Baldivis Secondary College

Year 11 Mathematics: Applications

Investigation 1, 2017

Topic - Finance

Which Savings Account is Best?

Validation Assessment

Name : Anne Sir Time: 45 minutes Mark: ___/31

Part Two

Calculators may be used. No notes. There is plenty of space provided to show calculations if needed.

Compound Interest Formula

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

$A=P(1+\frac{r}{n})^{nt}$ Compounded n times per year Where P= Principal, r= interest rate, t= term of loan in year

Situation 3

Abraham and Belinda are discussing the best way to save money.

Abraham says that he has $1 000 invested in a bank account where the bank will give him **R**% interest **compounded every 6 months** (i.e. he will get **R**% interest added onto his account every 6 months).

Belinda says that she does not trust banks, she will keep her money in a moneybox. She has $500 saved up and she will add a further $100 to the amount **every 6 months**.

"We will see who is better off", says Abraham.

The table below shows how much Abraham has in his account at the end of **every 6 months.**

Time	Abraham's Account	Belinda's Total Amount
Original amount	$1 000.00	$500.00
1st 6 months	$1 040.00	600
2nd 6 months (end of 1 year)	$1 081.60	700
3rd 6 months	$1 124.86	800
4th 6 months (end of 2 years)	$1 169.86	900
5	$1 216.65	1000
6	$1 265.32	1100
7	$1 315.93	1200
8	$1 368.57	1300
9	$1 423.31	1400
10	$1 480.24	1500
11	1539.45	1600
12	1601.03	1700
13	1665.07	1800
14	1731.68	1900
15	1800.94	2000
16	1872.98	2100
17	1947.90	2200
18	2025.82	2300
19	2106.85	2400
20	2191.12	2500
21	2278.77	2600
22	2369.92	2700
23	2464.72	2800
24	2563.30	2900
25	2665.84	3000
26	2772.47	3100
27	2883.37	3200
28	2998.70	3300
29	3118.65	3400
30	3243.40	3500

1. [2 marks]

Calculate the interest rate which Abraham receives for his account each **six months**.

$\frac{40}{1000} = 0.04$ ✓

4% ✓

2. [2 marks]

Write an **expression** for the balance of Abraham's account at the end of each period of six months. Use t = time. Note : $t = 3$ means 3 lots of six months.

$A = 1000(1.04)^t$ ✓ ✓

3. [2 marks]

Complete the table for Abraham's account, showing the amount of money (the balance) of Abraham's account at the end of every six months.

4. [2 marks]

Write an **expression** for the balance of Belinda's total amount at the end of each period of six months. Use t = time. Note : $t = 3$ means 3 lots of six months.

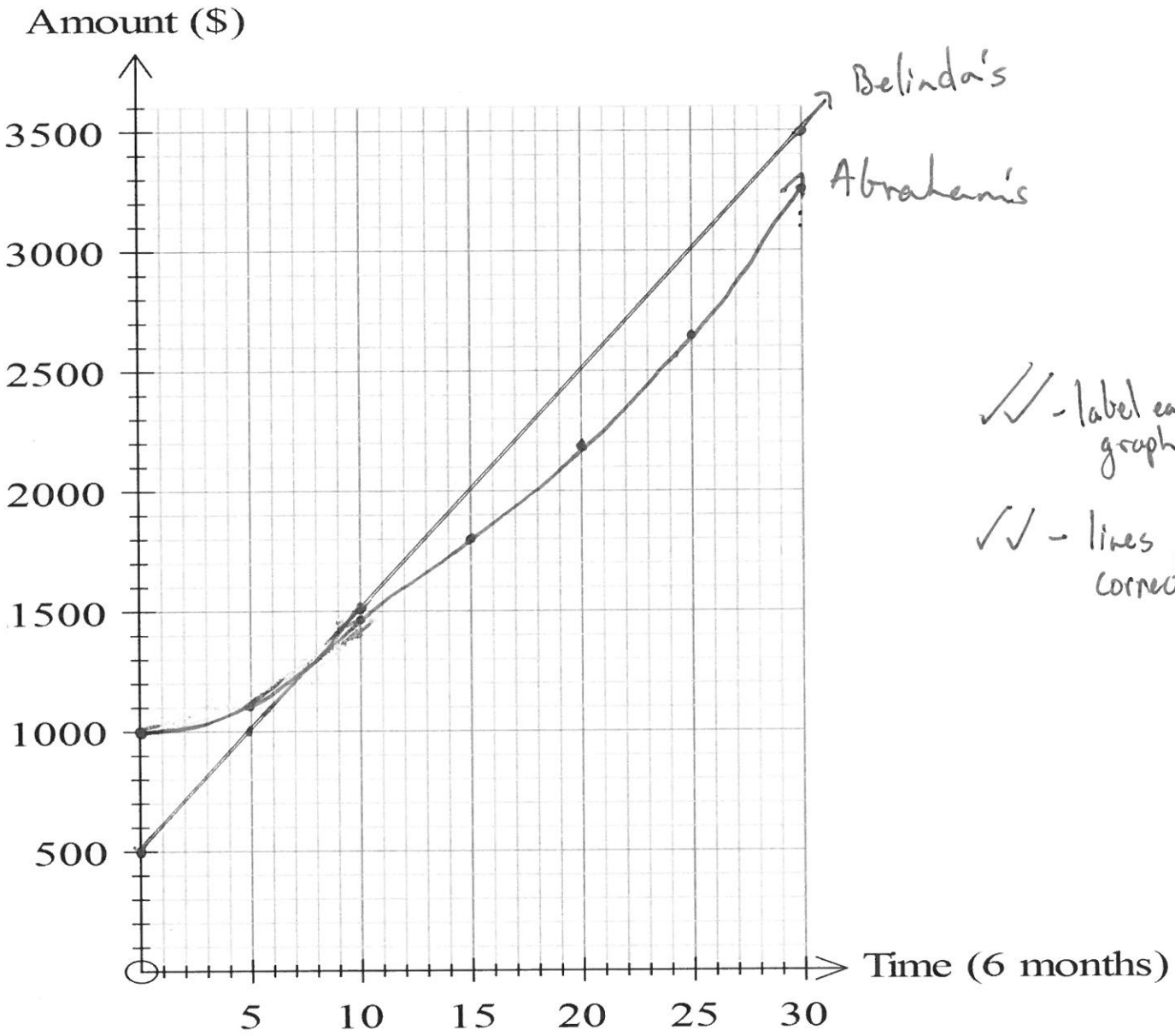
$A = 500 + 100t$ ✓ ✓

5. [2 marks]

Complete the table showing the amount of money (the balance) of Belinda's total amount at the end of every six months.

6. [4 marks]

Draw a graph on the axes below showing the amount of money that each person has at the end of every six months.



✓✓ - label each graph

✓✓ - lines correct

7. [2, 2, 2, 2 marks]

Who will be better off ?		and by how much ?	at the end of
a)	Two **years**	Abs ✓	$269.86 ✓
b)	Five **years**	Bel ✓	$19.76 ✓
c)	Ten **years**	Bel ✓	$308.88 ✓
d)	Fifteen **years**	Bel ✓	$256.60 ✓

8. [1, 1, 2 marks]

a) What will be the balance of Abraham's account at the end of 20 years?

$t = 40$ $1000(1.04)^{40} = \$4801.02$ ✓

b) What will be the balance of Belinda's total amount at the end of 20 years?

$500 + 100 \times 40 = \$4500$ ✓

c) Which person will be better off ? and by how much ? at the end of 20 years?

Abs ✓ by $\$301.02$ ✓

9. [1 marks]

a) During which year will both accounts have the same balance?

9th and 10th 6months 4th year ✓

10. [2 marks]

A tragedy happened and Abraham's account remained in the bank receiving the same interest rate, compounding each 6 months for 100 years.
Calculate the balance of the account after the 100 years.

$1000(1.04)^{200} = \$2\,550\,749.79$ ✓ ✓

11. [2 marks]

What would be the balance of Belinda's savings if \$100 was added to the money box for 100 years?

~~1000+~~ $500 + 100 \times 200$ ✓

$= \$20\,500$ ✓