

**GAUTENG DEPARTMENT OF EDUCATION  
GAUTENGSE DEPARTEMENT VAN ONDERWYS  
SENIOR CERTIFICATE EXAMINATION  
SENIORSERTIFIKAAT-EKSAMEN**

**FITTING AND TURNING SG  
PAS- EN DRAAIWERK**

**MULTIPLE-CHOICE QUESTIONS / MEERKEUSEVRAE**

1.1	A	B	C	D	(2)
1.2	A	B	C	D	(1)
1.3	A	B	C	D	(2)
1.4	A	B	C	D	(2)
1.5	A	B	C	D	(2)
1.6	A	B	C	D	(1)
1.7	A	B	C	D	(2)
1.8	A	B	C	D	(1)
1.9	A	B	C	D	(2)

**[15]**

**TRUE OR FALSE/WAAR OF VALS**

- 1.10.1 TRUE / WAAR
- 1.10.2 FALSE / VALS
- 1.10.3 TRUE / WAAR
- 1.10.4 TRUE / WAAR
- 1.10.5 FALSE / VALS
- 1.10.6 TRUE / WAAR
- 1.10.7 FALSE / VALS
- 1.10.8 TRUE / WAAR
- 1.10.9 FALSE / VALS
- 1.10.10 TRUE / WAAR

**QUESTION 2 / VRAAG 2**

<p>2.1</p> <ol style="list-style-type: none"> <li>1. To ensure that equipment is regularly checked and in good condition.</li> <li>2. To improve equipment quality.</li> <li>3. To improve design and to supply replacement parts.</li> <li>4. To improve maintenance equipment.</li> <li>5. To do regular inspections to prevent machines getting out of order.</li> <li>6. To do maintenance with maximum efficiency.</li> </ol>	<p>2.1</p> <ol style="list-style-type: none"> <li>1. Om te verseker dat toerusting gereeld nagegaan word en in 'n goeie toestand is.</li> <li>2. Om gehalte van toerusting te verbeter.</li> <li>3. Om ontwerp te verbeter en om in vervangingsonderdele te voorsien.</li> <li>4. Om instandhoudingstoerusting te verbeter.</li> <li>5. Om gereelde inspeksies te doen om te verhoed dat masjiene onklaar raak.</li> <li>6. Om instandhouding met maksimum doeltreffendheid te doen.</li> </ol> <p style="text-align: right;">(5)</p>
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## 2.2

Absolute programming demands a common reference point from which all dimensions are taken.  
Incremental programming means that any dimension must be taken from where the last one ended, without reference to a common point.

Absolute programmering verg 'n algemene (gemene) verwysingspunt vanwaar alle afmetings geneem moet word.  
Inkrementele programmering beteken dat enige afmeting geneem moet word vanwaar die laaste een geëindig het, sonder om na 'n gemene punt te verwys.

(3)

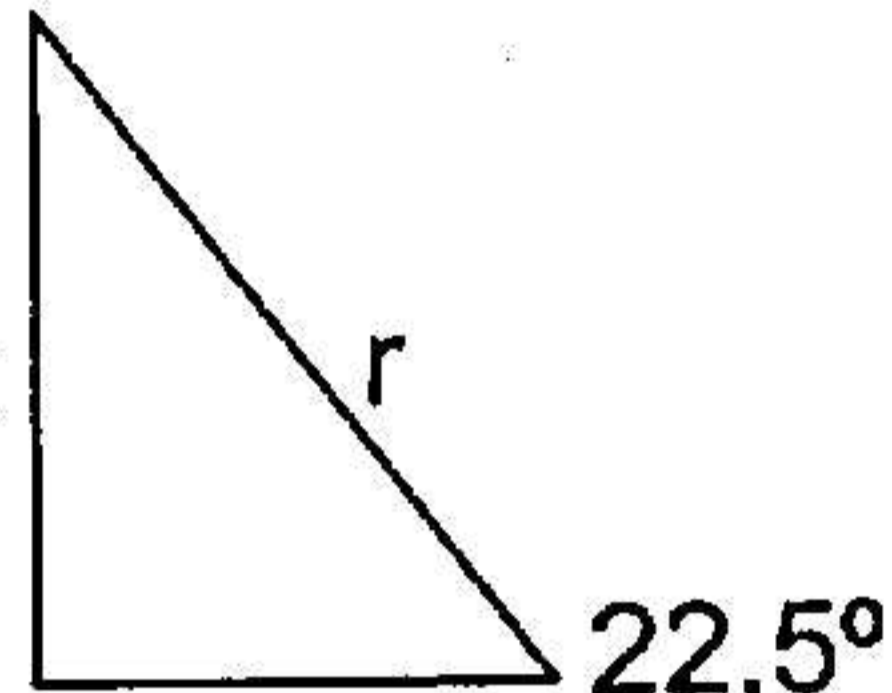
## 2.3.1

$$\begin{aligned} A &= l \times b \\ &= 0,3 \times 0,25 \\ &= 0,075 \text{ m}^2 \quad (3) \end{aligned}$$

## 2.3.2

$$\begin{aligned} \delta &= \frac{F}{A} \\ &= \frac{2500 \times 10}{0,075} \\ &= 333333,333 \\ &= 333,333 \text{ kPa} \quad (4) \end{aligned}$$

## 2.4

$$\frac{87,3 + 15}{2} = 51,15 \text{ mm}$$


$$\begin{aligned} \sin 22,5 &= \frac{51,15}{r} \\ r &= \frac{51,15}{\sin 22,5} \\ &= 133,661 \text{ mm} \\ D &= 2 \times 133,661 \\ &= 267,323 \text{ mm} \quad (8) \end{aligned}$$

## 2.5.1

$$\begin{aligned} \text{PCD/SSD} &= Tm \\ &= 60 \times 5 \\ &= 300 \text{ mm} \end{aligned}$$

## 2.5.2

$$\begin{aligned} \text{OD/BD} &= m(T + 2) \\ &= 5(60 + 2) \\ &= 5 \times 62 \\ &= 310 \text{ mm} \end{aligned}$$

## 2.5.3

$$\begin{aligned} a &= m \\ &= 5 \text{ mm} \end{aligned}$$

## 2.5.4

$$\begin{aligned} \text{DED} &= 1,157 \text{ m} \\ &= 1,157 \times 5 \\ &= 5,785 \text{ mm} \end{aligned}$$

## 2.5.5

$$\begin{aligned} \text{WD} &= 2a \\ &= 2 \times 5 \\ &= 10 \text{ mm} \end{aligned}$$

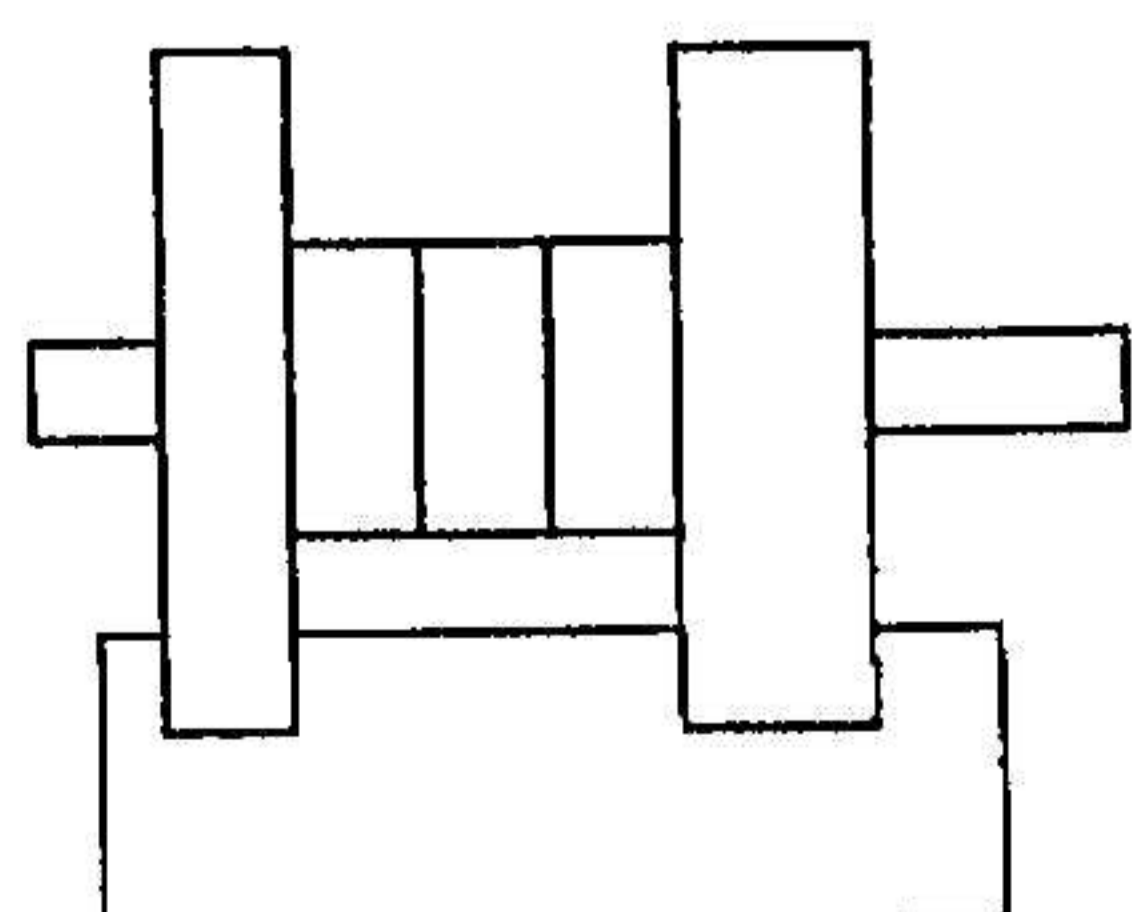
## 2.5.6

$$\begin{aligned} \text{FD/VD} &= a + d \\ &= 5 + 5,785 \\ &= 10,785 \text{ mm} \quad (12) \end{aligned}$$

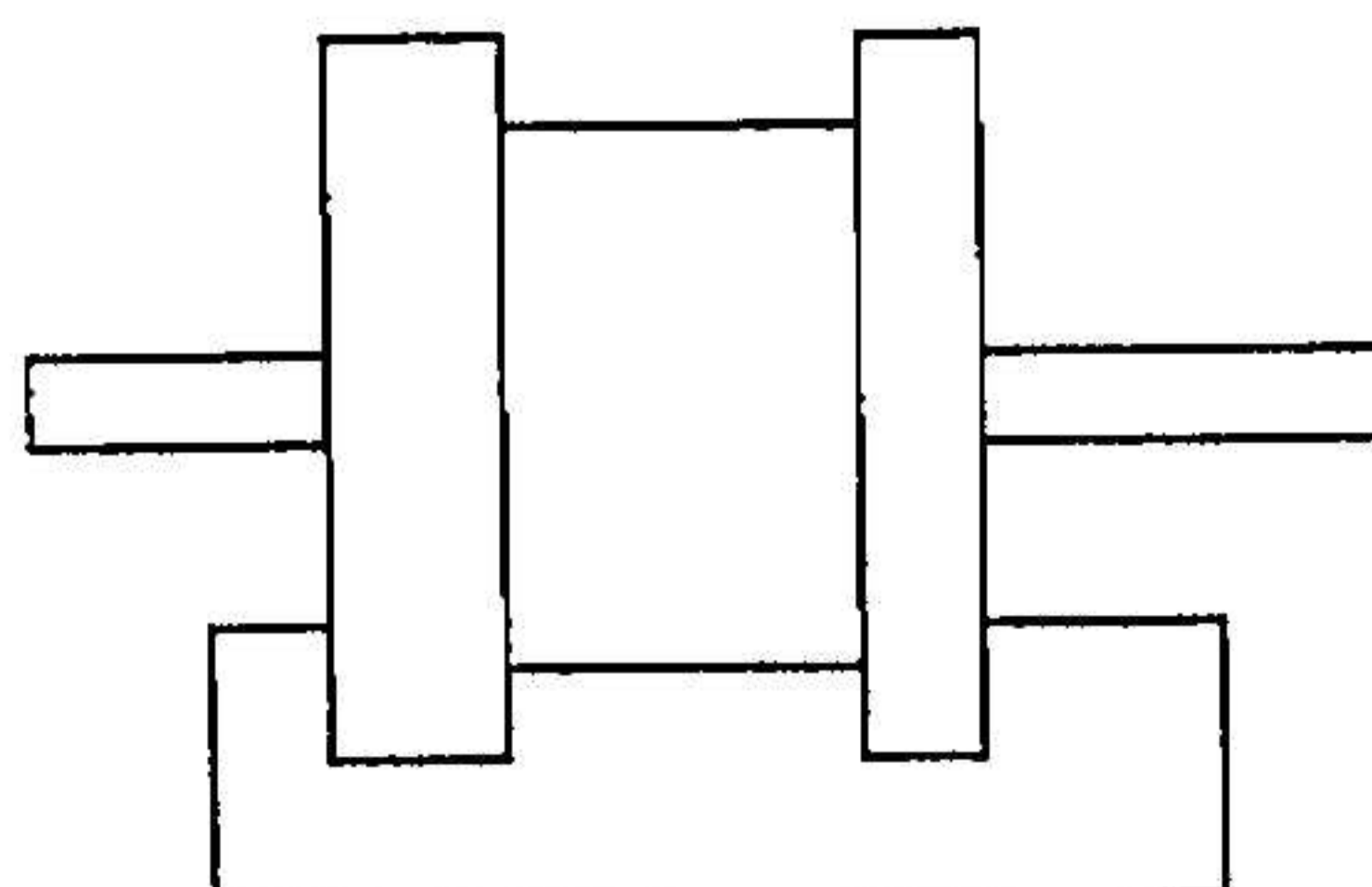
## QUESTION 3 / VRAAG 3

## 3.1.1

Straddle milling/Koppelfrees



Gang milling/Groepfrees



3.1.2

<p>Straddle milling is when a number of parts must be machined in the same way. The cutters are separated by collars of specific dimensions.</p> <p>Gang milling is when a number of cutters are grouped together to cut at the same time without any collars between them.</p>	<p>Koppelfreeswerk is wanneer `n aantal onderdele op dieselfde wyse gesny moet word. Die snyers word deur krae van spesifieke afmeting geskei.</p> <p>Groepfrees is wanneer `n aantal snyers saam gegroepeer word om gelyktydig te sny. Geen krae.</p>
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(8)

3.2

<ol style="list-style-type: none"> <li>Coolant carried down to where required.</li> <li>Chips carried from max. to min.</li> <li>Can use favourable rake angles.</li> <li>Smooth finish on thin stock.</li> <li>Smooth cutting through thin tubes, etc.</li> <li>Work forced down by cutter.</li> </ol>	<ol style="list-style-type: none"> <li>Koelmiddel afwaarts gevoer tot waar benodig.</li> <li>Snyfels weggevoer van maks tot min.</li> <li>Kan gunstige voorsnyhoeke gebruik.</li> <li>Gladde afwerking op dun plate.</li> <li>Gladde snyaksie deur dun pype, ens.</li> <li>Werk afgedruk deur snyer.</li> </ol>
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(Any / Enige 4)

(4)

3.3

<ol style="list-style-type: none"> <li>Provides space for cuttings.</li> <li>Prevents heel from rubbing against tooth field.</li> </ol>	<ol style="list-style-type: none"> <li>Verskaf spasie vir snyfels.</li> <li>Voorkom dat agterkant teen die tandveld vryf.</li> </ol>
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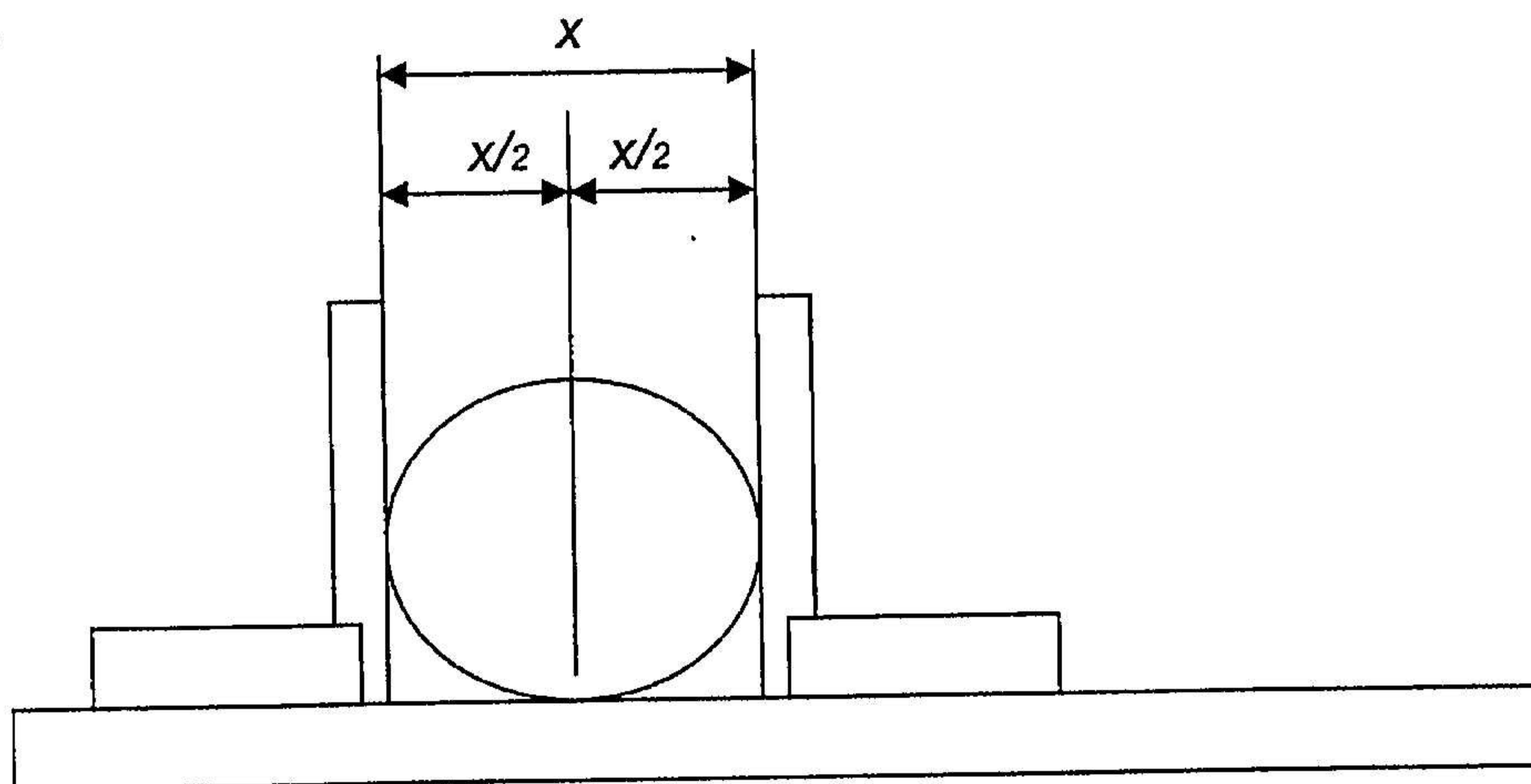
(2)

3.4

<ol style="list-style-type: none"> <li>Number of cutter.</li> <li>Number of teeth on cutter.</li> <li>Pressure angle.</li> <li>Module.</li> <li>Cutting depth.</li> </ol>	<ol style="list-style-type: none"> <li>Nommer van snyer.</li> <li>Aantal tande op snyer.</li> <li>Drukhoek.</li> <li>Module.</li> <li>Snydiepte.</li> </ol>
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(4)

3.5



(6)

3.6

M	D/Afs	M/D/Af
3,5	130	455
2	250	500
?	200	?

To scale/Volgens skaal

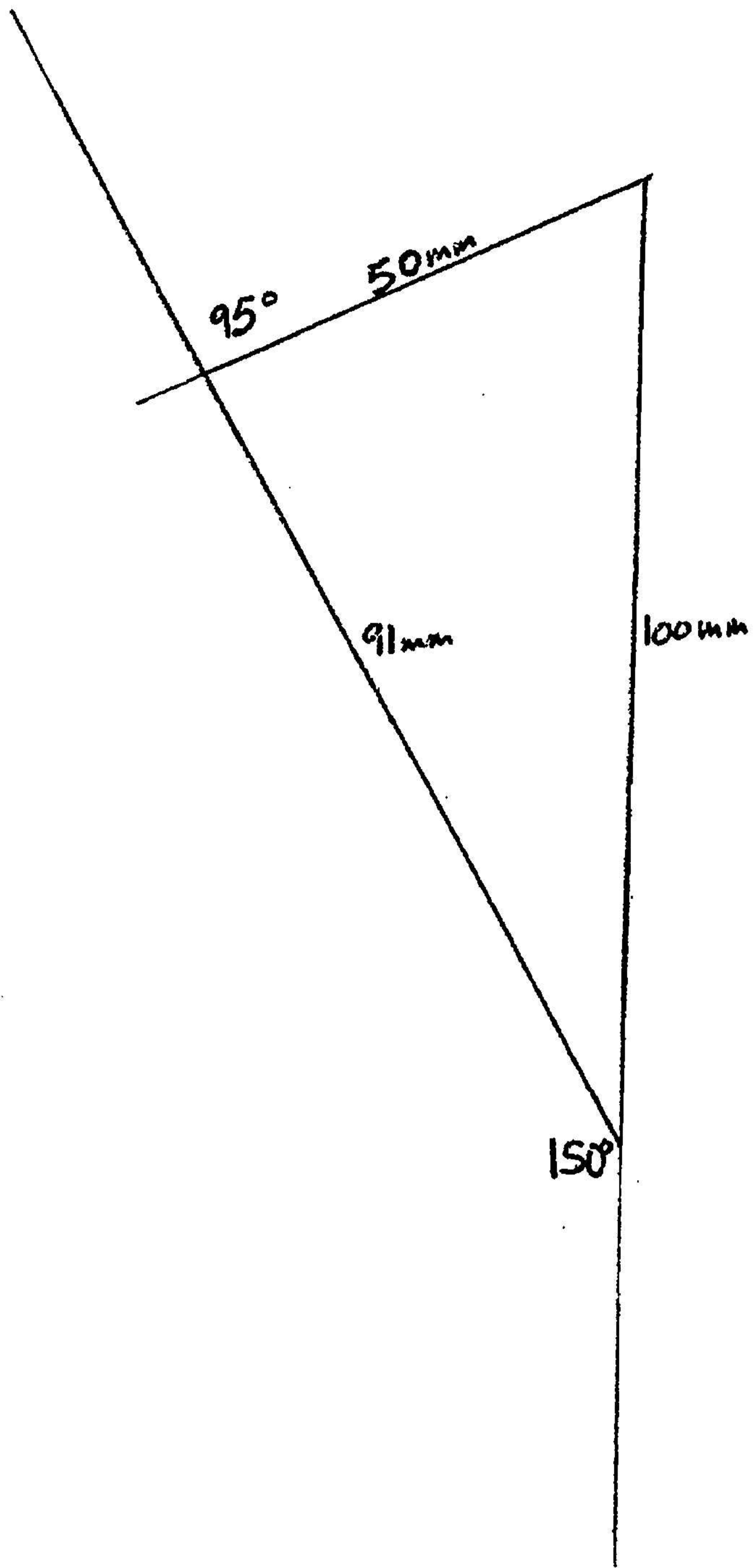
$$50\text{mm} = 50 \times 5$$

$$= 250 \text{ kg.mm}$$

$$\text{Mass/Massa} = \frac{250}{200}$$

$$= 1,25 \text{ kg}$$

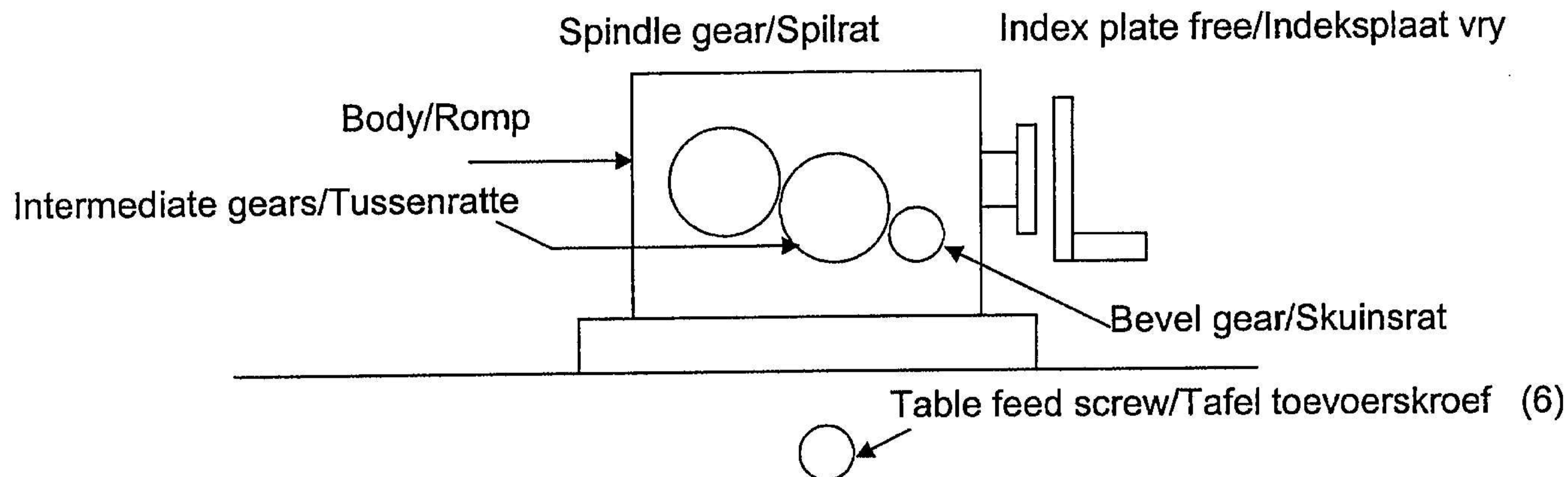
(3)



(6)

## QUESTION 4 / VRAAG 4

4.1



4.2

Indexing/Indeksring

$$40 = 40 = 4 = 4 \times 2 = 8$$

$$N = 150 = 15 = 15 \times 2 = 30$$

= 8 holes on the 30 hole circle/8 gate op die 30 gatsirkel (3)

4.3

Module =  $\frac{OD}{T + 2}$

$$= \frac{70}{12 + 2}$$

$$= \frac{70}{14}$$

$$= 5\text{mm}$$

Circular pitch/Sirkelsteek

$$= \pi m$$

$$= \pi \times 5$$

$$= 15,7\text{mm}$$

Indexing/Indeksring

$$= \frac{\text{Div. Head Ratio/Verdeelkopverhouding}}{\text{Gear ratio/Ratverhouding}} \times \frac{\text{CP of Rack/SS van Tandstang}}{\text{Lead screw pitch/Leiskroefsteek}}$$

$$= \frac{40 \times 157}{4 \times 10 \times 6}$$

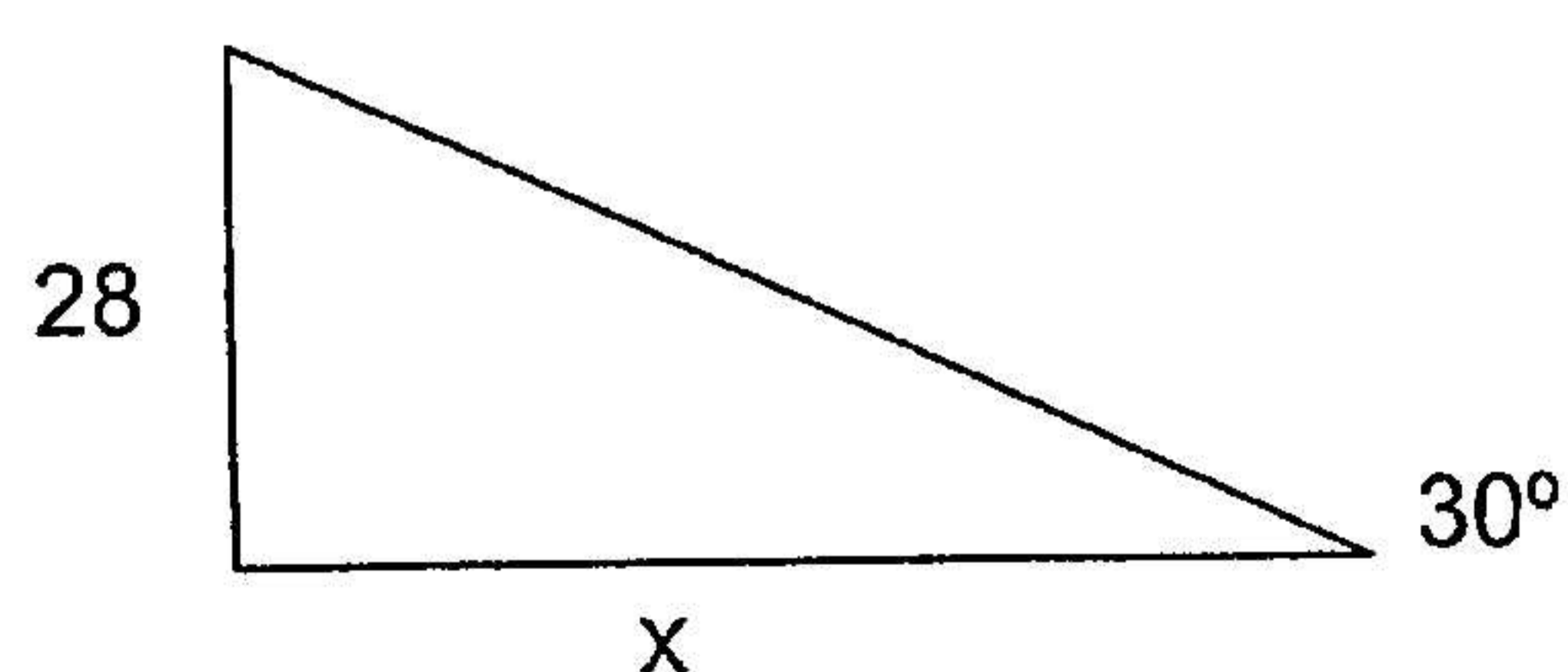
$$= \frac{157}{6}$$

$$= 26 \frac{1}{6} \text{ Turns/Draaie}$$

$$= 26 \text{ Full turns plus 5 holes on the 30 hole circle.}$$

$$= 26 \text{ Volle draaie plus 5 gate op die 30 gatsirkel} \quad (9)$$

4.4

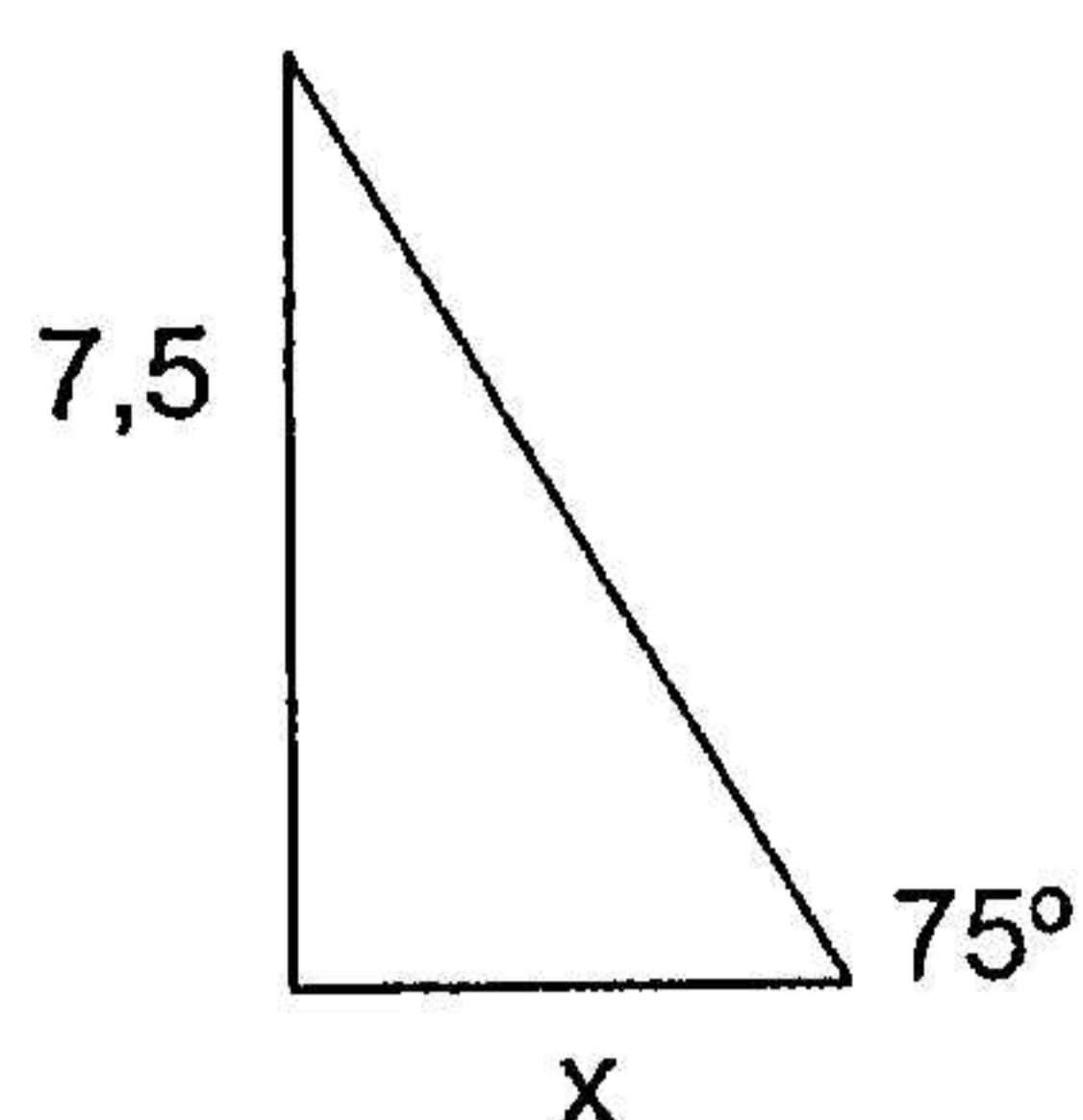


$$\tan 60^\circ = \frac{x}{28}$$

$$x = 28 \times \tan 60^\circ$$

$$= 28 \times 1,732$$

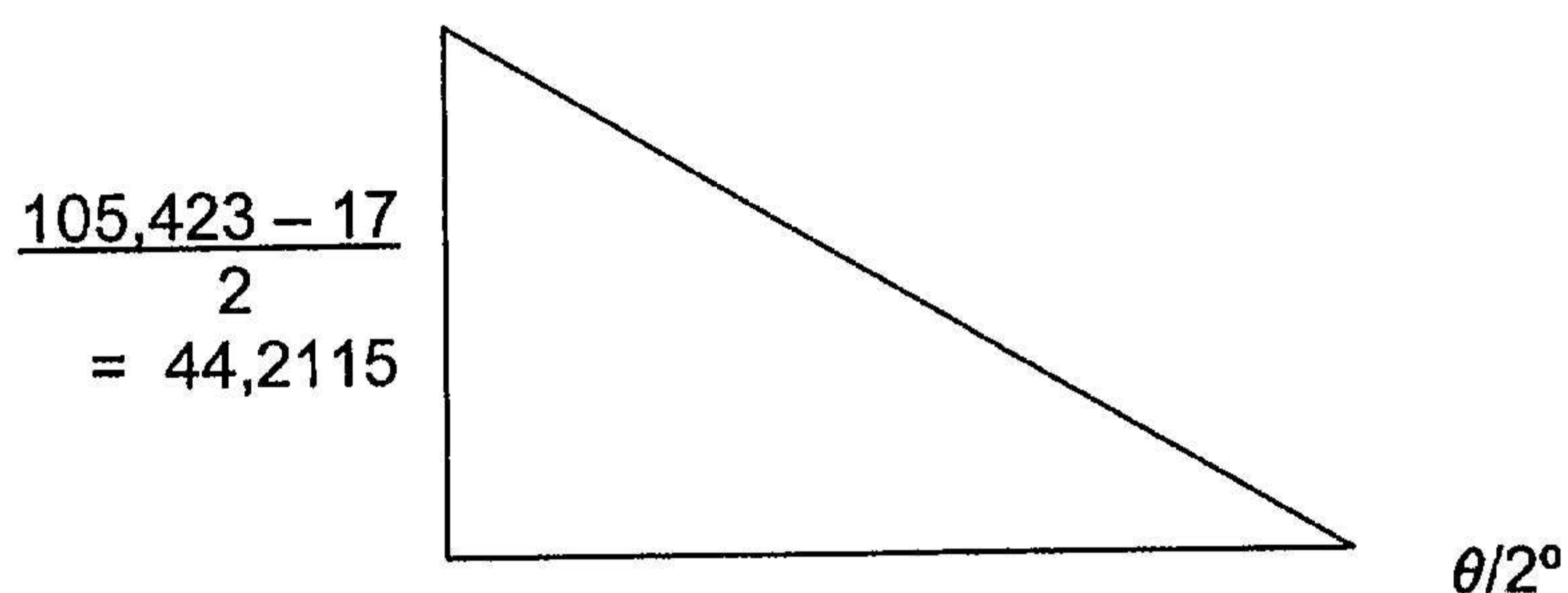
$$= 48,497 \text{ mm}$$



$$\begin{aligned} \tan 75^\circ &= \frac{7,5}{x} \\ x &= \frac{7,5}{\tan 75^\circ} \\ &= \frac{7,5}{3,732} \\ &= 2,0096 \text{ mm} \end{aligned}$$

$$\begin{aligned} W &= 65,676 - 2,01 - 48,497 - 7,5 \\ &= 7,669 \text{ mm} \end{aligned} \quad (11)$$

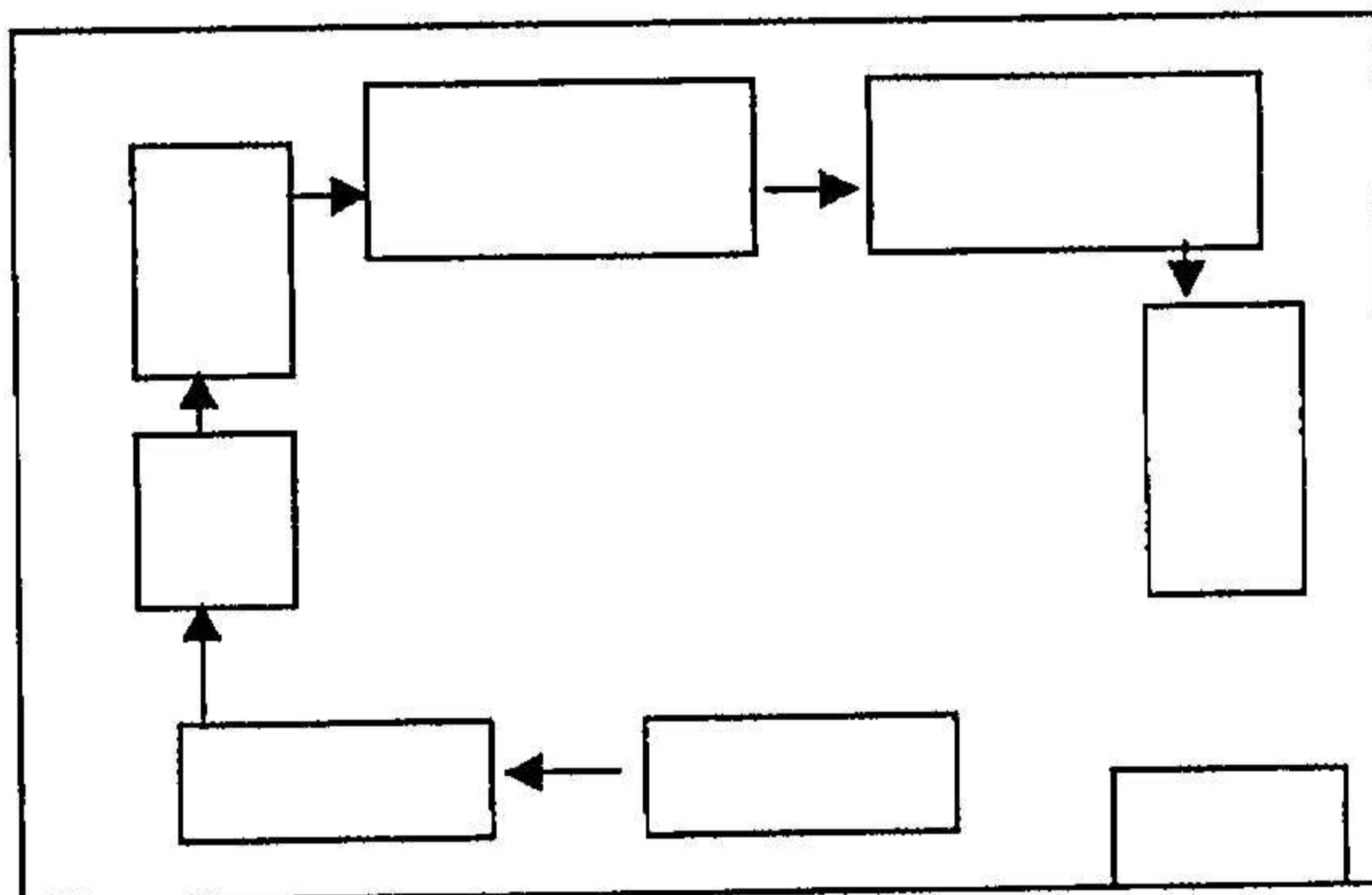
4.5



$$\begin{aligned} \tan \theta/2^\circ &= \frac{44,2115}{165} \\ &= 0,267948 \\ \theta/2^\circ &= \tan^{-1} 0,267948 \\ &= 14,999^\circ \\ &= 15^\circ \\ \theta &= 2 \times 15 \\ &= 30^\circ \end{aligned} \quad (6)$$

**QUESTION 5 / VRAAG 5**

5.1.1



(4)

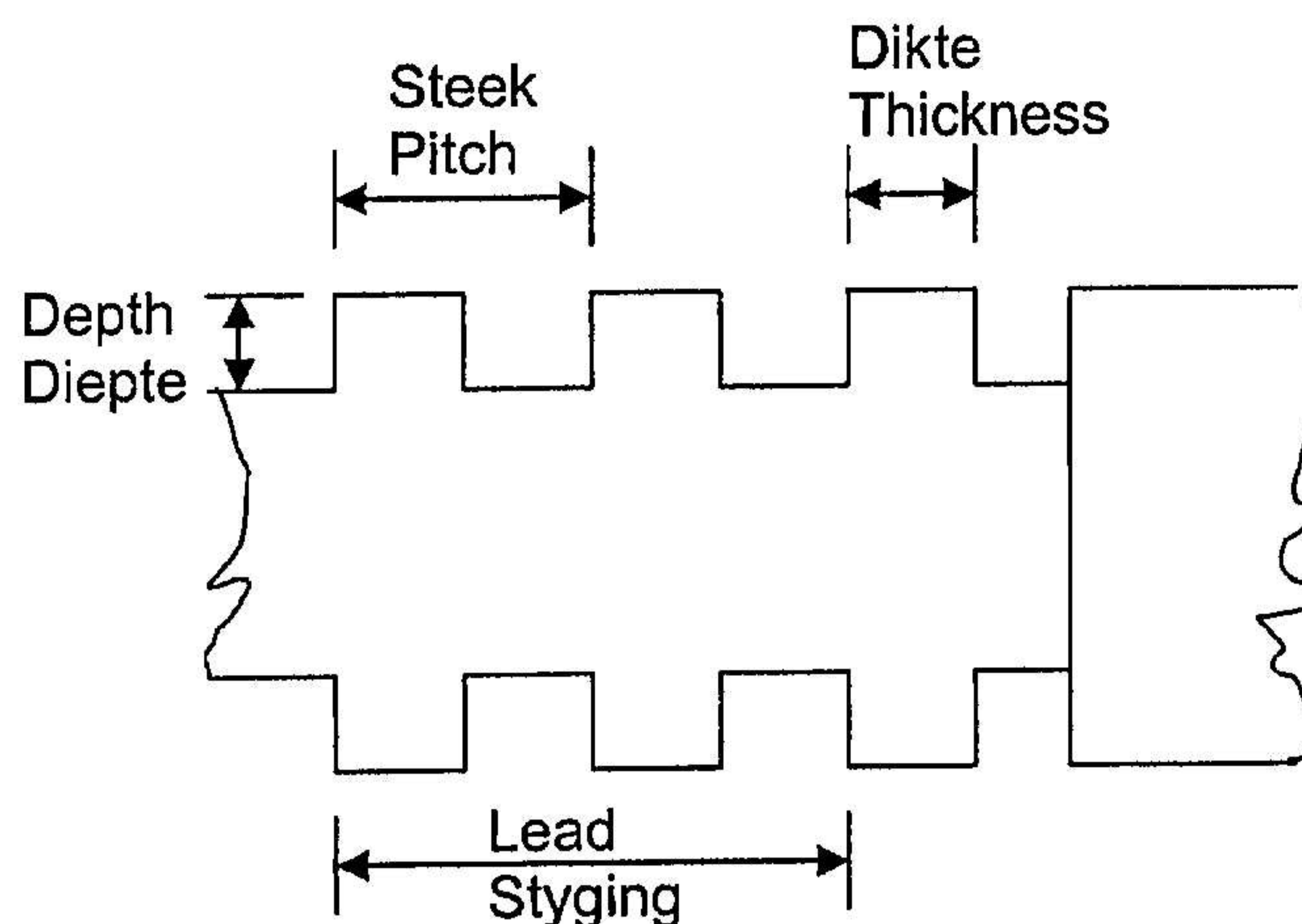
5.1.2

Similar machines are grouped together, e.g. lathes, milling machines, etc. to finish the machining and then the work is passed on to the next group of machines for further machining.

Soortgelyke masjiene word saam gegroepeer, bv. draaibanke, freesmasjiene, ens. om die masjinerig te voltooi en dan word die werk na die volgende groep masjiene oorgeplaas vir verdere masjinerig.

(2)

## 5.2.1



(6)

## 5.2.2

1. Mount shaft on lathe and cut recesses at front and end of shaft.
2. Sharpen tool to correct angles.
3. Bring tool to work and set tool square with shaft.
4. Set dial to zero.
5. Set machine to correct lead of thread.
6. Take light cut and check pitch, lead etc.
7. If everything is fine, complete first thread.
8. Take tool to beginning of thread and move compound slide 12 mm towards work.
9. Take light cut and re-check everything.
10. Finish the second thread.

(10)

1. Monteer as op draaibank en sny resesse aan begin en einde van as.
2. Maak beitel skerp met korrekte hoeke.
3. Bring beitel tot by werkstuk en stel beitel haaks met as.
4. Stel kraag op zero.
5. Stel masjien vir korrekte styging van draad.
6. Neem ligte snit en gaan steek, styging, ens. na.
7. As alles in orde is, voltooi eerste draad.
8. Neem beitel na begin van draad en beweeg saamgestelde sleet 12 mm na die werkstuk toe.
9. Neem ligte snit en gaan weer alles na.
10. Voltooi die tweede draad.

## 5.2.3 (a)

$$\begin{aligned} L &= 2 \times \text{pitch/steek} \\ &= 2 \times 12 \\ &= 24\text{mm} \end{aligned}$$

## 5.2.3 (b)

$$\begin{aligned} D_m/D_g &= 80 - \frac{1}{2}P/S \\ &= 80 - 6 \\ &= 74 \text{ mm} \end{aligned}$$

$$\begin{aligned} \tan \theta &= \frac{L}{\pi D_m/D_g} \\ &= \frac{24}{\pi \times 74} \\ &= 0,1032 \\ \theta &= \tan^{-1} 0,1032 \\ &= 5,894^\circ \\ &= 5^\circ 54' \end{aligned}$$

(4)

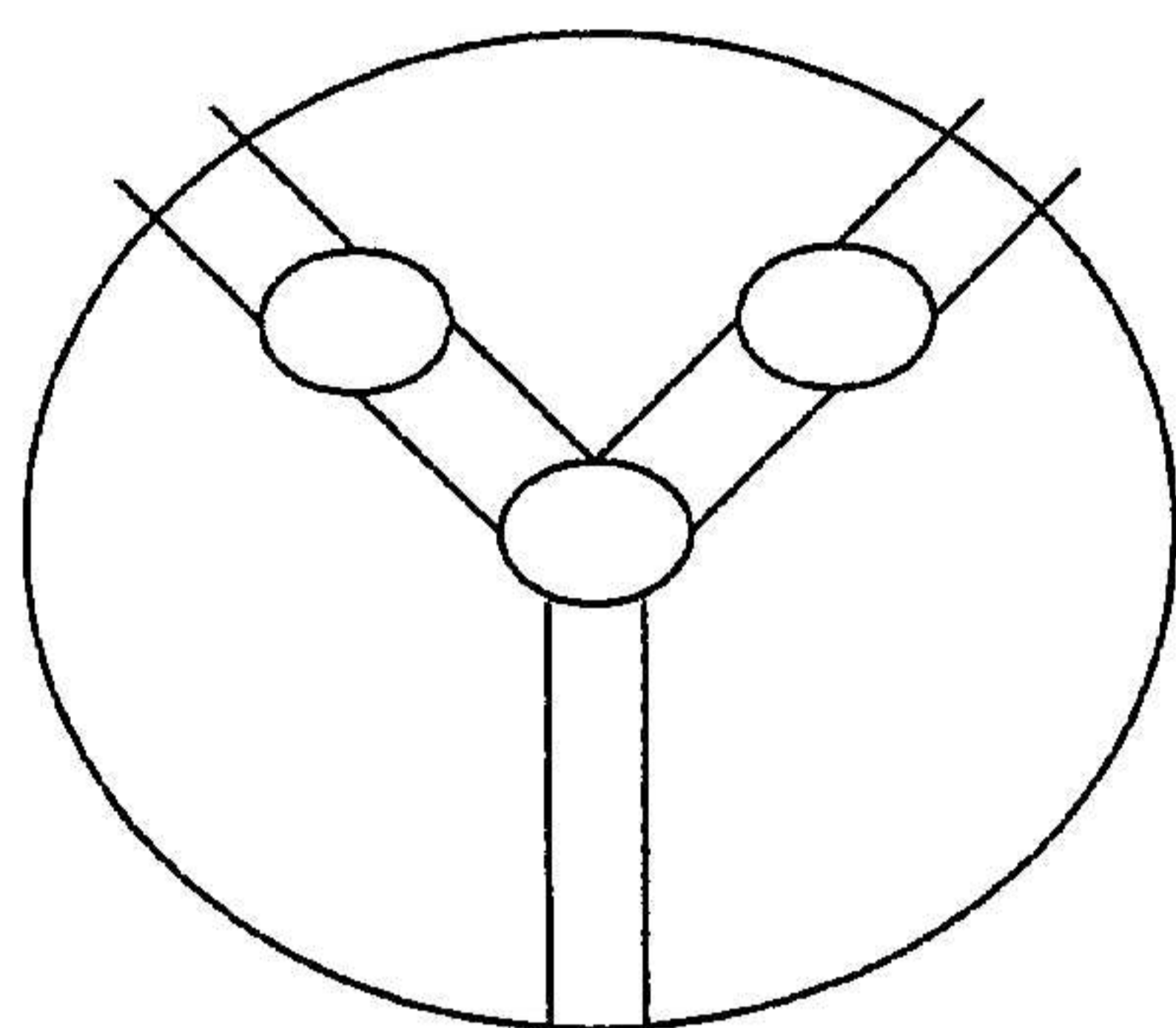
5.2.3 (c)

Leading angle/Voorsnyhoek =  $90 - (\theta + 5,894)$   
 =  $90 - (4 + 5,894)$   
 =  $90 - 9,894$   
 =  $80,106$   
 =  $80^{\circ} 6'$  (2)

5.2.3 (d)

Trailing angle/Nasleephoek =  $90 + (\theta - 5,894)$   
 =  $90 + (4 - 5,894)$   
 =  $90 - 1,894$   
 =  $88^{\circ} 6'$  (2)

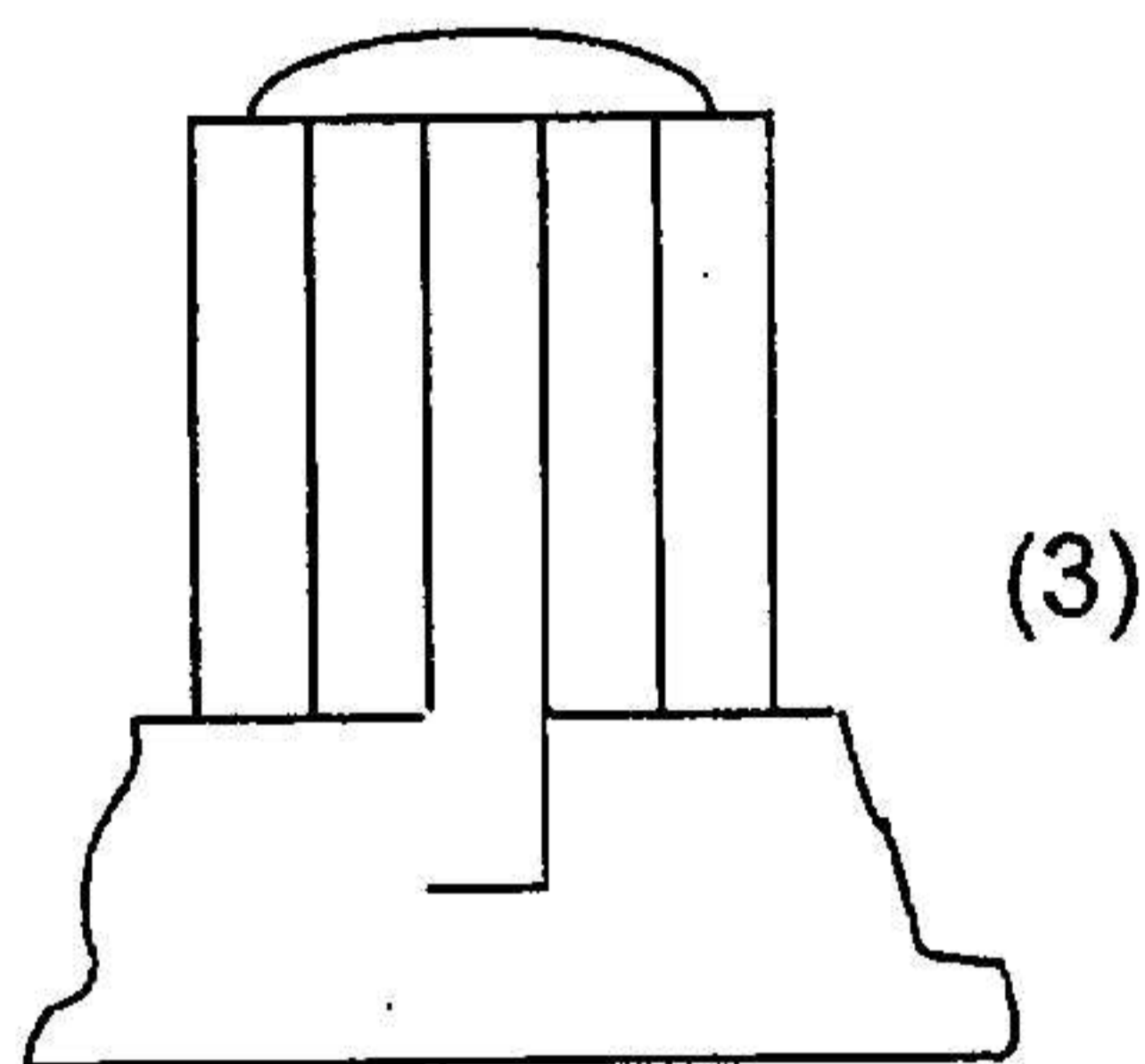
5.3



(4)

**QUESTION 6 / VRAAG 6**

6.1



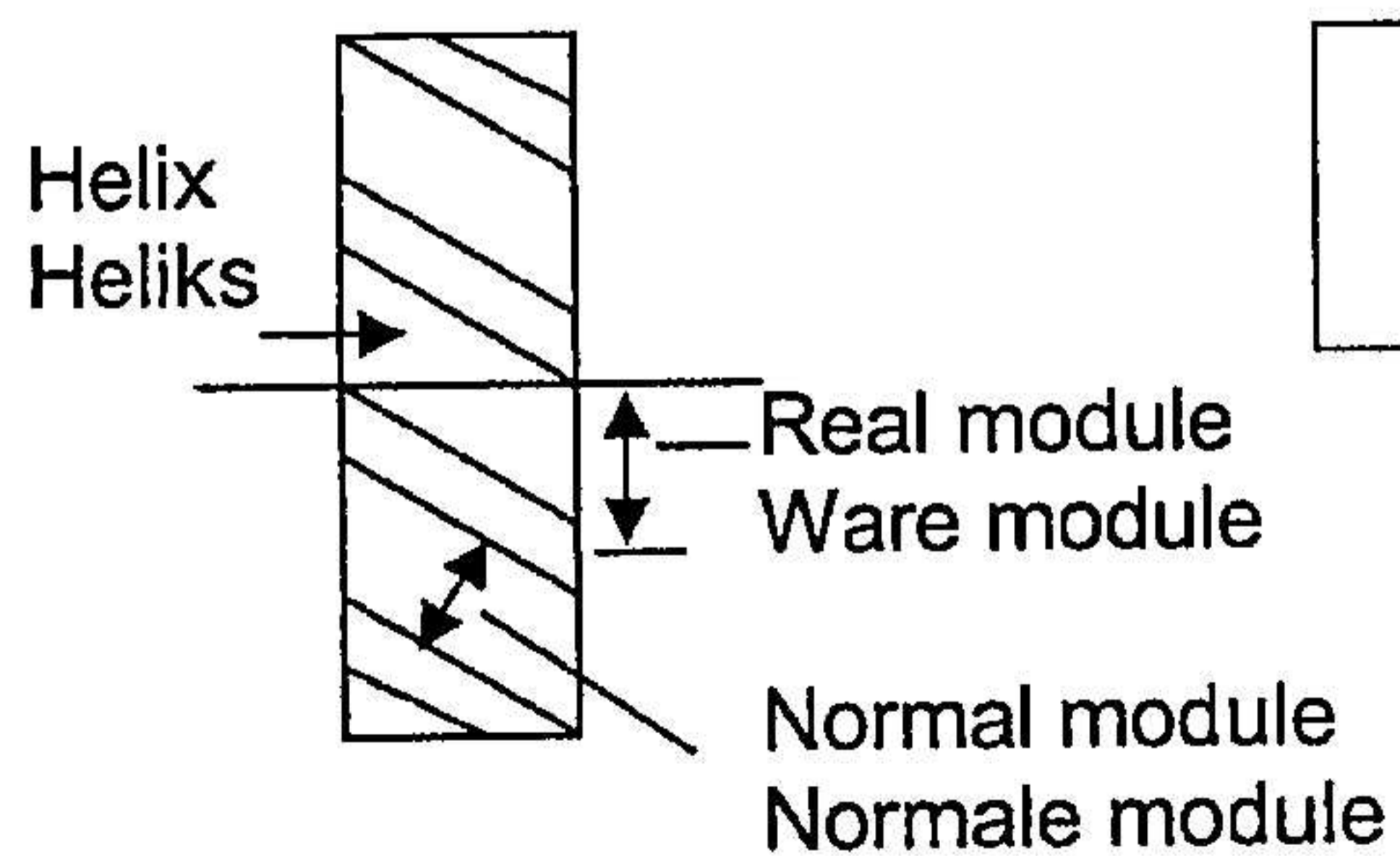
(3)

6.2

1. - Addendum
2. - circular thickness
3. - dedendum
4. - bottom land
5. - top land
6. - chordal addendum
7. - chordal thickness

(7)

6.3



6.4

1. Depth of cut.	1. Diepte van snit.
2. Indexing.	2. Indeksering.
3. The cutter.	3. Die snyer.

(6)

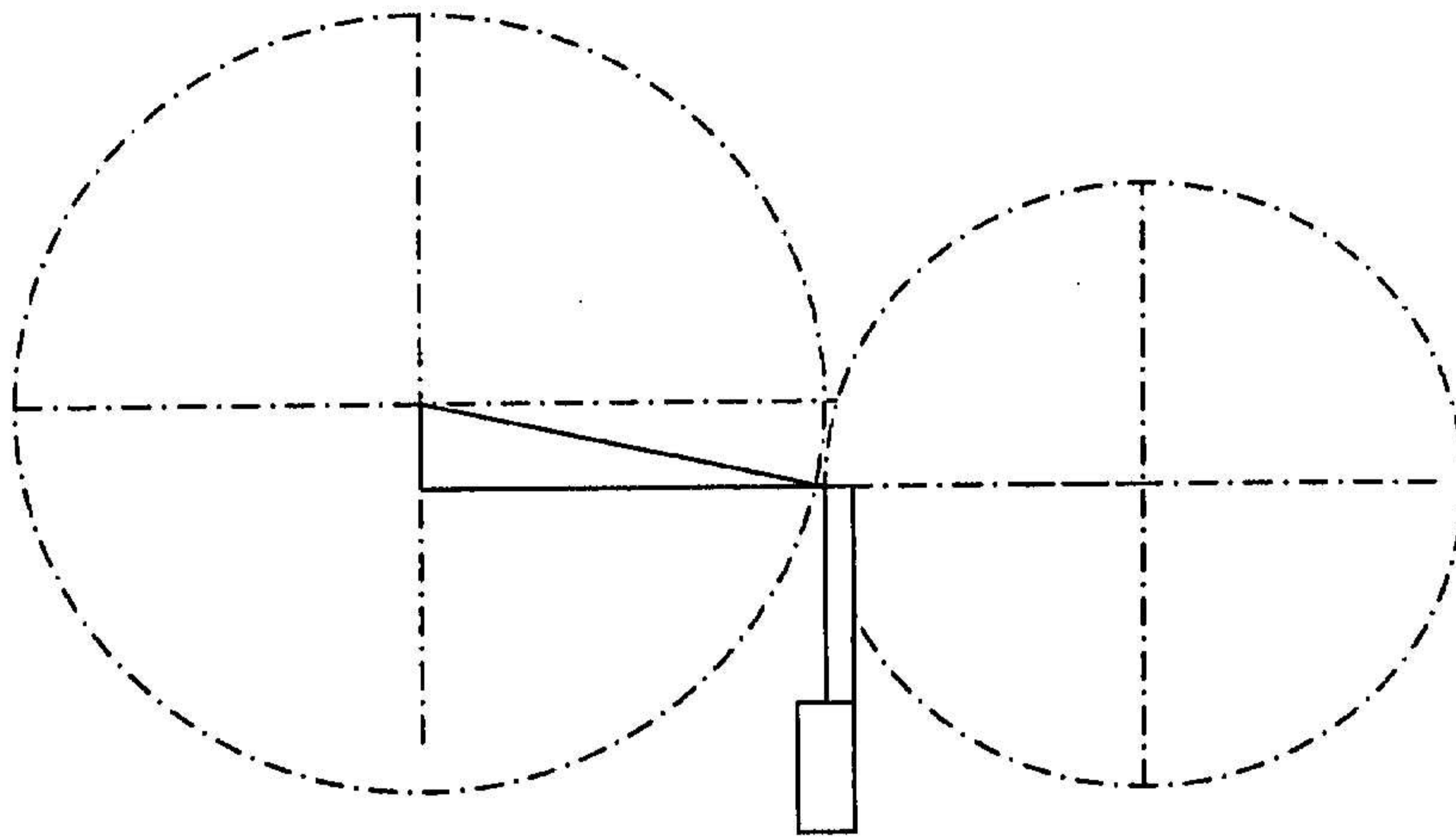
(3)



6.5.1

$$\begin{aligned}
 \text{Offset/Oorstelling} &= R \cdot \sin \theta \\
 &= 75 \times \sin 7^\circ \\
 &= 75 \times 0,122 \\
 &= 9,14\text{mm}
 \end{aligned}
 \tag{3}$$

6.5.2



(5)

6.6

$$\begin{aligned}
 P_1 &= P_2 \\
 \underline{F_1} &= \underline{F_2} \\
 A_1 &= A_2 \\
 F_1 A_2 &= F_2 A_1 \\
 A_2 &= \frac{F_2 A_1}{F_1} \\
 \frac{\pi D^2}{4} &= \frac{\pi \times 45000 \times 0,05^2}{4 \times 600} \\
 D^2 &= 0,1875 \\
 D &= 0,1875 \\
 &= 0,433012\text{m} \\
 &= 433,012\text{mm}
 \end{aligned}
 \tag{8}$$