

Note Title

More about Problem Solving

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OBJECTIVES

- 1 Use percent in problems involving rates.
- ~~2 Solve problems involving mixtures~~
- 3 Solve problems involving simple interest.
- 4 Solve problems involving denominations of money.

Ans. 1

unemployment: (Source: U.S. Bureau of Labor Statistics.)

12. In 1998, the U.S. labor force (excluding agricultural employees, self-employed persons, and the unemployed) consisted of 116,730,000 persons. Of this total, 16,211,000 were union members. To the nearest tenth, what percent of this labor force belonged to unions? (Source: U.S. Bureau of Labor Statistics.)

7% of union members = $\frac{\# \text{ of union members}}{\text{total work force}}$

$$\frac{16,211,000}{116,730,000} = \frac{16,211}{116,730} = 0.1389$$
$$= 13.89\%$$
$$= 13.9\%$$

Simple Interest $I = Prt$

P = principal (and invested)

r = interest rate (convert to decimal)

t = years

Ex what is the total interest earned from investing \$500 at 4% simple interest and \$800 at 5% simple interest for one year?

$$\begin{aligned} \text{Interest} + \text{Int.} &= \text{Total} \\ 500(.04)(1) + 800(.05)(1) &= 20 + 40 \\ &= \$60 \end{aligned}$$

Ex Suppose you invested a total of
\$ 1,000, part at 3% simple interest
and the rest at 4.5% simple interest.

Write an expression for total interest
earned in one year.

$$x \text{ at } 3\% \Rightarrow .03x$$

$$1000 - x \text{ at } 4.5\% \Rightarrow .045(1000 - x)$$

$$\text{total interest} = .03x + .045(1000 - x)$$

25. Li Nguyen invested some money at 3% and \$4000 less than that amount at 5%. The two investments produced a total of \$200 interest in 1 yr. How much was invested at each rate?

P	r	t	=	I
X	.03	1		.03X
X-4000	.05	1		.05(X-4000)

\$5000 @ 3%
\$1000 @ 5%

$$.03X + .05(X - 4000) = 200$$

$$.03X + .05X - 200 = 200$$

$$.08X - 200 = 200$$

$$\frac{+200 \quad +200}{.08X = 400}$$

$$X = 5000$$

28. An artist invests her earnings in two ways. Some goes into a tax-free bond paying 6%, and \$6000 more than three times as much goes into mutual funds paying 5%. Her total annual interest income from the investments is \$825. How much does she invest at each rate?

\$2500 @ 6%

3(2500) + 6000 =

13,500 @

5%

$$P \quad r \quad t = I$$

X	.06	1	.06X
3X+6000	.05	1	.05(3X+6000)

$$.06X + .05(3X + 6000) = 825$$

$$.06X + .15X + 300 = 825$$

$$.21X + 300 = 825$$

$$\underline{\quad -300 \quad -300}$$

$$.21X = 525$$

$$X = 2500$$

Value of a Collection of Coins/Bills

Ex What is the value of

30 dimes and 20 nickels?

$$30(.10) + 20(.05)$$

$$3 \text{ } \neq 1 \\ \$4$$

4 \$5 bills and 10 \$20 bills?

$$4(5) + 10(20)$$

$$20 + 200$$

$$\$220$$

times value

Write the total value of 20 coins, if part
are nickels and the rest are quarters

	number	value
nickels	X	$.05X$
quarters	$20 - X$	$.25(20 - X)$

total value: $.05X + .25(20 - X)$

30. A coin collector has \$1.70 in dimes and nickels. She has 2 more dimes than nickels. How many nickels does she have?

	# of each coin	value of coin	total value
nickels	n	$.05$	$.05n$
dimes	$n+2$	$.10$	$.10(n+2)$

$$.05n + .10(n+2) = 1.70$$

$$\frac{.15n = 1.50}{.15} \quad \frac{.15}{.15}$$

$$n = 10$$

$$.05n + .10n + .2 = 1.70$$

10 nickels

$$.15n + .2 = 1.70$$

12 dimes

$$\underline{\underline{-.2 \quad -.2}}$$

32. A convention manager finds that she has \$1290, made up of twenties and fifties. She has a total of 42 bills. How many of each kind does she have?

	# of each	value	total
\$20's	X	20	<u>20X</u>
\$50's	42-X	50	<u>50(42-X)</u>

$$20X + 50(42 - X) = 1290$$

$$X = 27$$

27 \$20 bills

$$28X + 2100 - 50X = 1290$$

42 - 27 = 15 \$50 bills

$$-30X + 2100 = 1290$$

$$\underline{-2100} \quad \underline{-2100}$$

$$\underline{-30X} = \underline{-810}$$

$$\underline{-30} \quad \underline{-30}$$