1. You deposit $2000 in the bank. Find the simple interest earned if the interest rate is 3% and you leave it in the bank for 10 months.

\[ I = 2000 \times 0.03 \times \frac{10}{12} = \$50 \]

2. Calculate the total in your bank account at the end of a year if you deposit $5000 at an interest rate of 2.5%, compounded annually.

\[ A = 5000 \left(1 + \frac{0.025}{1}\right)^1 = \$5125 \]

3. Calculate the total in your bank account at the end of a year if you deposit $5000 at an interest rate of 2.5%, compounded semi-annually.

\[ A = 5000 \left(1 + \frac{0.025}{2}\right)^2 = \$5125.78 \]

4. A friend said they put $10,000 in the bank and one year later had earned $900 in interest.

a) Calculate the interest rate required to earn $900 interest.

\[ r = \frac{I}{(P + )} \times 100 = \frac{900}{10000 \times 1} \times 100 = 9\% \]

b) Is it possible to get this kind of interest rate? Comment.

Not at a bank! Highest is about 3.5% for a term deposit.

5. You invest $4,000 into a credit union for five years. The interest rate is 3.75%, compounded monthly. Calculate the interest earned.

\[ A = 4000 \left(1 + \frac{0.0375}{12}\right)^{60} = \$4823.51 - 4000 \]

\[ \text{Interest earned} = \$823.51 \]
6. The same $4,000 is deposited into an account earning the same interest rate (3.75%), compounded daily! Calculate the interest earned after 5 years.

7. You inherit $5,000,000 and invest it at an interest rate of 2%. How many years will it take you to double your investment?

\[ \text{Rule of 72} \quad \frac{72}{2} = 36 \text{ years} \]

8. When Sandra was born, her parents deposited $2000 in the bank. Sandra has just turned 16 years old.

   a) Using the simple interest formula \( I = Prt \) and assuming the interest rate was 2%, approximately how much money will be in the bank account now?

\[
I = Prt = 2000 \times 0.02 \times 16 = 640 \text{ Int.} + 52000 \text{ principal.}
\]

\[
= 52640 \text{ in account.}
\]

   b) Will the actual amount of interest added to Sandra’s account be more, less, or equal to the amount calculated in a)? Why?

   Would be slightly more because of compounded interest - possibly annually at least.

9. Abe wants to buy a car when he turns 18. His bank is offering 2.75% interest, compounded annually.

   a) If Abe invests $1000, how long will it take him to have a balance of $3000 in his bank account? Use the simple interest formula.

\[
\frac{3000 - 1000}{1000 \times 0.0275} = \frac{2000}{27.5} = 72.7 \text{ years!}
\]

\[\text{Wow!}\]
b) If Abe is 16 now, how old will he be when gets his car?

\[16 + 72.7 = 88.7 \text{ years old!}
\]
Hope he can still drive.

c) Abe needs some advice. How can he increase his $1000 to $3000 in two years? Think budgets.

deposit extra money into his account every month.

10. Why is the stock market considered a high risk investment and a savings account a low risk investment?

higher risk of losing your investment, but
a higher rate of return.

11. Joyce's monthly credit card statement has a previous balance of $1238.56. The statement indicates that Joyce made a payment of $1000 during the month and purchased more goods totaling $989.78. Assume her interest charges for the month are $43.60. Joyce's minimum monthly payment corresponds to at least 5% of her ending balance or $10, whichever is greater.

a) Calculate Joyce's new balance.

\[1238.56 - 1000 = 238.56 + 989.78 = 1228.34\]

\[1228.34 + 43.60 = \$1271.94\]

b) Calculate Joyce's minimum monthly payment.

\[1271.94 \times 0.05 = \$63.60\]

\$63.60 is greater than \$10
12. Sally wants to borrow $6,700. A bank is offering Sally two loan options.

Option 1: A 3-year loan has an annual interest rate of 6.75%.
Option 2: A 6-year loan has an annual interest rate of 6.75%.

a) Calculate Sally's monthly loan payment if she chooses the 3-year loan with a rate of 6.75%. Use a loan payment table.

\[
\frac{6700}{1000} \times 30.76 = \$206.08 \text{ per month}
\]

b) Calculate Sally's monthly loan payment if she chooses the 6-year loan with a rate of 6.75%. Use a loan payment table.

\[
\frac{6700}{1000} \times 16.93 = \$113.54 \text{ per month}
\]

c) Compare the total interest paid with the 3-year loan and the 6-year loan. Which loan will cost her more in interest? How much?

\[
206.08 \times 36 = \$7419.24
\]
\[
113.54 \times 72 = \$8166.96
\]

\[
8166.96 - 6700 = \$1466.96 \text{ in interest}
\]

13. Complete the following chart that compares several different sources of credit. Jot down the approximate interest rate and when it makes sense to use that source of credit.

<table>
<thead>
<tr>
<th>Interest Rate</th>
<th>Bank or Credit Union</th>
<th>Credit Card</th>
<th>In-Store Credit (ex. Buy now, pay later)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td></td>
<td>20%</td>
<td>≈ 400%</td>
</tr>
</tbody>
</table>
14. You are purchasing a Panasonic TV and have two payment options: Cash or Installment Plan.

a) Complete the tables below to compare paying cash to paying in installments:

<table>
<thead>
<tr>
<th>Panasonic TV – Paying Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sticker Price</strong></td>
</tr>
<tr>
<td>$1659</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panasonic TV – Paying in Installments (taxes included in price)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Money Down</strong></td>
</tr>
<tr>
<td>$200</td>
</tr>
</tbody>
</table>

b) What is the carrying charge (extra) when paying by installment?

\[2000 - 1874.67 = \$125.33\]

Calculate the percent interest rate you are paying if you “borrow” money from the store instead of paying cash.

\[
r = \frac{125.33}{(1874.67 \times 1)} \times 100 = 6.7\%\]

Not that bad actually!

d) When does it make sense to pay for something in installments? (1 mark)

- If the interest rate is lower than a credit card.
- If it is a needed item and not just a want.
15. Merle has just purchased a treadmill for his wife at Sonic Sports. The promotional offer is as follows:

\[ \text{Buy now, pay later! An administration fee of $175 is payable now when you take the treadmill home. The balance owing of $1299 is due two years from now.} \]

a) How much “interest” is Merle getting on this “loan”?

\[ \text{admin fee of $175 is interest in disguise!} \]

b) What interest rate is Merle getting on this “loan”?

\[
\begin{align*}
p &= \$1299 \\
+ &= 2 \text{ years} \\
\end{align*}
\]

\[ r = \frac{175}{(1299 \times 2)} \times 100 = 6.70\% \]

c) Merle can’t pay the balance two years from now and the store says he can put the balance on their store credit card. The balance is $1299 but the added interest at 29.99% from two years ago! How much interest was added to his balance?

\[
\begin{align*}
\text{compound interest - daily} \\
n &= 365 \\
+ &= 2 \\
n + t &= 367 \\
\end{align*}
\]

\[
A = 1299 \left(1 + \frac{.2999}{365}\right)^2 = \$2365.88 \\
\text{interest!}
\]

16. Jillian receives her credit card statement in the mail. Her balance is $2016.84. Her minimum payment due is $61.00.

a) Calculate Jillian’s new balance after making the minimum payment.

\[
\$2016.84 - \$61.00 = \$1955.84
\]

b) What percent of Jillian’s balance ($2016.84) is the minimum payment ($61.00)?

\[
\frac{61.00}{2016.84} \times 100 = 3.0\%
\]
c) Jillian does not make any more purchases this month. Calculate her balance owing next month if the credit card company charges 19.99% interest, compounded daily. Assume 31 days in the month.

\[
1955.84 \times 0.1999 \times (31/365) = \text{balance owing faster}
\]

\[
\frac{1955.84 \times (1 + \frac{0.1999}{365})^{31}}{31} = 1989.32 - 1955.84 = \text{interest}
\]

\[
1955.84 \times \frac{33}{28} = \text{balance}
\]

d) Estimate how long it will take Jillian to pay off her balance if she continues making only the minimum payment.

Estimate Wow! Paid $61.00 but was charged $33 so goes down by $28. $1955.84 / 28 = about 70 months!

17. Marge has no money in her bank account and needs to pay her mechanic today. She gets paid in two weeks. Payday Loan charges a fee of $23 for every $100 borrowed. After two weeks, you must pay back what you owe plus the fee.

a) If Marge borrows $750 to pay her mechanic, how much will she need to pay back in two weeks?

\[
\text{fee} \quad \frac{\$23}{\$100} = \frac{x}{750} \quad x = 172.50
\]

\[
750 + 172.50 = \text{owing}
\]

b) What percent interest did Mary pay when borrowing money from Payday Loan? Hint: It is more than 23%.

\[
r = \frac{172.50}{(750 \times 2.52)} \times 100 = 598\%
\]

18. What is a budget?

- A plan to manage monthly income and expenses -
19. Explain the difference between a deficit and surplus budget situation.

   - deficit: expenses are greater than income
   - surplus: income is greater than expenses

20. Give an example of a recurring expense.

   rent, phone bill, groceries

21. Give an example of an expense that occurs every month but is not the exact same amount. Explain why this is so.

   fuel price changes plus your driving might vary.

22. Len earns $86 for 8 hours of work at his new job. Calculate Len’s hourly wage.

   \[ \frac{86}{8} = 10.75 \]

23. Why is making a conservative budget (expenses rounded up and income rounded down) a good idea? Explain.

   - No surprises if expenses are a bit higher.
   - Safer way to plan.

24. What is it called when you put money into savings each month?

   "pay yourself first"
25. How much money do financial "experts" say you should put into savings each month?

\[ \frac{10\%}{\text{of your income}}. \]

26. Susan earns $3200 every month before deductions.

a) What is Susan’s gross pay?

\[ \$3200 \text{ per month}. \]

b) If her deductions are 33% of her gross pay, calculate the amount of her deductions.

\[ \$3200 \times 0.33 = \$1056 \text{ ded.} \]

c) What is Susan’s net pay?

\[ \$3200 - 1056 = \$2144 \text{ take home pay}. \]

d) How much money should Susan put aside every month for savings if she follows the recommended guidelines?

\[ 10\% \text{ of her net pay} = \$214.40 \]

27. Underestimating expenses can have disastrous results. How can you be sure your expenses are accurate?

- Keep track for a few months and then make adjustments if necessary.
28. If your expenses regularly exceed your income, what steps should you take? Be specific.

- Make adjustments to your expenses.
- Don't spend it on unnecessary things, e.g., entertainment.

29. An older friend (someone who has CPP, EI, and income tax deductions) of yours brags that they make $17.68 an hour!

a) If they work a 40-hour week, what do they make in a year?

\[ \$17.68 \times 40 \times 52 = \$36,774.40 \]

b) Assuming they have typical deductions (CPP, EI, and income tax), what would their take-home pay be every month? Estimate (assume deductions are 30% of gross pay).

\[ \frac{36,774.40 \times 0.70}{6} = \$2145.17 / month \]

30. Marley has the following expenses every month:

- Apartment rent $475
- Cell phone bill $60
- Groceries $325
- Eating out $30
- Gasoline $65

a) Which expenses will remain the same every month?

Rent and maybe cell phone if you don't go over your limit.

b) Why do some expenses change every month?

Prices change. Eating out - do you try out more expensive restaurants?
c) How much money does Marley have to make every month to have a balanced budget?

- The same as his expenses.
- $955 for rent, etc. plus any other expenses.

\[ \text{(1) } 955 \text{ expenses } + 200 \text{ savings} = 1155. \]
\[ \text{(2) } 1155 \div 10.50 = 110 \text{ hours. Assume no deductions!} \]

31. Mark spends $875.00 on food every month and this accounts for 45% of his net monthly income. How much should Morley spend on food to bring his monthly percentage down to 25%?

\[ \text{(1) } \text{Food } 875 = \frac{45}{100} \text{ income.} \]
\[ \text{(2) } 1944.44 \times 0.25 = 486.11 \text{ on food.} \]

32. After creating your own budget, you should have some sense of your expenses every month. Imagine that you suddenly lost your job. What balance would you need in your savings account to survive for two months (necessary expenses) while you looked for work? Show your calculations if necessary.

33. Did you think about a bank when you did your moving out project? If you didn’t do this, explain what you would look for in a bank. Think about fees.

\[ \text{Lower fees = better!} \]
\[ \text{ATM use, min. balance?} \]
34. You have spent some time planning your budget. Give an example of an unexpected expense that would require you to pay more than you had budgeted.

- broken phone
- speeding ticket

35. Where would the money come from in the above situation?

- probably savings
- hopefully you put aside for this every month.

36. John makes $78,000 per year and his wife Mary makes $700 weekly. How much is their monthly income for budget purposes?

\[
\frac{78000}{12} + \frac{700 \times 52}{12} = \text{ } \\
\]

37. Bob buys a sandwich every day for lunch at the cafeteria. Instead of buying a sandwich every day for $2.75, he wants to make his own.

A jar of sandwich spread is $3.29 and should last 8 weeks. \( \times 5 = 40 \text{ days} \)
A container of margarine is $4.99 and should last 8 weeks. \( \times 5 = 40 \text{ days} \)
A package of sandwich meat is $3.99 and should last one week. \( \times 5 = 5 \text{ days} \)
A loaf of bread is $3.49 and should last one week. \( \times 5 = 5 \text{ days} \)

Assume each week above is a 5 day work week.

a) Calculate the cost of a sandwich if Bob makes it on his own.

\[
\text{Cost per day} = 1.70 \\
\]

b) How much money does Bob save in a year if he makes his own sandwiches?

\[
\frac{2.75 - 1.70}{1.65 \text{ saved per day}} = \frac{1.05}{1.65 \text{ saved per day}} = 5 \text{ days/wk} \times 52 = 260 \text{ days} \\
\times 1.65 \text{ saved} \]

\[
\text{Saved per year} = \frac{273}{1 \text{ yr}} \\
\]
38. Calculate how much money you will deposit into your bank account using the following information. You have 15 quarters, 10 loonies, 2 five-dollar bills, 3 twenty-dollar bills, and 2 cheques for $146.00 and $351.95. You want to withhold $25 cash.

\[
\begin{align*}
15 \times 0.25 &= 3.75 \\
10 \times 1.00 &= 10.00 \\
2 \times 5.00 &= 10.00 \\
3 \times 20.00 &= 60.00 \\
\hline
\text{Total} &= 83.75 \\
+ 146.00 &= 229.75 \\
+ 351.95 &= 581.70 \\
- 497.55 &= 0.15 \\
\text{Deposit} &= 0.15 \\
\end{align*}
\]

39. Find the measure of the missing angle. Show your work.

\[
180^\circ - 90^\circ - 53^\circ = 37^\circ
\]

40. A rectangular cement pad in front of a garage is 24 feet wide and 32 feet long.
   a) Draw a sketch.

   \[
x = \sqrt{a^2 + b^2}
\]

   \[
   x = \sqrt{24^2 + 32^2}
   \]

   \[
   = 40 \text{ ft}
   \]

   b) Draw a diagonal line from corner to corner and then calculate the length of the diagonal line.
41. Find the missing side in the triangle below:

$$\cos 38^\circ = \frac{x}{32}$$

$$x = \frac{25.2}{?}$$

42. Find the missing angle in the triangle below:

$$\theta = \tan^{-1} \left( \frac{43}{32} \right)$$

$$\theta = 53.3^\circ$$

43. Find the missing angle in the triangle below:

$$\theta = \cos^{-1} \left( \frac{31}{53} \right)$$

$$\theta = 54.2^\circ$$
44. Billy wants to fence in an area for his goats. Calculate the perimeter of the area.

\[ 50 + 24.6 + 30 + 19.9 = 124.5 \text{ ft} \]

45. A maple tree casts a shadow that is 35 feet long. The angle of elevation to the sun is 33°. How tall is the tree?

\[ \tan 33 = \frac{x}{35} \]

\[ x = 22.7 \text{ ft} \]

46. From the top of a 180 meter building, the angle of elevation to the top of another building is 38°. The angle of depression to the bottom of the second building is 24°. How tall is the second building?

\[ \tan 24 = \frac{180}{x} \]

\[ x = 404.3 \]

\[ \tan 38 = \frac{x}{404.3} \]

\[ x = 315.9 \]

Building 2 = 180 + 315.9 = 495.9 m tall
47. Bernie is in a rowboat, rowing across Lake Itasca. In the distance, he sees an eagle perched on the top branch of a spruce tree. He estimates he is about a kilometer from the tree. Pulling a protractor out of his shirt pocket, he estimates the angle of elevation to the eagle to be 8°. How tall is the tree? 
Hint: Draw a sketch, label, and then solve.

\[ \tan 8^\circ = \frac{x}{1000} \]
\[ x = 140.5 \text{ m} \]

48. Jeff has purchased a small shark (about 3 feet long) on Ebay and wants to build a large shark tank in his bedroom. He needs to build a tank that is 8 feet long by 6 feet wide and 4 feet high.

a) Draw a net of the shark tank.

b) Calculate the surface area of the glass needed to build the tank.

\[
\begin{align*}
\text{sides} & \quad = 8 \times 4 \times 2 = 64 \\
\text{ends} & \quad = 6 \times 4 \times 2 = 48 \\
\text{bottom} & \quad = 8 \times 6 = 48 \\
\text{Total} & \quad = 160 \text{ ft}^2
\end{align*}
\]

c) Calculate the price of the glass plus taxes. Glass is sold for $11.99 a square foot. PST is 8% and GST is 5%.

\[
160 \times 11.99 = 1918.40 \times 1.13 = \$2167.79
\]
49. Bill’s truck box is 6.5 feet long, 4 feet wide, and 20 inches deep. He wants to make a portable swimming pool. How many litres of water will it take to fill up the entire box? Remember that there are 12 inches in a foot and that 1 inch is 2.54 cm.

Vol \[\frac{6.5 \times 12 \times 4 \times 12 \times 20}{78 \times 48 \times 20} = \frac{74880\text{in}^3}{122706.34}\text{cm}^3 = \frac{122.71\text{L}}{1000}\text{L}\]

50. Calculate the surface area and the volume of both shapes.

\[SA = 2(7 \times 10) + 2(7 \times 30) + 2(10 \times 30)\]
\[= 1160\text{cm}^2\]
\[Vo1 = 7 \times 10 \times 30 = 2100\text{cm}^3\]

51. A basketball has a circumference of 29.5 inches. How much leather, to the nearest square inch, is needed for the surface?

\[C = 2\pi r\]
\[\frac{29.5}{2\pi} = r \approx 4.67\text{in}\]

\[SA = 4\pi r^2\]
\[= 4 \times \pi \times 4.7^2\]
\[= 277.6\text{in}^2\]

52. Daryl has a summer job painting fences. He is asked to paint a wooden fence that runs around the perimeter of a yard that is 88 feet wide and 165 feet long. The fence is 6 feet tall and needs to be painted on both sides.

a) What is the total surface area that he must paint?

\[88 \times 6 \times 2 = 1056\]
\[165 \times 6 \times 2 = 1980\]
\[= 3036\text{ft}^2\]
\[\times 2\text{both sides}\]
\[= 6072\text{ft}^2\]
b) A one-gallon can of the stain that Daryl is using covers approximately 225 ft². If Daryl applies 2 coats of stain, how many cans of stain should he buy?

\[ \frac{6072}{225} = 26.9867 \times 2 \ \text{coats} \]

53. Larry is estimating the cost to re-shingle his roof. To determine the number of shingles, he must calculate the surface area of the roof. The roof is shaped like a pyramid with each side having a base length of 25 feet and a slant height of 15 feet 3 inches.

\[ 15'3'' = 15.25' \]

a) What is the total surface area he needs to cover?

\[ A = \frac{15.25 \times 25}{2} \times 4 \ \text{sides} = 762.5 \text{ ft}^2 \]

b) Asphalt shingles are sold in bundles that cover 32 ft² per bundle. How many bundles does he need?

\[ 762.5 \div 32 = 23.8 \approx 24 \ \text{bundles} \]

54. A grain stockpile cover in the shape of a cone has a diameter of 96 m and a height of 23 m. How much material is needed for the cover?

\[ r = \frac{48}{2} \]

\[ S = \sqrt{48^2 + 23^2} = 53.2 \]

\[ \text{SA} = \pi \times 48 \times 23 + \left( \pi \times 48^2 \right) \text{ bottom} \]

\[ = 8022.4 \text{ m}^2 \]
55. A bakery stores flour in a cylindrical bin 70 cm high and with a diameter of 50 cm.

a) What volume of flour does the bin hold?

\[ V = \pi r^2 h = \pi \times 25^2 \times 70 = 13744.7 \text{ cm}^3 \]

b) The bakery orders flour in 20-kg sacks. Each sack is approximately 46 cm wide, 80 cm long, and 15 cm thick. How many sacks of flour fit in the bin?

\[ V = 46 \times 80 \times 15 = 55200 \text{ cm}^3 \]

\[ 13744.7 \div 55200 = 0.25 \text{ bags} \]

c) How many kilograms of flour does the bin hold?

\[ 2.5 \times 20 \text{ kg} = 50 \text{ kg} \]

56. A gravel pile in a maintenance yard has a diameter of 3.5 metres and a height of 1.2 metres.

a) What is the volume of gravel in the pile?

\[ V = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \times 1.75^2 \times 1.2 = 3.8 \text{ m}^3 \]

b) What will be the volume of a stockpile with double the dimensions? Use proportional reasoning.

\[ V = \frac{1}{3} \pi \times 3.5^2 \times 2.4 = 30.8 \text{ m}^3 \]

\[ \text{Double} \times \text{double} = 3.8 \times 2^3 \]

This works if you leave lots of decimals.
57. A steel storage silo for livestock feed pellets is shown below.

a) What is the volume of the silo in cubic centimeters?

\[
\text{Vol cyl} + \text{Vol cone} = \pi \times 90^2 \times 157 + \frac{3}{8} \pi \times 90^2 \times 193
\]

\[
= 3995163.4 \text{ cm}^3 + 1637083.9 = 5632247.3 \text{ cm}^3
\]

b) Express the volume in cubic meters.

\[
\frac{5632247.3}{1000} = 5.6 \text{ m}^3
\]

c) If you filled the silo with water, how many litres would it hold?

\[
\frac{5632247.3}{1000} = 5632.2 \text{ litres}
\]
58. What volume of concrete, in cubic yards, is needed to make the stairs shown below? Assume the stairs are all the same size.

Strategy - whole block volume

\[ \text{Volume} = 30 \times 48 \times 78\text{ in}^3 \]

Subtract step cutouts:

\[ (7.5 \times 48 \times 10) \times 6 = 21600\text{ in}^3 \]

Convert to yd\(^3\):

\[ \frac{90720\text{ in}^3}{36^3} = 1.94\text{ yd}^3 \]

- 21 in = 1 yd
- \(36^3 = 1\text{ yd}^3\)