Chapter 8 TASK: Socking it Away

Level 4 Sample Response

1. a) The part-time job that pays $10.50/h.
Earnings for the summer period of 9 weeks (40 h per week): $40 \times 9 \times \$10.50 = \$3780$
Earnings for the other 43 weeks of the year (20 h per week): $43 \times 20 \times \$10.50 = \$9030$
Gross annual income = $12 810.

b) Savings: 20% of $12810 = $2562
In one year the savings would be $2600, to the nearest hundred dollars.

2.

	Annual Interest Rate Earned	**Simple or Compound Interest?**	**Compounding Frequency (if applicable)**
A youth savings account from a bank or credit union	Citizen's Bank Youth Starter Account: 1%	Compound	Daily
A savings account from an Internet bank	HSBC Direct Savings Internet Account: 4%	Compound	Daily
A Canada Savings Bond	Year 1: 3.15% Year 2 : 3.2% Year 3 : 3.25%	Compound	Annually

b) The greatest interest rate and best option is the HSBC internet account. This seems to be true for all types of internet savings accounts. This account has daily compounding periods as compared with annual compounding periods given by Canada Savings Bonds.

3. a) The future value of the savings invested in the Citizen's Bank Youth Account at the end of one year is given by: $2562 for 1 year at 1% compounded daily.
Using the TVM Solver, N = 1, I = 1%, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 365.
So FV = $2587.75.

The future value of the savings invested in the HSBC Direct Savings Internet Account at the end of one year is given by: $2562 for 1 year at 4% compounded daily.
Using the TVM Solver, N = 1, I = 4%, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 365.
So FV = $2666.55.

The future value of the savings invested in a Canada Savings Bond at the end of one year is given by: $2562 for 1 year at 3.15% compounded annually.
Using the TVM Solver, N = 1, I = 3.15%, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 1.
So FV = $2642.70.

b) I will be 65 in 48 years. Then the future value of $2562 invested in the HSBC Direct Savings Internet account for 48 years at 4% compounded daily can be found using the TVM Solver with:
N = 48, I = 4, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and
C/Y = 365.
So the FV = $17 473.46.

The future values would be less than this amount if either of the other options is used.

For the Youth account with I = 1%, using the TVM Solver, FV = $4140.36.

For the CSB, assuming a rate of I = 3.15%, using the TVM Solver, FV = $11619.94.

c) Investing the amount of $2562 every year for the next 48 years using the HSBC Internet Account assuming an interest rate of 4%, we can use the TVM Solver to find the an estimate of the future value.

N= 48, I = 4, PV = 0, PMT = -$2562, FV is to be found, P/Y = 1, C/Y = 365.
This gives FV = $ 365 400.83.

If either of the other two options is used the amount earned would be much less.

Assuming that the investment is in the Youth Account with I = 1%, the TVM Solver gives an estimate of $157 049.84.

Assuming that Canadian Savings Bonds have an investment rate of 3.15%, the TVM Solver gives an estimate of $283 061.00.

These estimates make a number of assumptions. For example, we have assumed that the interest rate will stay about the same; we have ignored the taxes that have to be paid on interest earned each year, and possible changes in taxation laws.
It is also possible that changes in a person's life may not allow them to save each year and may even require them to sometimes dip into their savings because of emergencies. For example, they may buy a house, have children, or suffer an accident or illness.

Level 4 Notes

Look for the following:

- thorough understanding of compound interest
- thorough understanding of the benefits of rate differences and different compounding periods
- highly effective use of problem solving techniques
- appropriate and detailed solutions with minor errors
- highly organized solutions and clear justification of responses
- highly effective use of mathematical and financial terminology

Chapter 8 Task: Socking it Away

Level 3 Sample Response:

1. a) The earnings for the summer period of 9 weeks for a part-time job that pays \$10.50/h for 40 h of work per week is: $40 \times 9 \times \$10.50 = \$3780$.

The earnings for the other 43 weeks of the year for a 20 h work week is :
$43 \times 20 \times \$10.50 = \$9030$.

Total Earned = \$12 810

b) If the savings is 20% of the total earned: 20% of \$12810 = \$2562.

This is \$2600 to the nearest hundred dollars.

2.

	Annual Interest Rate Earned	**Simple or Compound Interest?**	**Compounding Frequency (if applicable)**
A youth savings account from a bank or credit union	BMO Youth Account 2.25% under \$60 000 invested 4% over \$60 000	Compound	Daily
A savings account from an Internet bank	PC Internet 3% under \$1000 4% over \$1000	Compound	Daily
A Canada Savings Bond	Year 1: 3.15% Year 2 : 3.2% Year 3 : 3.25%	Compound	Annually

b) Based on the information in the table, the best option from the above three is the PC internet account. This option has the highest interest rate for an amount over \$1000 invested. It also has daily compounding, which is preferable to the annual compounding given by Canada Savings Bonds.

3. a) The future value of the savings invested in the BMO Youth Account at the end of one year is given by: \$2562 for 1 year at 2.25% compounded daily.
Using the TVM Solver, N = 1, I = 2.25%, PV = \$2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 365.
So FV = \$2620.30.

The future value of the savings invested in the PC Internet Account at the end of one year is given by: \$2562 for 1 year at 4% compounded daily.
Using the TVM Solver, N = 1, I = 4%, PV = \$2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 365.
So FV = \$2666.55.

The future value of the savings invested in a Canada Savings Bond at the end of one year is given by: \$2562 for 1 year at 3.15% compounded annually.

Using the TVM Solver, N = 1, I = 3.15%, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 1.
So FV = $2642.70.

b) I am 17 and will be 65 in 48 years. The future value of $2562 invested in the PC Internet account for 48 years at 4% compounded daily can be found using the TVM Solver with:
N = 48, I = 4, PV = $2562, PMT = 0, FV is to be found, P/Y = 1 and C/Y = 365.
So FV = $17 473.46. The investment would be less than this amount if either of the other options were used.

c) If I were to invest the amount of $2562 every year for the next 48 years using the PC Internet Account which has the highest interest rate of 4%, I can use the TVM Solver to find the future value.

N= 48, I = 4, PV = 0, PMT = -$2562, FV is to be found, P/Y = 1, C/Y = 365.
This gives FV = $365 400.83.
If either of the other two options were used the amount earned would be less.

Level 3 Notes

Look for the following:

- understanding of compound interest
- understanding of the benefits of rate differences and different compounding periods
- appropriate solutions with minor errors
- organized solutions and clear justification of responses
- effective use of mathematical and financial terminology

Chapter 8 Task: Sock it Away

Level 2 Sample Response:

1. a) If I had a part-time summer job that pays $10.50/h for 40h of work per week I would earn

$9 \times 40 \times \$10.50 = \$3780.$

If I worked only 20 h a week for the school year, I would earn

$40 \times 20 \times \$10.50 = \$8400.$ *Error: assumed school year is 40 weeks*

Total Earned = $\$(3780 + 8400) = \$12\,180.$

b) If I managed to save 20% of the money I earned, I would have 20% of $12 180, which is $2436. This is $2400 to the nearest hundred dollars.

2. a)

	Annual Interest Rate Earned	**Simple or Compound Interest?**	**Compounding Frequency (if applicable)**
A youth savings account from a bank or credit union	CIBC Advantage for Youth Account 0.45% for a balance of up to $10 000	Compound	Daily
A savings account from an Internet bank	HSBC Internet Savings Account 4% with no minimum balance	Compound	Daily
A Canada Savings Bond	Year 1: 3.15% Year 2 : 3.2% Year 3 : 3.25%	Compound	Annually

b) I found that comparing the interest rates for youth accounts was hard to do. Some of the banking web sites talk about the advantages of things like free cheques but don't tell you what the interest rate is. From the information I found, I think that the best option is the HSBC Internet Account. It has the highest interest rate and has no minimum.

3. a) The future value of the savings invested in the CIBC Advantage for Youth Account at the end of one year is given by: $2436 for 1 year at 0.45% compounded daily.

$FV = PV(1+i)^n$

with $PV = \$2436,\ i = \dfrac{0.045}{365} = 0.00012,$ and $n = 365$

$\therefore FV = 2436(1+0.00012)^{365} = \$2545.06$

Error in second line. Should be the following:

with $PV = \$2436,\ i = \dfrac{0.0045}{365} = 0.000012,$ and $n = 365$

$\therefore FV = 2436(1+0.000012)^{365} = \$2446.99$

The future value of the savings invested in the HSBC Internet Account at the end of one year is given by: $2436 for 1 year at 4% compounded daily.

$FV = PV(1+i)^n$

with $PV = \$2436,\ i = \frac{0.4}{365} = 0.0011,$ and $n = 365$

$\therefore FV = 2436(1+0.0011)^{365} = \$3638.74$

Error in second line. Should be the following:

with $PV = \$2436,\ i = \frac{0.04}{365} = 0.00011,$ and $n = 365$

$\therefore FV = 2436(1+0.00011)^{365} = \$2535.79$

The future value of the savings invested in a Canada Savings Bond at the end of one year is given by: $2436 for 1 year at 3.15% compounded annually.

$FV = PV(1+i)^n$

with $PV = \$2436, i = 0.0315$ and $n = 1$

$\therefore FV = 2436(1+0.0315)^1 = \$2512.73$

b) I am 17 and will be 65 in 48 years. The future value of $2436 invested in the Canada Savings Bonds for 48 years at 3.15% compounded annually can be found using the formula:

$FV = PV(1+i)^n$

with $PV = \$2436, i = 0.0315$ and $n = 48$

$\therefore FV = 2436(1+0.0315)^{48} = \$10794.45$

c) If I were to invest the amount of $2436 every year for the next 48 years in Canada Savings Bonds, I estimate that I would have about:

48 × $10794.45 = $518 133.60

Level 2 Notes

Look for the following:

- some understanding of compound interest
- some understanding of rate differences and different compounding periods
- somewhat appropriate solutions with some errors
- somewhat organized solutions with some justification of responses
- some effective use of mathematical and financial terminology

Chapter 8 Task: Socking it Away

Level 1 Sample Response:

1. a) I would earn 40 × 9 × $10.50 = $3780 for the summer period of 9 weeks for the part-time job .

I would earn 40 × 43 × $10.50 = $18060 for the other 43 weeks of the year. *Error 40 instead of 20*

My annual gross income would be $21840.

b) If I saved 20% of the total earned, it would be $4368.

This is $4300 to the nearest hundred dollars. *Error*

2. a)

	Annual Interest Rate Earned	**Simple or Compound Interest?**	**Compounding Frequency (if applicable)**
A youth savings account from a bank or credit union	CIBC Advantage for Youth Account - 0.45% for up to $10 000 invested	Compound	Daily
A savings account from an Internet bank	ING Direct Internet 3.75% no minimum	Compound	Monthly *Error(daily)*
A Canada Savings Bond	Year 1: 3.15% Year 2 : 3.2% Year 3 : 3.25%	Simple *Error(compound)*	Annually

b) I would prefer to keep my savings in Canada Savings Bonds, because the savings will earn more interest and it will be safer than in an internet bank.

3. a) If I put my savings of $4368 in Canada Savings Bonds for a year my savings would earn $\frac{4368 \times 3.15 \times 1}{100} = \$137.59$ after one year. So my savings would be worth $4368 + $137.59 = $4505.59. *(Correct answer, used simple interest)*

b) I am 17 and I will be 65 in 48 years. Then the future value if I invested my savings in Canada Savings Bonds would be

$\frac{4368 \times 3.15 \times 48}{100} = \$6606.42$. *Error Simple Interest*

c) If I invested the same amount every year for the next 48 years in Canada Savings Bonds I would have a lot more money than $6606.42. I estimate that I would have about 48 times $6606.42, which is $317 108.16.

Level 1 Notes

Look for the following:

- little understanding of compound interest
- little understanding of rate differences and different compounding periods
- inappropriate solutions with significant errors
- disorganized solutions with little justification of responses
- little effective use of mathematical and financial terminology