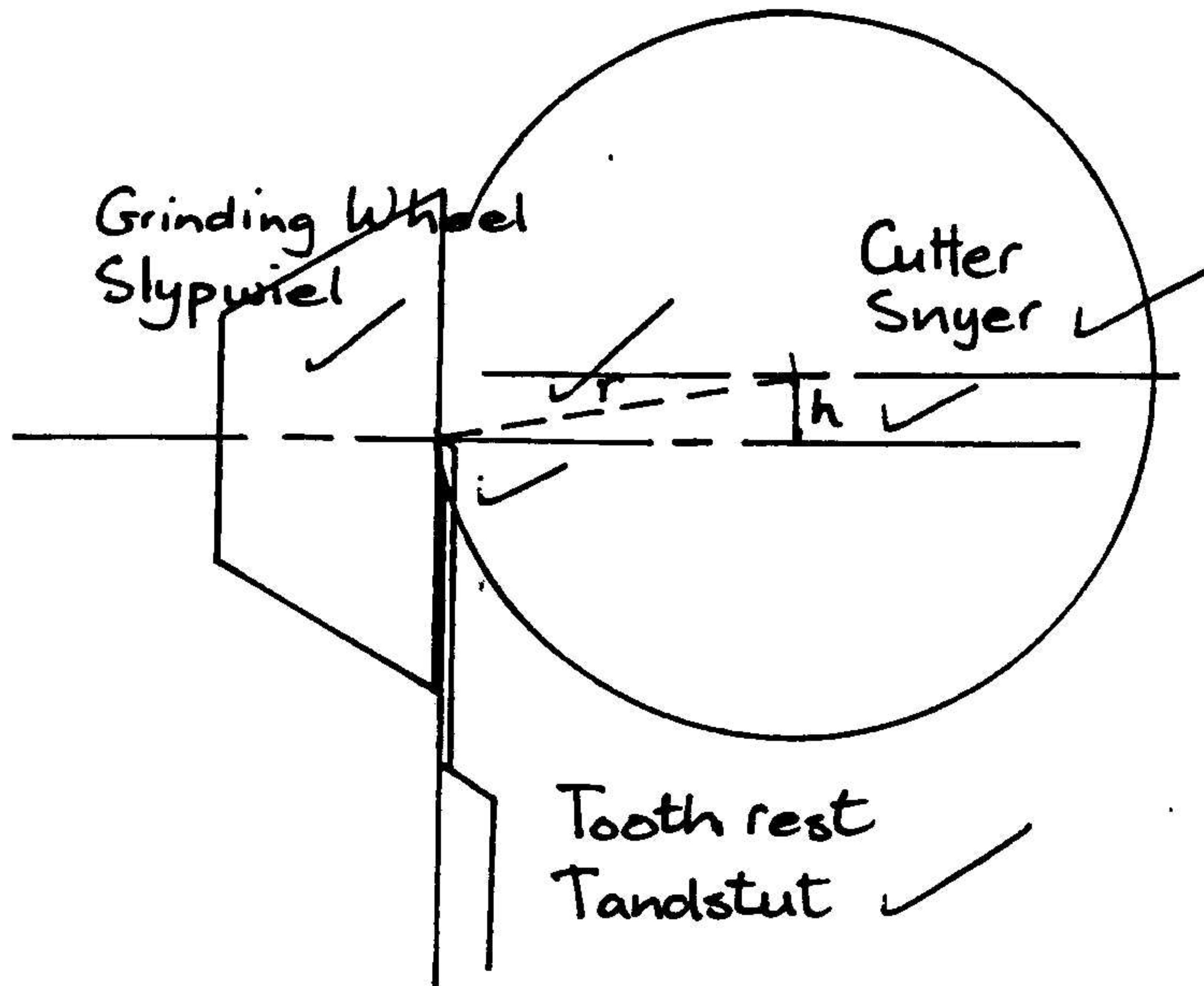


POSSIBLE ANSWERS FOR:
FITTING AND TURNING SG/PAS-EN DRAAIWERK SG
N 2002/M 2003
PAPER A/VRAESTEL A

QUESTION 2 / VRAAG 2

2.1.1



2.1.2

Set over / Oorstelling:

$$\begin{aligned}
 &= r \cdot \sin \theta \\
 &= 100 \cdot \sin 7^\circ \\
 &= 100 \times 0,121869 \\
 &= 12,187 \text{ mm}
 \end{aligned}$$



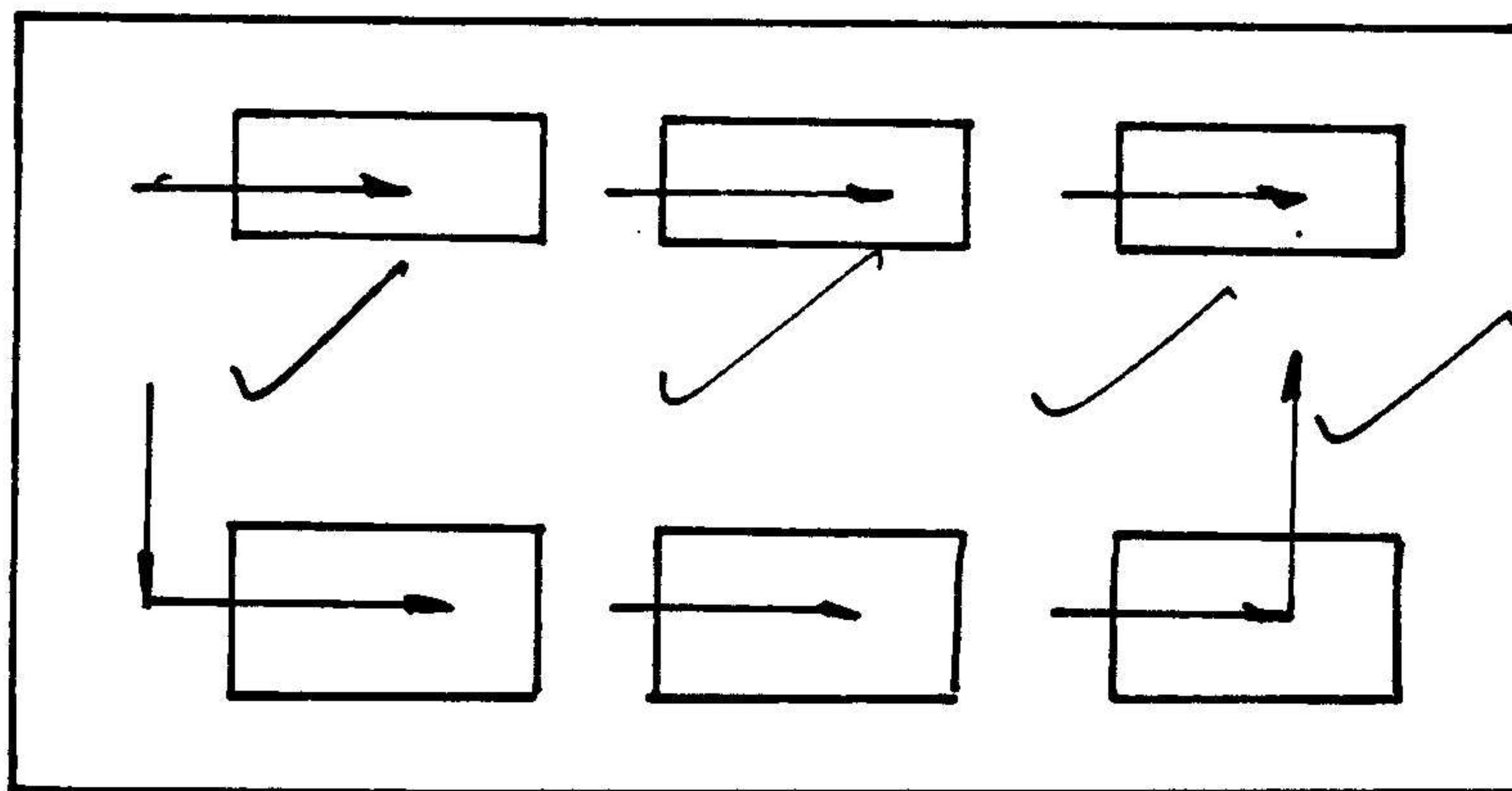
(10)

2.2

1. Setting standards.	✓	1. Stelling van standarde.
2. Inspect or check all materials.	✓	2. Inspekteer of nagaan van alle materiale.
3. Take samples for testing/quality control.	✓	3. Neem monsters vir toetsing/gehaltebeheer.
4. Regular testing of gauges.	✓	4. Gereelde toetsing van mates.

(4)

2.3



(4)

**ANSWER SHEET FOR QUESTION
ANTWOORDBLAD VIR VRAAG**

1

PA

1.1	A	B	C	D	E
1.2	A	B	C	D	E
1.3	A	B	C	D	E
1.4	A	B	C	D	E
1.5	A	B	C	D	E
1.6	A	B	C	D	E
1.7	A	B	C	D	E
1.8	A	B	C	D	E
1.9	A	B	C	D	E
1.10	A	B	C	D	E
1.11	A	B	C	D	E
1.12	A	B	C	D	E
1.13	A	B	C	D	E
1.14	A	B	C	D	E
1.15	A	B	C	D	E
1.16	A	B	C	D	E
1.17	A	B	C	D	E
1.18	A	B	C	D	E
1.19	A	B	C	D	E
1.20	A	B	C	D	E
1.21	A	B	C	D	E
1.22	A	B	C	D	E
1.23	A	B	C	D	E
1.24	A	B	C	D	E
1.25	A	B	C	D	E
1.26	A	B	C	D	E
1.27	A	B	C	D	E
1.28	A	B	C	D	E
1.29	A	B	C	D	E
1.30	A	B	C	D	E
1.31	A	B	C	D	E
1.32	A	B	C	D	E
1.33	A	B	C	D	E
1.34	A	B	C	D	E
1.35	A	B	C	D	E
1.36	A	B	C	D	E
1.37	A	B	C	D	E
1.38	A	B	C	D	E
1.39	A	B	C	D	E
1.40	A	B	C	D	E

1.41	A	B	C	D	E
1.42	A	B	C	D	E
1.43	A	B	C	D	E
1.44	A	B	C	D	E
1.45	A	B	C	D	E
1.46	A	B	C	D	E
1.47	A	B	C	D	E
1.48	A	B	C	D	E
1.49	A	B	C	D	E
1.50	A	B	C	D	E
1.51	A	B	C	D	E
1.52	A	B	C	D	E
1.53	A	B	C	D	E
1.54	A	B	C	D	E
1.55	A	B	C	D	E
1.56	A	B	C	D	E
1.57	A	B	C	D	E
1.58	A	B	C	D	E
1.59	A	B	C	D	E
1.60	A	B	C	D	E
1.61	A	B	C	D	E
1.62	A	B	C	D	E
1.63	A	B	C	D	E
1.64	A	B	C	D	E
1.65	A	B	C	D	E
1.66	A	B	C	D	E
1.67	A	B	C	D	E
1.68	A	B	C	D	E
1.69	A	B	C	D	E
1.70	A	B	C	D	E
1.71	A	B	C	D	E
1.72	A	B	C	D	E
1.73	A	B	C	D	E
1.74	A	B	C	D	E
1.75	A	B	C	D	E
1.76	A	B	C	D	E
1.77	A	B	C	D	E
1.78	A	B	C	D	E
1.79	A	B	C	D	E
1.80	A	B	C	D	E

**FOR EXAMINER'S USE:
VIR EKSAMINATOR SE GEBRUIK:**

**TOTAL
TOTAAL**

25



2.4

$$\begin{aligned} \delta &= F/A \\ A &= F/\delta \\ &= \frac{10 \times 10^3}{6,0172 \times 10} \\ &= 1,6619 \times 10^3 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{But/Maar } A &= \frac{\pi d^2}{4} \\ d &= \sqrt{A \times 4} \\ &= \frac{\pi}{\sqrt{1,6619 \times 10^3} \times 4} \\ &= \frac{\pi}{\sqrt{2,116 \times 10^3}} \\ &= 0,046 \text{ m} \\ &= 46 \text{ mm} \end{aligned}$$

2.5

$$\begin{aligned} \text{Total mass/Totale massa} &= (500 \times 60) + 3000 \text{ kg} \\ &= 33000 \text{ kg} \\ \text{Force/Krag} &= 33000 \times 10 \text{ N} \\ &= 330 \text{ kN} \end{aligned}$$

$$\begin{aligned} A_T &= \frac{\pi d^2 \times 10}{4} \\ &= \frac{\pi \times 0,25^2 \times 10}{4} \\ &= 0,49087 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \delta &= \frac{F_T}{A_T} \\ &= \frac{330000}{0,49087} \\ &= 672275,755 \text{ Pa} \\ &= 672,276 \text{ kPa} \end{aligned}$$

(8)

(2)

(4)

(3)

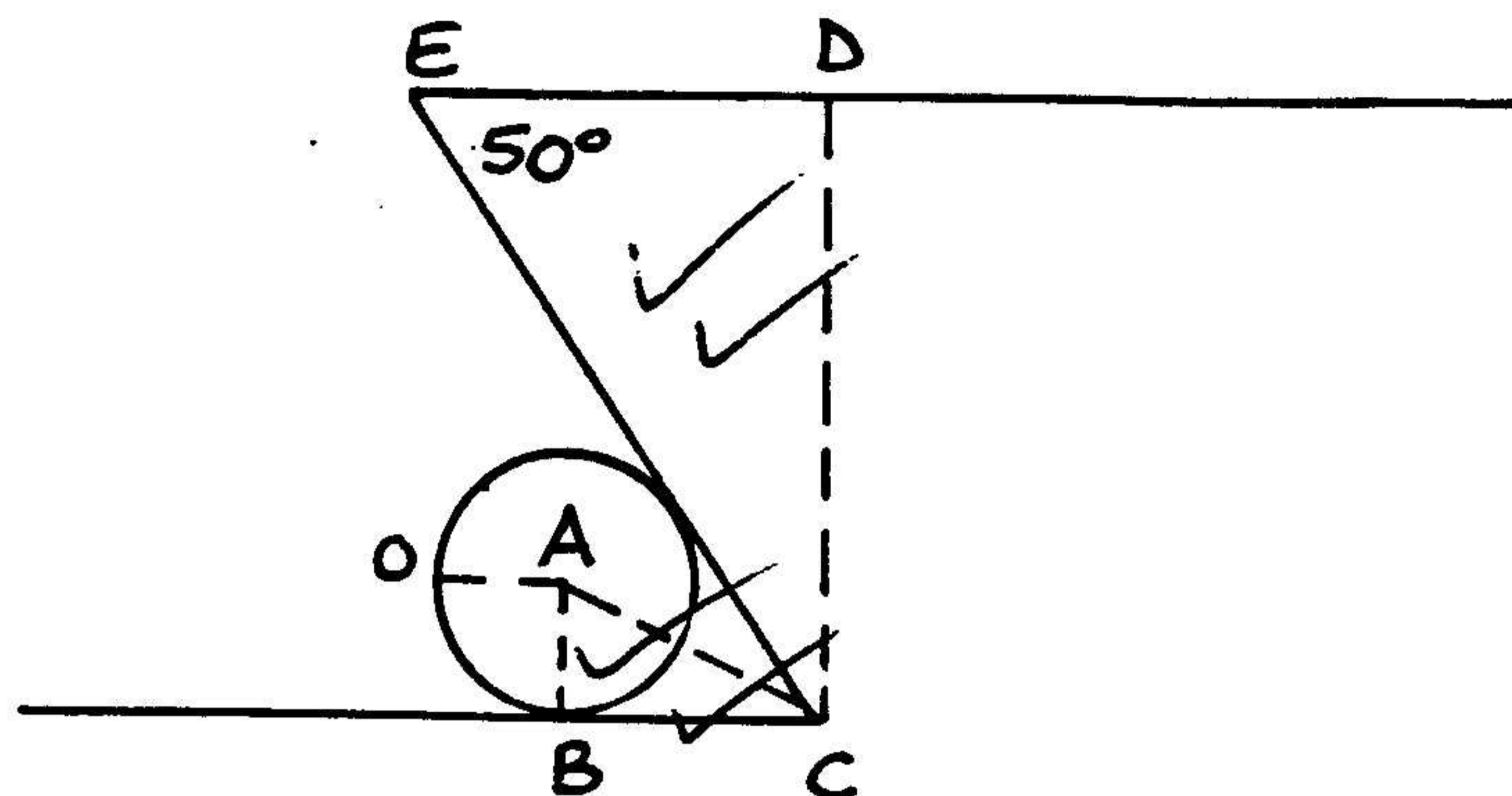
[35]

QUESTION 3 / VRAAG 3

3.1.1 Internal dovetail / Interne swaelstert. ✓

(1)

3.1.2



(4)

3.1.3

Finding E / Om E te vind

In Δ CDE

CD = 18 mm [Given/Gegee] ✓

E = 50° ✓

Tan 50° = $\frac{18}{ED}$ ✓

ED = $\frac{18}{\text{Tan } 50^\circ}$ ✓

= $\frac{18}{1,192}$ ✓
 = 15,104 mm ✓

E = 90 - 2.15,104 ✓
 = 90 - 30,208 ✓
 = 59,792 mm ✓

(4)

(2)

Finding BC / Om BC te vind:

In Δ ABC:

AB = AO = 7,5 mm [$\frac{1}{2}$ of/van roller ϕ]

C = 25° [$\frac{1}{2}$ included/ingeslote \sphericalangle]

Tan 25° = $\frac{AB}{BC}$

BC = $\frac{AB}{\text{Tan } 25^\circ}$ ✓

✓

$$\begin{aligned}
&= \frac{7,5}{0,4663} && \checkmark \checkmark \checkmark && (3) \\
&= 16,084 \text{ mm} \\
W &= E + 2BC + 2AO && \checkmark \\
&= 59,792 + 2 \cdot 16,084 + 2 \cdot 7,5 && \checkmark \\
&= 59,792 + 32,168 + 15 && \checkmark \\
&= 106,96 \text{ mm} && \checkmark && (3)
\end{aligned}$$

3.2.1

Indexing / Indeksering: $= \frac{40}{N}$ \checkmark

$$= \frac{40}{120} = \frac{1 \times 8}{3 \times 8} = \frac{8}{24} \checkmark$$

= 8 holes on the 24 hole circle \checkmark
gate op die 24 gatsirkel \checkmark (3)

3.2.2

Change gears / Wisselratte: $= \frac{D_r}{D_n} = \frac{(A-N) \times 40}{A \times 1}$ \checkmark

$$= \frac{(120 - 119) \times 40}{120 \times 1} \checkmark$$

$$= \frac{1 \times 4}{12} = \frac{4}{12} = \frac{1}{3} \checkmark$$

$$= \frac{1 \times 24}{3 \times 24} = \frac{24}{72} \text{ OR } \frac{28}{84} \checkmark (4)$$

3.2.3 Rotation : The index plate rotates WITH the index crank (+). \checkmark (1)
Rotasie : Die indeksplaat roteer MET die indeksskruk (+).

3.3

Angle between divisions = $\frac{360}{27}$ \checkmark
Hoek tussen indelings = $13,33^\circ = 13^\circ 20'$ \checkmark

Indexing : $= \frac{N}{9} = \frac{13^\circ 20'}{9} = \frac{800 \text{ min.}}{540 \text{ min.}}$ \checkmark Turns
Indeksering: $= \frac{13^\circ 20'}{9} = \frac{800 \text{ min.}}{540 \text{ min.}}$ \checkmark Draaie

= 1 26/54 Turns/ Draaie
= 1 Full turn plus 26 holes on the 54 hole circle.
= 1 Volle draai plus 26 gate op die 54 gatsirkel.

3.4

(4)

- | | |
|--|---|
| 1. Divides work piece into any number of divisions. \checkmark | 1. Verdeel die werkstuk in enige aantal indelings. \checkmark |
| 2. Used with change gears when differential is performed. \checkmark | 2. Gebruik met wisselratte wanneer differensiaalindeksering gedoen word. \checkmark |
| 3. Engage the leadscrew when gear racks are cut. \checkmark | 3. Koppel die leiskroef vir ratsnywerk. \checkmark |

4. The chuck holds the work piece while cutting is done. ✓

4. Die kloukop hou die werk vas terwyl snywerk gedoen word. (4)

QUESTION 4 / VRAAG 4

4.1

$$F = mg = 32000 \text{ mg} \times 10 \text{ m/s}^2 = 320 \text{ kN} \quad \checkmark \quad (1)$$

$$\begin{aligned} \text{Area of piston} &= \frac{\pi d^2}{4} \\ \text{Area van suier} &= \frac{\pi \times 0,05^2}{4} \quad \checkmark \\ &= 1,963 \times 10^{-3} \text{ m}^2 \quad \checkmark \end{aligned} \quad (2)$$

$$\begin{aligned} P &= F/A \\ &= \frac{320000}{1,963 \times 10^{-3}} \quad \checkmark \\ &= 162974661,7 \text{ Pa} \quad \checkmark \\ &= 162,975 \text{ MPa} \quad \checkmark \end{aligned} \quad (3)$$

4.2.1

$$\begin{aligned} \text{Area of ram} &= \frac{\pi d^2}{4} \\ \text{Area van ram} &= \frac{\pi \times 0,156^2}{4} \quad \checkmark \\ &= 0,019 \text{ m}^2 \quad \checkmark \end{aligned}$$

$$\begin{aligned} P &= F/A \\ &= \frac{65000 \times 10^3}{0,019} \quad \checkmark \\ &= 340074664,7 \text{ Pa} \quad \checkmark \\ &= 340,075 \text{ MPa} \quad \checkmark \end{aligned} \quad (4)$$

4.2.2

$$\begin{aligned} V_1 &= V_2 \quad \checkmark \\ D^2 \times H &= d^2 \times h \quad \checkmark \\ 156^2 \times 5 &= d^2 \times 15 \quad \checkmark \\ d &= \frac{\sqrt{156^2 \times 5}}{15} \quad \checkmark \\ &= \sqrt{8112} \quad \checkmark \\ &= 90,067 \text{ mm} \quad \checkmark \end{aligned} \quad (6)$$