

Section 3.5 Linear Equations and Problem Solving

Examples

1. A page of pictures for a yearbook is $8\frac{1}{2}$ inches x 11 inches. The top margin is $\frac{3}{4}$ inch and the bottom margin is $1\frac{1}{4}$ inches. The space between the pictures is $\frac{3}{16}$ inch. How high can each picture be to fit seven down the length of the page?

Handwritten equations for problem 1:

$$11 = \frac{3}{4} + 6\left(\frac{3}{16}\right) + 7x + 1\frac{1}{4}$$

$$11 = \frac{25}{8} + 7x$$

$$\frac{57}{8} - \frac{25}{8} = 7x$$

$$\frac{32}{8} = 7x$$

$$\left(\frac{1}{7}\right)\frac{32}{8} = 7x\left(\frac{1}{7}\right)$$

$x = 1\frac{1}{8}$ in

2. At West High School, 362 students take Spanish. This number has been increasing at a rate of 20 students per year. The number of students taking French is 259 and has been decreasing at a rate of about 3 per year. At these rates, when will there be two times as many students taking Spanish as taking French?

Handwritten solutions for problem 2:

② $S = 2F$ ④ $y = \text{years}$

③ $S: 362 + 20y$
 $F: 259 - 3y$

④ $362 + 20y = 2(259 - 3y)$

$$362 + 20y = 518 - 6y$$

$$362 + 26y = 518 - 362$$

$$26y = 156$$

$$\frac{26y}{26} = \frac{156}{26}$$

$y = 6 \text{ years}$

3. Jim can run 11 ft/sec and Sarah can run 13 ft/sec. How far ahead of Sarah must Jim be not to fall behind Sarah in the first 15 seconds that they run?

Handwritten solutions for problem 3:

① $x = \text{ft head start}$

③ $S = x + 13(15)$

④ $195 = x + 165 - 165$

$$30 = x$$

$x = 30 \text{ ft}$