

a) $R = h_{\text{gleichseitiges Dreieck}} + 12$ 0.5 P

$$R = \frac{24 \cdot \sqrt{3}}{2} + 12 = \underline{\underline{32.785}} \quad \checkmark$$

20,785

0.5 P

b) $u = \bigcirc + 4 \cdot \bigcirc - (2 \cdot \text{Kreisbogen}(60^\circ) + 2 \cdot \text{Kreisbogen}(120^\circ))$ 0.5 P

$$u = \bigcirc + 3 \cdot \bigcirc = 205,9918 + 226,1947 = \underline{\underline{432,1864}} \quad \checkmark$$

0.5 P

$$u = 2 \cdot \pi \cdot 32.785 + 3 \cdot (2 \cdot \pi \cdot 12) = \underline{\underline{432.186}}$$

0.5 P

$$3 \cdot 376,68 - 3 \cdot 452,3893 - 2 \cdot 249,4153 = \underline{\underline{1520,68136}} \quad \checkmark$$

c) $A_{\text{schräftert}} = \bigcirc - (2 \cdot \text{Sektoren}(300^\circ) + 2 \cdot \text{Sektoren}(240^\circ)) - 2 \cdot \Delta$ 0.5 P

$$A_{\text{schräftert}} = \bigcirc - 3 \cdot \bigcirc - 2 \cdot \Delta$$

0.5 P

$$A_{\text{schräftert}} = \underbrace{32.785^2 \cdot \pi}_{3376,68} - 3 \cdot \underbrace{(12^2 \cdot \pi)}_{1357,168} - 2 \cdot \underbrace{\left(\frac{24^2 \cdot \sqrt{3}}{4}\right)}_{2 \cdot 249,415} = \underline{\underline{1520.681}} \quad \checkmark$$

3 \cdot 452,39
498,83

0.5 P

a) $h: \overline{OP} = \begin{pmatrix} 2 \\ -1 \\ -3 \end{pmatrix} + u \cdot \begin{pmatrix} 1 \\ 0 \\ z+3 \end{pmatrix}$ 0.5 P

$g=h \rightarrow \left. \begin{array}{l} t+1=u+2 \\ 2t+3=-1 \\ -t=-3+u(z+3) \end{array} \right\} \xrightarrow{\text{solve}} \left. \begin{array}{l} t=-2 \\ u=-3 \end{array} \right\} \text{ einsetzen in III}$ 1 P

$\rightarrow 2 = -3z - 12 \rightarrow z = \underline{\underline{\frac{-14}{3}}}$ 0.5 P

b) $t=-2 \xrightarrow{\text{in g einsetzen}} \overline{OS} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} - 2 \cdot \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} = \begin{pmatrix} -1 \\ -1 \\ 2 \end{pmatrix} \rightarrow \underline{\underline{S = (-1/-1/2)}}$ 0.5 P

c) $\vec{v} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}; \vec{w} = \begin{pmatrix} 1 \\ 0 \\ -5/3 \end{pmatrix}$

$\cos \varphi = \frac{\vec{v} \cdot \vec{w}}{|\vec{v}| \cdot |\vec{w}|} = 0.560 \rightarrow \underline{\underline{\varphi = 55.936^\circ}}$ 1 P

d) $g': \overline{OP} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + t \cdot \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$ 0.5 P

Umwandlung in Funktionsgleichung!

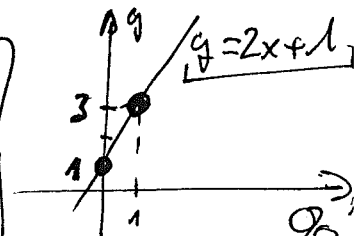
$\left. \begin{array}{l} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \end{pmatrix} + t \begin{pmatrix} 1 \\ 2 \end{pmatrix} \rightarrow x-1=t \\ \rightarrow \frac{y-3}{2}=t \end{array} \right\} x-1 = \frac{y-3}{2}$

$2x-2 = y-3$

$y = 2x + 1$

Kontrollballe!

$\left. \begin{array}{l} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix} + t \begin{pmatrix} 1 \\ 2 \end{pmatrix} \hat{=} \begin{pmatrix} 1 \\ 3 \end{pmatrix} + t \begin{pmatrix} 1 \\ 2 \end{pmatrix} \end{array} \right\}$



Lösungen Nr. 3

4 P

a) $m = m_0 \cdot a^t$ 0.5 P

$3m_0 = m_0 \cdot a^{9.125}$ 0.5 P

$a^{9.125} = 3 \rightarrow a = 1.128 \hat{=} 1.127943 \quad \checkmark$ 0.5 P

$m = 11 \cdot 1.128^t$ für $t = 30 \rightarrow$

$m = 11 \cdot 1.128^{30} = 407.390136 \rightarrow \underline{\underline{m = 407.39 \text{ g}}}$ 0.5 P

b) $1000 = 11 \cdot 1.128^t \xrightarrow{\text{solve}} t = 37.459 \xrightarrow{8672} \underline{\underline{\text{in 37 Tagen 11 Stunden}}}$ 1 P

c) $500 = m \cdot 1.128^{42.292} \xrightarrow{\text{solve}} m = 3.074 \xrightarrow{3073684} \underline{\underline{m = 3.074 \text{ g}}}$ 1 P

Lösungen Nr. 4

4 P

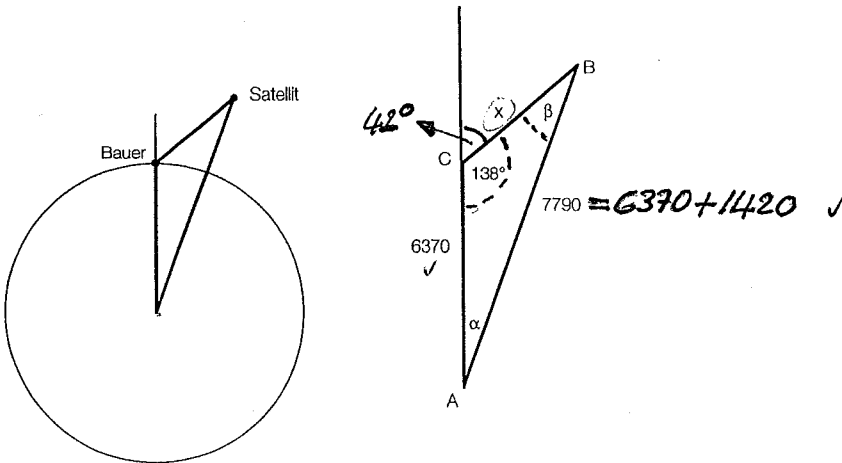
a) $y = ax^3 + bx^2 + cx + d$ 0.5 P

Punkte P, Q, R, S einsetzen $\rightarrow \begin{cases} 6 = -64a + 16b - 4c + d \\ -4 = -8a + 4b - 2c + d \\ 2 = d \\ 14 = 64a + 16b + 4c + d \end{cases} \xrightarrow{\text{solve}}$ 1 P

$y = -\frac{x^3}{4} + \frac{x^2}{2} + 5x + 2$ 0.5 P

b) $y = -\frac{(x+2)^3}{4} + \frac{(x+2)^2}{2} + 5(x+2) + 2 \rightarrow \underline{\underline{y = -\frac{x^3}{4} - x^2 + 4x + 12}}$ 1 P

c) $\xrightarrow{\text{mit TI89 Min u Max bestimmen}} \underline{\underline{\text{Minimum } (-4 / -4) ; \text{ Maximum } (1.333 / 14.963)}}$ 1 P



1.5 P

$$\frac{6370}{\sin \beta} = \frac{7790}{\sin 138^\circ} \xrightarrow{\text{solve}} \sin \beta = 0.547 \xrightarrow{158} \beta = 33.172^\circ \xrightarrow{208} \checkmark$$

1 P

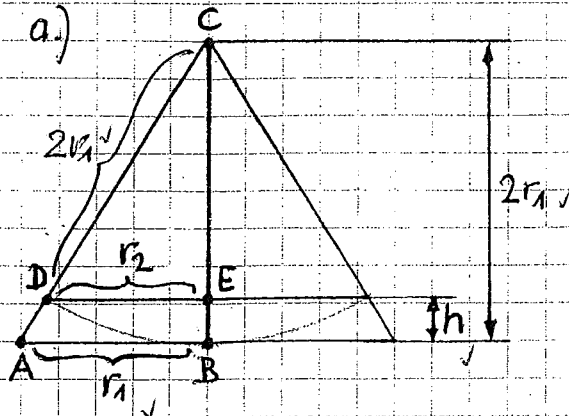
$$\rightarrow \alpha = 180^\circ - 138^\circ - \beta \rightarrow \alpha = 8.828^\circ \xrightarrow{7732} \checkmark$$

0.5 P

$$\frac{x}{\sin 8.828^\circ} = \frac{7790}{\sin 138^\circ} \xrightarrow{\text{solve}} x = 1786.625 \xrightarrow{306} x = 1787 \text{ km} \checkmark$$

1 P

6.



$$\overline{AC} = \sqrt{r_1^2 + (2r_1)^2} = 2.236068r_1 = \sqrt{5}r_1 = r_1 \sqrt{5} \quad 1/2 P$$

$$\Delta ABC \sim \Delta DEC \quad 1/2 P$$

$$\frac{r_1}{AC} = \frac{r_2}{2r_1} \rightarrow r_2 = \frac{2r_1}{\sqrt{5}} \quad 1/2 P$$

$$\overline{EC} = \sqrt{(2r_1)^2 - \left(\frac{2r_1}{\sqrt{5}}\right)^2} = \frac{4r_1}{\sqrt{5}} \rightarrow 1.788854r_1 \quad 1/2 P$$

$$h = 2r_1 - \overline{EC} = 2r_1 - \frac{4r_1}{\sqrt{5}} = 2r_1 \left(1 - \frac{2}{\sqrt{5}}\right) = 0.211146r_1 \quad 1/2 P$$

$$V_{\text{Kegelselktor}} = \frac{2}{3} \pi (2r_1)^2 \cdot 2r_1 \left(1 - \frac{2}{\sqrt{5}}\right) = 2 \cdot 1.768889r_1^3 \quad 1/2 P$$

$$= \frac{16}{3} \pi r_1^3 \left(1 - \frac{2}{\sqrt{5}}\right) = \frac{16}{15} \pi r_1^3 (5 - 2\sqrt{5}) \quad 1/2 P$$

$$b.) \quad V_{\text{Kegelselktor}} = 1.76889 \cdot 5^3 = \underline{\underline{221.11 \text{ cm}^3}} \quad 1/2 P$$