

2.3 Oppervlakte van ruimtefiguren

Opgave 28:

$$Opp(\text{mantel}) = 2\pi rh = 2 \cdot \pi \cdot 3 \cdot 4 = 24\pi$$

$$Opp(\text{cirkel}) = \pi r^2 = \pi \cdot 3^2 = 9\pi$$

$$Opp(\text{cilinder}) = 2 \cdot 9\pi + 24\pi = 42\pi = 132 \text{ cm}^2$$

Opgave 29:

a. omtrek grondcirkel kegel = $2 \cdot \pi \cdot 3 = 6\pi$

$$R = \sqrt{4^2 + 3^2} = \sqrt{25} = 5$$

omtrek cirkel met $R = 5$ is $2 \cdot \pi \cdot 5 = 10\pi$

je hebt het $\frac{6\pi}{10\pi} = \frac{3}{5}$ deel

$$\text{dus } \frac{3}{5} \cdot 360^\circ = 216^\circ$$

b. $Opp(\text{kegelmantel}) = \frac{216}{360} \cdot \pi \cdot 5^2 = 47 \text{ cm}^2$

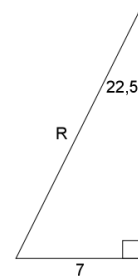
c. $Opp(\text{kegel}) = \pi \cdot 3^2 + 47 = 75 \text{ cm}^2$

Opgave 30:

$$\sin 22,5^\circ = \frac{7}{R}$$

$$R = \frac{7}{\sin 22,5^\circ} = 18,29$$

$$Opp = \pi rR + \pi r^2 = \pi \cdot 7 \cdot 18,29 + \pi \cdot 7^2 = 556,2 \text{ cm}^2$$



Opgave 31:

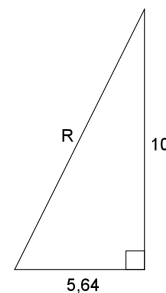
$$Opp(\text{grondcirkel}) = \pi r^2 = 100$$

$$r^2 = \frac{100}{\pi}$$

$$r = \sqrt{\frac{100}{\pi}} = 5,64$$

$$R = \sqrt{10^2 + 5,64^2} = 11,48$$

$$Opp(\text{kegelmantel}) = \pi rR = \pi \cdot 5,64 \cdot 11,48 = 203,4 \text{ cm}^2$$



Opgave 32:

$$Opp(\text{grondcirkel}) = \pi r^2 = 50$$

$$r^2 = \frac{50}{\pi}$$

$$r = \sqrt{\frac{50}{\pi}} = 3,99$$

$$Opp(\text{kegelmantel}) = \pi rR = \pi \cdot 3,99 \cdot R = 75$$

$$R = 5,98$$

$$\sin \angle A = \frac{3,99}{5,98}$$

$$\angle A = 41,85^\circ$$

$$\text{tophoek} = 84^\circ$$



Opgave 33:

$$\text{a. } \frac{TN}{TM} = \frac{BN}{AM}$$

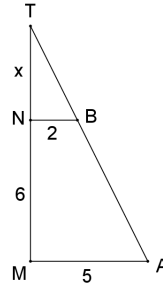
$$\frac{x}{x+6} = \frac{2}{5}$$

$$5x = 2(x+6)$$

$$5x = 2x + 12$$

$$3x = 12$$

$$x = 4$$



$$\text{b. } R = \sqrt{10^2 + 5^2} = \sqrt{125}$$

$$\text{Opp(kegelmantel)} = \pi rR = \pi \cdot 5 \cdot \sqrt{125} = 175,62$$

c. bovenste kegel:

$$R = \sqrt{4^2 + 2^2} = \sqrt{20}$$

$$\text{Opp(kegelmantel)} = \pi rR = \pi \cdot 2 \cdot \sqrt{20} = 28,10$$

$$\text{Opp(mantel afgeknotte kegel)} = 175,62 - 28,10 = 147,52$$

$$\text{d. } \text{Opp} = 147,52 + \pi \cdot 2^2 + \pi \cdot 5^2 = 238,63$$

Opgave 34:

$$\frac{DT}{BT} = \frac{CD}{AB}$$

$$\frac{x}{x+4} = \frac{4}{10}$$

$$\frac{x}{x+4} = \frac{4}{10}$$

$$10x = 4(x+11)$$

$$10x = 4x + 44$$

$$6x = 44$$

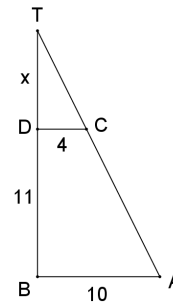
$$6x = 44$$

$$x = \frac{44}{6} = 7\frac{1}{3}$$

$$AT = \sqrt{10^2 + (18\frac{1}{3})^2} = 20,88$$

$$CT = \sqrt{4^2 + (7\frac{1}{3})^2} = 8,35$$

$$\text{Opp} = \pi \cdot 10 \cdot 20,88 - \pi \cdot 4 \cdot 8,35 = 551 \text{ cm}^2$$

**Opgave 35:**

$$\text{Opp}(I) = 2 \cdot \pi \cdot 4^2 + 2 \cdot \pi \cdot 4 \cdot 10 = 112\pi$$

$$\text{Opp}(II) = 2 \cdot \pi \cdot 2^2 + 2 \cdot \pi \cdot 2 \cdot h = 8\pi + 4\pi h$$

$$8\pi + 4\pi h = 112\pi$$

$$4\pi h = 104\pi$$

$$h = 26$$

Opgave 36:

$$\text{Opp(halve cilinder)} = \frac{1}{2} \cdot 2 \cdot \pi \cdot 3 \cdot 6 = 18\pi$$

$$\text{Opp(rechthoek)} = 6 \cdot 6 = 36$$

$$\text{Opp} = 18\pi + 36$$

$$K = (18\pi + 36) \cdot 175 = 16196 \text{ euro}$$

Opgave 37:

$$Opp = \frac{1}{2} \cdot Opp(\text{cilindermantel}) = \frac{1}{2} \cdot 2 \cdot \pi \cdot 12 \cdot 20 = 754 \text{ cm}^2$$

Opgave 38:

$$2 \cdot 4 \cdot r^2 = 4 \cdot \pi \cdot 5^2$$

$$8\pi r^2 = 100\pi$$

$$r^2 = 12,5$$

$$r = 3,54$$

Opgave 39:

$$Omtrek = 2\pi R = 40000$$

$$R = 6366$$

$$Opp = 4\pi r^2 = 4 \cdot \pi \cdot 6366^2 = 509295818$$

$$0,71 \cdot 509295818 = 361600031 \text{ km}^2$$

Opgave 40:

a. $Opp(\text{bal}) = 4\pi r^2 = 4 \cdot \pi \cdot 3^2 = 36\pi$

$$Opp(\text{halve cilindermantel}) = \frac{1}{2} \cdot 2\pi r h = \pi \cdot 3 \cdot 12 = 36\pi$$

dus Linda heeft gelijk

b. in $\triangle AMN$ geldt:

$$\cos 30^\circ = \frac{R}{3-R}$$

$$0,866 = \frac{R}{3-R}$$

$$0,866 \cdot (3-R) = R$$

$$2,598 - 0,866R = R$$

$$-1,866R = -2,598$$

$$R = 1,39$$

c. de hoogte van een laag knikkers is: $2 \cdot 1,39 = 2,78 \text{ cm}$

de hoogte van vier lagen knikkers is: $4 \cdot 2,78 = 11,12 < 12$

d. $Opp = 12 \cdot 4 \cdot \pi \cdot 1,39^2 = 291 \text{ cm}^2$

e. $291 : (2 \cdot 36\pi) = 1,29 \times \text{zo groot}$

