High School Mathematics Test 2014

Year 10

Financial Maths & Compound Interest

Calculator Allowed

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. Khaled invests $2 500 in an account which pays 6% pa simple interest. How much interest does he earn after 2 years?

……

……

Questions 2 and 3 refer to the table which shows an investment of $6000 which pays 5% pa interest, compounded annually for 3 years.

Year	Principal at the Start of the Year	Interest Earned During the Year	Principal at the End of the Year
1	$6 000	$300	$6 300
2	$6 300	$315	
3	A	B	C

2. What number should go at the position A?

……

3. What numbers should go at the positions B and C?

……

……

Questions 4 and 5 refer to the table below which gives the value of $1.00 after being invested at different rates of compound interest for varying terms.

	Compound interest rate pa				
Years	2%	3%	4%	5%	6%
1	$1.0200	$1.0300	$1.0400	$1.0500	$1.0600
2	$1.0404	$1.0609	$1.0816	$1.1025	$1.1236
3	$1.0612	$1.0927	$1.1249	$1.1576	$1.1910
4	$1.0824	$1.1255	$1.1699	$1.2155	$1.2625

4. A principal of $4 000 is invested at 6% pa interest compounded annually. Find the value of the investment after 3 years.

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5. An amount of money which is invested at 5% pa interest compounded annually is worth $5 834.40 after 4 years. Find the amount that was invested?

……

……

6. A principal of $24 000 is invested at 5% pa interest compounded annually. Find the value of the investment after 4 years.

……

……

7. Andrew invests $28 000 at 8% p.a. interest, compounded quarterly. What is the value of the investment after 4 years?

……

……

8. Sunil invests $36 000 at 9% pa compounded annually for 6 years.
How much interest will he earn from the investment?

……

……

9. Karen invests $60 000 in a term deposit for 6½ years. The interest rate is 8% pa compounded half yearly. How much interest will Karen earn from the investment?

……

……

10. Brad bought a car for $25 000 four years ago. If it depreciates at 8% pa compounding annually, what is the value of the car today?

……

……

……

11. John invests $45 000 in a term deposit paying interest at 9% pa compounded monthly. What is the value of the investment after 2½ years?

……

……

12. Minh buys a laptop which has a cash price of $1 800 on time payments. The monthly repayments are $88.50 for two years. What annual rate of simple interest does she pay on the purchase?

……

……

13. Kosta invested an amount of money 4 years ago in an account that paid 7% pa compounding annually. The account is now worth $20 972.74. How much was in the account initially?

……

……

14. Zimmer Machinery bought a new tractor 5 years ago. It has depreciated at 12% p.a. since then. Its current value is $94 990. What was its value when new (to the nearest $10)?

……

……

15. Freya invests $60 000 and after 4 years its value has grown to $75 748.62.
If the interest was compounded annually, determine the interest rate, to the nearest percent.

……

……

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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. Kim buys a car priced at $12 000 by paying 52 weekly payments of $258. How much does he pay for the car, altogether?

A. $1 416 B. $3 096 C. $13 416 D. $25 416

2. A widescreen TV is advertised as shown.

How much extra is paid by paying it off over 24 months, compared to the cash price?

A. $272 B. $422 C. $1 872 D. $2 022

Barry invests $5 000 in an account which pays 6% pa interest, compounded annually for 3 years. The partially complete table below shows the progress of the investment over the 3 years.

Year	Principal at the Start of the Year	Interest Earned During the Year	Principal at the End of the Year
1	$5 000.00	$ 300.00	$ 5 300.00
2	$ 5 300.00	X	$5 618.00
3	$5 618.00		Y

3. What number should appear at position X?

A. $318.00 B. $600.00 C. $618.00 D. $5 618.00

4. What number should appear at position Y?

A. $318.00 B. $337.08 C. $ 5 936.00 D. $5 955.08

5. Use the compound interest formula to find the value of a $5 000 investment earning interest at 8% p.a. compounding annually for 3 years.

A. $4 268.00 B. $6 200.00 C. $6 298.56 D. $12 000.00

6. Graham borrows $28 000 from his dad for an overseas trip and repays the full amount plus interest after 4 years. His dad charges the interest at 4% p.a. compounded annually. How much does he need to repay?

A. $4 480 B. $4 756 C. $32 480 D. $32 756

7. Alexandra has $50 000 invested in a term deposit for 6 years. The interest rate is 7% pa compounded annually. How much interest will Alex be paid at the end of the 6 years?

A. $15 036.52 B. $25 036.52 C. $25 181.51 D. $75 036.52

8. Karen buys 4 rooms of furniture on terms over 3 years and pays $400 per month. If the cash price of the furniture was $12 000, what rate of simple interest did she pay, per annum?

A. 3.3% p.a. B. 4.5% p.a. C. 6.7% p.a. D. 20% p.a.

9. Ioannis deposits $9 000 into a savings account on the 1st January 2014. The account earns interest at the rate of 8% pa compounding half-yearly. If he makes no deposits or withdrawals for 18 months, how much will be in his account on the 1st July 2015?

A. $10 123.78 B. $11 160.00 C. $11 337.41 D. $11 387.87

10. Angus bought a guitar for $980 three years ago. Over that time it depreciates at 6% pa. What is it worth now?

A. $804 B. $814 C. $921 D. $962

11. Which calculation would you use to find the amount that $9 500 grows to when invested at 6% p.a. interest compounding monthly for three years.

A. $9\,500 \times 1.005^{3}$ B. $9\,500 \times 1.005^{36}$

C. $9\,500 \times 1.06^{3}$ D. $9\,500 \times 1.06^{36}$

12. Heath deposits $24 000 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. $1 170.53 B. $2 170.53 C. $2 752.17 D. $17 945.55

13. Camille invested an amount of money 3 years ago in an account that paid 8% pa compounding annually. The account is now worth $30 862.95. How much was in the account initially?

A. $21 500 B. $22 500 C. $23 500 D. $24 500

14. The Dam Mart telemarketing company sells a juicer for a cash price of $1 200.00. They also offer it on a 3 year monthly payment plan. If they charge 18% p.a. simple interest for those buying on the plan, how much would each repayment be?

A. $18.00 B. $36.11 C. $51.33 D. $54.77

15. How many years would it take for the value of a sound system bought by a band for $24 000 to drop below $10 000 if it depreciates at 12% p.a.?

A. 4 years B. 5 years

C. 6 years D. 7 years

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Financial Maths & Compound Interest

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 ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

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Financial Maths & Compound Interest

ANSWERS

Section 1 (1 mark each)	
	Working and Answers
1.	$I = PRN$ $= 2500 \times 0.06 \times 2$ $= \$300$
2.	Principal Start 3*rd* yr = Principal End 2*nd* Year A = 6300 + 315 = \$6 615
3.	B = Interest on \$6615 $= 0.05 \times 6615$ $= \$330.75$ $C = 330.75 + 6615$ $= \$6\,945.75$
4.	From table for 6% for 3 years \$1 grows to \$1.1910 Amount \$4000 grows to = 1.1910×4000 = \$4764
5.	From table for 5% for 4 years \$1 grows to \$1.2155 Amount \$$X$ grows to = $1.2155 \times X$ $\$5\,834.40 = 1.2155 \times X$ $X = \frac{5834.40}{1.2155}$ = \$4 800
6.	$A = P(1 + R)^N$ $= 24000(1.05)^4$ $= \$29\,172.15$
7.	Since quarterly $R = 0.08 \div 4 = 0.02$ $N = 4 \times 4 = 16$ $A = P(1 + R)^N$ $= 28000(1.02)^{16}$ $= \$38\,438.00$
8.	$A = P(1 + R)^N$ $= 36000(1.09)^6$ $= \$60\,375.60$ $I = 60375.60 - 36000$ $= \$24\,375.60$

9.	$R = 0.08 \div 2 = 0.04 \quad N = 6.5 \times 2 = 13$ $A = P(1 + R)^N$ $= 60000(1.04)^{13}$ $= \$99\,904.41$ $I = 99904.41 - 60000$ $= \$39\,904.41$
10.	$V = P(1 - R)^N$ $= 25000(0.92)^4$ $= \$17\,909.82$
11.	$R = 0.09 \div 12 = 0.0075 \quad N = 2.5 \times 12 = 30$ $A = P(1 + R)^N$ $= 45000(1.0075)^{30}$ $= \$56\,307.23$
12.	Amount paid $= 88.50 \times 24$ $= \$2124$ Interest $= 2124 - 1800$ $= \$324$ Interest rate pa $= \frac{324}{1800} \times 100 \div 2$ $= 9\%$ p.a.
13.	$A = P(1 + R)^N$ $20972.74 = P(1.07)^4$ $20972.74 = P \times 1.31079601$ $P = \frac{20972.74}{1.31079601}$ $P = \$16\,000.00$
14.	$V = P(1 - R)^N$ $94990 = P(0.88)^5$ $94990 = P \times 0.5277319168$ $P = \frac{94990}{0.5277319168}$ $P = \$179996.69$ $= \$180\,000$ (to nearest \$10)
15.	$A = P(1 + R)^N$ $75\,748.62 = 60000(X)^4$ $x^4 = \frac{75748.62}{60000}$ $x^4 = 1.262477$ $x = \sqrt[4]{1.262477}$ $= 1.06$ Interest rate $= 6\%$ p.a.

<table>
<tr><th colspan="3">Section 2 (1 mark each)</th></tr>
<tr><th></th><th>Working</th><th>Answers</th></tr>
<tr><td>1.</td><td>Payments = 52 × 258
= $13 416</td><td>C</td></tr>
<tr><td>2.</td><td>Amount paid = 24 × 78 + 150
= $2 022
Extra Paid = 2022 – 1600
= $422</td><td>B</td></tr>
<tr><td>For 3 and 4</td><td>
<table>
<tr><th>Year</th><th>Principal at the Start of the Year</th><th>Interest Earned During the Year</th><th>Principal at the End of the Year</th></tr>
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<tr><td>3.</td><td>$318.00</td><td>A</td></tr>
<tr><td>4.</td><td>$5 955.08</td><td>D</td></tr>
<tr><td>5.</td><td>$A = P(1 + R)^N$
$= 5000(1.08)^3$
= $6 298.56</td><td>C</td></tr>
<tr><td>6.</td><td>$A = P(1 + R)^N$
$= 28000(1.04)^4$
= $32 756</td><td>D</td></tr>
<tr><td>7.</td><td>$A = P(1 + R)^N$
$= 50000(1.07)^6$
= $75 036.52
Interest = $75 036.52 – 50 000.00
= $25 036.52</td><td>B</td></tr>
<tr><td>8.</td><td>Amount paid = $400 × 12 × 3
= $14400
Interest = 14400 – 12000
= $2400
Percentage interest = $\frac{2400}{12000} \times 100 \div 3$
= 6.7% pa</td><td>C</td></tr>
<tr><td>9.</td><td>Half yearly so $R = 0.04$ and $N = 3$
$A = P(1 + R)^N$
$= 9000(1.04)^3$
= $10 123.78</td><td>A</td></tr>
</table>

10.	$V = P(1-R)^N$ $= 980(0.94)^3$ $= \$813.97$ $= \$814$ (nearest dollar)	B
11.	Compounding monthly, so $R = 0.06 \div 12 = 0.005$ and $N = 3 \times 12 = 36$. $A = 9\,500 \times 1.005^{36}$	B
12.	Compounding quarterly, so $R = 0.064 \div 4 = 0.016$ and $N = \frac{9}{12} \times 4 = 3$. $A = 24\,000 \times 1.016^3$ $= \$25\,170.53$ $I = 25\,170.53 - 24\,000$ $= \$1\,170.53$	A
13.	$A = P(1+R)^N$ $\$30\,862.95 = P(1.08)^3$ $30\,862.95 = 1.259712 \times P$ $P = \frac{30862.95}{1.259712}$ $= \$24\,500.00$	D
14.	Interest $= 1200 \times 0.18 \times 3$ $= \$648$ Amount repaid $= 1200 + 648$ $= \$1848$ Monthly Repayment $= 1848 \div 36$ $= \$51.33$	C
15.	$V = P(1-R)^N$ $10000 > 24000(0.88)^N$ *By* trial and error $24000(0.88)^4 = 14\,392.69$ $24000(0.88)^6 = 11\,145.70$ $24000(0.88)^7 = \$9\,808.21$ After 7 years it drops below \$10 000	D

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Multiple Choice Answer Sheet

Name ___Marking Sheet

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 ○
11.	A ○	B ●	C ○	D ○
12.	A ●	B ○	C ○	D ○
13.	A ○	B ○	C ○	D ●
14.	A ○	B ○	C ●	D ○
15.	A ○	B ○	C ○	D ●