High School
Mathematics Test 2013

Year 10

Compound Interest and Consumer

Skills and Knowledge Assessed:
- Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)

Name_____

Section 1   Short Answer Section

Write all working and answers in the spaces provided on this test paper.

Simple Interest
$I = PRN$
I is the interest earned
P is the principal
R is the interest rate per period as a decimal
N is the number of periods

Compound Interest
$A = P(1 + R)^N$
A is the total amount of the investment
P is the principal
R is the interest rate per period as a decimal
N is the number of compounding periods

1. Alex invests $2 500 in an account which pays 6% pa simple interest. How much interest does she earn after 8 months?

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2. Olivia borrows $5 600 and repays the loan after 3 years plus interest of $2 016. What rate of simple interest did she pay, per annum?

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3. Clark buys a car on terms over 4 years and pays a total of $19 200. If the cash price of the car was $16 000, what rate of simple interest did he pay, per annum?

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4. Rafael invests $5 500 in an account which pays 8% pa interest, compounded annually for 3 years. Complete the table below to find the value of the investment at the end of each year.

Year	Principal at the Start of the Year	Interest Earned During the Year	Principal at the End of the Year
1	$5 500	$440	$5 940
2	$5 940		
3			

5. A principal of $65 000 is invested at 6% pa interest compounded annually. Find the value of the investment after 3 years.

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6. Felicity borrows $36 000 from her grandmother to buy a car and repays the full amount plus interest after 6 years. If the interest is charged at 8% pa, compounded quarterly, how much does she need to repay?

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7. Maisie invests $30 000 in a term deposit for 5 years. The interest rate is 6% pa compounded half yearly. How much interest will Maisie be paid at the end of the 5 years?

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8. Siobahn invested an amount of money 4 years ago in an account that paid 5% pa compounding annually. The account is now worth $19 448.10. How much was in the account initially?

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9.   Kelly bought a motorbike for $12 000 four years ago. If it depreciates at 9% pa compounding annually, what is the value of the car today?

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10.   Bridgeport Legal bought a new computer system for $15 000. It depreciates at 15% pa compounded annually. It will be replaced in the first whole year that its value falls below $7 500. After how many whole years will it be replaced?

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Section 2   Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1.   A credit card charges simple interest at a rate of 18% p.a. charged daily on the outstanding balance. Nguyen has an outstanding balance of $860 for 25 days before he pays it back. How much interest is he charged on the balance?

   A. $6.19   B. $10.60   C. $68.80   D. $154.80

2.   Simon bought a car for $12500 by paying an 8% deposit and then weekly payments of $105 for 3 years. How much does he pay for the car, altogether?

   A. $3 780   B. $4 780   C. $16 380   D. $17 380

3.   Ivy and Daniel buy a TV cabinet, which has a cash price of $1 500, on a deferred payment plan. They pay no deposit and no monthly payments for the first 9 months and they then make 15 monthly payments of $140. How much extra do they pay compared to the cash price?

   A. $600   B. $1500   C. $1860   D. $2 100

4.   A microwave oven is advertised as shown.

> **Super Juicer**
> Cash Price $360
> or
> $50 deposit and $34 per
> month for 12 months

   How much extra is paid by paying it off over 12 months, compared to the cash price?

   A. $8   B. $48   C. $98   D. $408

5.   Nikos puts $4 000 in a credit union term deposit which earns $780 in interest after 3 years. What is the annual simple interest rate on the account?

   A.   5.1%   B.   6.5%   C. 19.5%   D.   58.5%

6. When interest rates went up, Jules home loan repayments increased from $1 240.00 to $1 309.00 per month. The loan still has a remaining term of 15 years. How much extra will Jules have to pay over the remaining life of the loan?

    A. $12 420   B. $149 040   C. $223 200   D. $235 620

7. Which calculation would you use to find the amount that $5 000 grows to when invested at 9% p.a. interest compounding monthly for two years.

    A. $5\,000 \times 1.0075^2$ B. $5\,000 \times 1.09^2$

    C. $5\,000 \times 1.0075^{24}$ D. $5\,000 \times 1.09^{24}$

8. Ewen invests $30 000 at 8% p.a. interest, compounding annually. What is his investment worth at the end of 3 years?

    A. $32 400.00   B. $37 200.00   C. $37 791.36   D. $40 814.67

9. Miles deposits $9 000 into a term deposit. The account earns interest at the rate of 6.4% pa compounding quarterly. If he invests the money for a term of 9 months, how much interest will he earn?

    A. $438.95   B. $441.33   C. $1382.12   D. $6 729.58

10. Franz bought a laptop exactly 2 years ago for $1 780.00. It depreciates at 16% pa compounded annually. What is its value now?

    A. $1 210.40   B. $1 255.97   C. $1 495.20   D. $4 129.6

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Section 3   Longer Answer Section

Write all working and answers in the spaces provided on this test paper.

Marks

1. The table below gives the value of $1.00 after being invested at different rates of compound interest for varying terms.

Years	Compound interest rate pa						
	2%	3%	4%	5%	6%	7%	8%
1	$1.0200	$1.0300	$1.0400	$1.0500	$1.0600	$1.0700	$1.0800
2	$1.0404	$1.0609	$1.0816	$1.1025	$1.1236	$1.1449	$1.1664
3	$1.0612	$1.0927	$1.1249	$1.1576	$1.1910	$1.2250	$1.2597
4	$1.0824	$1.1255	$1.1699	$1.2155	$1.2625	$1.3108	$1.3605
5	$1.1041	$1.1593	$1.2167	$1.2763	$1.3382	$1.4026	$1.4693
6	$1.1262	$1.1941	$1.2653	$1.3401	$1.4185	$1.5007	$1.5869
7	$1.1487	$1.2299	$1.3159	$1.4071	$1.5036	$1.6058	$1.7138
8	$1.1717	$1.2668	$1.3686	$1.4775	$1.5938	$1.7182	$1.8509

a) What would be the value of an investment of $350.00 after 6 years invested at 5% pa compound interest?

1

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b) At what interest rate would you need to invest $6 000.00 to grow to $8 211.41 after 8 years?

1

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c) Use the compound interest formula to find the first two numbers that would go on the next row of the table, (i.e. A term of 9 years at 2% and 3%.)

2

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Marks

2. Nick bought a television priced at $4 500. He paid a $1 000 deposit and then monthly payments of $125 for 3 years.

    a) How much did he still owe after the deposit was paid (the balance)?   **1**

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    b) How much did he pay for the television altogether?   **1**

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    c) How much interest did he pay?   **1**

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    d) What annual flat interest rate was charged over the 3 years?   **1**

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Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1.   A ⬯   B ◯   C ◯   D ◯
2.   A ◯   B ◯   C ◯   D ◯
3.   A ◯   B ◯   C ◯   D ◯
4.   A ◯   B ◯   C ◯   D ◯
5.   A ◯   B ◯   C ◯   D ◯
6.   A ◯   B ◯   C ◯   D ◯
7.   A ◯   B ◯   C ◯   D ◯
8.   A ◯   B ◯   C ◯   D ◯
9.   A ◯   B ◯   C ◯   D ◯
10. A ◯   B ◯   C ◯   D ◯

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ANSWERS

	Section 1
1.	Interest $= 2500 \times 0.06 \times \dfrac{8}{12} = \$100$
2.	$I = PRN$ $2016 = 5600 \times R \times 3$ $2016 = 16800 \times R$ $R = \dfrac{2016}{16800} = 0.12$ Interest Rate $= 12\%$
3.	Interest $= 19200 - 16000 = 3\,200$ $I = PRN$ $3200 = 16000 \times R \times 4$ $3200 = 64000 \times R$ $R = \dfrac{3200}{64000} = 0.05$ Interest Rate $= 5\%$
4.	Complete the table below to find the value of the investment at the end of each year.

Year	Principal at the Start of the Year	Interest Earned During the Year	Principal at the End of the Year
1	$5 500.00	$440.00	$5 940.00
2	$5 940.00	$475.20	$6 415.20
3	$6 415.20	$513.22	$6 928.42

5.	$A = P(1 + R)^N$ $= 65000 \times (1.06)^3$ $= \$77\,416.04$
6.	$A = P(1 + R)^N$ $= 36000 \times (1.02)^{24}$ $= \$57\,903.74$
7.	$A = P(1 + R)^N$ $\qquad$ Interest $= 40\,317.50 - 30\,000$ $= 30000 \times 1.03^{10}$ $\qquad\quad = \$10\,317.50$ $= \$40\,317.50$

8.	$A = P(1 + R)^N$ $19448.10 = P \times (1.05)^4$ $P = \dfrac{19448.10}{(1.05)^4}$ $\qquad = \$16\,000$
9.	$S = P(1 - R)^N$ $\quad = 12000 \times 0.91^4$ $\quad = \$8\,229.00$
10.	$S = P(1 - R)^N$ $7500 = 15000 \times 0.85^N$ $0.85^N = \dfrac{7500}{15000} = 0.5$ When $N = 4,\ 0.85^4 = 0.522$ When $N = 5,\ 0.85^5 = 0.444$ It will be replaced after 5 years

Section 2	
1.	B
2.	D
3.	A
4.	C
5.	B
6.	A
7.	C
8.	C
9.	A
10.	B

	Section 3	
1	a) Value = 1.3401×350 $= \$469.035 = \$469.04$	1
	b) Growth of \$1 = 8211.41 ÷6000=1.3686 From table Rate = 4%	1
	c) 1st = $1 \times 1.02^9 = 1.1951$ 2nd = $1 \times 1.03^9 = 1.3048$	2
2	a) Balance = 4500 – 1000 = \$3 500	1
	b) Payments = $125 \times 36 = 4500$ Total Paid = 4 500+1 000 = \$5 500	1
	c) Interest = 5 500 – 3 500 = \$2 000	1
	d) Interest rate $= \dfrac{2000}{3500} \times 100 \div 3 = 19\%$	1

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Multiple Choice Answer Sheet

Name____ <u>Marking Sheet</u>

Completely fill the response oval representing the most correct answer.

1. A ◯ B ⬤ C ◯ D ◯
2. A ◯ B ◯ C ◯ D ⬤
3. A ⬤ B ◯ C ◯ D ◯
4. A ◯ B ◯ C ⬤ D ◯
5. A ◯ B ⬤ C ◯ D ◯
6. A ⬤ B ◯ C ◯ D ◯
7. A ◯ B ◯ C ⬤ D ◯
8. A ◯ B ◯ C ⬤ D ◯
9. A ⬤ B ◯ C ◯ D ◯
10. A ◯ B ⬤ C ◯ D ◯