Name _____ Date _____

9-1 Retirement Income from Savings

Key Math Concepts

- Future value of a periodic deposit investment = $B = \dfrac{P\left(\left(1+\frac{r}{n}\right)-1\right)^{nt}}{\frac{r}{n}}$
- Present value of a periodic deposit investment = $P = \dfrac{B\times\frac{r}{n}}{\left(1+\frac{r}{n}\right)^{nt}-1}$

Guided Exercises

1. Ethan is 48 years old. He is planning on retiring when he turns 62. He has opened an IRA with an APR of 2.95% compounded monthly. If he makes monthly deposits of \$850 to the account, how much will he have in the account when he is ready to retire?

$$B = \frac{P\left(\left(1+\frac{r}{n}\right)-1\right)^{nt}}{\frac{r}{n}} = \frac{850\left(\left(1+\frac{0.0295}{12}\right)-1\right)^{(12)(\mathbf{14})}}{\frac{0.0295}{12}}$$

62 – 48 = t, the number of years until retirement.

$B =$ **176,539.27**

Ethan will have **\$176,539.27** when he is ready to retire.

2. Tanya is 42 years old. She would like to open a retirement account so that she will have one half million dollars in the account when she retires at the age of 65. How much must she deposit each month into an account with an APR of 2.75% in order to reach her goal?

$$P = \frac{B\times\frac{r}{n}}{\left(1+\frac{r}{n}\right)^{nt}-1} = \frac{\mathbf{500{,}000}\times\frac{0.0275}{12}}{\left(1+\frac{0.0275}{12}\right)^{(12)(\mathbf{23})}-1} = \mathbf{1{,}300.68}$$

Substitute.

Tanya should deposit **\$1,300.68** each month for 23 years to reach her goal.

Name _____ Date _____

Exercises

3. Conor is 21 years old and just started working after college. He has opened a retirement account that pays 2.5% interest compounded monthly. He plans on making monthly deposits of $200. How much will he have in the account when he reaches $59\frac{1}{2}$ years of age?

$155,098.92

4. Gillian started a retirement account with $10,000 when she turned 35. The account compounds interest quarterly at a rate of 3.625%. She made no further deposits into the account. After 20 years, she decided to withdraw 40% of what had accumulated in the account so that she could make her home handicap accessible. She had to pay a 10% penalty on the early withdrawal. What was her penalty?

$823.20

Annette makes $96,000 per year working for an online e-magazine. Her company offers a 401K retirement plan in which they will match 45% of her contributions to the 401K up to 9% of her salary. The company will only allow employees to make contributions to the 401K to a maximum of 25% of their salary. For the year in question, the maximum allowable contribution to any 401K is $22,000 since she is over the age of 55. Answer Exercises 5-8.

5. What is the maximum Annette's employer will allow for her contribution?

$24,000

6. What is the maximum contribution she could make?

$22,000

7. What is her employer's maximum contribution amount?

$8,640

8. Annette only wants to contribute an amount up to her employer's maximum contribution level. What should that monthly amount be?

$1,600

Name _____ Date _____

9-2 Social Security Benefits

Key Math Concepts

- Social security taxes = taxable income (to the maximum amount) × current tax rate

Guided Exercises

1. Emanuel requests his annual Social Security Statement from the IRS each year. He wants to check how many Social Security credits he received for 2009. He worked all year and earned $2,962 per month. How many credits did he earn in 2009?

Annual income = 2,962 × 12 = **35,544**

In 2009, one Social Security credit = $1,090 in a quarter. The maximum credits are 4.

1,090 × 4 = **4,360**

To earn the maximum credits, Emanuel needs to earn at least **$4,360**.

35,544 > 4,360; so, Emanual earned **4** credits.

2. In 2009, the maximum taxable income for Social Security was $106,800 with a 6.2% tax rate.

a. What is the maximum anyone could have paid into Social Security tax in the year 2009?

Social Security taxes = up to the maximum taxable income × current tax rate

Social Security taxes = **106,800** × **0.062** = **6,621.60**

The maximum amount anyone could have paid to Social Security in 2009 was **$6,621.60**.

b. Ravi had two jobs in 2009. One employer paid him $59,810 and the other paid him $61,200. Each employer took out 6.2% for Social Security. How much did Ravi overpay in Social Security for 2009?

Social Security taxes = (**59,810** + **61,200**) × **0.062** = **7,502.62**

7,502.62 − **6,621.60** = **881.02**

Find the difference between what Ravi paid and the maximum amount for the overpayment.

Ravi overpaid his taxes by **$881.02**.

Name _____ Date _____

Exercises

3. Carrie earned $231 each month, every month in 2009. How many Social Security credits did she earn in 2009?

2 credits

4. In 2009, Riley had three jobs. He worked at Young's Grocery and earned $5,805. He was a waiter at the A & B Restaurant and earned $12,445. He also earned $56,002 working for CCD Communications. Each employer took out 6.2% for Social Security. How much did Riley pay in Social Security for 2009?

$4,603.63

5. In 2009, Giselle had two jobs. She earned $73,440 working the first 8 months of the year at a nursing home. She switched jobs in September and began to work in a hospital, where she earned $32,211. In 2009, the maximum taxable income for Social Security was $106,800. The Social Security tax rate was 6.2%. How much OASDI tax did Giselle overpay?

$0

6. Alexandra had two employers last year. Both of her employers took out OASDI tax. The OASDI percent was p and the maximum taxable OASDI income was m dollars. She earned x dollars at one job and y dollars at her second job, and $x + y > m$. Express her OASDI refund algebraically.

$\frac{p}{100}(x + y - m)$

Name _____ Date _____

9-3 Pensions

Key Math Concepts

- Pension (flat retirement benefit) = number of years of service × annual amount
- Pension (multiplier retirement benefit) = average salary × years of service × percentage multiplier

Guided Exercises

1. George is retiring after 30 years at Peabody Motors. The company offers him a flat yearly retirement benefit of $870 for each year of service. What will be his monthly pension?

Pension (flat retirement benefit) = number of years of service × annual amount

Pension (flat retirement benefit) = 30 × 870 = **$2,175**

George will receive a **$2,175** monthly pension.

2. Kevin is planning on retiring after 25 years of employment. For the last three years he has made $132,000; $135,000; and $138,000. His employer offers a defined benefit plan in which the annual pension is calculated as the product of the final three-year average salary, the number of years of service, and a 2.25% multiplier. What will Kevin's annual pension be?

Average salary = sum of salaries × number of salaries

Average salary = (**132,000** + **135,000** + **138,000**) ÷ **3** = **135,000**

Pension (multiplier retirement benefit) = average salary × years of service × percentage multiplier

Pension (multiplier retirement benefit) = **135,000** × **25** × **0.0225**

Pension (multiplier retirement benefit) = **75,937.50**

Write the percent as a decimal.

Kevin's annual pension will be **$75,937.50**.

Name _____ Date _____

Exercises

3. Frank worked for Morton Industries for 18 years. His company offered him a flat amount of $48 for each year of service as his monthly pension package. After one year, he was notified of a 1.625% cost of living adjustment to his monthly pension benefit. Determine Frank's current monthly pension benefit.

$878.04

4. Depot City uses a final average formula to calculate an employee's pension benefits. The amount used in the calculations is the salary average of the final five years of employment. The retiree will receive an annual benefit that is equivalent to 1.2% of the final average for each year of employment. Vilma is retiring at the end of this year, after 23 years of employment at Depot City. Calculate her annual retirement pension given that her final five years of salaries are $63,000; 63,700; 64,000; 64,000; and 64,800.

$17,636.40

5. Singh's employer offers a defined contribution pension plan that uses a graded 6-year vesting formula as shown here.

Years Employed	Vesting Percentage
1 – 2	0%
3 – 10	25%
10 – 15	45%
15 – 20	70%
20 – 35	85%
30+	100%

His employer matches $0.75 on the dollar for all of his contributions. After 16 years, Singh decides to move to a different state. His personal contributions (adjusted for losses or gains in the investment) amount to $25,000. How much of his pension will he be able to take with him?

$38,125

Name _____ Date _____

9-4 Life Insurance

Key Math Concepts

- Premiums paid = cash value (universal life insurance) ÷ monthly premium
- Insurance company profit = amount of premium × number of payments paid – face value of policy paid
- Percent probability of death before next birthday = death probability × 100
- The greatest integer function, [*x*], means the greatest integer less than or equal to *x*.

Guided Exercises

1. Julio has a universal life insurance policy with a face value of $200,000. The current cash value of the policy is $11,560. If the premium is $102 per month, for how many months can the cash value be used to pay the premium?

Number of premiums = cash value (universal life insurance) ÷ monthly premium

Number of premiums = 11,560 ÷ 102 ≈ **113.3**

Round to the greatest integer less than 113.3.

The greatest number of payments the cash value can cover is **113**.

2. Mr. Kurris is 50 years old. In four years, his house will be paid off and his daughter will be finished with college. He wants to take out a five-year level-term life insurance policy with a face value $750,000. The monthly premium is $61. What will be his total cost for this policy over the 5-year period? If he dies after paying for the policy for 13 months, how much will the insurance company lose on this policy?

Number of premiums paid = (5 years × 12 months) = **60** premiums paid

Total cost = number of premiums paid × amount of premium

Total cost = **60** × **61** = **3,660**

Profit = amount of premium × number of payments paid – face value of policy paid

Profit = **61** × **13** – **750,000**

Beneficiaries are paid the face value of the policy.

Profit = **–749,207**

The total cost of the policy is **$3,660**. If Mr. Kurris dies in 13 months, the insurance company loses **$749,207**.

Name _____ Date _____

Exercises

3. An insurance company sells a $500,000 five-year term policy to a female. The monthly policy is *m* dollars. If the person dies 20 months after taking out the policy, express the insurance company's profit algebraically.

$20m - 500,000$

4. Mr. DiPasquale's whole life premium increased from $115 to $149 per month when he increased his face value. Find the percent increase to the nearest percent.

30%

5. The mortality rate for a certain female elderly age category is 0.0059. A company insures 10,000 people in this category. About how many of them will die before their next birthday?

59

6. Mr. Kite took out a 10-year term policy with a face-value of *f* dollars. Over the lifetime of the policy, he pays monthly payments of *m* dollars. He dies after 12 years. How much will his family receive from the insurance company?

$0

7. Mr. Henderson takes out a term life insurance policy with a renewable annual premium. The first year premium is $350. Premiums increase by 7% each year. What will the premiums be in the second year? What will the premiums be in the third year? Round to the nearest cent.

$374.50; $400.72