

Age Problems

Problem 1. Mike is 12 years older than Julie. **7 years ago**, Mike was six less than three times Julie's age. **Find their ages today.**

Names	Ages	- 7 yrs
Mike	$j + 12$	$j + 5$
Julie	j	$j - 7$

$$\text{Mike} = 3(\text{Julie}) - 6$$

$$j + 5 = 3(j - 7) - 6$$

$$j + 5 = 3j - 21 - 6$$

$$j + 5 = 3j - 27$$

$$5 + 27 = 3j - j$$

$$32 = 2j$$

$$16 = j$$

$$\text{Mike} = 28$$

$$\text{Julie} = 16$$

Problem 2. Tina is 3 years younger than Wanda, and Melvin is 3 times as old as Tina. **Six years ago**, Melvin's age was twice the sum of the girls' ages. **Find their present ages.**

Names	Ages	- 6 yrs
Tina	t	$t - 6$
Wanda	$t + 3$	$t - 3$
Melvin	$3t$	$3t - 6$

$$\text{Melvin} = 2 [\text{Tina} + \text{Wanda}]$$

$$3t - 6 = 2[t - 6 + t - 3]$$

$$3t - 6 = 2(2t - 9)$$

$$3t - 6 = 4t - 18$$

$$-6 + 18 = 4t - 3t$$

$$12 = t$$

$$\text{Tina} = 12$$

$$\text{Wanda} = 15$$

$$\text{Melvin} = 36$$

Integer Problems

Problem 3. Find three **consecutive even integers** such that four times the sum of the first and third integers is twenty less than six times the middle integer.

$$\begin{aligned}\text{First:} & \quad 2n \\ \text{Second:} & \quad 2n + 2 \\ \text{Third:} & \quad 2n + 4 \\ \\ 4(\text{First} + \text{Third}) &= 6(\text{Second}) - 20 \\ \\ 4(2n + 2n + 4) &= 6(2n + 2) - 20 \\ 4(4n + 4) &= 12n + 12 - 20 \\ 16n + 16 &= 12n - 8 \\ 16n - 12n &= -8 - 16 \\ 4n &= -24 \\ n &= -6\end{aligned}$$

$$\mathbf{\text{First} = -12}$$

$$\mathbf{\text{Second} = -10}$$

$$\mathbf{\text{Third} = -8}$$

Problem 4. Five times the smallest of three **consecutive odd integers** is ten more than twice the largest. **Find the integers.**

$$\begin{aligned}\text{First:} & \quad 2n + 1 = 6 \\ \text{Second:} & \quad 2n + 3 = 8 \\ \text{Third:} & \quad 2n + 5 = 10 \\ \\ 5(\text{First}) &= 2(\text{Third}) + 10 \\ \\ 5(2n + 1) &= 2(2n + 5) + 10 \\ 10n + 5 &= 4n + 10 + 10 \\ 10n + 5 &= 4n + 20 \\ 10n - 4n &= 20 - 5 \\ 6n &= 15 \\ n &= 2\frac{1}{2}\end{aligned}$$

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Number Problems

Problem 5. The sum of three numbers is one hundred twenty-three. The second number is two more than twice the first number. The third number is five less than three times the first number. **Find the three numbers.**

$$\begin{array}{l} \text{One:} \quad x \\ \text{Other:} \quad 2x + 2 \\ \text{Another:} \quad 3x - 5 \\ \hline 123 \end{array}$$

$$\text{One} + \text{Other} + \text{Another} = 123$$

$$x + 2x + 2 + 3x - 5 = 123$$

$$6x - 3 = 123$$

$$6x = 123 + 3$$

$$6x = 126$$

$$x = 21$$

$$\text{One} = 21$$

$$\text{Other} = 44$$

$$\text{Another} = 58$$

Problem 6. The sum of two integers is 10. Three times the larger integer is three less than eight times the smaller integer. **Find the numbers.**

$$\begin{array}{l} \text{One:} \quad x \\ \text{Other:} \quad 10 - x \\ \hline 10 \end{array}$$

$$3(\text{One}) = 8(\text{Other}) - 3$$

$$3x = 8(10 - x) - 3$$

$$3x = 80 - 8x - 3$$

$$3x + 8x = 77$$

$$11x = 77$$

$$x = 7$$

$$\text{One} = 7$$

$$\text{Other} = 3$$

Problem 7. Twenty increased by five times the sum of a number and two, is the same as six decreased by three times the number. **What is the number?**

Number: n

$$20 + 5(n + 2) = 6 - 3n$$

$$20 + 5n + 10 = 6 - 3n$$

$$30 + 5n = 6 - 3n$$

$$5n + 3n = 6 - 30$$

$$8n = -24$$

$$n = -3$$

Number = - 3

Mixture Problems

Problem 8. At the Golden Oldies Theater, tickets for adults cost \$5.50 and tickets for children cost \$3.50. **How many of each type of ticket** was purchased if 21 tickets were bought for \$83.50?

	Amount # Tickets	Price \$	Total
Adult	t	5.50	5.50t
Children	$21 - t$	3.50	73.50 - 3.50t
Total	21		83.50

Total Adults + Total Children = Total Gate

$$5.50t + 73.50 - 3.50t = 83.50$$

$$2t = 83.50 - 73.50$$

$$2t = 10.00$$

$$t = 5$$

Adult = 5 tickets

Children = 16 tickets

Problem 9. Fifty kilograms of oats worth 90¢/kg is added with some corn worth 60¢/kg to make some animal feed worth 75¢/kg. **How many kilograms of corn** were used in the mixture?

Ingredients	Amount kg	Price \$	Total
Oats	50	.90	45.00
Corn	x	.60	.60x
Feed	x + 50	.75	.75x + 37.50

Total Oats + Total Corn = Total Feed

$$45 + .60x = .75x + 37.5$$

$$45 - 37.5 = .75x - .60x$$

$$7.5 = .15x$$

$$\frac{7.5}{.15} = \frac{.15x}{.15}$$

$$50 = x$$

Corn = 50 kg

Problem 10. Pixie dust worth \$1.80/g is mixed with leprechaun gold worth \$2.10/g to make a 100g mixture of magical treasure worth \$190.50. **How many grams of each ingredient are used?**

Ingredients	Amount (g)	Price \$	Total
Pixie Dust	x	1.80	1.80x
Leprechaun Gold	100 - x	2.10	210 - 2.10x
Treasure	100		190.50

Total Pixie Dust + Total Leprechaun Gold = Total Treasure

$$1.80x + 210 - 2.10x = 190.50$$

$$-.30x + 210 = 190.50$$

$$-.30x = 190.50 - 210$$

$$-.30x = -19.5$$

$$\frac{-.30x}{-.30} = \frac{-19.5}{-.30}$$

$$x = 65$$

Pixie Dust = 65g

Lep. Gold = 35g