

## Luvuista kirjaimiin

### 11 YHTÄLÖN RATKAISEMINEN VÄHENTÄMÄLLÄ JA JAKAMALLA

#### Tuntitehtävien ratkaisut

$$282. \quad \begin{array}{l} \text{a) } x + 3 = 15 \\ \quad \quad x = 12 \end{array} \quad \begin{array}{l} || - 3 \\ \\ \end{array}$$

$$\begin{array}{l} \text{b) } x + 10 = 27 \\ \quad \quad x = 17 \end{array} \quad \begin{array}{l} || - 10 \\ \\ \end{array}$$

$$283. \quad \begin{array}{l} \text{a) } 4x = 36 \\ \quad \quad x = 9 \end{array} \quad \begin{array}{l} || : 4 \\ \\ \end{array}$$

$$\begin{array}{l} \text{b) } 9x = 90 \\ \quad \quad x = 10 \end{array} \quad \begin{array}{l} || : 9 \\ \\ \end{array}$$

$$284. \quad \begin{array}{l} \text{a) } 3x + 4 = 28 \\ \quad \quad 3x = 24 \\ \quad \quad \quad x = 8 \end{array} \quad \begin{array}{l} || - 4 \\ || : 3 \\ \\ \end{array}$$

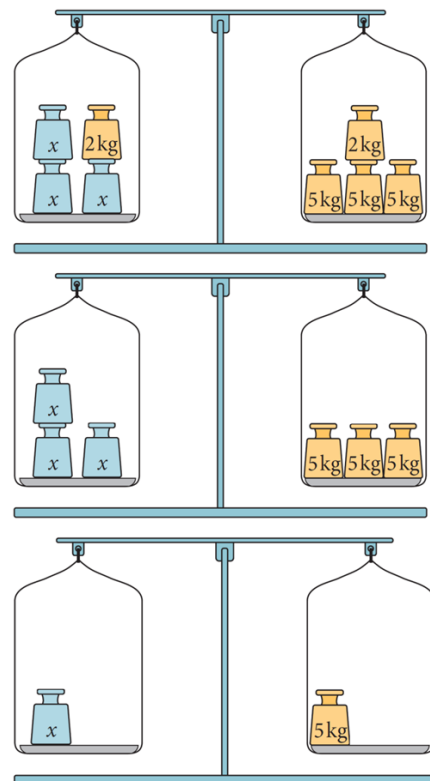
$$\begin{array}{l} \text{b) } 2x = x + 5 \\ \quad \quad x = 5 \end{array} \quad \begin{array}{l} || - x \\ \\ \end{array}$$

$$285. \quad \begin{array}{l} 3x + 2 = 17 \\ \\ \\ \end{array} \quad \begin{array}{l} || - 2 \\ \\ \\ \end{array}$$

$$3x = 15 \quad \begin{array}{l} || : 3 \\ \\ \end{array}$$

$$x = 5$$

Punnus painaa 5 kg.

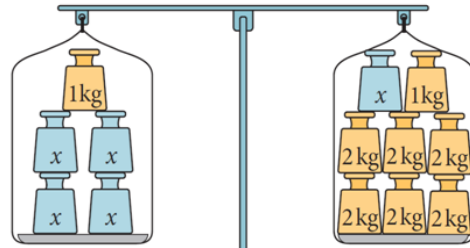


286. a)  $4x = 4$        $|| : 4$   
 $x = 1$

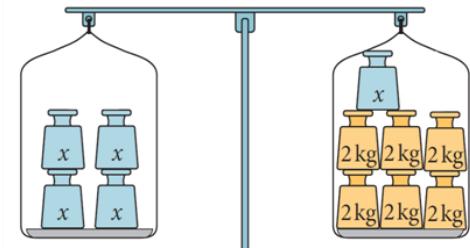
b)  $2x + 3 = 17$        $|| - 3$   
 $2x = 14$        $|| : 2$   
 $x = 7$

287.

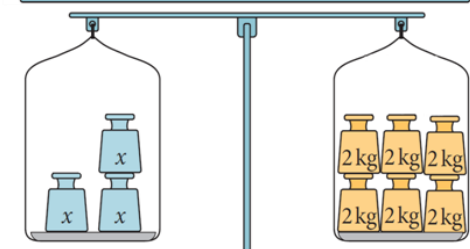
$4x + 1 = x + 13$        $|| - 1$



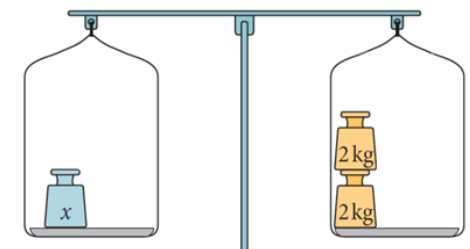
$4x = x + 12$        $|| - x$



$3x = 12$        $|| : 3$



$x = 4$



Punnus painaa 4 kg.

288. a)  $6x + 1 = 4$        $|| - 1$   
 $6x = 3$        $|| : 6$   
 $x = 0,5$

b)  $3x = 2x + 7$        $|| - 2x$   
 $x = 7$

$$\begin{array}{lcl}
 289. & \text{a) } 5x + 2 = 3x + 8 & || - 3x \\
 & 2x + 2 = 8 & || - 2 \\
 & 2x = 6 & || : 2 \\
 & x = 3 &
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 7y + 4 = 2y + 49 & || - 2y \\
 & 5y + 4 = 49 & || - 4 \\
 & 5y = 45 & || : 5 \\
 & y = 9 &
 \end{array}$$

$$\begin{array}{lcl}
 290. & x + 5x + x + 5x = 48 & \\
 & 12x = 48 & || : 12 \\
 & x = 4 &
 \end{array}$$

$$5x = 5 \cdot 4 = 20$$

Lyhyet sivut ovat 4 cm ja pitkät sivut 20 cm.

$$\begin{array}{lcl}
 291. & \text{a) } 10x + 80 = 150 & || - 80 \\
 & 10x = 70 & || : 10 \\
 & x = 7 &
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 70x = 30x + 200 & || - 30x \\
 & 40x = 200 & || : 40 \\
 & x = 5 &
 \end{array}$$

292. Sijoitetaan luku 6 yhtälön molemmille puolille:  
 Vasen puoli:  $4 \cdot 6 + 1 = 24 + 1 = 25$   
 Oikea puoli:  $2 \cdot 6 + 13 = 12 + 13 = 25$   
 Koska arvot ovat samat, luku 6 on yhtälön ratkaisu.

$$\begin{array}{lcl}
 293. & \text{Muodostetaan yhtälö } 8x + 2 = 50 \text{ ja ratkaistaan se.} & \\
 & 8x + 2 = 50 & || - 2 \\
 & 8x = 48 & || : 8 \\
 & x = 6 &
 \end{array}$$

$$\begin{array}{lcl}
 294. & \text{a) } 2x + 4 = 4 & || - 4 \\
 & 2x = 0 & || : 2 \\
 & x = 0 &
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 4x + 3 = x + 9 & || - x \\
 & 3x + 3 = 9 & || - 3 \\
 & 3x = 6 & || : 3 \\
 & x = 2 &
 \end{array}$$

$$\begin{array}{lcl}
 295. & \text{a) } 8x + 2 = 6x + 20 & || - 6x \\
 & 2x + 2 = 20 & || - 2 \\
 & 2x = 18 & || : 2 \\
 & x = 9 & 
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 5x + 1 = 2 & || - 1 \\
 & 5x = 1 & || : 5 \\
 & x = 0,2 & 
 \end{array}$$

$$\begin{array}{lcl}
 296. & 2x + 4x + 3x = 72 & \\
 & 9x = 72 & || : 9 \\
 & x = 8 & 
 \end{array}$$

$$\begin{array}{l}
 2x = 2 \cdot 8 = 16 \\
 3x = 3 \cdot 8 = 24 \\
 4x = 4 \cdot 8 = 32
 \end{array}$$

Sivut ovat 16 cm, 24 cm ja 32 cm.

$$\begin{array}{lcl}
 297. & \text{a) } 6y + 5 = 10y + 3 & || - 10y \\
 & -4y + 5 = 3 & || - 5 \\
 & -4y = -2 & || : (-4) \\
 & y = 0,5 & 
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 9x + 2 = x + 4 & || - x \\
 & 8x + 2 = 4 & || - 2 \\
 & 8x = 2 & || : 2 \\
 & x = 0,25 & 
 \end{array}$$

$$\begin{array}{lcl}
 298. & \text{a) } 70x + 240 = 310 & || - 240 \\
 & 70x = 70 & || : 70 \\
 & x = 1 & 
 \end{array}$$

$$\begin{array}{lcl}
 & \text{b) } 0,7x + 2,4 = 3,1 & || - 2,4 \\
 & 0,7x = 0,7 & || : 0,70 \\
 & x = 1 & 
 \end{array}$$

$$\begin{array}{lcl}
 299. & 2x + 6 = 4x & || - 2x \\
 & 6 = 2x & || : 2 \\
 & 3 = x & \\
 & x = 3 & 
 \end{array}$$

$$\begin{array}{l} 300. \quad \text{a) } 3x + 7 = 1 \qquad \quad || - 7 \\ \qquad \quad 3x = -6 \qquad \quad \quad || : 3 \\ \qquad \quad x = -2 \end{array}$$

$$\begin{array}{l} \text{b) } 5x + 14 = x + 2 \qquad \quad || - x \\ \qquad \quad 4x + 14 = 2 \qquad \quad \quad || - 14 \\ \qquad \quad 4x = -12 \qquad \quad \quad \quad || : 4 \\ \qquad \quad x = -3 \end{array}$$

301. Sijoitetaan luku 4 yhtälön molemmille puolille:  
Vasen puoli:  $8 \cdot 4 + 1 = 32 + 1 = 33$   
Oikea puoli:  $9 \cdot 4 - 2 = 36 - 2 = 34$   
Koska arvot ovat eri suuret, luku 4 ei ole yhtälön ratkaisu.

$$\begin{array}{l} 302. \quad \text{a) } x^2 + 6x = x^2 + 30 \qquad \quad || - x^2 \\ \qquad \quad 6x = 30 \qquad \quad \quad \quad \quad || : 6 \\ \qquad \quad x = 5 \end{array}$$

$$\begin{array}{l} \text{b) } 3x^2 + 5x + 14 = 3x^2 + x + 2 \qquad \quad || - 3x^2 \\ \qquad \quad 5x + 14 = x + 2 \qquad \quad \quad \quad || - x \\ \qquad \quad 4x + 14 = 2 \qquad \quad \quad \quad \quad || - 14 \\ \qquad \quad 4x = -12 \qquad \quad \quad \quad \quad \quad || : 4 \\ \qquad \quad x = -3 \end{array}$$