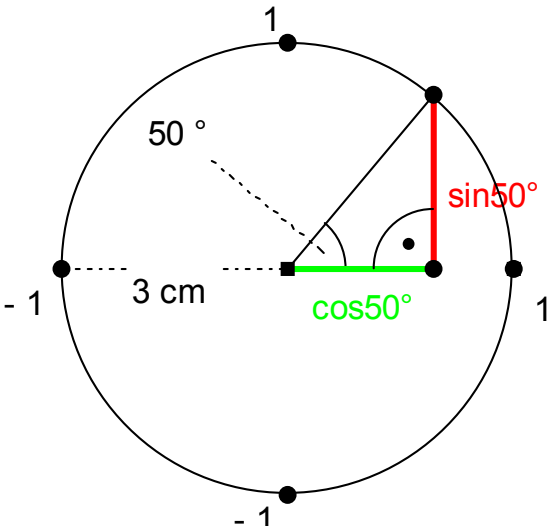


| | | | |
|----|------|--|------------------------------|
| 1. | a. | | 2 P |
| | b. | $y = 0,5x + 1$ | 2 P |
| | c. | Schnittpunkte der Geraden g und h mit der x-Achse: g: A(-2 0) ; h: N(3 0) Grundseite des Dreiecks: 5LE $g \cap h$: S(6 4) ; Höhe des Dreiecks: 4LE Dreieck gleichschenkelig: Seite $\overline{NS} = 5LE$ (Pythagoras) Flächeninhalt $A = 0,5 \cdot 5 \cdot 4 \text{ FE} = 10 \text{ FE}$ | 2 P 3 P 1 P 1 P |
| 2. | 1.a. | $x = 9,5$; $y = 7$ | 4 P |
| | 1.b. | $x = \frac{2}{a-1}$; $y = 1 - \frac{2}{a-1} = \frac{a-3}{a-1}$ $a \neq 1$: beliebig viele Lösungen, für jedes a genau eine Lsg $a = 1$ keine Lösung | (2 P) |
| | 2. | I) $x + y = 15$ $x = 8$ (Gerbera) II) $2,30x + 2,95y + 3 = 42,05$ $y = 7$ (Sonnenblumen) | 4 P |
| 3. | 1.a. | $\sqrt{128} : \sqrt{18} = \sqrt{\frac{128}{18}} = \sqrt{\frac{64}{9}} = \frac{8}{3}$ | 2 P |
| | 1.b. | $\frac{10\sqrt{10}}{5\sqrt{5}} = 2\sqrt{2}$ | 1 P |
| | 2. | $x^2 + 23 = (3x - 21)^2$; $x^2 + 23 = 9x^2 - 126x + 441$ $8x^2 - 126x + 418 = 0$ $x_1 = 11$, $x_2 = 4,75$; $L = \{11\}$ | 5 P (mit Probe) |
| 4. | | $x_1 = 2$; $x_2 = -4,5$ | 3 P |
| 5. | a. | $-1,6 \cdot 5^4 + 1,8 \cdot 5^4 = 0,2 \cdot 5^4$ | 1 P |
| | b. | $11^{11} \cdot 11^{11} = 11^{22}$ | 1 P |

| | c. | $k^{m+6} : k^{9-2m} = k^{3m-3}$ | 1 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|-------|--|--|------|------|-----|------|-----|-----|------|------|---|---|---|----------|-------|----|----|---|---|---|------|-----|-----|------|------|----------|------|------|------|------|------|-----|---|---|---|---|----|------------|
| | d. | $2^{2y} \cdot 3^{2y} = 6^{2y}$ | 1 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | e. | $(d^{4pq})^{1,5q} = d^{6pq^2}$ | 1 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | a. | $D_1 = \mathbb{R} \setminus \{-2\}$; $D_2 = \mathbb{R}$ | 2 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b. | <table border="1"> <thead> <tr> <th>x</th> <th>-5</th> <th>-4</th> <th>-3</th> <th>-2</th> <th>-1</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>$f_1(x)$</td> <td>-0,67</td> <td>-1</td> <td>-2</td> <td>-</td> <td>2</td> <td>1</td> <td>0,67</td> <td>0,5</td> <td>0,4</td> <td>0,33</td> <td>0,29</td> </tr> <tr> <td>$f_2(x)$</td> <td>0,02</td> <td>0,03</td> <td>0,06</td> <td>0,13</td> <td>0,25</td> <td>0,5</td> <td>1</td> <td>2</td> <td>4</td> <td>8</td> <td>16</td> </tr> </tbody> </table> | x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | $f_1(x)$ | -0,67 | -1 | -2 | - | 2 | 1 | 0,67 | 0,5 | 0,4 | 0,33 | 0,29 | $f_2(x)$ | 0,02 | 0,03 | 0,06 | 0,13 | 0,25 | 0,5 | 1 | 2 | 4 | 8 | 16 | 3 P |
| x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $f_1(x)$ | -0,67 | -1 | -2 | - | 2 | 1 | 0,67 | 0,5 | 0,4 | 0,33 | 0,29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $f_2(x)$ | 0,02 | 0,03 | 0,06 | 0,13 | 0,25 | 0,5 | 1 | 2 | 4 | 8 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. | <p><u>Verhalten von f_1</u></p> <p>$f_1(x) \rightarrow 0$ für $x \rightarrow \pm \infty$</p> <p>$f_1(x) \rightarrow -\infty$ für $x \rightarrow -2$ und $x < -2$</p> <p>$f_1(x) \rightarrow +\infty$ für $x \rightarrow -2$ und $x > -2$</p> <p><u>Verhalten von f_2</u></p> <p>$f_2(x) \rightarrow +\infty$ für $x \rightarrow +\infty$</p> <p>$f_2(x) \rightarrow 0$ für $x \rightarrow -\infty$</p> <p>$f_2(-2) = 0,125$</p> | 4 P (2 Punkte pro Schaubild) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1,5 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1,5 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. | a. | $U(t) = 16 \text{Mrd} \cdot 1,018^t$; t in Jahren (exponentielles Wachstum) | 3 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b. | $20 = 16 \cdot 1,018^t$; $1,25 = 1,018^t$; $\ln 1,25 = t \cdot \ln 1,018$ | 1 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | $t = 12,5$; Kalenderjahr 2021 | 2 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. | $U(5) = 17,49$; Ergebnis besser als erwartet! | 2 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d. | $18 = 16 \cdot q^5$; $q = \sqrt[5]{\frac{9}{8}}$; $q = 1,024$ | 2 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Umsatzsteigerung 2,4% | 1 P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|--------------|----|---|-------------|
| 8. | a. | $123 + 2,9^{2x-1} = 225,5$; $2,9^{2x-1} = 102,5$; $2x - 1 = \frac{\ln 102,5}{\ln 2,9}$ $x = 2,6742$ | 2 P |
| | b. | $\lg(0,5x + 200) = 3$; $0,5x + 200 = 1000$; $x = 1600$ | 2 P |
| 9. | a. | Skizzen | 2 P |
| | b. | $V_{\text{Pyr}} = \frac{1}{3}a^3$; $V_{\text{kegel}} = \frac{1}{3}\pi r^2 a$; $\frac{1}{3}a^3 = \frac{1}{3}\pi r^2 a$; $r = \frac{a}{\pi}\sqrt{\pi}$ | 3 P |
| 10. | a. |  | 4 P |
| | b. | $\sin^2\alpha + \cos^2\alpha = 1$; $\cos^2\alpha = 1 - \sin^2\alpha$; $\cos\alpha = \sqrt{1 - \sin^2\alpha}$ | 2 P |
| | c. | $\tan\alpha \cdot \cos\alpha = \frac{\sin\alpha}{\cos\alpha} \cdot \cos\alpha = \sin\alpha$ | 2 P |
| Summe | | | 75 P |