

2.4 Inhoud van ruimtefiguren

Opgave 41:

a. $Inh(kegel) = \frac{1}{3} \pi r^2 h$

b. $Inh(bol) = 4 \cdot \frac{1}{3} \pi r^2 h = \frac{4}{3} \pi r^2 h$ maar voor de bol geldt: $h = r$

$$Inh(bol) = \frac{4}{3} \pi r^3$$

Opgave 42:

neem voor de straal van de tennisbal r , dan is $h_{cilinder} = 6r$

$$Inh(cilinder) = \pi r^2 h = \pi r^2 \cdot 6r = 6\pi r^3$$

$$Inh(tennisbal) = \frac{4}{3} \pi r^3$$

$$Inh(3 \text{ tennisballen}) = 3 \cdot \frac{4}{3} \pi r^3 = 4\pi r^3$$

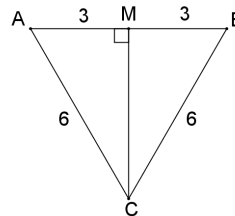
dus $\frac{4\pi r^3}{6\pi r^3} \cdot 100\% = 66,7\%$

Opgave 43:

a. $CM = \sqrt{6^2 - 3^2} = \sqrt{27}$

$$Opp(\triangle ABC) = \frac{1}{2} \cdot 6 \cdot \sqrt{27} = 3\sqrt{27}$$

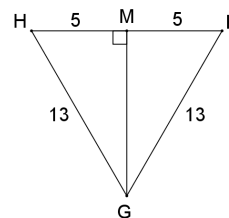
$$Inh(ABCDEF) = G \cdot h = 3\sqrt{27} \cdot 8 = 124,7$$



b. $GM = \sqrt{13^2 - 5^2} = \sqrt{144} = 12$

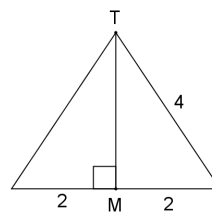
$$Opp(\triangle GHK) = \frac{1}{2} \cdot 10 \cdot 12 = 60$$

$$Inh(LGHK) = \frac{1}{3} \cdot G \cdot h = \frac{1}{3} \cdot 60 \cdot 9 = 180$$



c. $TM = \sqrt{4^2 - 2^2} = \sqrt{12}$

$$Inh(kegel) = \frac{1}{3} \cdot G \cdot h = \frac{1}{3} \cdot \pi \cdot 2^2 \cdot \sqrt{12} = 14,5$$



Opgave 44:

$$h = \sqrt{2^2 - 1^2} = \sqrt{3}$$

$$Opp(G) = 3,5$$

$$Inh = \frac{1}{3} \cdot G \cdot h = \frac{1}{3} \cdot 3,5 \cdot \sqrt{3} = 2,0 \text{ cm}^3$$

Opgave 45:

$$\text{Inh}(T ABCD) = \frac{1}{3} \cdot G \cdot h = \frac{1}{3} \cdot 16^2 \cdot 12 = 1024$$

voorste prisma:

$$\text{Opp}(\triangle EIJ) = \frac{1}{2} \cdot 4 \cdot 6 = 12$$

$$\text{Inh}(EIJ PHK) = G \cdot h = 12 \cdot HI = 12 \cdot 8 = 96$$

prisma rechts:

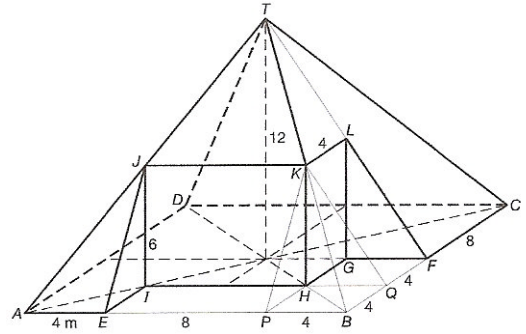
$$\text{Opp}(\triangle FGL) = \frac{1}{2} \cdot 4 \cdot 6 = 12$$

$$\text{Inh}(FGL QHK) = G \cdot h = 12 \cdot GH = 12 \cdot 4 = 48$$

kleine piramide

$$\text{Inh}(K BPHQ) = \frac{1}{3} \cdot G \cdot h = \frac{1}{3} \cdot 4^2 \cdot 6 = 32$$

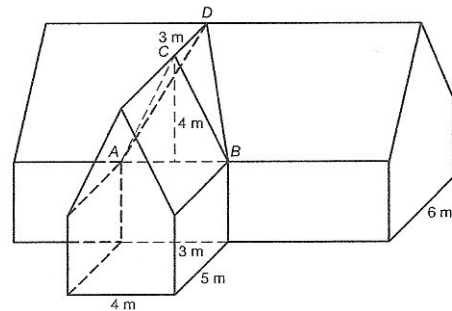
$$\text{Inh}(\text{woning}) = 1024 - 96 - 48 - 32 = 848 \text{ m}^3$$

**Opgave 46:**

$$\text{Opp}(\triangle ABC) = \frac{1}{2} \cdot 4 \cdot 4 = 8$$

$$\text{Inh}(D ABC) = \frac{1}{3} \cdot 8 \cdot 3 = 8$$

Je kunt het huis splitsen in aan de onderkant twee balken en boven twee keer een prisma en een piramide.



$$\text{Inh}(\text{huis}) = 4 \cdot 5 \cdot 3 + 14 \cdot 6 \cdot 3 + \frac{1}{2} \cdot 4 \cdot 4 \cdot 5 + 8 + \frac{1}{2} \cdot 6 \cdot 4 \cdot 14 = 528 \text{ m}^3$$

Opgave 47:

het grondvlak is een regelmatige zeshoek met zijde $5 \cdot 1,4 = 7 \text{ cm}$

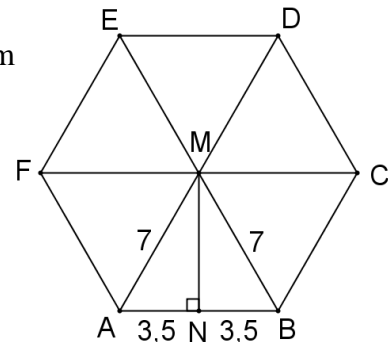
$$h = 5 \cdot 2,75 = 13,75 = \text{cm}$$

$$MN = \sqrt{7^2 - 3,5^2} = \sqrt{36,75}$$

$$\text{Opp}(\triangle ABM) = \frac{1}{2} \cdot 7 \cdot \sqrt{36,75} = 3,5 \sqrt{36,75}$$

$$\text{Opp}(\text{zeshoek}) = 6 \cdot 3,5 \sqrt{36,75}$$

$$\text{Inh} = G \cdot h = 21 \sqrt{36,75} \cdot 13,75 = 1750 \text{ cm}^3$$

**Opgave 48:**

$$\text{Inh}(\text{bol}) = \frac{4}{3} \pi r^3 = \frac{4}{3} \pi \cdot 5^3 = \frac{500}{3} \pi$$

$$\text{Inh}(\text{kegel}) = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \cdot r^2 \cdot 10 = \frac{500}{3} \pi$$

$$r^2 = 50$$

$$r = \sqrt{50} = 7,1 \text{ cm}$$

$$\text{Inh}(\text{cilinder}) = \pi r^2 h = \pi \cdot r^2 \cdot 10 = \frac{500}{3} \pi$$

$$r^2 = \frac{50}{3}$$

$$r = \sqrt{\frac{50}{3}} = 4,1 \text{ cm}$$

Opgave 49:

$$\text{Inh}(\text{kegel}) = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \cdot r^2 \cdot 2r = \frac{2}{3} \pi r^3$$

$$\text{Inh}(\text{bol}) = \frac{4}{3} \pi r^3$$

$$\text{Inh}(\text{cilinder}) = \pi r^2 h = \pi r^2 \cdot 2r = 2\pi r^3$$

$$\text{Inh}(\text{kegel}) : \text{Inh}(\text{bol}) : \text{Inh}(\text{cilinder}) = \frac{2}{3}\pi r^3 : \frac{4}{3}\pi r^3 : 2\pi r^3 = 1 : 2 : 3$$

Opgave 50:

a. $\text{Inh}(\text{balk}) = 15 \cdot 15 \cdot 200 = 45000 \text{ cm}^3$

$$\text{Inh}(\text{cilinder}) = 4 \cdot \pi r^2 h = 4 \cdot \pi \cdot 7,5^2 \cdot 92,5 = 65384 \text{ cm}^3$$

$$\text{Inh}(\text{totaal}) = 45000 + 65384 = 110384 \text{ cm}^3$$

b. $\pi \cdot 7,5^2 \cdot h = 110384$

$$h = 625 \text{ cm}$$

Opgave 51:

a. $AC = \sqrt{AB^2 + BC^2} = \sqrt{4^2 + 4^2} = \sqrt{32}$

$$AG = \sqrt{AC^2 + CG^2} = \sqrt{(\sqrt{32})^2 + 4^2} = \sqrt{48}$$

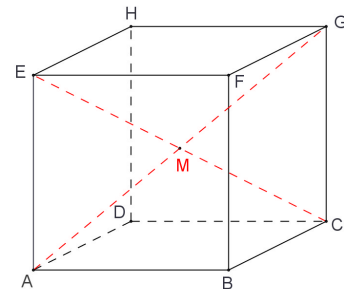
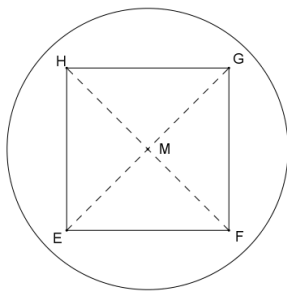
$$AM = \frac{1}{2} AG = \frac{1}{2} \sqrt{48}$$

$$r = \frac{1}{2} \sqrt{48}$$

$$\text{Inh} = \text{Inh}(\text{bol}) - \text{Inh}(\text{kubus})$$

$$= \frac{4}{3}\pi \cdot \left(\frac{1}{2}\sqrt{48}\right)^3 - 4^3 = 110,12 \text{ cm}^3$$

b.

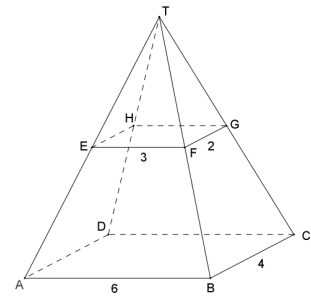


Opgave 52:

a. de voorzijde is een snavefiguur met vergrotingsfactor 2
de rechterzijkant is een snavefiguur met vergrotingsfactor 2

b. $h = 4$

$$\text{Inh}(\text{karretje}) = \frac{1}{3} \cdot 3 \cdot 2 \cdot 4 - \frac{1}{3} \cdot 1,5 \cdot 1 \cdot 2 = 7 \text{ m}^3$$



Opgave 53:

neem alle afmetingen in dm

$$\frac{x}{x+2,5} = \frac{1}{1,5}$$

$$1,5x = x + 2,5$$

$$0,5x = 2,5$$

$$x = 5$$

$$\text{Inh} = \frac{1}{3}\pi \cdot 1,5^2 \cdot 7,5 - \frac{1}{3}\pi \cdot 1^2 \cdot 5 = 12,4 \text{ dm}^3$$

dus de inhoud van de emmer is 12,4 liter

