G195 $d = 3\,m$ $r = 1.5\,m$

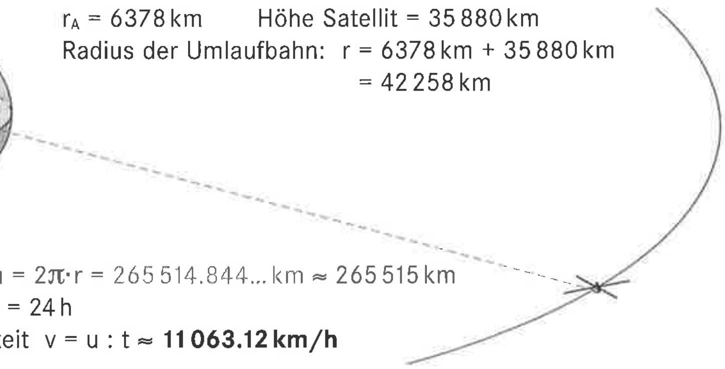
a $A = \pi \cdot r^2 \approx 7.07\,m^2$
b $u = \pi \cdot d \approx 9.42\,m$

G196 **a** $r = 2.8\,dm$
$d = 2r = 5.6\,dm$ $u = \pi \cdot d \approx 17.59\,dm$ $A = \pi \cdot r^2 \approx 24.63\,dm^2$

b $u = 44\,cm$ 155.92
$r = u : 2\pi = 7.002...\,cm \approx 7.00\,cm$ $d = 2r \approx 14.01\,cm$ $A = \pi \cdot r^2 \approx 104.06\,cm^2$

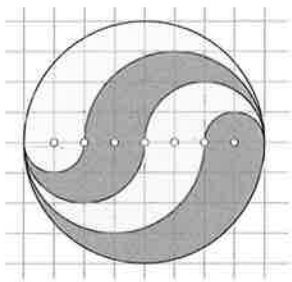
G197

$r_A = 6378\,km$ Höhe Satellit = 35 880 km
Radius der Umlaufbahn: $r = 6378\,km + 35\,880\,km$
$= 42\,258\,km$



Umlaufbahn $u = 2\pi \cdot r = 265\,514.844...\,km \approx 265\,515\,km$
Umlaufzeit $t = 24\,h$
Geschwindigkeit $v = u : t \approx$ **11 063.12 km/h**

G198 **a**

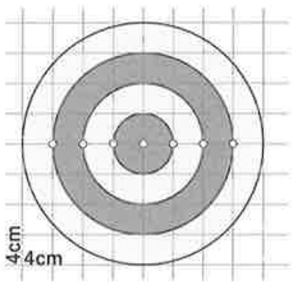


Die gelbe und die grüne Fläche sind gleich gross. Sie liegen punktsymmetrisch zueinander.

Radius des äussersten Kreises: $r = 16\,cm$

$\mathbf{A_{gelb}} = A_{grün} = A_{Kreis} : 2 = \pi \cdot r^2 : 2 \approx \mathbf{402.12\,cm^2}$

b



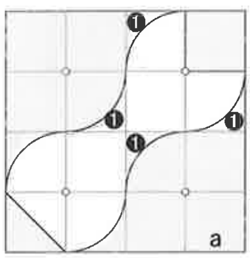
$A_{gelb} = A_{ganz} - A_{Kreis\ grün} - A_{Ring\ grün}$

$A_{ganz} = 804.247...\,cm^2$
$A_{Kreis\ grün} = 50.226...\,cm^2$
$A_{Ring\ grün} = 251.327...\,cm^2$

$\mathbf{A_{gelb} \approx 502.65\,cm^2}$

G199 **a** $\mathbf{A_{gelb}} = 4.5 \cdot A_{\square s=2\,cm} + 0.5 \cdot A_{\bigcirc r=a=2\,cm}$
$= 4.5 \cdot 4\,cm^2 + 0.5 \cdot \pi \cdot 4\,cm^2 \approx \mathbf{24.28\,cm^2}$

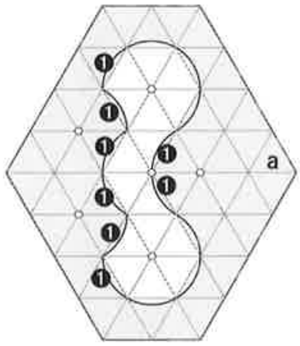
$\mathbf{u_{gelb}} = 1.5 \cdot u_{\bigcirc r=a=2\,cm} + 2a + a \cdot \sqrt{2}$
$= 3\pi \cdot 2\,cm + 4\,cm + 2\,cm \cdot \sqrt{2} \approx \mathbf{25.68\,cm}$



→

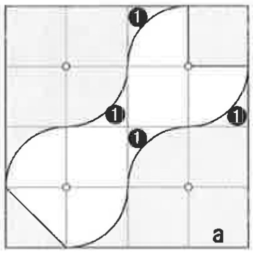
→ **b** $A_{gelb} = 10 \cdot A_{\triangle s=2\,cm} + A_{\bigcirc r=2\,cm}$
$= 10 \cdot 2\,cm \cdot 1\,cm \cdot \sqrt{3} : 2 + \cdot \pi \cdot 4\,cm^2$
$= 10 \cdot \sqrt{3} + \cdot \pi \cdot 4\,cm^2 \approx \mathbf{29.89\,cm^2}$

$u_{gelb} = (^{14}/_6) \cdot u_{\bigcirc r=a=2\,cm}$
$= 14:6 \cdot 2\pi \cdot 2\,cm \approx \mathbf{29.32\,cm}$



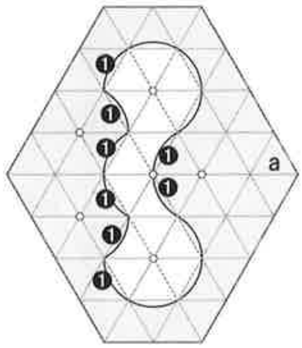
G1100 **a** $A_{gelb} = 4.5 \cdot A_{\square s=a} + 0.5 \cdot A_{\bigcirc r=a}$
$= 4.5 \cdot a^2 + 0.5 \cdot \pi \cdot a^2$
$= (4.5 + 0.5 \cdot \pi) a^2$

$u_{gelb} = 1.5 \cdot u_{\bigcirc r=a=2\,cm} + 2a + a \cdot \sqrt{2}$
$= 1.5 \cdot 2\pi \cdot a + 2a + a \cdot \sqrt{2}$
$= (3\pi + 2 + \sqrt{2}) \cdot a$



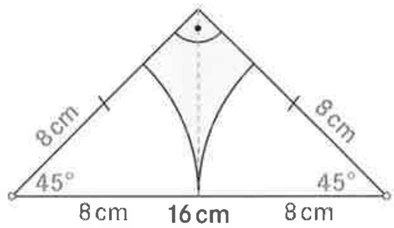
b $A_{gelb} = 10 \cdot A_{\triangle s=a} + A_{\bigcirc r=a}$
$= 10 \cdot a \cdot \frac{a}{2} \cdot \sqrt{3} : 2 + \pi \cdot a^2$
$= 2.5a^2 \cdot \sqrt{3} + \pi \cdot a^2$
$= (2.5 \cdot \sqrt{3} + \pi) \cdot a^2$

$u_{gelb} = (^{14}/_6) \cdot u_{\bigcirc r=a}$
$= \frac{14}{6} \cdot 2\pi \cdot a$
$= \frac{14}{3}\, \pi \cdot a$



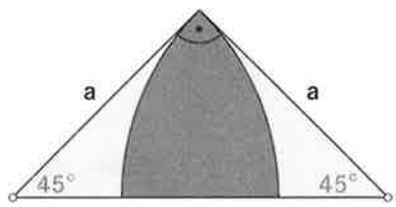
G1101 $A_{gelb} = A_{Dreieck} - 0.25 A_{\bigcirc r=8\,cm}$
$= 64\,cm^2 - 0.25\pi \cdot (8\,cm)^2$
$= \mathbf{13.73\,cm^2}$

$u_{gelb} = 2 \cdot Seite + 0.25 u_{\bigcirc r=8\,cm}$
$= 2 \cdot (8\,cm \cdot \sqrt{2} - 8\,cm) + 0.25 \cdot 2\pi \cdot 8\,cm$
$\approx \mathbf{19.19\,cm}$



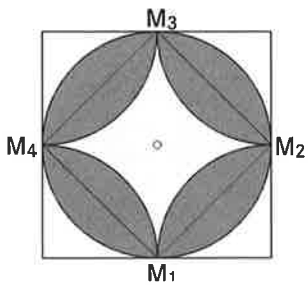
G1102 $A_{grün} = 0.25 A_{\bigcirc r=a} - A_{Dreieck}$
$= 0.25\pi \cdot a^2 - 0.5a^2$
$= (0.25\pi - 0.5) \cdot a^2$

$u_{grün} = 0.25 A_{\bigcirc r=a} + 2 \cdot a - a \cdot \sqrt{2}$
$= 0.25 \cdot 2\pi \cdot a + 2 \cdot a - a \cdot \sqrt{2}$
$= (0.5\pi + 2 - \sqrt{2}) \cdot a \approx 2.16a$



G1103 $A_{grün} = 8 \cdot A_{halbe\ Linse}$
$= 8 \cdot (0.25 A_{\bigcirc r=a/2} - A_{Dreieck})$
$= 8 \cdot (0.25\pi \cdot (0.5a)^2 - 0.5a \cdot 0.5a:2)$
$= 8 \cdot (0.0625\pi a^2 - 0.125a^2)$
$= (0.5\pi - 1)a^2 \approx 0.57a$

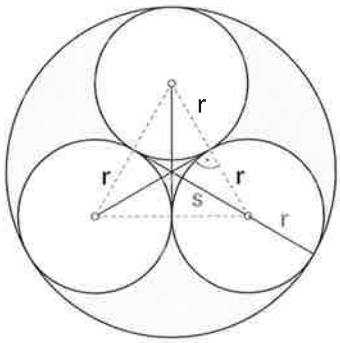
$u_{grün} = 2 \cdot A_{\bigcirc r=a/2}$
$= 2 \cdot \pi a$



G1104 $A_{gelb} = A\bigcirc_{gross\ r=s+r} - 3 \cdot A\bigcirc_{klein\ r=r}$

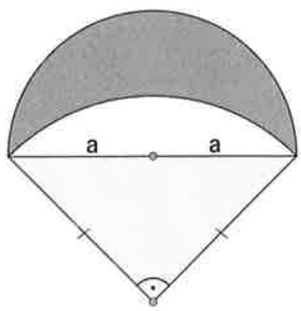
$r = 5\,cm$
$s = 2 \cdot 5\,cm : \sqrt{3} = 5.773...\,cm$
$r + s = 10.773...\ cm$

$A_{gelb} = \pi \cdot (r+s)^2 + 3\pi \cdot r^2$
$\approx \mathbf{129.02\,cm^2}$

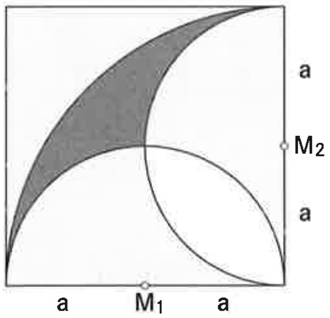


G1105 **a** $A_{gelb} = a^2$

$A_{grün} = 0.5A\bigcirc_{r=a} + A\triangle - 0.25A\bigcirc_{r=a\sqrt{2}}$
$= 0.5 \cdot \pi \cdot a^2 + a^2 - 0.25\pi \cdot (a\sqrt{2})^2$
$= 0.5 \cdot \pi \cdot a^2 + a^2 - 0.5 \cdot \pi \cdot a^2$
$= a^2$



b



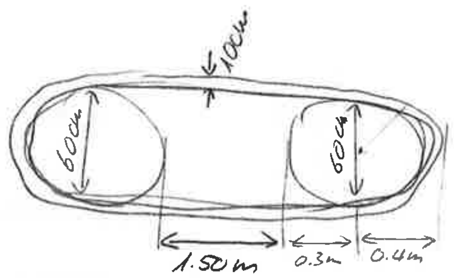
Wenn die beiden Fläche gleich gross sind, dann muss $A = 0.25A\bigcirc_{r=2a} - 2 \cdot 0.5A\bigcirc_{r=a}$ Null geben.

$A = 0.25\pi \cdot 4a^2 - 1 \cdot \pi \cdot a^2 = 0$ ✓

G1106 **a** Durchmesser inkl. Raupe = 0.8 m

$u = 80\,cm \cdot \pi = 251.327...\,cm \approx \mathbf{251.33\,cm}$

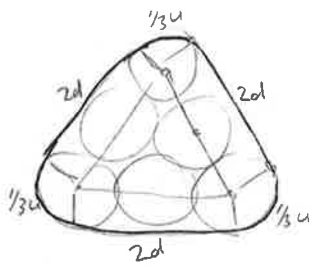
Mit einer Radumdrehung kommt der Bagger 2.5 m weit.

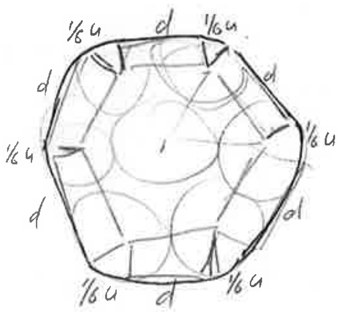


b Länge Raupenband = u + 2·2.1 m ≈ **6.71 m**
Der Bagger ist ungefähr 6.7 m weit gefahren.

G1107 Durchmesser einer Kerze = 22 mm

Bandlänge 6-er-Bündel $= 6\,d + u\bigcirc_{r=11mm}$
$= 6 \cdot 22\,mm + 2 \cdot \pi \cdot 11\,mm$
$\approx 201.12\,mm \approx \mathbf{20.11\,cm}$





Bandlänge 7-er-Bündel $= 6d + u\bigcirc_{r=11mm}$
$= 6 \cdot 22\,mm + \pi \cdot 22\,mm \approx \mathbf{20.11\,cm}$

Ein A4-Blatt ist 210 x 297 mm gross.
Loredana kann das Papier quer in Streifen schneiden.

G1108 Länge: $l = 3 \cdot 28\,mm + 4 \cdot 2\,mm = 92\,mm$

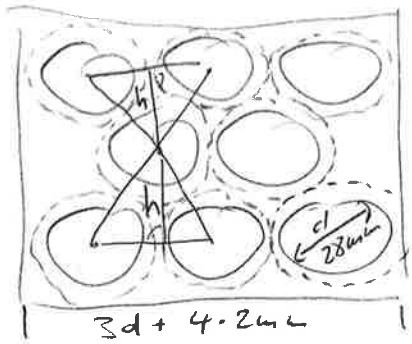
Breite: $b = 2 \cdot 14\,mm + 2 \cdot 2\,mm + 2 \cdot h$

$h = 15\,mm \cdot \sqrt{3}$

$b = 28\,mm + 4\,mm + 2 \cdot 15\,mm \cdot \sqrt{3}$

$= 83.96\,mm$

Die Folie ist **9.2 cm x 8.4 cm** gross.



G1109 **a** **kleine Schachtel**

$r = x \cdot \sqrt{3}$

$x = r : \sqrt{3}$

Seitenlänge

$\mathbf{s_k} = 2r + 2x$

$= 2r + 2r:\sqrt{3}$

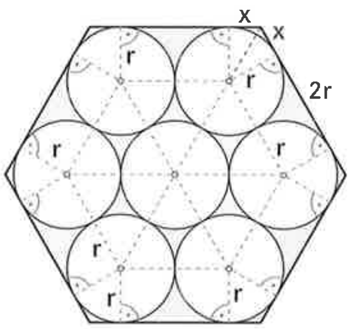
$= r(2 + 2:\sqrt{3})$

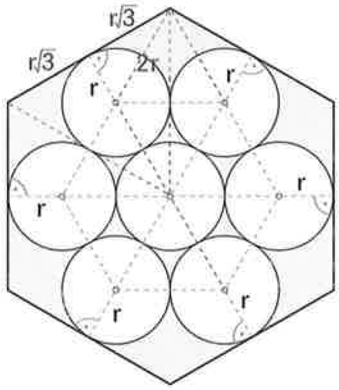
$= \mathbf{3.154...r}$

grosse Schachtel

Seitenlänge

$\mathbf{s_g} = 2 \cdot r\sqrt{3} = \mathbf{3.464...r}$





b **Leerfläche kleine Schachtel**

$A_{Leer\,k} = 6 \cdot A_{\triangle sk} - 7 \cdot A_{\bigcirc r}$

$= 6 \cdot s_k \cdot 0.5 s_k \cdot \sqrt{3} : 2 - 7 \cdot \pi \cdot r^2 = 3.865...r^2$

$A_{Leer\,g} = 6 \cdot A_{\triangle sg} - 7 \cdot A_{\bigcirc r}$

$= 6 \cdot s_g \cdot 0.5 s_g \cdot \sqrt{3} : 2 - 7 \cdot \pi \cdot r^2 = 9.185...r^2$

$A_{Leer\,g} : A_{Leer\,k} = 2.37649... = 237.65\%$

Es hat **137.65%** mehr Leerfläche in der grossen Schachtel.

G1110 Rampenhöhe $h = 16\,m$

Rampendurchmesser $= 9\,m$

Annahme:
Durchmesser für mittleren Fahrweg
$d = 9\,m - 2 \cdot 1.5\,m = 6\,m$

4 Windungen: $w = 4u = 4 \cdot \pi \cdot 6\,m$

$s = \sqrt{16^2 + (24\pi)^2}\,m = 77\,m$

Der mittlere Fahrweg beträgt 77 m.