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Date _____
Algebra II

Compound Interest

1. A bank account is opened with \$3000 and interest is compounded monthly at an interest rate of 4.2%. How much money is in the account after 8 years?

$A = x$
 $P = 3000$
 $r = .042$
 $n = 12$
 $t = 8$

$$A = P(1 + \frac{r}{n})^{nt}$$
$$x = 3000(1 + \frac{.042}{12})^{12(8)}$$
$$x = 4195.56$$

2. If a bank account is opened with \$4000 and is compounded at a rate of 5.2% continuously, how much money will be in the account after 3 years?

$A = x$
 $P = 4000$
 $r = .052$
 $t = 3$

$$A = Pe^{rt}$$
$$x = 4000e^{.052(3)}$$
$$x = 4675.30$$

3. Sal has a savings account. He opened the account 6 years ago by putting in \$3000. If the interest is compounded daily at a rate of 5.6%, how much money is in the account now?

$A = x$
 $P = 3000$
 $r = .056$
 $n = 365$
 $t = 6$

$$A = P(1 + \frac{r}{n})^{nt}$$
$$x = 3000(1 + \frac{.056}{365})^{365(6)}$$
$$x = 4197.91$$

4. How much money is in a bank account opened 7.5 years ago with \$3125.67 that is compounded weekly with an interest rate of 5.26%?

$A = x$
 $P = 3125.67$
 $r = .0526$
 $n = 52$
 $t = 7.5$

$$A = P(1 + \frac{r}{n})^{nt}$$
$$x = 3125.67(1 + \frac{.0526}{52})^{52(7.5)}$$
$$x = 4636.45$$

5. Moe opened a bank account with \$3100 4 years ago at an interest rate of 6.1% that is compounded continuously. How much money is in Moe's bank account now?

$$\begin{aligned}
 A &= x \\
 P &= 3100 \\
 r &= .061 \\
 t &= 4 \\
 A &= Pe^{rt} \\
 x &= 3100e^{.061(4)} \\
 x &= 3956.67
 \end{aligned}$$

6. Max opens a bank account with \$2100. If interest is compounded quarterly at an interest rate of 7%, how much interest will Max have earned after 3 years?

$$\begin{aligned}
 A &= x \\
 P &= 2100 \\
 r &= .07 \\
 n &= 4 \\
 t &= 3 \\
 A &= P(1 + \frac{r}{n})^{nt} \\
 x &= 2100(1 + \frac{.07}{4})^{4(3)} \\
 x &= 2586.02 \\
 \text{Interest} &= A - P \\
 \text{Interest} &= 2586.02 - 2100 = 486.02
 \end{aligned}$$

7. Dan opened a savings account with \$3300. If 4 years has passed, and interest is compounded monthly at a rate of 4.6%, how much interest has Dan made?

$$\begin{aligned}
 A &= x \\
 P &= 3300 \\
 r &= .046 \\
 n &= 12 \\
 t &= 4 \\
 A &= P(1 + \frac{r}{n})^{nt} \\
 x &= 3300(1 + \frac{.046}{12})^{12(4)} \\
 x &= 3965.26 \\
 \text{Interest} &= A - P \\
 \text{Interest} &= 3965.26 - 3300 = 665.26
 \end{aligned}$$

8. The table below shows three different investment options in which Lauren can invest \$7,000.

Option	Annual Interest Rate	Frequency of Compounding
A	6.5%	Annually
B	6.38%	Continuously
C	6.46%	Weekly

Which option will allow Lauren to earn the most money over the course of a four-year period? Justify your answer.

$$\begin{aligned}
 A &= x \\
 P &= 7000 \\
 r &= .065 \\
 t &= 4 \\
 A &= P(1+r)^t \\
 A &= 7000(1+.065)^4 \\
 A &= 9005.26
 \end{aligned}$$

$$\begin{aligned}
 A &= x \\
 P &= 7000 \\
 r &= .0638 \\
 t &= 4 \\
 A &= Pe^{rt} \\
 x &= 7000e^{.0638(4)} \\
 x &= 9035.04
 \end{aligned}$$

$$\begin{aligned}
 A &= x \\
 P &= 7000 \\
 r &= .0646 \\
 n &= 52 \\
 t &= 4 \\
 x &= 7000(1 + \frac{.0646}{52})^{52(4)} \\
 x &= 9062.54
 \end{aligned}$$

Option C

9. The table below shows three different investment options in which Lauren can invest \$3,200.

Option	Annual Interest Rate	Frequency of Compounding
A	4.9%	Annually
B	4.81%	Continuously
C	4.85%	Weekly

Which option will allow Lauren to earn the most money over the course of a four-year period? Justify your answer.

A

$$A = P(1+r)^t$$

$P = 3200$
 $r = .049$
 $t = 4$

$$x = 3200(1.049)^4$$

$$x = 3874.82$$

B

$$A = Pe^{rt}$$

$P = 3200$
 $r = .0481$
 $t = 4$

$$x = 3200e^{.0481(4)}$$

$$x = 3878.90$$

C

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$P = 3200$
 $r = .0485$
 $t = 4$
 $n = 52$

$$x = 3200\left(1 + \frac{.0485}{52}\right)^{52(4)}$$

$$x = 3884.76$$

Option C

10. Seth's parents gave him \$5000 to invest for his 16th birthday. He is considering two investment options. Option A will pay him 4.5% interest compounded annually. Option B will pay him 4.6% compounded quarterly. Write a function of option A and option B that calculates the value of each account after n years. Seth plans to use the money after he graduates from college in 6 years. Determine how much more money option B will earn than option A to the nearest cent.

Option A

$$A = P(1+r)^t$$

$P = 5000$
 $r = .045$
 $t = n$

$$A(n) = 5000(1.045)^n$$

$$A(6) = 5000(1.045)^6$$

$$A(6) = 6511.30$$

Option B

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$P = 5000$
 $r = .046$
 $n = 4$
 $t = n$

$$B(n) = 5000\left(1 + \frac{.046}{4}\right)^{4n}$$

$$B(n) = 5000(1.0115)^{4n}$$

$$B(6) = 5000(1.0115)^{24}$$

$$B(6) = 6578.87$$

$$6578.87 - 6511.30$$

$$67.57$$

