A∞Ω
MATH@TD

Name Solutions

MCR3U

11U U8: Practice Quiz W23

Formulas:

Simple Interest: $I = Prt$, $A = P(1+rt)$

Compound Interest:

Future Value

$$A = P(1+i)^n$$

Present Value

$$P = \frac{A}{(1+i)^n}$$

Annuities

$$FV = \frac{R[(1+i)^n - 1]}{i}$$

$$PV = \frac{R[1-(1+i)^{-n}]}{i}$$

Multiple Choice

Indicate your choice for each question..

C

1. Kevin invests \$725 at 5.2%/a simple interest. What is the total amount in Kevin's account at the end of 5 years?
   a. \$188.50
   b. \$189.50
   c. \$913.50
   d. \$2610.00

$A = 725(1 + (0.052)(5))$
$= 913.5$

A

2. What is the interest earned on \$6500 at 8% simple interest for 9 months?
   a. \$390
   b. \$520
   c. \$4860
   d. \$6890

$I = (6500)(0.08)\left(\frac{9}{12}\right) = 390$

B

3. Sabine borrows \$2300 for 36 months at a fixed rate of simple interest. At the end of the time, she owes \$2748.50. What interest rate is she being charged?
   a. 4.9%/a
   b. 6.5%/a
   c. 12.5%/a
   d. 29.9%/a

Given	Wat
$P = 2300$	r
$A = 2748.50$	
$t = 3$ years	

$A = P(1+rt)$

$2748.5 = 2300(1 + r(3))$

$\Rightarrow \frac{2748.5}{2300} = 1 + 3r$

$1.195 = 1 + 3r$

$\Rightarrow 3r = 0.195$

$\therefore r = 0.065$
$= 6.5\%$

Full Solution

Write clear and well written solutions using the following problems. A communications grade out of 3 will be awarded for how well your math is presented.

4. Sam borrows $8000 at 6.4%/a interest compounded quarterly for 25 years. How much money is in Sam's account at the end of 25 years?

"today" – present value

Given	Want
$P = 8000$	A
$i = \frac{0.064}{4} = 0.016$	
$n = (4)(25) = 100$	

$$A = P(1+i)^n$$
$$= 8000(1.016)^{100}$$
$$= \$39,125.58$$

($31 000 FREE MONEY)

5. Maria wants to have $120 000 in her retirement account at the age of 65. If she is 20 years old now, how much must she invest at 3.5%/a compounded semi-annually to meet her goal?

future!

Given	Want
$A = 120000$	P
$i = \frac{0.035}{2} = 0.0175$	
$n = (2)(45) = 90$	

$$P = \frac{A}{(1+i)^n} = \frac{120\,000}{1.0175^{90}} = \$25\,181.62$$

Maria needs to invest $25 181.62 today to have $120 000 at retirement

6. Chandra invests $75 every month at 4.8%/a compounded monthly for 38 years. What is the total amount of Chandra's investments after 38 years, and how much interest does she earn?

regular payment ⇒ Annuity

Given	Want
$R = 75$	FV
$i = \frac{0.048}{12} = 0.004$	
$n = (12)(38) = 456$	

$$FV = \frac{R((1+i)^n - 1)}{i}$$
$$= \frac{75(1.004^{456} - 1)}{0.004}$$
$$= 97\,014.21$$

$$I = F.V. - P.V.$$
$$= 97014.21 - (75)(456)$$
$$= \$62\,814.21 \text{ in interest}$$

7. Joe borrowed $330 000 from the bank to purchase a house. If the bank charges 6.12%/a compounded monthly, he will take 30 years to pay off the loan. What is Joe's ***regular*** mortgage payment? How much interest will he have paid over the term of the loan?

Given	Want
$PV = 330\,000$	R
$i = \frac{0.0612}{12} = 0.0051$	
$n = (12)(30) = 360$	

$$PV = \frac{R(1-(1+i)^{-n})}{i}$$
$$\Rightarrow R = \frac{(PV)(i)}{(1-(1+i)^{-n})} = \frac{(330\,000)(0.0051)}{(1-(1.0051)^{-360})}$$
$$= 2004.05$$

Joe pays $2004.05, 360 times

$$\Rightarrow \text{Total paid} = (2004.05)(360) = \$721\,458$$

$$I = \text{Total} - \text{borrowed}$$
$$= 721\,458 - 330\,000$$
$$= \$391,458$$

↳ that is A LOT of $!