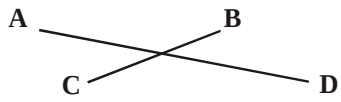
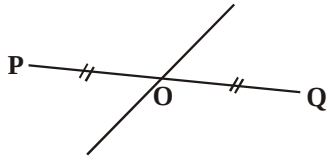
Agtergrondkennis – Graad 8 Meetkunde hersiening

N1 Lyne en hoeke:

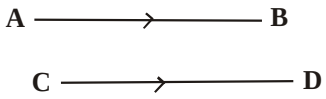
(1) Snylyne: Twee lyne wat mekaar sny.
∴ AD sny BC.



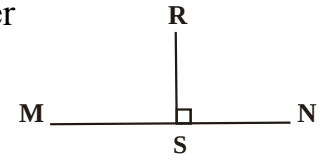
(2) Halveerlyne: Een lyn sny ′n ander lyn presies in die middel.
∴ PO = OQ.



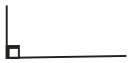
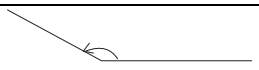
(3) Ewewydige lyne: Twee of meer lyne wat altyd ewe ver van mekaar af is. Die lyne sal dus nooit kruis nie.
∴ AB // CD.



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

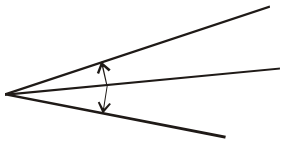


(5) Tipes hoeke:

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°.

(6) Aangrensende hoeke:

Dit is twee hoeke met ′n gemeenskaplike hoekpunt en ′n gemeenskaplike sy en die hoeke lê aan weerskante van die gemeenskaplike sy.

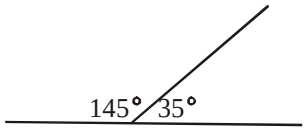


(7) Komplementêre hoeke: Hoeke met ′n som van 90°.

(8) Supplementêre hoeke: Hoeke met ′n som van 180°.

(9) Hoeke op ′n reguit lyn:

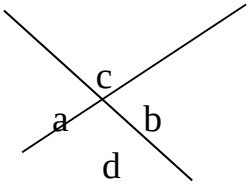
Die som van aangrensende hoeke op ′n reguit lyn is 180°.



(10) Regoorstaande hoeke:

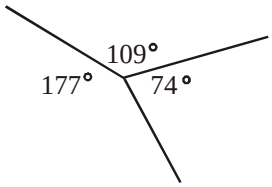
Indien twee reguit lyne mekaar sny, sal die regoorstaande hoeke ewe groot wees.

$\therefore \quad \hat{a} = \hat{b} \quad en \quad \hat{c} = \hat{d}$



(11) Hoeke om ′n punt (omwenteling):

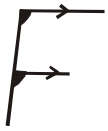
Die som van die hoeke om ′n punt is 360°.



(12) Ewewydige lyne:

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

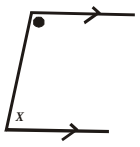
(a) Ooreenkomstige hoeke:
bv. a = e; b = f;
c = g en d = h.

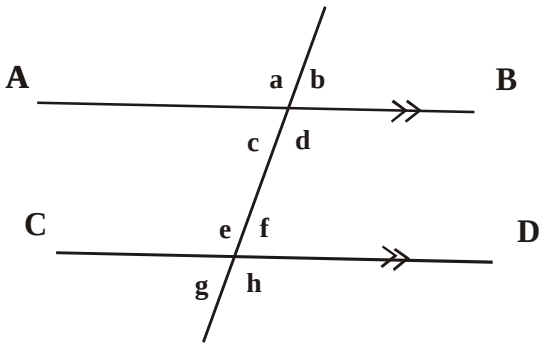


(b) Verwisselende hoeke:
bv. e = d; c = f;
a = h en b = g.



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





(13) Om lyne ewewydig te bewys, moet een van die volgende geld:

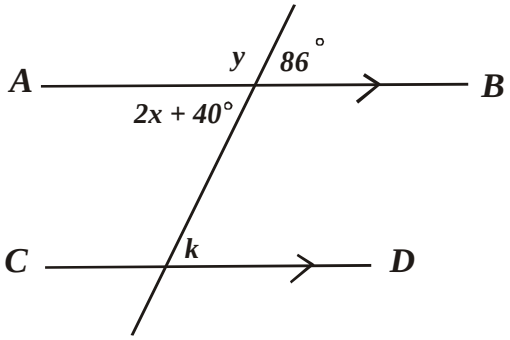
(a) ′n Paar ooreenkomstige hoeke moet gelyk wees of
(b) ′n Paar verwissellende hoeke moet gelyk wees of
(c) ′n Paar ko-binnehoeke moet saam 180° wees

Vb. 1 (a) Bereken die waardes van die veranderlikes; gee redes:

* $y = 180° - 86°$ $[\angle^e$ *op reguit lyn]*
$\boldsymbol{y = 94°}$

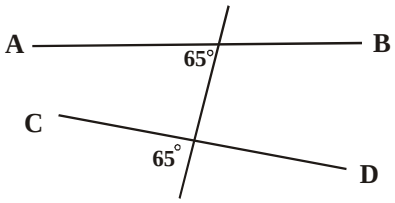
* $2x + 40 = 86°$ *[regoorst* $\angle^e$*]*
$2x = 86° - 40°$
$2x = 46°$
$\boldsymbol{x = 23°}$

* $\boldsymbol{k = 86°}$ *[ooreenk* $\angle^e$*; AB // CD]*



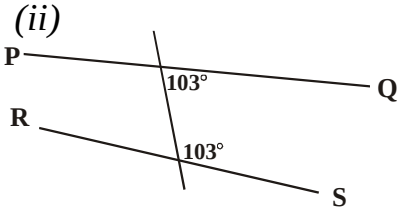
(b) Bepaal of die volgende pare lyne ewewydig is of nie. Motiveer jou antwoord.

(i)



AB // CD, want 'n paar ooreenk $\angle^e$ *is gelyk.*

(ii)

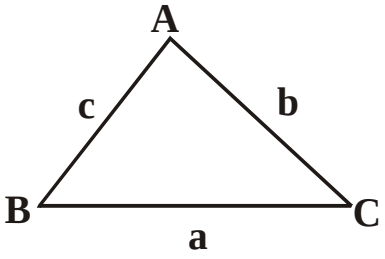


PQ is nie // aan RS nie, want die ko-binne $\angle^e$ *is nie saam 180° nie.*

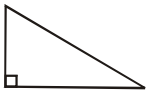
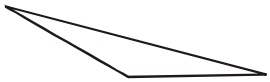
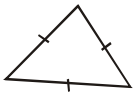
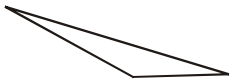
N2 <u>Driehoeke</u>:

(1) <u>Benoeming van sye en hoeke</u>:

A, B en C stel die hoeke voor.
a, b en c stel die sye voor.



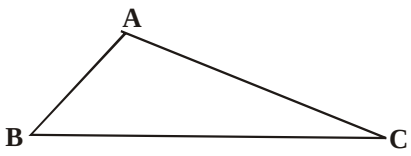
(2) Tipes driehoeke:

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.
Gelyksydige driehoek		Al drie die sye is ewe lank.
Ongelyksydige driehoek		Al drie die sye is verskillende lengtes.

(3) Eienskappe van driehoeke:

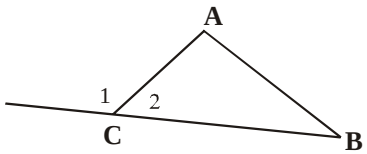
(a) In ′n driehoek is die langste sy altyd teenoor die grootste hoek.
(b) In ′n gelykbenige driehoek is die hoeke teenoor die gelyke sye altyd ewe groot.
(c) In ′n gelyksydige driehoek is al die hoeke gelyk aan 60°.

(d) Die som van die binnehoeke van alle driehoeke is 180°.
$\therefore \hat{A} + \hat{B} + \hat{C} = 180°$



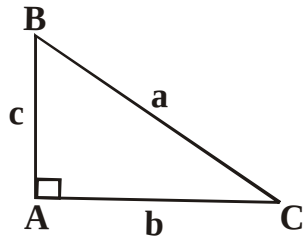
(e) Die buitehoek van ′n driehoek is gelyk aan die som van die twee teenoorstaande binnehoeke.

$\therefore \hat{C}_1 = \hat{A} + \hat{B}$



(4) Stelling van Pythagoras:

Volgens Pythagoras: Die vierkant op die skuinssy van ′n reghoekige driehoek is gelyk aan die som van die vierkante op die reghoeksye.

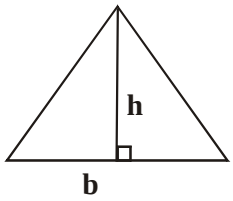


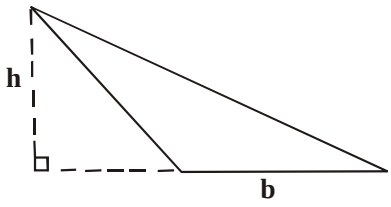
$\therefore\ a^2 = b^2 + c^2$

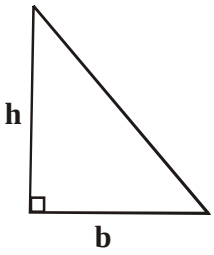
(5) Die oppervlakte van ′n driehoek:

Opp Δ $= \frac{1}{2}$ basis × loodregte hoogte

$= \frac{1}{2}$ b × h

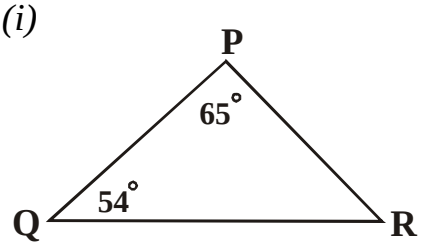






Vb. 2 (a) Bereken die waarde van x, y en k in elk van die volgende en gee redes:

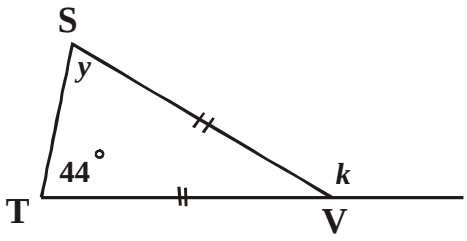
(i)



65° + 54° + x = 180° [binne ∠^{e} van Δ]

x = 61°

(ii)



y = 44° *[∠^{e} teenoor gelyke sye]*

k = 44° + 44° *[buite ∠ van Δ]*

k = 88°

(b) Bereken die lengte van die onbekende sy in die volgende driehoek:

$f^2 = g^2 + e^2$

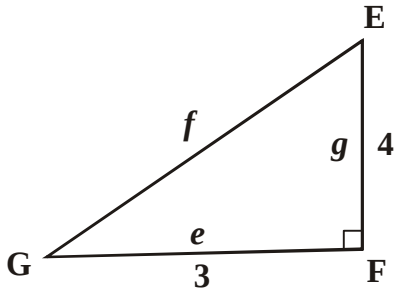
$f^2 = 4^2 + 3^2$

$f^2 = 16 + 9$

$f^2 = 25$

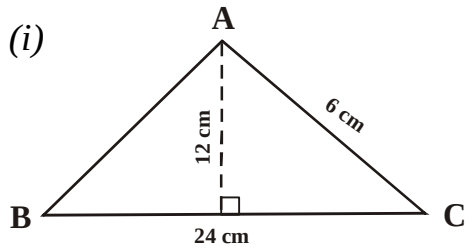
$\sqrt{f^2} = \sqrt{25}$

$f = 5$

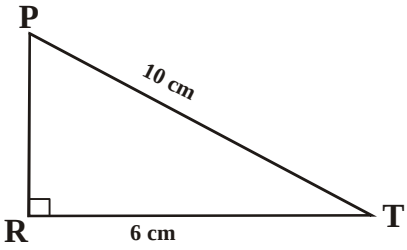


(c) Bereken die oppervlaktes van die volgende driehoeke:

(i)



(ii)



$Opp\ \Delta = \frac{1}{2} b \times h$

$= \frac{1}{2}(24)(12)$

$= \mathbf{144\ cm^2}$

$r^2 = p^2 + t^2$

$100 = 36 + t^2$

$100 - 36 = t^2$

$64 = t^2$

$\mathbf{8 = t}$

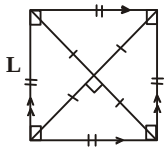
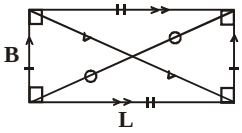
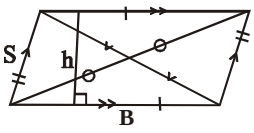
$Opp\ \Delta = \frac{1}{2} b \times h$

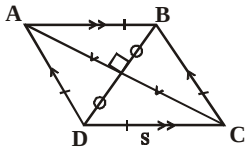
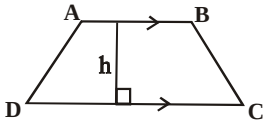
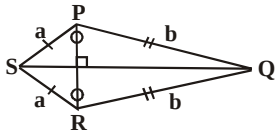
$= \frac{1}{2}(6)(8)$

$= \mathbf{24\ cm^2}$

N3 <u>Vierhoeke</u>:

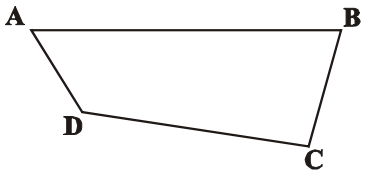
(1) <u>Tipes vierhoeke</u>:

Tipe vierhoek	Eienskappe	Omtrek	Oppervlakte
Vierkant 	* Al die sye is ewe lank. * Die teenoorstaande sye is ewewydig. * Al die hoeke is 90°. * Die diagonale (hoeklyne) halveer mekaar reghoekig en halveer die hoeke. * Die diagonale is ewe lank.	4L	L^2
Reghoek 	* Teenoorstaande sye is ewe lank en ewewydig. * Al die hoeke is 90°. * Hoeklyne halveer mekaar. * Die diagonale is ewe lank.	2L + 2B	L × B
Parallelogram 	* Teenoorstaande sye is ewe lank en ewewydig. * Die teenoorstaande hoeke is ewe groot. * Hoeklyne halveer mekaar.	2B + 2S	B × ⊥h

Ruit 	* Al die sye is ewe lank. * Die teenoorstaande sye is ewewydig. * Die teenoorstaande hoeke is ewe groot. * Die diagonale halveer mekaar reghoekig en halveer die hoeke.	4s	$\frac{1}{2}$ AC × BD of B × ⊥h
Trapesium 	* Slegs een paar teenoorstaande sye is ewewydig.	AB+BC+CD+DA	$\frac{1}{2}$ h × (AB + CD)
Vlieër 	* Die pare aangrensende sye is ewe lank. * Een paar teenoorstaande hoeke is ewe groot. * Die diagonale is loodreg op mekaar en die langste diagonaal halveer die korter diagonaal.	2a + 2b	$\frac{1}{2}$ × SQ × PR

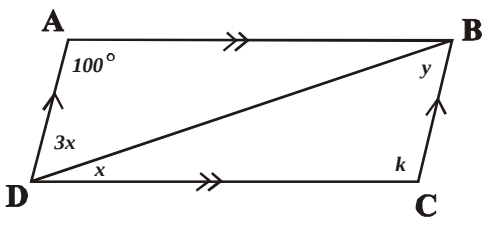
(2) Die som van die binnehoeke van ′n vierhoek is gelyk aan 360°.

$\hat{A} + \hat{B} + \hat{C} + \hat{D} = 360°$



Vb. 3 (a) Bepaal, met redes, die waardes van x, y en k:

(i)



100° + 3x + x = 180° [ko-binne ∠^{e}; AB//CD

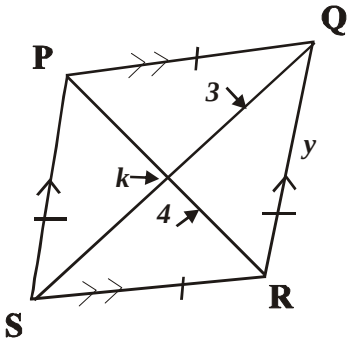
4x = 80°

x = 20°

3x = ***y = 60°*** *[verw ∠^{e}; AD // BC]*

k = 100° *[oorst. ∠^{e} van parm]*

(ii)

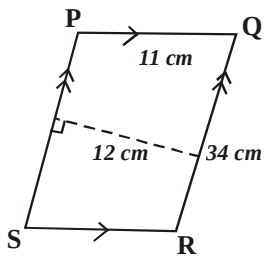


k = 90°
[hoeklyne halveer ⊥]

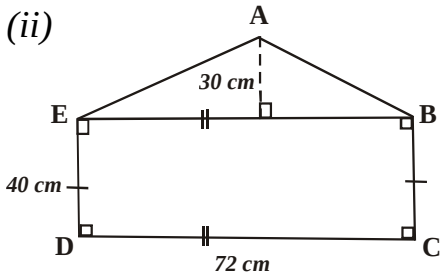
$y^2 = 3^2 + 4^2$ [Pythagoras]
$y^2 = 9 + 16$
$y^2 = 25$
y = 5

(b) Bepaal die oppervlaktes van die volgende:

(i)



(ii)



Opp PQRS $= b \times \perp h$

$= 34 \times 12$

$=$ ***408 cm²***

Opp ABCDE $= [L \times B] + [\frac{1}{2} \times B \times \perp h]$

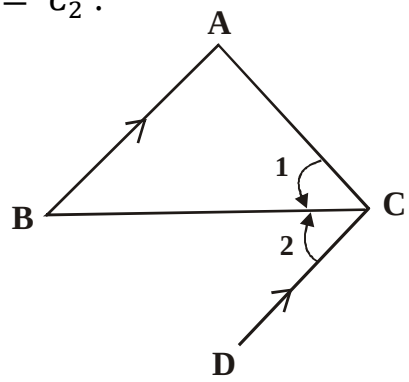
$= [72 \times 40] + [\frac{1}{2} \times 72 \times 30]$

$= [2\,880] + [1\,080]$

$=$ ***3 960 cm²***

N4 <u>Nog toepassings</u>:

Vb. 4 (1) Bewys dat Δ ABC gelykbenig is, as AB // CD en $\hat{C}_1 = \hat{C}_2$ *:*



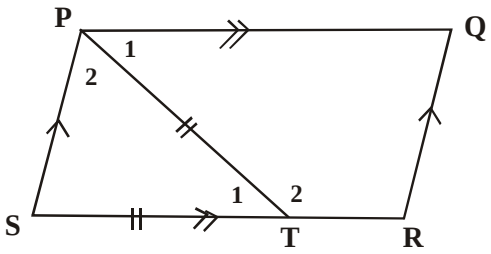
$\hat{C}_2 = \hat{B}$ *[verw* $\angle^e$*; PT // ST]*

maar $\hat{C}_1 = \hat{C}_2$ *[gegee]*

$\hat{C}_1 = \hat{B}$

$\therefore$ *AB = AC [sye teenoor gelyke hoeke]*

(2) PQRS is 'n parallelogram, met PT = ST.



As $\hat{S} = x$*, bewys dat* $\hat{P}_1 = 180° - 2x$

$\hat{P}_2 = x$ *[hoeke teenoor gelyke sye]*

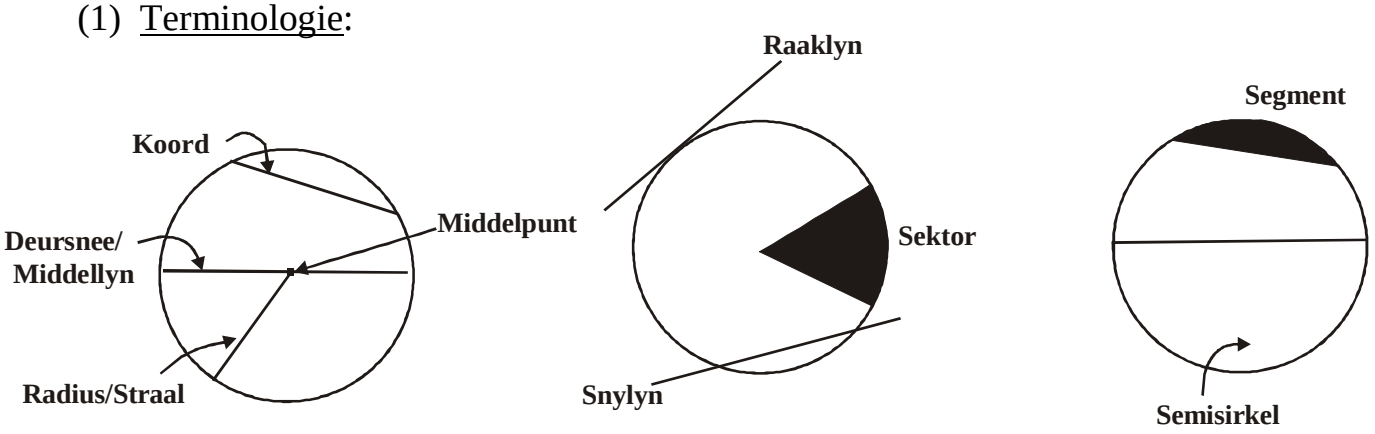
$\therefore \hat{T}_1 = 180° - 2x$ *[binne* $\angle^e$ *van Δ]*

maar $\hat{T}_1 = \hat{P}_1$ *[verw* $\angle^e$ *; PQ // SR]*

$\therefore \hat{P}_1 = 180° - 2x$

N5 Sirkels:

(1) Terminologie:

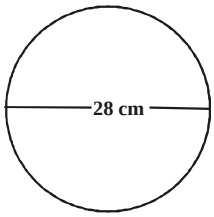


(2) Oppervlakte en omtrek:

Omtrek = $2 \times \pi \times r$ en Oppervlakte = $\pi \times r^2$

Onthou: $\pi = \frac{22}{7}$ en Deursnee (d) = 2 × radius (r)

Vb. 5 (a) Bepaal die oppervlakte en omtrek van die volgende sirkel:



Omtrek $= 2\pi r$

$= 2 \times \frac{22}{7} \times 14$

$=$ ***88 cm***

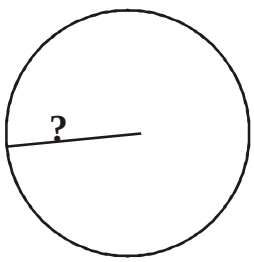
Opp^{te} $= \pi r^2$

$= \frac{22}{7} \times (14)^2$

$= \frac{22}{7} \times 196$

$=$ ***616 cm²***

(b) Die oppervlakte van die sirkel is 201 mm². Bepaal die lengte van die radius tot die naaste heelgetal.



$Opp = \pi r^2$

$201 = \frac{22}{7} \times r^2$

$201 \times 7 = 22 \times r^2$

$1\,407 = 22r^2$

$\frac{1\,407}{22} = r^2$

$63{,}95\ldots = r^2$

$\boldsymbol{8 = r}$