 180°$ **[Binne $\angle^e$ van Δ]**

$\therefore y = 180° - 27° - 79°$

$\therefore y = 74°$

(b)



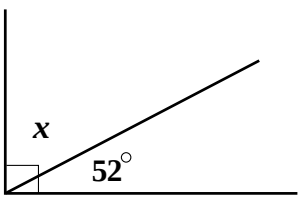
$y + y + 66° = 180°$ **[Aangr $\angle^e$ op reguitlyn]**

$\therefore 2y = 180° - 66°$

$\therefore 2y = 114°$

$\therefore y = \frac{114°}{2} \rightarrow \therefore y = 57°$

(c)

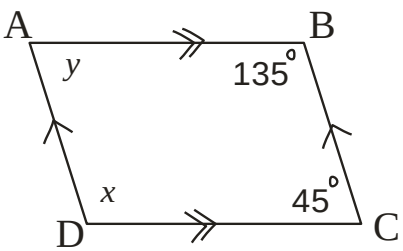


$x + 52° = 90°$ **[Regte hoek]**

$\therefore x = 90° - 52$

$\therefore x = 38°$

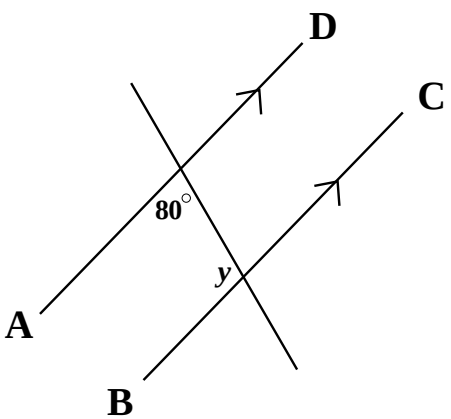
(d)



$x = 135°$ **[Teenoorst hoeke van parallelogram]**

$y = 45°$ **[Teenoorst hoeke van parallelogram]**

(e)

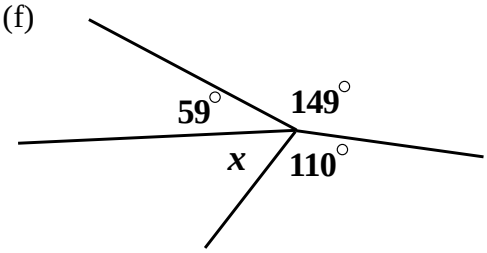


$y + 80° = 180°$ **[Ko-binne $\angle^e$; AD//BC]**

$\therefore y = 180° - 80°$

$\therefore y = 100°$

(f)



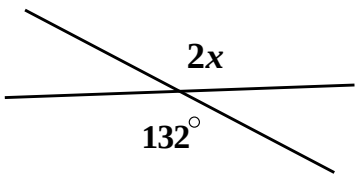
$x + 59° + 149° + 110° = 360°$

$\therefore x = 360° - 59° - 149° - 110°$

$\therefore x = 42°$

[Omwenteling]

(g)



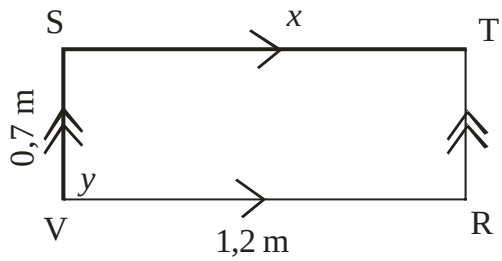
$2x = 132°$ [Regoorstaande $\angle^e$]

$\therefore x = \frac{132°}{2}$

$\therefore x = 66°$

(h) STVR is 'n reghoek

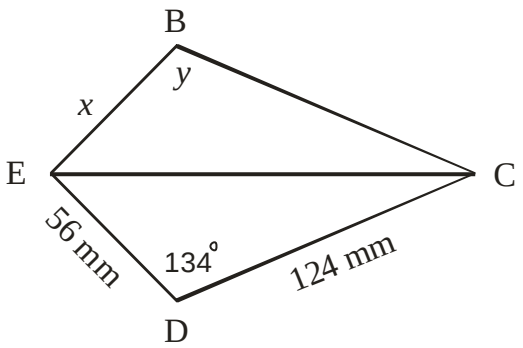
$x = 1,2$ m [Teenoorstaande sye van reghoek]



$y = 90°$ [Hoeke van reghoek]

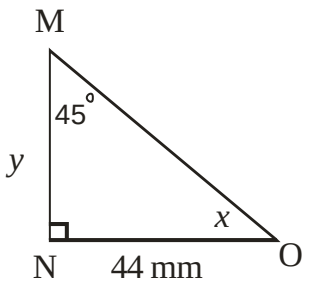
(i) BCDE is 'n vlieër

$x = 56$ mm [Aangrensende sye van vlieër]



$y = 134°$ [Teenoorst hoeke van vlieër]

(j)



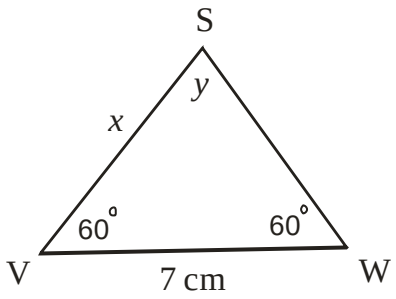
$x + 45° = 90°$ [Reghoekige driehoek]

$\therefore x = 90° - 45°$

$\therefore x = 45°$

$y = 44$ mm [sye teenoor gelyke $\angle^e$]

(k)



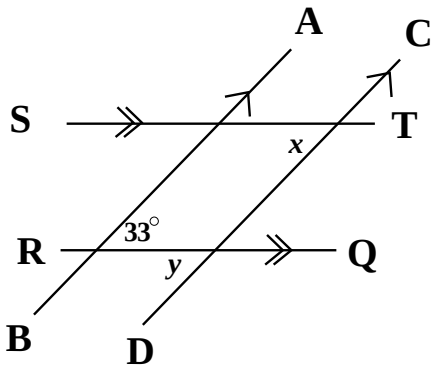
$x + 60° + 60° = 180°$ [Binne $\angle^e$ van Δ]

$\therefore y = 180° - 60° - 60°$

$\therefore y = 60°$

$x = 7$ cm [Sye van gelyksydige driehoek]

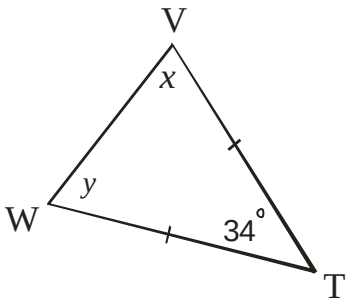
(l)



$\therefore y = 33°$ [Verwissellende $\angle^e$; AB//CD]

$\therefore x = 33°$ [Ooreenkomstige $\angle^e$; ST//RQ]

(m)



$y + x + 34° = 180°$ [Binne $\angle^e$ van Δ]

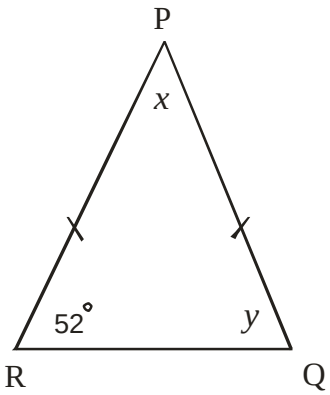
$\therefore y + x = 180° - 34° = 146°$

Maar $y = x$ [$\angle^e$ teenoor gelyke sye]

$\therefore y = x = \frac{146°}{2}$

$\therefore y = x = 73°$

(n)



$y = 52°$ [$\angle^e$ teenoor gelyke sye]

$x + 52° + 52° = 180°$ [Binne $\angle^e$ van Δ]

$\therefore x = 180° - 52° - 52°$

$\therefore x = 76°$

(3) Pas kolom B by kolom A:

	Kolom A	
(a)	Al drie die sye is ewe lank.	**E**
(b)	Tweemaal die radius.	**H**
(c)	Som van die binnehoeke is 540°.	**A**
(d)	Vorm is dieselfde, maar die grootte verskil.	**J**
(e)	Hoeke teenoor gelyke sye is ewe groot.	**G**
(f)	'n Vierhoek waarvan slegs een paar teenoorstaande sye ewewydig is.	**C**
(g)	'n Hoek groter as 180° en kleiner as 360°.	**D**
(h)	'n Vierhoek waarvan twee paar aangrensende sye ewe lank is.	**F**
(i)	Som van die binnehoeke van 'n driehoek.	**I**
(j)	'n Parallelogram waarvan al die sye ewe lank is.	**K**

Kolom B	
A.	Pentagoon.
B.	Kongruente figure.
C.	Trapesium.
D.	Inspringende hoek.
E.	Al drie die hoeke is gelyk aan 60°.
F.	Vlieër.
G.	Gelykbenige driehoek.
H.	Middellyn.
I.	180°.
J.	Gelykvormige figure.
K.	Ruit.
L.	Gestrekte hoek.
M.	360°

****