

## Lösungen Semesterprüfung Mathematik 3. Klasse 2008/2009

### Aufgabe 1

$$\frac{2x}{1-x} - \frac{2}{x-1} = \frac{2x^2-6}{1-x^2} - \frac{8}{x+1} \Rightarrow \frac{2x}{1-x} + \frac{2}{1-x} = \frac{2x^2-6}{(1+x)(1-x)} - \frac{8}{1+x}$$

$$\Rightarrow D = \mathbb{R} \setminus \{-1; 1\}$$

$$\Rightarrow 2x(1+x) + 2(1+x) = 2x^2 - 6 - 8(1-x)$$

$$\Rightarrow 2x + 2x^2 + 2 + 2x = 2x^2 - 6 - 8 + 8x$$

$$\Rightarrow 16 = 4x \Rightarrow x = 4 \Rightarrow L = \{4\}$$

### Aufgabe 2

$$\frac{x+2}{x-5} \leq 3 \Rightarrow \frac{x+2}{x-5} - 3 \leq 0 \Rightarrow \frac{x+2}{x-5} - \frac{3(x-5)}{x-5} \leq 0$$

$$\Rightarrow \frac{x+2}{x-5} - \frac{3x-15}{x-5} \leq 0 \Rightarrow \frac{x+2-3x+15}{x-5} \leq 0 \Rightarrow \frac{-2x+17}{x-5} \leq 0$$

	5		$\frac{17}{2}$
-2x+17	+	+	-
x-5	-	+	+

$$\Rightarrow L = ]-\infty; 5[ \cup \left[ \frac{17}{2}; \infty[$$

### Aufgabe 3

$$\text{a) } m = \frac{\Delta y}{\Delta x} = \frac{4-0}{0-(-5)} = \frac{4}{5} \Rightarrow y = \frac{4}{5}x + q$$

Punkt einsetzen, z.B. B:

$$\Rightarrow 4 = \frac{4}{5} \cdot 0 + q \Rightarrow q = 4 \Rightarrow y = \frac{4}{5}x + 4$$

$$\text{b) } A' = A ; B' (0 / -4)$$

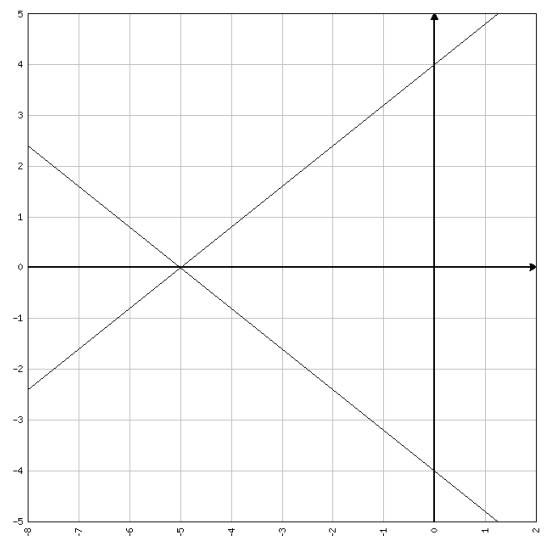
$$\Rightarrow m = \frac{\Delta y}{\Delta x} = \frac{-4-0}{0-(-5)} = -\frac{4}{5}$$

$$\Rightarrow y = -\frac{4}{5}x + q$$

Punkt einsetzen, z.B. B:

$$\Rightarrow -4 = \frac{4}{5} \cdot 0 + q \Rightarrow q = -4$$

$$\Rightarrow y = -\frac{4}{5}x - 4$$



$$c) g \cap h: y = \frac{4}{5} \cdot 3 + 4 = \frac{32}{5}$$

$$\Rightarrow P_1\left(3 / \frac{32}{5}\right)$$

$$g' \cap h: y = -\frac{4}{5} \cdot 3 - 4 = -\frac{32}{5}$$

$$\Rightarrow P_2\left(3 / -\frac{32}{5}\right)$$

#### Aufgabe 4

$$M = \frac{1}{4} x ; P = \frac{1}{5} x ; H = \frac{1}{6} x$$

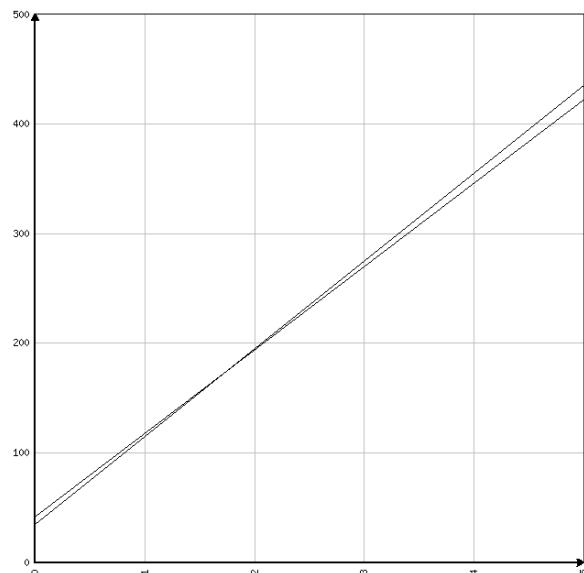
$$\frac{1}{4} x + \frac{1}{5} x + \frac{1}{6} x = 1850 \Rightarrow 15x + 12x + 10x = 111000 \Rightarrow x = 3000$$

$$\Rightarrow M = 750 ; P = 600 ; H = 500$$

#### Aufgabe 5

b) Firma A:  $y = 76x + 42$

Firma B:  $y = 80x + 35$



a) Firma A:  $y = 76 \cdot 3.5 + 42 = 308$  ; Firma B:  $y = 80 \cdot 3.5 + 35 = 315$

b)  $76x + 42 = 80x + 35 \Rightarrow x = \frac{7}{4} \Rightarrow$  nach 1 h 45 min

#### Aufgabe 6

g: Grundseite ; h: Höhe

$$\left| \begin{array}{l} \frac{gh}{2} + 65 = \frac{(g+5)(h+2)}{2} \\ \frac{gh}{2} - 7 = \frac{(g+3)(h-2)}{2} \end{array} \right| \Rightarrow \left| \begin{array}{l} gh + 130 = gh + 2g + 5h + 10 \\ gh - 14 = gh - 2g + 3h - 6 \end{array} \right|$$

$$II: 2g = 120 - 5h \Rightarrow \text{In I: } -14 = -(120 - 5h) + 3h - 6$$

$$\Rightarrow 112 = 8h \Rightarrow h = 14 \Rightarrow g = 25$$

### Aufgabe 7

$$\text{Ordnen} \Rightarrow \begin{cases} x - 2y - 2z = 1 \\ -2x + y - 6z = 2 \\ x - 3y + z = -4 \end{cases}$$

$$L = \left\{ \left( \frac{3}{2} / -1 \right) \right\}$$

### Aufgabe 8

$$\begin{cases} ax + bx + ay - by = b \\ ax - bx - ay - by = b \end{cases}$$

Durch Subtraktion erhält man eine einfache 3. Gleichung  $\Rightarrow$  I - II:

$$2bx + 2ay = 0 \Rightarrow x = -\frac{ay}{b} \Rightarrow \text{In I:}$$

$$-a \cdot \frac{ay}{b} - b \cdot \frac{ay}{b} + ay - by = b \Rightarrow -a^2y - b^2y = b^2$$

$$\Rightarrow x = -\frac{b^2}{a^2 + b^2} \Rightarrow L = \left\{ \left( \frac{ab}{a^2 + b^2} / -\frac{b^2}{a^2 + b^2} \right) \right\}$$

### Aufgabe 9

$$\text{a) } \frac{x}{a+x} = \frac{d}{b} \Rightarrow bx = ad + dx \Rightarrow bx - dx = ad \Rightarrow x(b-d) = ad$$

$$\Rightarrow x = \frac{ad}{b-d}$$

$$\text{b) } x = \frac{20 \cdot 24}{34 - 24} = 48 \text{ m}$$

### Aufgabe 10

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