Name _____ Date _____

Simple Interest

1. Erica's parents gave her $500 for her high school graduation. She put the money into a savings account that earned 7.5% annual interest. She left the money in the account for nine months before she withdrew it. How much interest did the account earn if interest is paid monthly?

2. If she would have left the money in the account for another nine months before withdrawing, how much interest would the account have earned?

3. About how many years and months would she have to leave the money in the account if she wants to reach her goal of saving $750?

1. Enrique takes out a student loan to pay for his college tuition this year. Find the interest on the loan if he borrowed $\$2{,}500$ at an annual interest rate of 6% for 15 years.

2. Your family plans to start a small business in your neighborhood. Your father borrows $\$10{,}000$ from the bank at an annual interest rate of 8% rate for 36 months. What is the amount of interest he will pay on this loan?

3. Mr. Rodriguez invests $\$2{,}000$ in a savings plan. The savings account pays an annual interest rate of 5.75% on the amount he put in at the end of each year.
   a. How much will Mr. Rodriguez earn if he leaves his money in the savings plan for 10 years?
   b. How much money will be in his savings plan at the end of 10 years?
   c. Create (and label) a graph in the coordinate plane to show the relationship between time and the amount of interest earned for 10 years. Is the relationship proportional? Why or why not? If so, what is the constant of proportionality?
   d. Explain what the points $(0, 0)$ and $(1, 115)$ mean on the graph.
   e. Using the graph, find the balance of the savings plan at the end of seven years.
   f. After how many years will Mr. Rodriguez have increased his original investment by more than 50%? Show your work to support your answer.

Challenge Problem

4. George went on a game show and won $\$60{,}000$. He wanted to invest it and found two funds that he liked. Fund 250 earns 15% interest annually, and Fund 100 earns 8% interest annually. George does not want to earn more than $\$7{,}500$ in interest income this year. He made the table below to show how he could invest the money.

	I	P	r	t
Fund 100		x	0.08	1
Fund 250		$60{,}000 - x$	0.15	1
Total	7,500	60,000		

   a. Explain what value x is in this situation.

   b. Explain what the expression $60{,}000 - x$ represents in this situation.

   c. Using the simple interest formula, complete the table for the amount of interest earned.

   d. Write an equation to show the total amount of interest earned from both funds.

   e. Use algebraic properties to solve for x and the principal, in dollars, George could invest in Fund 100. Show your work.

   f. Use your answer from part (e) to determine how much George could invest in Fund 250.

   g. Using your answers to parts (e) and (f), how much interest would George earn from each fund?

1. Erica's parents gave her $\$500$ for her high school graduation. She put the money into a savings account that earned 7.5% annual interest. She left the money in the account for nine months before she withdrew it. How much interest did the account earn if interest is paid monthly?

$$I = Prt$$
$$I = (500)(0.075)\left(\frac{9}{12}\right)$$
$$I = 28.125$$

The interest earned is $\$28.13$.

2. If she would have left the money in the account for another nine months before withdrawing, how much interest would the account have earned?

$$I = Prt$$
$$I = (500)(0.075)\left(\frac{18}{12}\right)$$
$$I = 56.25$$

The account would have earned $\$56.25$.

3. About how many years and months would she have to leave the money in the account if she wants to reach her goal of saving $\$750$?

$750 - 500 = 250$ *She would need to earn* $\$250$ *in interest.*

$$I = Prt$$
$$250 = (500)(0.075)t$$
$$250 = 37.5t$$
$$250\left(\frac{1}{37.5}\right) = \left(\frac{1}{37.5}\right)(37.5)t$$
$$6\frac{2}{3} = t$$

It would take her 6 *years and* 8 *months to reach her goal because* $\frac{2}{3} \times 12$ *months is* 8 *months.*

1. Enrique takes out a student loan to pay for his college tuition this year. Find the interest on the loan if he borrowed $\$2,500$ at an annual interest rate of 6% for 15 years.

$I = 2,500(0.06)(15)$

$I = 2,250$

Enrique would have to pay $\$2,250$ *in interest.*

2. Your family plans to start a small business in your neighborhood. Your father borrows $\$10,000$ from the bank at an annual interest rate of 8% rate for 36 months. What is the amount of interest he will pay on this loan?

$I = 10,000(0.08)(3)$

$I = 2,400$

He will pay $\$2,400$ *in interest.*

3. Mr. Rodriguez invests $\$2,000$ in a savings plan. The savings account pays an annual interest rate of 5.75% on the amount he put in at the end of each year.

a. How much will Mr. Rodriguez earn if he leaves his money in the savings plan for 10 years?

$I = 2,000(0.0575)(10)$

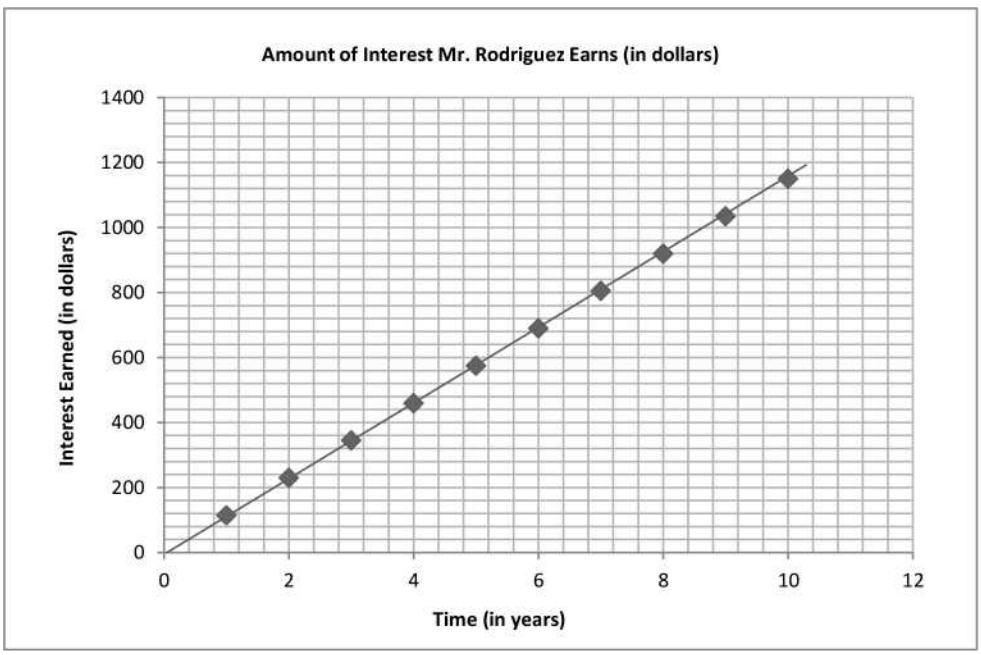
$I = 1,150$

He will earn $\$1,150$.

b. How much money will be in his savings plan at the end of 10 years?

At the end of 10 *years, he will have* $\$3,150$ *because* $\$2,000 + \$1,150 = \$3,150$.

c. Create (and label) a graph in the coordinate plane to show the relationship between time and the amount of interest earned for 10 years. Is the relationship proportional? Why or why not? If so, what is the constant of proportionality?



Yes, the relationship is proportional because the graph shows a straight line touching the origin. The constant of proportionality is 115 *because the amount of interest earned increases by* $\$115$ *for every one year.*

d. Explain what the points $(0,0)$ and $(1,115)$ mean on the graph.

$(0,0)$ *means that no time has elapsed and no interest has been earned.*

$(1,115)$ *means that after* 1 *year, the savings plan would have earned* $\$115$. 115 *is also the constant of proportionality.*

e. Using the graph, find the balance of the savings plan at the end of seven years.

From the table, the point $(7,805)$ *means that the balance would be* $\$2,000 + \$805 = \$2,805$.

f. After how many years will Mr. Rodriguez have increased his original investment by more than 50%? Show your work to support your answer.

$\text{Quantity} = \text{Percent} \times \text{Whole}$

Let Q be the account balance that is 50% more than the original investment.

$$Q > (1 + 0.50)(2,000)$$
$$Q > 3,000$$

The balance will be greater than $\$3,000$ beginning between 8 and 9 years because the graph shows $(8, 920)$ and $(9, 1035)$, so $\$2,000 + \$920 = \$2,920 < \$3,000$, and $\$2,000 + \$1,035 = \$3,035 > \$3,000$.

Challenge Problem:

4. George went on a game show and won $\$60,000$. He wanted to invest it and found two funds that he liked. Fund 250 earns 15% interest annually, and Fund 100 earns 8% interest annually. George does not want to earn more than $\$7,500$ in interest income this year. He made the table below to show how he could invest the money.

	I	P	r	t
Fund 100	$0.08x$	x	0.08	1
Fund 250	$0.15(60000 - x)$	$60,000 - x$	0.15	1
Total	$7,500$	$60,000$		

a. Explain what value x is in this situation.

x is the principal, in dollars, that George could invest in Fund 100.

b. Explain what the expression $60,000 - x$ represents in this situation.

$60,000 - x$ is the principal, in dollars, that George could invest in Fund 250. It is the money he would have left over once he invests in Fund 100.

c. Using the simple interest formula, complete the table for the amount of interest earned.

See table above.

d. Write an equation to show the total amount of interest earned from both funds.

$0.08x + 0.15(60,000 - x) \leq 7,500$

e. Use algebraic properties to solve for x and the principal, in dollars, George could invest in Fund 100. Show your work.

$$0.08x + 9,000 - 0.15x \leq 7,500$$
$$9,000 - 0.07x \leq 7,500$$
$$9,000 - 9,000 - 0.07x \leq 7,500 - 9,000$$
$$-0.07x \leq -1,500$$
$$\left(\frac{1}{-0.07}\right)(-0.07x) \leq \left(\frac{1}{-0.07}\right)(-1,500)$$
$$x \approx 21,428.57$$

x approximately equals $\$21,428.57$. George could invest $\$21,428.57$ in Fund 100.

f. **Use your answer from part (e) to determine how much George could invest in Fund 250.**

He could invest $\$38,571.43$ *in Fund 250 because* $60,000 - 21,428.57 = 38,571.43$.

g. **Using your answers to parts (e) and (f), how much interest would George earn from each fund?**

Fund 100: $0.08 \times 21,428.57 \times 1$ *approximately equals* $\$1,714.29$.

Fund 250: $0.15 \times 38,571.43 \times 1$ *approximately equals* $\$5,785.71$ *or* $7,500 - 1,714.29$.