

WORD PROBLEMS 1

- 1) Calculate the measure of the three angles of a triangle if the first is three times the second and this is twice the third.
- 2) Martha's age is a third of Bob's, and in 30 years' time she'll be 10 years younger than him. How old are both of them?
- 3) A father is 40 years old and his son is 18. How many years have gone by since the age of the father was triple the age of his son's?
- 4) Two people have got the same amount of money. The first person spends \$35 and the second spends \$22. The second person is left with twice the amount of money than the first. How much money did they have at the beginning?
- 5) The perimeter of a rectangle is 24m. The area is 27m^2 . Find its dimensions.
- 6) A train covers the distance between two cities A and B at 70 km/h during certain time. If it goes 10km/h faster, it will cover the same distance in one hour less. Find the distance between the two cities and the time it takes to do the first trip.
- 7) A chemist wants to make 40 litres of 22.5% acid solution. She is going to make it by mixing a 10% acid and a 30% acid solution. How many litres of each will she need?
- 8) A hotel has double rooms and single rooms. In total there are 80 rooms and 145 beds. How many rooms are there of each type?
- 9) Anne is counting a cash register at the end of the night. She has \$1015 in \$5 bills and \$10 bills. If she has 138 bills all together, how many of each type does she have?
- 10) 353 people attend a local play at a private club. Members get tickets for \$2.75, while non-members have to pay \$6.50. If the total gate for the play came to \$1762, how many members and non-members came to the play?

ANSWERS

- 1) Calculate the measure of the three angles of a triangle if the first is three times the second and this is twice the third.

$$1^{\text{st}} \text{ angle } 6x$$

$$2^{\text{nd}} \text{ angle } 2x$$

$$3^{\text{rd}} \text{ angle } x$$

$$\text{Equation: } 6x + 2x + x = 180^\circ$$

$$8x = 180 \rightarrow x = 22.5^\circ$$

Answer: 1st angle 135°, 2nd angle 45°, 3rd angle 22.5°

- 2) Martha's age is a third of Bob's, and in 30 years' time she'll be 10 years younger than him. How old are both of them?

Age	Now	In 30 years' time
Martha	$x/3$	$x/3 + 30$
Bob	x	$x + 30$

$$\text{Equation: } \frac{x}{3} + 30 = x + 30 - 10 \rightarrow x + 90 = 3x + 60$$

$$90 - 60 = 3x - x \rightarrow 30 = 2x \rightarrow x = 15$$

Answer: Martha is 5 years old and Bob is 15 years old

- 3) A father is 40 years old and his son is 18. How many years have gone by since the age of the father was triple the age of his son's?

Age	Now	x years ago
father	40	$40 - x$
son	18	$18 - x$

$$\text{Equation: } 40 - x = 3(18 - x) \rightarrow 40 - x = 54 - 3x$$

$$3x - x = 54 - 40 \rightarrow 2x = 14 \rightarrow x = 7$$

Answer: 7 years ago

- 4) Two people have got the same amount of money. The first person spends \$35 and the second spends \$22. The second person is left with twice the amount of money than the first. How much money did they have at the beginning?

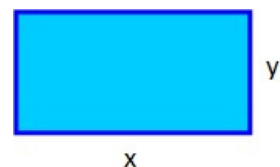
$$\left. \begin{array}{l} 1^{\text{st}} \rightarrow x \\ 2^{\text{nd}} \rightarrow x \end{array} \right\} \text{the same} \rightarrow \left\{ \begin{array}{l} x - 35 \\ x - 22 \end{array} \right. \rightarrow x - 22 = 2(x - 35)$$

$$x - 22 = 2x - 70 \rightarrow 70 - 22 = 2x - x \rightarrow x = 48$$

Answer: They had \$48 at the beginning

- 5) The perimeter of a rectangle is 24m. The area is 27m². Find its dimensions.

$$\left. \begin{array}{l} 2x + 2y = 24 \\ x \cdot y = 27 \end{array} \right\} \rightarrow \left\{ \begin{array}{l} x + y = 12 \\ y = \frac{27}{x} \end{array} \right.$$



x

$$x + \frac{27}{x} = 12x \rightarrow x^2 + 27 = 12x \rightarrow x^2 - 12x + 27 = 0$$

$$x = \frac{12 \pm \sqrt{144 - 108}}{2} = \frac{12 \pm 6}{2} = \begin{cases} 9 \rightarrow y = 3 \\ 3 \rightarrow y = 9 \end{cases}$$

Answer: Dimensions 9 m x 3 m

- 6) A train covers the distance between two cities A and B at 70 km/h during certain time. If it goes 10km/h faster, it will cover the same distance in one hour less. Find the distance between the two cities and the time it takes to do the first trip.

speed	time	distance
70 km/h	x	d
80 km/h	x-1	d

$$\left. \begin{array}{l} d = 70 \cdot x \\ d = 80(x-1) \end{array} \right\} \rightarrow 70x = 80x - 80$$

$$10x = 80 \Rightarrow x = 8; d = 70x = 70 \cdot 8 = 560$$

Answer: Distance between A and B 560 km, it takes 8 hours (first trip)

- 7) A chemist wants to make 40 litres of 22.5% acid solution. She is going to make it by mixing a 10% acid and a 30% acid solution. How many litres of each will she need?

	1 st acid solution	2 nd acid solution	Mixture
litres	x	40 - x	40
percentage	10	30	22.5

$$10x + 30(40 - x) = 40 \cdot 22.5 \Rightarrow 10x + 1200 - 30x = 900$$

$$-20x = -300 \rightarrow x = \frac{300}{20} = 15$$

Answer: She will need 15 litres of the 1st solution and 25 litres of the 2nd

- 8) A hotel has double rooms and single rooms. In total there are 80 rooms and 145 beds. How many rooms are there of each type?

$$\left. \begin{array}{l} \text{Double rooms} \rightarrow x \\ \text{Single rooms} \rightarrow y \end{array} \right\} \rightarrow \begin{cases} x + y = 80 \\ 2x + y = 145 \end{cases} \rightarrow x = 145 - 80 = 65$$

Answer: The hotel has 65 double rooms and 15 single rooms

- 9) Anne is counting a cash register at the end of the night. She has \$1015 in \$5 bills and \$10 bills. If she has 138 bills all together, how many of each type does she have?

$$\left. \begin{array}{l} \$5 \text{ bills} \rightarrow x \\ \$10 \text{ bills} \rightarrow y \end{array} \right\} \rightarrow \begin{cases} x + y = 138 \\ 5x + 10y = 1015 \end{cases} \rightarrow \begin{cases} -5x - 5y = -690 \\ 5x + 10y = 1015 \end{cases}$$

$$5y = 1015 - 690 \rightarrow 5y = 325 \rightarrow y = 65 \rightarrow x + y = 138 \rightarrow x = 73$$

Answer: She has 73 bills of \$5 and 65 bills of \$10

- 10) 353 people attend a local play at a private club. Members get tickets for \$2.75, while non-members have to pay \$6.50. If the total gate for the play came to \$1762, how many members and non-members came to the play?

$$\left. \begin{array}{l} \text{Members} \rightarrow x \\ \text{Non-members} \rightarrow y \end{array} \right\} \rightarrow \left. \begin{array}{l} x + y = 353 \\ 2.75x + 6.50y = 1762 \end{array} \right\} \rightarrow y = 353 - x$$

$$\begin{aligned} 2.75x + 6.50(353 - x) &= 1762 \rightarrow 2.75x + 2294.5 - 6.50x = 1762 \\ -3.75x &= -532.5 \rightarrow x = 142 \rightarrow y = 353 - 142 = 211 \end{aligned}$$

Answer: 142 members and 211 non-members came to the play