Warm up

14. When you check your options at the bank, you find an account that earns 5.5% compound interest. The teller explains that compound interest is calculated using the balance in your account after each year.
   a) Use a table to find out the amount for a deposit of $500 after 4 years.
   b) What is the total amount of interest earned? Explain how you found this.
   c) How much more does compound interest provide than simple interest, at the same rate?

<table>
<thead>
<tr>
<th>Year</th>
<th>Principal</th>
<th>Rate</th>
<th>Interest</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$500.00</td>
<td>0.055</td>
<td>$27.50</td>
<td>$527.50</td>
</tr>
<tr>
<td>2</td>
<td>$527.50</td>
<td>0.055</td>
<td>$29.01</td>
<td>$556.51</td>
</tr>
<tr>
<td>3</td>
<td>$556.51</td>
<td>0.055</td>
<td>$30.61</td>
<td>$587.12</td>
</tr>
<tr>
<td>4</td>
<td>$587.12</td>
<td>0.055</td>
<td>$32.29</td>
<td>$619.41</td>
</tr>
</tbody>
</table>

\[
\text{Simple} = 500 \times 0.055 \times 4 = 110
\]

\[
\text{Compound} = 27.50 + 29.01 + 30.61 + 32.29 = 119.41
\]

\[
\text{}\begin{array}{c}
\text{Simple} - \frac{\text{Compound}}{	ext{Simple}} = \frac{119.41}{110.00} \\
\text{extra} \end{array}
\]

Ratios

\[\Rightarrow\text{simplify to lowest form}\]

Divide the values by the GCF

\[
\begin{align*}
15 : 35 & \div 5 \\
3 : 7 & \div 5
\end{align*}
\]

The order is important
Proportion Statements

⇒ use to find a missing value.

Eg Bunter runs 30m in 4 seconds. How far can he run in 7 seconds?

Comparing \( \frac{\text{distance}}{\text{time}} \)

\[ \Rightarrow \frac{x}{7} = \frac{30}{4} \]

\[ x = \frac{30}{4} \times 7 \]

\[ x = 52.5 \text{m} \]

How long to run 40m?

\[ \Rightarrow \frac{\text{time}}{\text{distance}} = \frac{4}{30} \]

\[ \Rightarrow \frac{x}{40} = \frac{4}{30} \times 40 \]

\[ x = \frac{4}{30} \times 40 \]

\[ x = 5 \frac{1}{3} \text{ seconds} \]

Unit rate

Finding the comparison to "one".

Eg Speed = \( \frac{\text{Distance}}{\text{Time}} \)

350 km in 4 hours

\[ \Rightarrow 350 \div 4 \]

\[ = 87.5 \text{ km/h} \]
Taxes

5% GST = Goods and Services Tax
8% PST = Provincial Sales Tax
13% HST = Harmonised Sales Tax

Added onto the price

Discounts

These are applied to the ticket price.
You then add the required tax onto the sale price.
Commission
People can be paid a percentage of their sales.
This is called commission.

Simple Interest
\[ I = P \times r \times t \]
\[ A = P + I \]

Interest / Principal (start amount) / rate (\( \div 100 \)) / time in years end amount
Ratios, Rates & Percentages Review

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Solutions
Key Words
For questions 1 to 6, match each definition to one of these words:
- commission
- discount
- principal
- proportion
- rate
- ratio
- sales taxes
- simple interest
- speed
- unit price
- unit rate

1. a comparison of quantities measured in different units
   - ratio

2. a statement that two ratios are equal
   - proportion

3. the price of one unit, used in shopping
   - unit price

4. an amount subtracted from a listed price to give a sale price
   - discount

5. money collected by the government on purchases
   - sales taxes

6. a payment, expressed as a percent, earned on sales
   - commission

7. Write a ratio, in simplest form, to compare the number of buttons of each colour.
   - a) green to blue
   - b) green to yellow

   - a) 3 : 5
   - b) 3 : 6
     = 1 : 2

8. Find the missing number in each proportion.
   - a) 12 : 8 = 6 : □
   - b) 3 : □ = 12 : 20
   - c) 7 : 2 = □ : 10

   - a) \(\frac{12}{2} : \frac{8}{2} = 6 : 4\)
   - b) \(\frac{3}{4} : \frac{5}{4} = 12 : 20\)
   - c) \(\frac{7}{2} \times 2 \times 5 = \frac{35}{10} \times 2 \times 5\)
9. A baseball team has a win-loss record of 30:25.
   a) Write this as a ratio in simplest form.
   b) Predict the team’s final record at the end of a 165-game season. What assumption do you need to make?

   a) \( \frac{30:25}{5} = \frac{6:5} \)

   b) Ratio of 6:5
      \( \Rightarrow \frac{6+5}{11} = \text{11 parts} \)
      \( 165 \div 11 = 15 \)
      Multiply ratio by 15
      \( \Rightarrow 90:75 \)

10. Write each as a unit rate.
    a) Sonya walked 500 m in 5 min.
    b) It costs 99¢ for 3 lemons.
    c) Jordan typed 150 words in 6 min.

    a) \( \frac{500}{5} = 100 \text{ m/min} \)
    b) \( \frac{99}{3} = 33 \text{ ¢/lemon} \)
    c) \( \frac{150}{6} = 25 \text{ words/min} \)

11. It costs $2.45 for 500 mL of soy sauce.
    a) Express this as a unit price per 100 mL.
    b) How much would 1.5 L of soy sauce cost?

    a) \( \text{Price} \div \text{Volume} \)
       \( \Rightarrow \frac{x}{100} = \frac{2.45}{500} \)
       \( x = \frac{2.45}{500} \times 100 \)
       \( x = \$0.49/100\text{mL} \)

    b) 1.5 L = 1500 mL
       \( \Rightarrow \frac{x}{1500} = \frac{2.45}{500} \)
       \( x = \frac{2.45}{500} \times 1500 \)
       \( x = \$7.35 \)

12. Julie drove 150 km in 2 h, at a fairly constant speed.
    a) Express this as a unit rate.
    b) At this rate, how far will Julie travel in 5 h?
    c) Describe any assumptions you must make.

    a) \( \frac{150}{2} = 75 \text{ km/h} \)
    b) \( \frac{x}{5} = \frac{150}{2} \)
       \( x = \frac{150}{2} \times 5 \)
       \( x = 375 \text{ km} \)
    c) Assume you drive at the same rate.
13. Which is the better buy? Justify your choice.

\[
\text{Price} = \frac{\text{mass}}{\text{mass}}
\]

Smaller: \[\frac{2.49}{300} = \$0.0083/\text{g}\]

Larger: \[\frac{3.59}{450} = \$0.0079/\text{g}\]

\[\Rightarrow \text{Larger is better value as it costs less per gram.}\]

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14. Find the 7\% GST and the 8\% PST on each item.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>GST</th>
<th>PST</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Sweater</td>
<td>(28.95 \times 0.07)</td>
<td>(28.95 \times 0.08)</td>
</tr>
<tr>
<td>b)</td>
<td>Bracelet</td>
<td>$10.99 \times 0.07)</td>
<td>$10.99 \times 0.08)</td>
</tr>
<tr>
<td>c)</td>
<td>Camera</td>
<td>$239.00 \times 0.07)</td>
<td>$239.00 \times 0.08)</td>
</tr>
</tbody>
</table>

\[= \$2.03\] \[= \$2.32\]

\[= \$0.77\] \[= \$0.88\]

\[= \$16.73\] \[= \$19.12\]
15. Estimate, then calculate, each discount.
   a) 30% off a picture frame, regular price $15.95
   b) 25% off a filing cabinet, regular price $59.85
   c) 20% off a magazine subscription, regular price $28.00

   Estimates
   $5.30
   $15
   $5.50

   Actual discounts
   a) \[15.95 \times 0.30 = 4.79\]
   b) \[59.85 \times 0.25 = 14.96\]
   c) \[28 \times 0.20 = 5.60\]

16. The regular price of a knapsack is $39.95. Now, it is marked down by 25%. It is subject to both 7% GST and 8% PST.
   a) Estimate the final price.
   b) Calculate the discount and the sale price.
   c) Calculate the total sales tax and the final price.
   d) Compare the final price to your estimate. How close were you?

   o) \$35
   b) Discount
   \[39.95 \times 0.25 = 9.99\]
   Sale price
   \[39.95 - 9.99 = 29.96\]
   c) Sales tax
   \[29.96 \times 0.15 = 4.49\]
   Total is tax 15%.
   Final price
   \[29.96 + 4.49 = 34.45\]
   d) Quite close! $35 vs $34.45
17. The regular price of a snowboard is $349. Now, it is marked at 35% off.
a) What is the sale price? b) Find the total price, including 7% GST and 8% PST.

\[ a) \text{ Discount} = 349 \times 0.35 = \$122.15 \]
\[ \text{Sale price} = 349 - 122.15 = \$226.85 \]

\[ \text{Total tax} = 15\% \]

\[ b) \text{ Total price} = 226.85 \times 1.15 = \$260.88 \]

18. Tomka earns 40% commission on the make-up that she sells. How much will she earn on each sale?
a) 1 eye shadow b) 2 lipsticks
c) 1 mascara, 3 nail polishes, and 2 eye shadows

\[ a) \ 7.50 \times 0.40 = \$3 \]
\[ b) \ 2 \times 5.95 \times 0.40 = \$4.76 \]
\[ c) \left[ 5.95 + 3(4.59) + 2(7.50) \right] \times 0.40 \\
= \left[ 5.95 + 13.77 + 15 \right] \times 0.40 \\
= \left[ 34.72 \right] \times 0.40 \\
= \$13.89 \]
19. Aria earns a 3% commission on real estate sales.
   a) What is her commission if she sells a house for $150,000?
   b) Aria receives a commission cheque for a house sale. The cheque is for $6000. What was the selling price of the house?

   a) \( 150,000 \times 0.03 \)  
   \[ = \$4,500 \]

   b) \( \frac{6000}{0.03} \)  
   \[ = \frac{y \times 0.03}{0.03} \]  
   \[ 200,000 = y \]  
   \( \Rightarrow \) House sold for \( \$200,000 \)

20. Ian deposits $700 into an account that earns 6% interest per year.
   a) How much interest is earned in 5 years?
   b) What is the total amount after 5 years?

   a) \( I = P \times r \times t \)  
   \[ I = 700 \times 0.06 \times 5 \]  
   \[ I = \$210 \]

   b) \( A = P + I \)  
   \[ A = 700 + 210 \]  
   \[ A = \$910 \]
21. Suhanna borrows $350 for 18 months at a rate of 8 1/2% interest per year. What total amount must she pay when the loan is due?

\[ I = P \times r \times t \]
\[ I = 350 \times 0.085 \times 1.5 \]
\[ I = $44.63 \]
\[ A = P + I \]
\[ A = 350 + 44.63 \]
\[ A = $394.63 \]

22. $1000 is deposited into an account for 3 months. The account earns 5 1/4% interest per year. How much interest is earned?

\[ I = P \times r \times t \]
\[ I = 1000 \times 0.0525 \times 0.25 \]
\[ I = $13.13 \]