Contemporary Business Mathematics with Canadian Applications (Canadian) 12th edition Hummelbrunner Solutions Manual

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Contemporary Business Mathematics with Canadian Applications (Canadian) 12th edition Hummelbrunner Solutions Manu

INSTRUCTOR'S SOLUTIONS MANUAL

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Contemporary Business Mathematics with Canadian Applications

Twelfth Canadian Edition

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PART ONE ***Mathematics Fundamentals and Business Applications***

Chapter 1 Review of Arithmetic

Exercise 1.1

A. 1. $12+6\div 3=12+2=\boxed{14}$

2. $(3\times 8-6)\div 2=(24-6)\div 2=18\div 2=\boxed{9}$

3. $(7+4)\times 5-2=11\times 5-2=55-2=\boxed{53}$

4. $5\times 3+2\times 4=15+8=\boxed{23}$

5. $6(7-2)-3(5-3)=6(5)-3(2)=30-6=\boxed{24}$

6. $\dfrac{20-16}{15+5}=\dfrac{4}{20}=\dfrac{1}{5}=\boxed{0.2}$

7. $4(8-5)^2-5(3+2^2)=4(3)^2-5(3+4)=4(9)-5(7)=36-35=\boxed{1}$

8. $(3\times 4-2)^2+(2-2\times 7^2)=(12-2)^2+(2-2\times 49)$

$=10^2+(2-98)=100-96=\boxed{4}$

9. $250(1+0.08)^{10}=250(2.158925)=\boxed{539.73}$

10. $(1+0.04)^4-1=1.169859-1=\boxed{0.17}$

11. $30\times 600-2500-12\times 600=18\ 000-2500-7200=\boxed{8300}$

12. $1-[(1-0.40)(1-0.25)(1-0.05)]=1-[(0.6)(0.75)(0.95)]=1-[0.4275]=0.5725=\boxed{0.57}$

13.

$15-7+6(2+3)/3$
$=15-7+6(5)\div 3$
$=15-7+30\div 3$
$=15-7+10$
$=18$

14.

$16/2\times 4+6(4+2)$
$=8\times 4+6(6)$
$=32+36$
$=68$

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15.

$$\begin{aligned}&(1-0.7)-4\times 20\div 5\\&=(0.3)-4\times 4\\&=(0.3)-16\\&=-15.7\end{aligned}$$

16.

$$\begin{aligned}&50[(1-0.2)(1-0.175)(1-0.04)]\\&=50[(0.8)(0.825)(0.96)]\\&=50[(0.6336)]\\&=31.68\end{aligned}$$

17.

$$\begin{aligned}&7a-6[4-(3a+6)]\\&=7a-6[4-3a-6]\\&=7a-6[-2-3a]\\&=7a+12+18a\\&=25a+12\end{aligned}$$

18.

$$\begin{aligned}&6a+4b+2(16-2a+b)\\&=6a+4b+32-4a+2b\\&=2a+6b+32\end{aligned}$$

***Exercise* 1.2**

A. 1. $\dfrac{24}{36}=\dfrac{24/2}{36/2}=\dfrac{12}{18}=\dfrac{12/2}{18/2}=\dfrac{6}{9}=\dfrac{6/3}{9/3}=\boxed{\dfrac{2}{3}}$ also $\dfrac{24/12}{36/12}=\dfrac{2}{3}$

2. $\dfrac{28}{56}=\dfrac{28/2}{56/2}=\dfrac{14}{28}=\dfrac{14/2}{28/2}=\dfrac{7}{14}=\dfrac{7/7}{14/7}=\boxed{\dfrac{1}{2}}$ also $\dfrac{28/28}{56/28}=\dfrac{1}{2}$

3. $\dfrac{210}{360}=\dfrac{210/10}{360/10}=\dfrac{21}{36}=\dfrac{21/3}{36/3}=\boxed{\dfrac{7}{12}}$ also $\dfrac{210/30}{360/30}=\dfrac{7}{12}$

4. $\dfrac{360}{225}=\dfrac{360/5}{225/5}=\dfrac{72}{45}=\dfrac{72/9}{45/9}=\boxed{\dfrac{8}{5}}$ also $\dfrac{360/45}{225/45}=\dfrac{8}{5}$

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5. $\frac{144}{360}=\frac{144/2}{360/2}=\frac{72}{180}=\frac{72/9}{180/9}=\frac{8}{20}=\frac{8/4}{20/4}=\boxed{\frac{2}{5}}$ also $\frac{144/72}{360/72}=\frac{2}{5}$

6. $\frac{25}{365}=\frac{25/5}{365/5}=\boxed{\frac{5}{73}}$

7. $\frac{365}{73}=\frac{365/73}{73/73}=\boxed{\frac{5}{1}}$

8. $\frac{365}{219}=\frac{365/73}{219/73}=\boxed{\frac{5}{3}}$

B. 1. $6\ ½=\frac{13}{2}$

2. $4\frac{5}{6}=\frac{29}{6}$

3. $3¾=\frac{15}{4}$

4. $8\frac{2}{3}=\frac{26}{3}$

5. $\frac{23}{2}=11\frac{1}{2}$

6. $\frac{51}{10}=5\frac{1}{10}$

7. $\frac{31}{4}=7\frac{3}{4}$

8. $\frac{19}{7}=2\frac{5}{7}$

C. 1. $\frac{11}{8}=\boxed{1.375}$

2. $\frac{7}{4}=\boxed{1.75}$

3. $\frac{5}{3}=1.666667=\boxed{1.\dot{6}}$

4. $\frac{5}{6}=0.833333=\boxed{0.8\dot{3}}$

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5. $\frac{11}{6} = 1.833333 = \boxed{1.8\dot{3}}$

6. $\frac{7}{9} = 0.777778 = \boxed{0.\dot{7}}$

7. $\frac{13}{12} = 1.083333 = \boxed{1.083\dot{3}}$

8. $\frac{19}{15} = 1.266667 = \boxed{1.26\dot{6}}$

D. 1. $3\frac{3}{8} = \boxed{3.375}$

2. $3\frac{2}{5} = \boxed{3.4}$

3. $8\frac{1}{3} = 8.333333 = \boxed{8.\dot{3}}$

4. $16\frac{2}{3} = 16.666667 = \boxed{16.\dot{6}}$

5. $33\frac{1}{3} = 33.333333 = \boxed{33.\dot{3}}$

6. $83\frac{1}{3} = 83.333333 = \boxed{83.\dot{3}}$

7. $7\frac{7}{9} = 7.777778 = \boxed{7.\dot{7}}$

8. $7\frac{1}{12} = 7.083333 = \boxed{7.083\dot{3}}$

E. 1. $\boxed{\$5.63}$

2. $\boxed{\$17.45}$

3. $\boxed{\$18.00}$

4. $\boxed{\$253.49}$

5 $\boxed{\$57.70}$

6. $\boxed{\$3.10}$

7. $\boxed{\$13.00}$

8. $\boxed{\$40.00}$

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F. 1. $25\,000(15-8)-146\,000=25\,000(7)-146\,000=175\,000-146\,000=\boxed{29\,000}$

2. $(300\times 8000)-(180\times 8000)-63\,000=2\,400\,000-1\,440\,000-63\,000=\boxed{897\,000}$

3. $1-[(1-0.4)(1-0.25)(1-0.08)]=1-[(0.6)(0.75)(0.92)]=1-[0.414]=\boxed{0.586}$

4. $1-[(1-0.32)(1-0.15)(1-0.12)]=1-[(0.68)(0.85)(0.88)]=1-[0.50864]=\boxed{0.49136}$

5. $1500+\dfrac{1500}{0.05}=1500+30\,000=\boxed{31\,500}$

6. $\dfrac{\$54}{0.12\times\frac{225}{365}}=\dfrac{\$54}{0.12\times 0.616438}=\dfrac{\$54}{0.073973}=\boxed{\$730}$

7. $\dfrac{264}{4400\times\frac{146}{365}}=\dfrac{264}{4400\times 0.4}=\dfrac{264}{1760}=\boxed{0.15}$

8. $\$620\left(1+0.14\times\dfrac{45}{365}\right)=\$620(1+0.017260)=\$620(1.017260)=\boxed{\$630.70}$

9. $\$375\left(1+0.16\times\dfrac{292}{365}\right)=\$375(1+0.128)=\$375(1.128)=\boxed{\$423}$

10. $\dfrac{\$250\,250}{1+0.15\times\frac{330}{365}}=\dfrac{\$250\,250}{1+0.135616}=\dfrac{\$250\,250}{1.135616}=\boxed{\$220\,364.90}$

11. $\dfrac{\$2358}{1+0.12\times\frac{146}{365}}=\dfrac{\$2358}{1+0.048}=\dfrac{\$2358}{1.048}=\boxed{\$2250}$

12. $\$1000\left[\dfrac{(1+0.03)^{24}-1}{0.03}\right]=1000\left[\dfrac{1.032794}{0.03}\right]=1000[34.426470]=\boxed{\$34\,426.47}$

13. $\$70(1+0.02)\left[\dfrac{(1+0.02)^{20}-1}{0.02}\right]=70(1.02)\left[\dfrac{0.485947}{0.02}\right]$

$=71.4[24.29737]=\boxed{\$1734.83}$

14. $\$50\dfrac{[1-(1+0.075)^{-8}]}{0.075}=\dfrac{50[1-(0.560702)]}{0.075}=\dfrac{50[0.439297]}{0.075}=50[5.857303]$

$=\boxed{\$292.87}$

***Exercise* 1.3**

A. 1. $64\%=\dfrac{64}{100}=\boxed{0.64}$

2. $300\%=\dfrac{300}{100}=\boxed{3}$

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3. $2.5\% = \frac{2.5}{100} = \boxed{0.025}$

4. $0.1\% = \frac{0.1}{100} = \boxed{0.001}$

5. $0.5\% = \frac{0.5}{100} = \boxed{0.005}$

6. $85\% = \frac{85}{100} = \boxed{0.85}$

7. $250\% = \frac{250}{100} = \boxed{2.5}$

8. $4.8\% = \frac{4.8}{100} = \boxed{0.048}$

9. $7.5\% = \frac{7.5}{100} = \boxed{0.075}$

10. $0.9\% = \frac{0.9}{100} = \boxed{0.009}$

11. $6.25\% = \frac{6.25}{100} = \boxed{0.0625}$

12. $99\% = \frac{99}{100} = \boxed{0.99}$

13. $225\% = \frac{225}{100} = \boxed{2.25}$

14. $0.05\% = \frac{0.05}{100} = \boxed{0.0005}$

15. $8\frac{1}{4}\% = \frac{8.25}{100} = \boxed{0.0825}$

16. $\frac{1}{2}\% = \frac{0.5}{100} = \boxed{0.005}$

17. $112\frac{1}{2}\% = \frac{112.5}{100} = \boxed{1.125}$

18. $9\frac{3}{8}\% = \frac{9.375}{100} = \boxed{0.09375}$

19. $\frac{3}{4}\% = \frac{0.75}{100} = \boxed{0.0075}$

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20. $162\frac{1}{2}\% = \frac{162.5}{100} = \boxed{1.625}$

21. $\frac{2}{5}\% = \frac{0.4}{100} = \boxed{0.004}$

22. $\frac{1}{4}\% = \frac{0.25}{100} = \boxed{0.0025}$

23. $\frac{1}{40}\% = \frac{0.025}{100} = \boxed{0.00025}$

24. $137\frac{1}{2}\% = \frac{137.5}{100} = \boxed{1.375}$

25. $\frac{5}{8}\% = \frac{0.625}{100} = \boxed{0.00625}$

26. $0.875\% = \frac{0.875}{100} = \boxed{0.00875}$

27. $2\frac{1}{4}\% = \frac{2.25}{100} = \boxed{0.0225}$

28. $16\frac{2}{3}\% = \frac{16.\dot{6}}{100} = \boxed{0.1\dot{6}}$

29. $116\frac{2}{3}\% = \frac{116.\dot{6}}{100} = \boxed{1.1\dot{6}}$

30. $183\frac{1}{3}\% = \frac{183.\dot{3}}{100} = \boxed{1.8\dot{3}}$

31. $83\frac{1}{3}\% = \frac{83.\dot{3}}{100} = \boxed{0.8\dot{3}}$

32. $66\frac{2}{3}\% = \frac{66.\dot{6}}{100} = \boxed{0.\dot{6}}$

B. 1. $25\% = \frac{25}{100} = \boxed{\frac{1}{4}}$

2. $62\frac{1}{2}\% = \frac{62.5}{100} = \frac{625}{1000} = \boxed{\frac{5}{8}}$

3. $175\% = \frac{175}{100} = \boxed{\frac{7}{4}}$

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4. $5\% = \frac{5}{100} = \boxed{\frac{1}{20}}$

5. $37\frac{1}{2}\% = \frac{37.5}{100} = \frac{375}{1000} = \boxed{\frac{3}{8}}$

6. $75\% = \frac{75}{100} = \boxed{\frac{3}{4}}$

7. $4\% = \frac{4}{100} = \boxed{\frac{1}{25}}$

8. $8\% = \frac{8}{100} = \boxed{\frac{2}{25}}$

9. $40\% = \frac{40}{100} = \boxed{\frac{2}{5}}$

10. $87\frac{1}{2}\% = \frac{87.5}{100} = \frac{875}{1000} = \boxed{\frac{7}{8}}$

11. $250\% = \frac{250}{100} = \boxed{\frac{5}{2}}$

12. $2\% = \frac{2}{100} = \boxed{\frac{1}{50}}$

13. $12\frac{1}{2}\% = \frac{12.5}{100} = \frac{125}{1000} = \boxed{\frac{1}{8}}$

14. $60\% = \frac{60}{100} = \boxed{\frac{3}{5}}$

15. $2.25\% = \frac{2.25}{100} = \frac{225}{10\,000} = \boxed{\frac{9}{400}}$

16. $0.5\% = \frac{0.5}{100} = \frac{5}{1000} = \boxed{\frac{1}{200}}$

17. $\frac{1}{8}\% = \frac{1}{8(100)} = \boxed{\frac{1}{800}}$

18. $33\frac{1}{3}\% = \frac{100}{3}\% = \frac{100}{3(100)} = \boxed{\frac{1}{3}}$

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19. $\frac{3}{4}\% = \frac{3}{4(100)} = \boxed{\frac{3}{400}}$

20. $66\frac{2}{3}\% = \frac{200}{3}\% = \frac{200}{3(100)} = \boxed{\frac{2}{3}}$

21. $6.25\% = \frac{6.25}{100} = \frac{625}{10\,000} = \boxed{\frac{1}{16}}$

22. $0.25\% = \frac{0.25}{100} = \frac{25}{10\,000} = \boxed{\frac{1}{400}}$

23. $16\frac{2}{3}\% = \frac{50}{3}\% = \frac{50}{3(100)} = \boxed{\frac{1}{6}}$

24. $7.5\% = \frac{7.5}{100} = \frac{75}{1000} = \boxed{\frac{3}{40}}$

25. $0.75\% = \frac{0.75}{100} = \frac{75}{10\,000} = \boxed{\frac{3}{400}}$

26. $\frac{7}{8}\% = \frac{7}{8(100)} = \boxed{\frac{7}{800}}$

27. $0.1\% = \frac{0.1}{100} = \boxed{\frac{1}{1000}}$

28. $\frac{3}{5}\% = \frac{3}{5(100)} = \boxed{\frac{3}{500}}$

29. $2.5\% = \frac{2.5}{100} = \frac{25}{1000} = \boxed{\frac{1}{40}}$

30. $133\frac{1}{3}\% = \frac{400}{3}\% = \frac{400}{3(100)} = \boxed{\frac{4}{3}}$

31. $183\frac{1}{3}\% = \frac{550}{3}\% = \frac{550}{3(100)} = \boxed{\frac{11}{6}}$

32. $166\frac{2}{3}\% = \frac{500}{3}\% = \frac{500}{3(100)} = \boxed{\frac{5}{3}}$

C. 1. $3.5 = 3.5(100) = \boxed{350\%}$

2. $0.075 = 0.075(100) = \boxed{7.5\%}$

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3. $0.005 = 0.005(100) = \boxed{0.5\%}$

4. $0.375 = 0.375(100) = \boxed{37.5\%}$

5. $0.025 = 0.025(100) = \boxed{2.5\%}$

6. $2 = 2(100) = \boxed{200\%}$

7. $0.125 = 0.125(100) = \boxed{12.5\%}$

8. $0.001 = 0.001(100) = \boxed{0.1\%}$

9. $0.225 = 0.225(100) = \boxed{22.5\%}$

10. $0.008 = 0.008(100) = \boxed{0.8\%}$

11. $1.45 = 1.45(100) = \boxed{145\%}$

12. $0.0225 = 0.0225(100) = \boxed{2.25\%}$

13. $0.0025 = 0.0025(100) = \boxed{0.25\%}$

14. $0.995 = 0.995(100) = \boxed{99.5\%}$

15. $0.09 = 0.09(100) = \boxed{9\%}$

16. $3 = 3(100) = \boxed{300\%}$

17. $\frac{3}{4} = 0.75(100) = \boxed{75\%}$

18. $\frac{3}{25} = 0.12(100) = \boxed{12\%}$

19. $\frac{5}{3} = 1.666667(100) = \boxed{166.\dot{6}\%}$

20. $\frac{7}{200} = 0.035(100) = \boxed{3.5\%}$

21. $\frac{9}{200} = 0.045(100) = \boxed{4.5\%}$

22. $\frac{5}{8} = 0.625(100) = \boxed{62.5\%}$

23. $\frac{3}{400} = 0.0075(100) = \boxed{0.75\%}$

24. $\frac{5}{6} = 0.833333(100) = \boxed{83.\dot{3}\%}$

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25. $\frac{9}{800} = 0.01125(100) = \boxed{1.125\%}$

26. $\frac{7}{6} = 1.166667(100) = \boxed{116.\dot{6}\%}$

27. $\frac{3}{8} = 0.375(100) = \boxed{37.5\%}$

28. $\frac{11}{40} = 0.275(100) = \boxed{27.5\%}$

29. $\frac{4}{3} = 1.333333(100) = \boxed{133.\dot{3}\%}$

30. $\frac{9}{400} = 0.0225(100) = \boxed{2.25\%}$

31. $\frac{13}{20} = 0.65(100) = \boxed{65\%}$

32. $\frac{4}{5} = 0.8(100) = \boxed{80\%}$

***Exercise* 1.4**

A. 1. Total weight $= 1\frac{1}{3} + 2\frac{3}{4} + 1\frac{5}{8} + 3\frac{5}{6} = 1.\dot{3} + 2.75 + 1.625 + 3.8\dot{3} = 9.541\dot{6}$ ounces

Total selling value of 4 pieces $= \$1569 \times 9.541\dot{6} = \boxed{\$14\ 970.88}$

2. $$\begin{aligned}\text{Total hours} &= 15\frac{1}{2} + 13\frac{3}{4} + 18\frac{1}{2} + 21\frac{1}{4} + 22\frac{3}{4} \\ &= 15.5 + 13.75 + 18.5 + 21.25 + 22.75 \\ &= 91.75\end{aligned}$$

Total cost of labour $= 91.75 \times 25.75 = \boxed{\$2362.56}$

3. Assessed value $= \frac{6}{11} \times 56\ 100 = 6 \times 5100 = \$30\ 600$

Property tax $= 30\ 600 \times \frac{3.75}{100} = \boxed{\$1147.50}$

4. $$\begin{aligned}\text{Retail value} &= \$0.90 \times 2700 = \$0.90 \times 2700 \\ &= \$2430.00\end{aligned}$$

$$\text{Discount} = \frac{3}{8} \times 2430 \quad = \$911.25$$

Credit received $= 2430 - 911.25 = \boxed{\$1518.75}$

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5.

$64 \times \$0.75$	=	$\$ 48.00$
$54 \times 83\frac{1}{3}¢ = 54 \times \$0.8\dot{3}$	=	45.00
$72 \times \$0.375$	=	27.00
$42 \times \$1.3\dot{3} = 42 \times \$1.\dot{3}$	=	56.00
Total	=	$176.00

6.

$96 \times \$0.875$	=	$84.00
$330 \times 16\frac{2}{3}¢ = 330 \times \$0.1\dot{6}$	=	55.00
$144 \times \$1.75$	=	252.00
$240 \times \$1.6\dot{6} = 240 \times \$1.\dot{6}$	=	400.00
Total	=	$791.00

7.

Assessment	*Mark*	*Weight*	*Contribution to Final Grade*
Quiz 1	$^{7}/_{10}$	5%	3.5
Quiz 2	$^{7.25}/_{10}$	5%	3.625
Quiz 3	$^{9}/_{10}$	5%	4.5
Quiz 4	$^{6.5}/_{10}$	-	-
Test 1	$^{38}/_{50}$	20%	15.20
Test 2	$^{41}/_{50}$	20%	16.40
Test 3	$^{43}/_{50}$	20%	17.20
Exam	79%	25%	19.75
		100%	80.175

Michael's final grade in physics is 80%.

(His teacher did not count Quiz 4.)

B. 1.

$1100 \times 1.085 = \$1193.50$

$1600 \times 1.093 = \$1748.80$

$1400 \times 1.121 = \$1569.40$

Total cost $= \$4511.70$

$$\text{Average cost per litre} = \frac{\$4511.70}{4100} = \$1.100415$$

$$= \$1.10$$

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2. (a) $56 + 60 + 70 + 54 = 240$

Average number of litres $= 240 \div 4 = \boxed{60}$

(b) Total cost $= 56 \times \$1.180 = \$66.08$

$60 \times \$1.246 = \$74.76$

$70 \times \$1.278 = \$89.46$

$54 \times \$1.335 = \$72.09$

$\$302.39$

Average cost per litre $= 302.39/240 = \$1.259958 = \boxed{\$1.260}$

(c) Average cost per km $= \$1.259958/8.75 = \$0.143995 = \boxed{\$0.144}$

3. Weighted hours $= 3 \times 4 + 5 \times 2 + 2 \times 6 + 4 \times 2 + 4 \times 1 + 2 \times 6$

$= 12 + 10 + 12 + 8 + 4 + 12$

$= 58$

Total hours $= 3 + 5 + 2 + 4 + 4 + 2 = 20$

Grade-point average $= \dfrac{58}{20} = \boxed{2.9}$

4. Weighted investment:

January 1 – February 28:	$\$7500 \times 2$	$= \$15\,000$
March 1 – July 31:	6600×5	$= 33\,000$
August 1 – August 31:	8100×1	$= 8100$
September 1 – December 31:	7800×4	$= 31\,200$
		$\$87\,300$

Average investment balance $= \$87\,300 \div 12 = \boxed{\$7275}$

5. (a) Simple average of unit prices

$$= \frac{10.00 + 10.60 + 11.25 + 9.50 + 9.20 + 12.15}{6} = \frac{62.70}{6} = \boxed{\$10.45}$$

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(b) $\text{Number of units purchased} = \dfrac{\text{Amount invested}}{\text{Unit price}}$

Date	Amount Invested	Unit Price	Number of Units Purchased
February 1	200.00	10.00	$\frac{200.00}{10.00} = 20.000$
March 1	200.00	10.60	$\frac{200.00}{10.60} = 18.868$
April 1	200.00	11.25	$\frac{200.00}{11.25} = 17.778$
May 1	200.00	9.50	$\frac{200.00}{9.50} = 21.053$
June 1	200.00	9.20	$\frac{200.00}{9.20} = 21.739$
July 1	200.00	12.15	$\frac{200.00}{12.15} = 16.461$
	Total number of units purchased		$\boxed{115.899}$

(c) $\text{Average cost of units purchased} = \dfrac{1200.00}{115.899} = \boxed{\$10.35}$

(d) $\text{Value on July 31} = 115.899(11.90) = \boxed{\$1379.20}$

***Exercise* 1.5**

A. 1. (a) $\text{Annual salary} = \$43\,056$

$$\text{Semi-monthly payment} = \frac{43\,056}{24} = \boxed{\$1794.00}$$

(b) $\text{Weekly pay} = \dfrac{43056}{52} = \$828.00$

$$\text{Hourly rate} = \frac{828}{36} = \boxed{\$23.00}$$

(c) $\begin{aligned} \text{Regular pay} &= \$1794.00 \\ \text{Overtime pay} = 11 \times 23 \times 1.5 &= \underline{\quad 379.50} \\ \text{Gross pay} &= \boxed{\$2173.50} \end{aligned}$

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2. (a) Annual salary $= \$43\ 875$

$$\text{Biweekly pay} = \frac{43\ 875}{26} = \boxed{\$1687.50}$$

(b) $\text{Weekly pay} = \dfrac{1687.50}{2} = \$843.75$

$$\text{Hourly rate} = \frac{843.75}{37.5} = \boxed{\$22.50}$$

(c) Regular biweekly pay $= \$1687.50$

Overtime pay $= 8 \times 22.50 \times 1.5 = 270.00$

Gross pay $= \boxed{\$1957.50}$

3. (a) Monthly pay $= \$2011.10$

Yearly pay $= 2011.10 \times 12 = \$24\ 133.20$

Weekly pay $= 24\ 133.20 \div 52 = \$464.10$

Hourly rate of pay $= 464.10 \div 35 = \boxed{\$13.26}$

(b) Regular pay for May $= \$2011.10$

Overtime pay $= 7.75 \times 13.26 \times 1.5 = 154.15$

Gross pay $= \boxed{\$2165.25}$

4. (a) Semi-monthly pay $= \$1326.00$

Yearly salary $= 1326.00 \times 24 = \$31\ 824.00$

Weekly gross pay $= 31\ 824 \div 52 = \$612.00$

Hourly rate $= 612.00 \div 40 = \boxed{\$15.30}$

(b) Gross pay $= \$1518.78$

Regular pay $= 1326.00$

Overtime pay $= \$192.78$

Number of overtime hours $= (192.78 \div 1.5) \div 15.30 = \boxed{8.4}$

5. Total hours = 45

Regular hours = 40

Overtime hours = 5

At time-and-a-half, 5 overtime hours are equivalent to $5 \times 1.5 = 7.5$ regular hours

$$\text{Rate of pay} = \frac{\$680.20}{47.5} = \boxed{\$14.32}$$

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6. (a) Biweekly payment = \$3942.00

Annual salary = $3942.00 \times 22 = \$86\,724.00$

Daily pay = $86\,724 \div 200 = \$433.62$

Hourly rate = $433.62 \div 7.5 = 57.816 = \boxed{\$57.82}$

(b)

Regular pay	=	\$3942.00
Less: two days = 433.62×2	=	867.24
Gross pay	=	\$3074.76

7.

Gross sales	=	\$12 660.00
Less: returns	=	131.20
Net sales	=	\$12 528.80

Gross commission = $12\,528.80 \times 0.0975 = \$1221.56$

Less: drawings	=	720.00
Amount due	=	\$501.56

8. Net sales = \$16 244.00

Commission: $8\frac{1}{4}\%$ on first \$6000.00	=	\$495.00
$9\frac{3}{4}\%$ on next \$6000.00	=	585.00
11.5% on \$(16 244.00 − 12 000.00)	=	488.06
Total commission	=	\$1568.06

9. Gross sales = \$24 250.00

Less: returns = 855.00

Net sales = \$23 395.00

Commission: 4.5% on first \$10 000 = $0.045 \times 10\,000.00$	=	\$ 450.00
6% on next \$5000 = 0.06×5000.00	=	300.00
8% on remaining \$8395 = 0.08×8395.00	=	671.60
Total commission	=	\$1421.60

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10. (a) Sales = \$8125.00

Base salary on quota of \$8500 = \boxed{\$825.00}

(b) Sales = \$10 150.00

Base salary on quota of \$8500 = \$825.00

Commission = $6\frac{1}{2}\%$ on \$1650 = $0.065 \times \$1650$ = 107.25

Gross earnings = \boxed{\$932.25}

11. (a) Commission at 6.5% on sales of \$5830 = 0.065 × \$5830 = \$378.95.

This is less than \$540 guarantee, therefore weekly salary = \boxed{\$540.00}

(b) Commission at 6.5% on sales of \$8830 = $0.065 \times \$8830 = \$573.95$

This exceeds \$540 guarantee, therefore weekly salary = \boxed{\$573.95}

12.

Gross sales	= \$31 240.00
Less: returns = 3% of \$31 240.00	= 937.20
Net sales	= \$30 302.80

Rate of commission = $\frac{1590.90}{30\,302.80} = 0.0525$ = \boxed{5.25\%}

13.

Gross earnings	= \$566.25
Less: base salary	= 450.00
Commission:	= \$116.25
Sales for week	= \$6550
Quota:	= 5000
Commission sales	= \$1550

Rate of commission = $\frac{116.25}{1550} = 0.075 =$ \boxed{7.5\%}

14. Net sales = $\frac{\$\text{Commission}}{\text{Rate}} = \frac{\$2036.88}{0.1125} = \$18\,105.60$

Net sales = gross sales − returns

$18\,105.60 = S - 0.08S$

$0.92S = 18\,105.60$

$S = 19\,680$

Gross sales were \boxed{\$19\,680}

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15. Gross earnings $= \$837.50$
Less: Base salary $= 664.00$
Commission $= \$173.50$

$$\text{Commission sales} = \frac{173.50}{0.0875} = \$1982.86$$

Sales for week $= \$4800 + \$1982.86 = \boxed{\$6782.86}$

16. **Method A**

Regular hours $= 40 \times 14.60$		$= \$\ 584.00$
Overtime pay $= 3.5 \times 14.60 \times 1.5$		$= 76.65$
$6 \times 14.60 \times 2$		$= 175.20$
Gross earnings		$= \$\ 835.85$

Method B

At regular rate:	49.5×14.60	$= \$\ 722.70$
Overtime premium:	$3.5 \times 14.60 \times 0.5$	$= 25.55$
	$6 \times 14.60 \times 1$	$= 87.60$
Gross earnings		$= \boxed{\$835.85}$

***Exercise* 1.6**

1.

Month	*GST collected 5% of sales*	*GST paid 5% of purchases*	*GST payable (GST receivable)*
January	\$27 345.00	\$7391.60	\$19 953.40
February	12 200.00	3475.00	8725.00
March	29 400.00	43 300.00	(13 900.00)
April	32 515.00	22 500.00	10 015.00
May	7840.00	4904.90	2935.10
5-month totals	\$109 300.00	\$81 571.50	\$27 728.50

Cook's owes the government \$27 728.50.

2. Riza's revenue of \$28 350 includes 5% GST.

$$\text{GST taxable revenue} = \frac{28\ 350}{1.05} = \$27\ 000$$

GST collected $= 5\%$ of $\$27\ 000 = \$1350$

GST paid $= 5\%$ of $\$8000 = \$400$

Riza owes the Canada Revenue Agency $\$(1350 - 400) = \boxed{\$950.00}$

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3. Savings on GST = 5% of $780 = 0.05(780) = $\boxed{\$39.00}$

4. Cost of shirt = $15.00
   GST in Regina = 5% of $15.00 = 0.05(15.00) = 0.75
   PST = 5% of $15.00 = 0.05(15.00) = 0.75
   Consumer pays = $\boxed{\$16.50}$

5.
   At Blackcomb, B.C.
   Cost of ski pass = $214.00
   GST = 5% of $214.00 = 0.05(214.00) = 10.70
   PST = 7% of $214.00 = 0.07(214.00) = 14.98
   Amount paid at Blackcomb, B.C. = $239.68

   At Mont Tremblant, Que.
   Cost of ski pass = $214.00
   GST = 5% of $214.00 = 0.05(214.00) = 10.70
   PST = 9.975% of $214.00 = 0.09975(214.00) = 21.35
   Amount paid at Mont Tremblant = $246.05
   Difference = 246.05 – 239.68 = $\boxed{\$6.37}$

6. Total cost in Toronto
   Retail price = $625.00
   HST = 13% of $625.00 = 0.13(625) = 81.25
   Total cost in Toronto = $706.25

   Total cost in Calgary
   Retail price = $625.00
   GST = 5% of $625.00 = 0.05(625.00) = 31.25
   PST = nil
   Total cost in Calgary = $656.25
   Difference = PST $\boxed{\$ 50.00}$

7. Purchase price of the first item = $70.56 × 0.25 = $17.64
   Purchase price of the second item, including 5% GST = 70.56 – 17.64 = $52.92
   Purchase price of the second item = $52.92/1.05 = $50.40
   GST paid = $52.92 – 50.40 = $\boxed{\$2.52}$

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8. $\text{Property tax} = 125\,000\left(\dfrac{22.751}{1000}\right) = \boxed{\$2843.88}$

9. $\text{Property tax} = 225\,000(0.019368) = \boxed{\$4357.80}$

10. $\text{Semi-annual tax rate} = \dfrac{2216}{479\,000} = 0.004626$

$\text{Semi-annual tax rate} = 0.004626(1000) = 4.626305$

$\text{The annual tax rate} = 2(4.626305) = 9.252610$

$= \boxed{9.25\text{ mills}}$

11. (a) $\text{Total expenditure} = \$(3\,050\,000 + 2\,000\,000 + 250\,000 + 700\,000 + 850\,000)$

$= \$6\,850\,000$

$\text{Total residential property tax} = 0.80(6\,850\,000) = \boxed{\$5\,480\,000}$

(b) $\text{Tax rate per } \$1000 = \dfrac{5\,480\,000}{500\,000\,000}(1000) = \boxed{10.96}$

(c) $\text{Property tax} = \$375\,000\left(\dfrac{10.96}{1000}\right) = \boxed{\$4110.00}$

Business Math News Box

1. There are 52 weeks per year during which the employee works a 40-hour week. Total hours worked during the year is 52 × 40 = 2080.

Hourly Rate Calculations

Location	*Financial Controller*		*Human Resources Manager*		*Marketing Manager*	
Vancouver	99 500/2080 =	$47.84	88 324/2080 =	$42.46	78 663/2080 =	$37.82
Calgary	106 082/2080 =	$51.00	88 611/2080 =	$42.60	84 836/2080 =	$40.79
Toronto	98 500/2080 =	$47.36	83 350/2080 =	$40.07	77 823/2080 =	$37.41
Montreal	99 758/2080 =	$47.96	80 641/2080 =	$38.77	76 554/2080 =	$36.80
National Average	99 234/2080 =	$47.71	78 669/2080 =	$37.82	75 450/2080 =	$36.27

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2. Dollar and percentage differences by job function:

Financial Controller

National Average	–	Vancouver	=	$ difference		% difference	
$99 234	–	$99 500	=	$266	= 266/99 234	0.002681	0.27%
National Average	–	Calgary	=	$ difference		% difference	
$99 234	–	$1 06 082	=	$6 848	= 6848/99 234	0.069009	6.90%
National Average	–	Toronto	=	$ difference		% difference	
$99 234	–	$98 500	=	($734)	= –734/99 234	–0.007397	–0.74%
National Average	–	Montreal	=	$ difference		% difference	
$99 234	–	$99 758	=	$524	= 524/99 234	0.005280	0.53%

Human Resources Manager

National Average	–	Vancouver	=	$ difference		% difference	
$78 669	–	$88 324	=	$9 655	= 9655/78 669	0.122729	12.27%
National Average	–	Calgary	=	$ difference		% difference	
$78 669	–	$88 611	=	$9 942	= 9942/78 669	0.126378	12.64%
National Average	–	Toronto	=	$ difference		% difference	
$78 669	–	$83 350	=	$4 681	= 4681/78 669	0.059502	5.95%
National Average	–	Montreal	=	$ difference		% difference	
$78 669	–	$80 641	=	$1 972	= 1972/78 669	0.025067	2.51%

Marketing Manager

National Average	–	Vancouver	=	$ difference		% difference	
$75 450	–	$78 663	=	$3 213	= 3213/75 450	0.042584	4.26%
National Average	–	Calgary	=	$ difference		% difference	
$75 450	–	$84 836	=	$9 386	= 9386/75 450	0.124400	12.44%
National Average	–	Toronto	=	$ difference		% difference	
$75 450	–	$77 823	=	$2 373	= 2373/75 450	0.031451	3.15%
National Average	–	Montreal	=	$ difference		% difference	
$75 450	–	$76 554	=	$1 104	= 1104/75 450	0.014632	1.46%

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3. Discrepancies between the national averages and specific metropolitan centres might be the result of many factors, including:

- National average takes into account data supplied from all geographic locations.

- Lack of supply and/or high demand for specific jobs in geographic locations might cause salaries to exceed the national average.

Review Exercise

1. (a) $32-24\div 8=32-3=\boxed{29}$

(b) $(48-18)\div 15-10=30\div 15-10=2-10=\boxed{-8}$

(c) $(8\times 6-4)\div(16-4\times 3)=(48-4)\div(16-12)=44\div 4=\boxed{11}$

(d) $9(6-2)-4(3+4)=9(4)-4(7)=36-28=\boxed{8}$

(e) $\dfrac{108}{0.12\times\frac{216}{365}}=\dfrac{108}{0.12\times 0.591781}=\dfrac{108}{0.071014}=\boxed{\$1520.83}$

(f) $\dfrac{288}{2400\times\frac{292}{365}}=\dfrac{288}{2400\times 0.8}=\dfrac{288}{1920}=\boxed{0.15}$

(g) $320\left(1+0.10\times\dfrac{225}{365}\right)=320(1+0.061644)=320(1.061644)=\boxed{339.73}$

(h) $1000\left(1-0.12\times\dfrac{150}{365}\right)=1000(1-0.049315)=1000(0.950685)=\boxed{950.68}$

(i) $\dfrac{660}{1+0.14\times\frac{144}{365}}=\dfrac{660}{1+0.055233}=\dfrac{660}{1.055233}=\boxed{625.45}$

(j) $\dfrac{1120}{1-0.13\times\frac{292}{365}}=\dfrac{1120}{1-0.104}=\dfrac{1120}{0.896}=\boxed{1250}$

2. (a) $185\%=\boxed{1.85}$

(b) $7.5\%=\boxed{0.075}$

(c) $0.4\%=\boxed{0.004}$

(d) $0.025\%=\boxed{0.00025}$

(e) $1\dfrac{1}{4}\%=1.25\%=\boxed{0.0125}$

(f) $\dfrac{3}{4}\%=0.75\%=\boxed{0.0075}$

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(g) $162\frac{1}{2}\% = 162.5\% = \boxed{1.625}$

(h) $11\frac{3}{4}\% = 11.75\% = \boxed{0.1175}$

(i) $8\frac{1}{3}\% = \frac{8.\dot{3}}{100} = \boxed{0.08\dot{3}}$

(j) $83\frac{1}{3}\% = \frac{83.\dot{3}}{100} = \boxed{0.83\dot{3}}$

(k) $266\frac{2}{3}\% = \frac{266.\dot{6}}{100} = \boxed{2.\dot{6}}$

(l) $10\frac{3}{8}\% = 10.375\% = \boxed{0.10375}$

3. (a) $50\% = \frac{50}{100} = \boxed{\frac{1}{2}}$

(b) $37\frac{1}{2}\% = \frac{37.5}{100} = \frac{375}{1000} = \boxed{\frac{3}{8}}$

(c) $16\frac{2}{3}\% = \frac{16\frac{2}{3}}{100} = \frac{\frac{50}{3}}{\frac{100}{1}} = \boxed{\frac{1}{6}}$

(d) $166\frac{2}{3}\% = \frac{100+66\frac{2}{3}}{100} = 1+\frac{2}{3} = \boxed{\frac{5}{3}}$

(e) $\frac{1}{2}\% = \frac{\frac{1}{2}}{100} = \frac{1}{2}\times\frac{1}{100} = \boxed{\frac{1}{200}}$

(f) $7.5\% = \frac{7.5}{100} = \frac{75}{1000} = \boxed{\frac{3}{40}}$

(g) $0.75\% = \frac{3}{4}\% = \boxed{\frac{3}{400}}$

(h) $\frac{5}{8}\% = \frac{5}{800} = \boxed{\frac{1}{160}}$

4. (a) $2.25 = 2.25\times 100 = \boxed{225\%}$

(b) $0.02 = 0.02\times 100 = \boxed{2\%}$

(c) $0.009 = 0.009\times 100 = \boxed{0.9\%}$

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(d) $0.1275 = 0.1275 \times 100 = \boxed{12.75\%}$

(e) $\frac{5}{4} = \frac{5}{4} \times 100 = \boxed{125\%}$

(f) $\frac{11}{8} = 1.375 = 1.375 \times 100 = \boxed{137.5\%}$

(g) $\frac{5}{200} = 0.025 = 0.025 \times 100 = \boxed{2.5\%}$

(h) $\frac{7}{25} = \frac{28}{100} = \boxed{28\%}$

5. (a) 150% of 140

$= 1.5 \times 140 = \boxed{210}$

(b) 3% of 240

$= 0.03 \times 240 = \boxed{7.2}$

(c) $9\frac{3}{4}\%$ of 2000

$= 0.0975 \times 2000 = \boxed{195}$

(d) 0.9% of 400

$= 0.009 \times 400 = \boxed{3.6}$

6. (a) $4\frac{1}{3} + 3\frac{3}{4} + 5\frac{1}{2} + 6\frac{5}{8}$

$= 4.\dot{3} + 3.75 + 5.5 + 6.625 = \boxed{20.208\dot{3}\,\text{kg}}$

(b) $20.208\dot{3} \times 1.20 = \boxed{\$24.25}$

(c) $20.208\dot{3} \div 4 = 5.052083\dot{3} = \boxed{5.05\,\text{kg}}$

(d) $24.25 \div 4 = 6.0625 = \boxed{\$6.06}$

7.

$56 \times \$0.625$	=	$\boxed{\$\ 35.00}$
$180 \times 83\frac{1}{3}¢ = 180 \times \$0.83\dot{3}$	=	$\boxed{\$150.00}$
$126 \times \$1.16\dot{6}$	=	$\boxed{\$147.00}$
$144 \times \$1.75$	=	$\boxed{\$252.00}$
Total	=	$\boxed{\$584.00}$

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8. (a) $\dfrac{30.45+20.20+16.40+14.50}{4}=\dfrac{81.55}{4}=20.3875=\boxed{\$20.39}$

(b)
$$\begin{aligned} 30.45\times 2 &= \$\ 60.90\\ 20.20\times 6 &= \$121.20\\ 16.40\times 9 &= \$147.60\\ \underline{14.50\times 13} &= \underline{\$188.50}\\ 30 &= \$518.20 \end{aligned}$$

Average rate $=\dfrac{\$518.20}{30}=\boxed{\$17.27}$

9.
$$\begin{aligned} &\text{January 1 – May 31:} && 15\,000\times 5 &&= \$\ 75\,000\\ &\text{June 1 – July 31:} && 13\,000\times 2 &&= 26\,000\\ &\text{August 1 – October 31:} && 11\,500\times 3 &&= 34\,500\\ &\text{November 1 – December 31:} && 15\,500\times \underline{2} &&= \underline{31\,000}\\ &\text{Total} && 12 &&= \$166\,500 \end{aligned}$$

Average monthly investment $=\dfrac{\$166\,500}{12}=\boxed{\$13\,875}$

10.
$$\begin{aligned} &\text{January 1 – March 31:} && 12\,000\times 3 &= \$\ 36\,000\\ &\text{April 1 – May 31:} && 14\,400\times 2 &= 28\,800\\ &\text{June 1 – September 30:} && 12\,960\times 4 &= 51\,840\\ &\text{October 1 – December 31:} && 15\,840\times \underline{3} &= \underline{47\,520}\\ &\text{Total} && 12 &= \$164\,160 \end{aligned}$$

Average monthly investment $=\dfrac{\$164\,160}{12}=\boxed{\$13\,680}$

11. (a) Monthly remuneration $=\dfrac{34\,944}{12}=\boxed{\$2912.00}$

(b) Weekly pay $=34\,944\div 52=\$672.00$

Hourly rate $=672.00\div 35=\boxed{\$19.20}$

(c)
$$\begin{aligned} \text{Gross pay for month} &= 3387.20\\ \text{Regular gross pay} &= \underline{2912.00}\\ \text{Overtime pay} &= 475.20 \end{aligned}$$

Overtime hours $=475.20\div(19.20\times 1.5)=\boxed{16.5}$

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12. (a) Semi-monthly pay $= 31\,487.04 \div 24 =$ $\boxed{\$1311.96}$

(b) Weekly pay $= 31\,487.04 \div 52 = \$605.52$

Hourly rate $= 605.52 \div 36 =$ $\boxed{\$16.82}$

(c)

Regular earnings	=	\$1311.96
Overtime pay $= 12 \times 16.82 \times 1.5$	=	\$302.76
Gross earnings	=	$\boxed{\$1614.72}$

13. (a)

Gross sales	=	11 160
Less: returns	=	120
Net sales	=	11 040

Commission: 4% of \$6000.00	=	\$240
8% of \$3000.00	=	240
12.5% of \$[11 040 − 9000]	=	255
Gross earnings	=	$\boxed{\$735}$

(b) Average hourly rate $= 735 \div 43 =$ $\boxed{\$17.09}$

14. (a)

Regular earnings $= 44 \times 15.80$	=	\$695.20
Overtime pay $= 6.5 \times 15.80 \times 1.5$	=	154.05
Gross earnings	=	$\boxed{\$849.25}$

(b) Overtime premium $= 6.5 \times 15.80 \times 0.5 =$ $\boxed{\$51.35}$

15. (a)

Base salary on quota of \$8000	=	\$540.00
Commission = 4.75% on \$3340	=	158.65
Gross earnings	=	$\boxed{\$698.65}$

(b) Hourly rate $= 698.65 \div 35 =$ $\boxed{\$19.96}$

16.

Gross earnings	=	\$541.30
Base salary	=	475.00
Commission	=	\$66.30

Commission sales $= 6560.00 - 5000 = \$1560.00$

Rate of commission $= 66.30 \div 1560.00 = 0.0425 =$ $\boxed{4.25\%}$

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17. Net sales $= 2101.05 \div 0.105 = \$20\,010.00$

Net sales = Gross sales − Returns

$20\,010.00$ = Gross sales − 8% of Gross sales

$20\,010.00 = 92\%$ of Gross sales

$$\text{Gross sales} = \frac{20\,010}{0.92} = \boxed{\$21\,750}$$

18. Hours worked $= 47$

Regular hours $= \underline{40}$

Overtime hours $= 7$

7 overtime hours are equivalent to $7 \times 1.5 = 10.5$ regular hours.

Total hours paid at regular rate $= 40 + 10.5 = 50.5$

$$\text{Hourly rate of pay} = \frac{779.72}{50.5} = \boxed{\$15.44}$$

19. (a) Annual salary $= 1413.75 \times 24 = \$33\,930.00$

Weekly pay $= 33\,930 \div 52 = \$652.50$

Hourly rate of pay $= 652.50 \div 37.5 = \boxed{\$17.40}$

(b) Gross earnings $= \$1552.55$

Regular earnings $= \underline{1413.75}$

Overtime pay $= \$138.80$

Overtime hourly rate $= 17.40 \times 1.5 = \$26.10$

Overtime hours $= 138.80 \div 26.10 = 5.318008 = \boxed{5.32}$

20. Gross earnings $= \$528.54$

Less: base salary $= \underline{480.00}$

Commission $= \$\ 48.54$

Commission sales $= 48.54 \div 0.06 = \$809.00$

Net sales $= 5000.00 + 809.00 = \$5809.00$

Gross sales $= 5809.00 + 136.00 = \boxed{\$5945.00}$

21. Gross earnings $= \$731.92$

Regular earnings $= 35 \times 15.80 = \underline{553.00}$

Overtime pay $= \$178.92$

Overtime hours $= 178.92 \div (15.80 \times 1.5) = 7.549367$

Number of hours worked $= 35 + 7.549367 = \boxed{42.55}$

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22. GST collected $= 5\%$ of $\$76\,000 = 0.05(76\,000) = \$3800.00$
GST paid $= 5\%$ of $\$14\,960 = 0.05(14\,960) = 748.00$
GST remittance $\boxed{\$3052.00}$

23. GST collected:
Parts: 5% of $\$175\,000$
Labour: 5% of $\$165\,650$
Total: 5% of $\$340\,650 = 0.05(340\,650) = \$17\,032.50$
GST paid:
Parking fees: 5% of $\$ 2000$
Supplies: 5% of $\$55\,000$
Utilities: 5% of $\$ 4000$
Other: 5% of $\$ 3300$
Total: 5% of $\$64\,300 = 0.05(64\,300) = \$3215.00$
GST remittance $\boxed{\$13\,817.50}$

24. Amount paid in Kelowna, B.C.
$= \text{Retail price} + 5\%\ \text{GST} + 7\%\ \text{PST}$
$= 1868 + 0.05(1868) + 0.07(1868)$
$= 1868 + 93.40 + 130.76 = 2092.16$
Amount paid in Kenora, Ont.
$= \text{Retail price} + 13\%\ \text{HST}$
$= 1868 + 0.13(1868)$
$= 1868 + 242.84 = 2110.84$
The difference $= 2110.84 - 2092.16 = \boxed{\$18.68}$

25. Property tax in Ripley $= 350\,000\left(\dfrac{10.051}{1000}\right) = \$3517.85$
Property tax in Amberly $= 335\,000\left(\dfrac{12.124}{1000}\right) = \$4061.54$
The person in Amberly pays $\boxed{\$543.69 \text{ more}}$ in property tax.

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26. (a) Tax rate $= \dfrac{15\,567\,000}{975\,500\,000}(1000) = \boxed{15.957970}$

(b) Property tax $= 235\,000\left(\dfrac{15.957970}{1000}\right) = \boxed{\$3750.12}$

(c) Increase in tax rate $= \dfrac{2\,000\,000}{975\,500\,000}(1000) = \boxed{2.050231}$

(d) Additional property tax $= 235\,000\left(\dfrac{2.050231}{1000}\right) = \boxed{\$481.80}$

Self-Test

1. (a) $4320\left(1+0.18\times\dfrac{45}{365}\right) = 4320(1+0.022192) = \boxed{4415.87}$

(b) $2160\left(0.15\times\dfrac{105}{365}\right) = 2160(0.043151) = \boxed{93.21}$

(c) $2880\left(1-0.12\times\dfrac{285}{365}\right) = 2880(1-0.093699) = \boxed{2610.15}$

(d) $\dfrac{410.40}{0.24\times\frac{135}{365}} = \dfrac{410.40}{0.088767} = \boxed{4623.33}$

(e) $\dfrac{5124}{1-0.09\times\frac{270}{365}} = \dfrac{5124}{0.933424658} = \boxed{5489.46}$

2. (a) $175\% = \dfrac{175}{100} = \boxed{1.75}$

(b) $\dfrac{3}{8}\% = \dfrac{3}{8}\times\dfrac{1}{100} = \dfrac{3}{800} = \boxed{0.00375}$

3. (a) $2\dfrac{1}{2}\% = \dfrac{5}{2}\% = \dfrac{5}{2}\times\dfrac{1}{100} = \dfrac{5}{200} = \boxed{\dfrac{1}{40}}$

(b) $116\dfrac{2}{3}\% = 100\% + 16\dfrac{2}{3}\% = 1 + \dfrac{16\frac{2}{3}}{100} = 1 + \dfrac{\frac{50}{3}}{100} = 1 + \dfrac{50}{300}$

$= 1 + \dfrac{1}{6} = \boxed{\dfrac{7}{6}}$

4. (a) $1.125 = 1.125\times 100 = \boxed{112.5\%}$

(b) $\dfrac{9}{400} = 0.0225 = 0.0225\times 100 = \boxed{2.25\%}$

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5.
$$\begin{aligned} 72\times\$1.25 &= \$\ 90.00\\ 84\times16\tfrac{2}{3}\text{¢} = 84\times\$0.16\dot{} &= \$\ 14.00\\ 40\times\$0.875 &= \$\ 35.00\\ 48\times\$1.3\dot{3} = 48\times\$1.\dot{3} &= \$\ 64.00\\ \text{Total} &\quad \boxed{\$203.00} \end{aligned}$$

6.
$$\begin{array}{lll} 5\times\$9 & = & \$\ 45\\ 6\times\$7 & = & \$\ 42\\ 3\times\$8 & = & \$\ 24\\ \underline{6\times\$6} & = & \underline{\$\ 36}\\ \text{Total}\ \ 20 & = & \$147 \end{array}$$

$$\text{Average cost} = \frac{147}{20} = \boxed{\$7.35}$$

7.
$$\begin{aligned} \text{Total size} &= \left(5\frac{1}{4}+6\frac{1}{3}+4\frac{3}{8}+3\frac{5}{6}\right)\text{ sq. metres}\\ &= (5.25+6.\dot{3}+4.375+3.8\dot{3})\text{ sq. metres}\\ &= 19.791\dot{6}\text{ sq. metres}\\ \text{Sales value} &= 25\,120\times19.791\dot{6}\\ &= \boxed{\$497\,166.67} \end{aligned}$$

8.
$$\begin{array}{lrrr} \text{January 1 – February 28:} & 7200\times & 2 = & \$14\,400\\ \text{March 1 – July 31:} & 6720\times & 5 = & 33\,600\\ \text{August 1 – September 30:} & 7320\times & 2 = & 14\,640\\ \text{October 1 – December 31:} & 7440\times & \underline{3} = & \underline{22\,320}\\ \text{Total} & & 12 & \$84\,960 \end{array}$$

$$\text{Average monthly balance} = \frac{84\,960}{12} = \boxed{\$7080}$$

9. $\text{Annual salary} = 2080\times24 = \$49\,920$

$\text{Weekly pay} = 49\,920\div52 = \$960.00$

$\text{Hourly rate of pay} = 960.00\div40 = \boxed{\$24.00}$

10. $\text{Net sales} = 0.885\times5880.00 = \$5203.80$

$$\text{Commission rate} = \frac{806.59}{5203.80} = 0.155 = \boxed{15.5\%}$$

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11. Weekly pay $= 52\ 956.80 \div 52 = \$1018.40$

Hourly pay $= 1018.40 \div 38 = \$26.80$

Regular monthly pay $= 52\ 956.80 \div 12 =$ $4413.07

Overtime earnings $= 26.80 \times 8.75 \times 1.5 =$ 351.75

Gross pay $=$ $\boxed{\$4764.82}$

12. Total hours $= 8.25 + 8.25 + 9.5 + 11.5 + 7.25 = 44.75$

Regular hours $= 8 + 8 + 8 + 8 + 7.25 = 39.25$

Overtime hours $= 0.25 + 0.25 + 1.5 + 3.5 = 5.50$

Regular pay $= 39.25 \times 16.60 =$ $651.55

Overtime pay $= 5.5 \times 16.60 \times 1.5 =$ 136.95

Gross earnings $=$ $\boxed{\$788.50}$

13. Total hours $= 52.5$

Regular hours $= \underline{44.0}$

Overtime hours $= 8.5$

At time-and-a-half, 8.5 overtime hours are equivalent to $8.5 \times 1.5 = 12.75$ regular hours

$$\text{Hourly rate of pay} = \frac{983.15}{56.75} = \boxed{\$17.32}$$

14. Base salary on first \$4500 = \$600.00

Commission on next $\$2000 = 0.11 \times 2000$ = 220.00

Commission on additional sales $= (8280 - 6500) \times 0.15 = 1780 \times 0.15$ = 267.00

Gross earnings = $\boxed{\$1087.00}$

15.

Total value	\$6400.00 + \$20.00	= \$6420.00	
GST	5% of \$6420.00	\$321.00	
Manitoba PST	7% of \$6420.00	449.40	770.40

Total purchase price $\boxed{\$7190.40}$

16.

Purchase price	\$17.95
Less discount	2.50
Net price	\$15.45
Add shipping charge	1.45
Total cost before taxes	\$16.90

HST 15% of \$16.90 = 2.535 = \$2.54

Final purchase price is $\boxed{\$19.44}$

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17. $\text{Property Tax} = \text{Assessed Value} \times \text{Tax Rate}$

$$4502.50 = \text{Assessed Value} \times \frac{18}{1000}$$

$$\text{Assessed Value} = \frac{4502.50(1000)}{18} = \boxed{\$250\,138.89}$$

18. $\text{Assessed value} = \frac{2}{3} \times \$390\,000 = \$260\,000$

$$\text{Property tax} = \$260\,000 \times \frac{12.5}{1000} = \boxed{\$3250.00}$$

Challenge Problems

1. Purchase price of the first item = \$821.40 × 0.29 = \$238.206

   Purchase price of the second item, including 5% GST and 7% PST = \$821.40 – 238.206 = \$583.194

   Purchase price of the second item = \$583.194 / 1.12 = \$520.708929

   Total GST paid = \$520.708929(0.05) = \$26.035446 = \$26.04

   BC PST paid on second item = \$520.708929(0.07) = \$36.449625 = \$36.45

   BC PST paid on first item = (\$238.206 / 1.07)(0.07) = \$15.583570 = \$15.58

   Total BC PST paid = \$36.45 + \$15.58 = \$52.03

2.

	Test score	*Weight*	*Final grade contribution*
Test 1	60	30%	$60(0.30) = 18$
Test 2	50	30%	$50(0.30) = 15$
Final exam	?	40%	?
Final mark			70

$$\text{Final exam contribution to final mark} = 70 - (18 + 15) = 70 - 33 = 37$$

$$\text{Final examination mark required} = \frac{37}{0.40} = \boxed{92.5\%}$$

Case Study

1.

HST collected	13% of \$28 000	\$3640.00
HST paid	13% of \$ 4000	520.00
HST remittance		\$3120.00

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2. (a) HST by Quick Method

HST on sales = 185 000 × 0.13 = $24 050.00

Purchases:

Goods for resale (185 000 × 47%) × 1.13 =	$98 253.50
Other expenses (48 000 – 42 000) × 1.13 =	6 780.00
Total taxable goods and expenses	105 033.50
Input tax credits = 13/113 × 105 033.50 =	$12 083.50

Remittance by Quick Method: $24 050.00 – 12 083.50 = $11 966.50

(b) HST by Standard Method

HST collected	13% of $185 000	$24 050.00	
HST paid on purchases and taxable services			
13% of (47% of $185 000)		$11 303.50	
13% of ($48 000 – $42 000)		780.00	12 083.50
Remittance by Standard Method			$11 966.50

(c) Difference in remittances by method = $11 966.50 – $11 966.50 = $0.00

3.

Line 101		$ 486 530.00
Line 103	13% of $486 530	63 248.90
Line 104		0.00
Line 105		63 248.90
Line 106	13% of $239 690	31 159.70
Line 107		0.00
Line 108		31 159.70
Line 109	63 248.90 – 31 159.70	32 089.20
Line 110	3120 × (12)	37 440.00
Line 111		0.00
Line 112		37 440.00
Line 113	32 089.20 – 37 440.00	–5350.80
Line 114		5350.80
Line 115		0

Refund Claimed is $5350.80

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PART ONE ***Mathematics Fundamentals and Business Applications***

Chapter 1 Review of Arithmetic

Exercise 1.1

A. 1. 14
2. 9
3. 53
4. 23
5. 24
6. 0.2
7. 1
8. 4
9. 539.73
10. 0.17
11. 8300
12. 0.57
13. 18
14. 68
15. −15.7
16. 31.68
17. 25a + 12
18. 2a + 6b + 32

Exercise 1.2

A. 1. $\frac{2}{3}$
2. $\frac{1}{2}$
3. $\frac{7}{12}$

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4. $\frac{8}{5}$
5. $\frac{2}{5}$
6. $\frac{5}{73}$
7. $\frac{5}{1}$
8. $\frac{5}{3}$

B. 1. $\frac{13}{2}$
2. $\frac{29}{6}$
3. $\frac{15}{4}$
4. $\frac{26}{3}$
5. $11\frac{1}{2}$
6. $5\frac{1}{10}$
7. $7\frac{3}{4}$
8. $2\frac{5}{7}$

C. 1. 1.375
2. 1.75
3. $1.\dot{6}$
4. $0.8\dot{3}$
5. $1.8\dot{3}$
6. $0.\dot{7}$

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7. $1.08\dot{3}$
8. $1.2\dot{6}$

D. 1. 3.375
2. 3.4
3. $8.\dot{3}$
4. $16.\dot{6}$
5. $33.\dot{3}$
6. $83.\dot{3}$
7. $7.\dot{7}$
8. $7.08\dot{3}$

E. 1. $5.63
2. $17.45
3. $18.00
4. $253.49
5 $57.70
6. $3.10
7. $13.00
8. $40.00

F. 1. 29 000
2. 897 000
3. 0.586
4. 0.49136
5. 31 500
6. $730
7. 0.15
8. $630.70
9. $423
10. $220 364.90
11. $2250
12. $34 426.47
13. $1734.83

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14. $292.87

***Exercise* 1.3**

A. 1. 0.64
2. 3
3. 0.025
4. 0.001
5. 0.005
6. 0.85
7. 2.5
8. 0.048
9. 0.075
10. 0.009
11. 0.0625
12. 0.99
13. 2.25
14. 0.0005
15. 0.0825
16. 0.005
17. 1.125
18. 0.09375
19. 0.0075
20. 1.625
21. 0.004
22. 0.0025
23. 0.00025
24. 1.375
25. 0.00625
26. 0.00875
27. 0.0225
28. $0.1\dot{6}$
29. $1.1\dot{6}$
30. $1.8\dot{3}$

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31. $0.8\dot{3}$

32. $0.\dot{6}$

B. 1. $\frac{1}{4}$

2. $\frac{5}{8}$

3. $\frac{7}{4}$

4. $\frac{1}{20}$

5. $\frac{3}{8}$

6. $\frac{3}{4}$

7. $\frac{1}{25}$

8. $\frac{2}{25}$

9. $\frac{2}{5}$

10. $\frac{7}{8}$

11. $\frac{5}{2}$

12. $\frac{1}{50}$

13. $\frac{1}{8}$

14. $\frac{3}{5}$

15. $\frac{9}{400}$

16. $\frac{1}{200}$

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17. $\frac{1}{800}$

18. $\frac{1}{3}$

19. $\frac{3}{400}$

20. $\frac{2}{3}$

21. $\frac{1}{16}$

22. $\frac{1}{400}$

23. $\frac{1}{6}$

24. $\frac{3}{40}$

25. $\frac{3}{400}$

26. $\frac{7}{800}$

27. $\frac{1}{1000}$

28. $\frac{3}{500}$

29. $\frac{1}{40}$

30. $\frac{4}{3}$

31. $\frac{11}{6}$

32. $\frac{5}{3}$

C. 1. 350%

2. 7.5%

3. 0.5%

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4. 37.5%
5. 2.5%
6. 200%
7. 12.5%
8. 0.1%
9. 22.5%
10. 0.8%
11. 145%
12. 2.25%
13. 0.25%
14. 99.5%
15. 9%
16. 300%
17. 75%
18. 12%
19. $166.\dot{6}\%$
20. 3.5%
21. 4.5%
22. 62.5%
23. 0.75%
24. $83.\dot{3}\%$
25. 1.125%
26. $116.\dot{6}\%$
27. 37.5%
28. 27.5%
29. $133.\dot{3}\%$
30. 2.25%
31. 65%
32. 80%

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Exercise 1.4

A. 1. $14 970.88

2. $2362.56

3. $1147.50

4. $1518.75

5.
$$\begin{array}{r} \$\ 48.00 \\ 45.00 \\ 27.00 \\ 56.00 \\ \hline \$176.00 \end{array}$$

6.
$$\begin{array}{r} \$\,84.00 \\ 55.00 \\ 252.00 \\ 400.00 \\ \hline \$791.00 \end{array}$$

7. 80%

B. 1. $1.10

2. (a) 60

(b) $1.260

(c) $0.144

3. 2.9

4. $7275

5. (a) $10.45

(b) 115.899

(c) $10.35

(d) $1379.20

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***Exercise* 1.5**

A. 1. (a) $1794.00
(b) $23.00
(c) $2173.50

2. (a) $1687.50
(b) $22.50
(c) $1957.50

3. (a) $13.26
(b) $2165.25

4. (a) $15.30
(b) 8.4

5. $14.32

6. (a) $57.82
(b) $3074.76

7. $501.56

8. $1568.06

9. $1421.60

10. (a) $825.00
(b) $932.25

11. (a) $540.00
(b) $573.95

12. 5.25%

13 7.5%

14. $19 680

15. $6782.86

16. **Method A** $ 835.85
Method B $ 835.85

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Exercise 1.6

1. Cook's owes the government $27 728.50
2. $950.00
3. $39.00
4. $16.50
5. $6.37
6. $50.00
7. $17.64
   $52.92
   $50.40
   $2.52
8. $2843.88
9. $4357.80
10. 9.25 mills
11. (a) $5 480 000
    (b) 10.96
    (c) $4110.00

Business Math News Box

1. There are 52 weeks per year during which the employee works a 40-hour week. Total hours worked during the year is 52 × 40 = 2080.

Hourly Rate Calculations

Location	*Financial Controller*		*Human Resources Manager*		*Marketing Manager*	
Vancouver	99 500/2080 =	$47.84	88 324/2080 =	$42.46	78 663/2080 =	$37.82
Calgary	106 082/2080 =	$51.00	88 611/2080 =	$42.60	84 836/2080 =	$40.79
Toronto	98 500/2080 =	$47.36	83 350/2080 =	$40.07	77 823/2080 =	$37.41
Montreal	99 758/2080 =	$47.96	80 641/2080 =	$38.77	76 554/2080 =	$36.80
National Average	99 234/2080 =	$47.71	78 669/2080 =	$37.82	75 450/2080 =	$36.27

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2. Dollar and percentage differences by job function:

Financial Controller

National Average	–	Vancouver	=	$ difference		% difference	
$99 234	–	$99 500	=	$266	= 266/99 234	0.002681	0.27%
National Average	–	Calgary	=	$ difference		% difference	
$99 234	–	$1 06 082	=	$6 848	= 6848/99 234	0.069009	6.90%
National Average	–	Toronto	=	$ difference		% difference	
$99 234	–	$98 500	=	($734)	= –734/99 234	–0.007397	–0.74%
National Average	–	Montreal	=	$ difference		% difference	
$99 234	–	$99 758	=	$524	= 524/99 234	0.005280	0.53%

Human Resources Manager

National Average	–	Vancouver	=	$ difference		% difference	
$78 669	–	$88 324	=	$9 655	= 9655/78 669	0.122729	12.27%
National Average	–	Calgary	=	$ difference		% difference	
$78 669	–	$88 611	=	$9 942	= 9942/78 669	0.126378	12.64%
National Average	–	Toronto	=	$ difference		% difference	
$78 669	–	$83 350	=	$4 681	= 4681/78 669	0.059502	5.95%
National Average	–	Montreal	=	$ difference		% difference	
$78 669	–	$80 641	=	$1 972	= 1972/78 669	0.025067	2.51%

Marketing Manager

National Average	–	Vancouver	=	$ difference		% difference	
$75 450	–	$78 663	=	$3 213	= 3213/75 450	0.042584	4.26%
National Average	–	Calgary	=	$ difference		% difference	
$75 450	–	$84 836	=	$9 386	= 9386/75 450	0.124400	12.44%
National Average	–	Toronto	=	$ difference		% difference	
$75 450	–	$77 823	=	$2 373	= 2373/75 450	0.031451	3.15%
National Average	–	Montreal	=	$ difference		% difference	
$75 450	–	$76 554	=	$1 104	= 1104/75 450	0.014632	1.46%

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3. Discrepancies between the national averages and specific metropolitan centres might be the result of many factors, including:

   - National average takes into account data supplied from all geographic locations.

   - Lack of supply and/or high demand for specific jobs in geographic locations might cause salaries to exceed the national average.

Review Exercise

1. (a) 29
   (b) −8
   (c) 11
   (d) 8
   (e) $1520.83
   (f) 0.15
   (g) 339.73
   (h) 950.68
   (i) 625.45
   (j) 1250
2. (a) 1.85
   (b) 0.075
   (c) 0.004
   (d) 0.00025
   (e) 0.0125
   (f) 0.0075
   (g) 1.625
   (h) 0.1175
   (i) $0.08\dot{3}$
   (j) $0.8\dot{3}$
   (k) $2.\dot{6}$
   (l) 0.10375
3. (a) $\frac{1}{2}$
   (b) $\frac{3}{8}$

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(c) $\frac{1}{6}$

(d) $\frac{5}{3}$

(e) $\frac{1}{200}$

(f) $\frac{3}{40}$

(g) $\frac{3}{400}$

(h) $\frac{1}{160}$

4. (a) 225%

(b) 2%

(c) 0.9%

(d) 12.75%

(e) 125%

(f) 137.5%

(g) 2.5%

(h) 28%

5. (a) 210

(b) 7.2

(c) 195

(d) 3.6

6. (a) $20.208\dot{3}$kg

(b) $24.25

(c) 5.05kg

(d) $6.06

7. $35.00

$150.00

$147.00

$252.00

$584.00

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8. (a) $20.39
   (b) $17.27
9. $13 875
10. $13 680
11. (a) $2912.00
    (b) $19.20
    (c) 16.5
12. (a) $1311.96
    (b) $16.82
    (c) $1614.72
13. (a) $735
    (b) $17.09
14. (a) $849.25
    (b) $51.35
15. (a) $698.65
    (b) $19.96
16. 4.25%
17. $21 750
18. $15.44
19. (a) $17.40
    (b) 5.32
20. $5945.00
21. $42.55
22. $3052.00
23. $13 817.50
24. $18.68
25. $543.69 more

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26. (a) 15.957970
    (b) $3750.12
    (c) 2.050231
    (d) $481.80

Self-Test

1. (a) 4415.87
   (b) 93.21
   (c) 2610.15
   (d) 4623.33
   (e) 5489.46
2. (a) 1.75
   (b) 0.00375
3. (a) $\frac{1}{40}$
   (b) $\frac{7}{6}$
4. (a) 112.5%
   (b) 2.25%
5. $203.00
6. $7.35
7. $497166.67
8. $7080
9. $24.00
10. 15.5%
11. $4764.82
12. $788.50
13. $17.32
14. $1087.00
15. $7190.40
16. $19.44
17. $250 138.89
18. $3250.00

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Challenge Problems

1. $238.206
   $583.194
   $26.04
   $36.45
   $15.58
   $52.03
2. 92.5%

Case Study

1. $3120.00
2. (a) $11 966.50
   (b) $11 966.50
   (c) $0.00
3. Refund Claimed is $5350.80

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CHAPTER 1

Review of Arithmetic

Chapter Overview

Chapter 1 covers the basics of arithmetic operations. Students learn how to set up equivalent fractions, convert fractions and mixed numbers into decimals, evaluate complex fractions, reduce fractions to lowest terms, and simplify expressions using the rules of the order of operations.

Applications involving both arithmetic and weighted averages are discussed. Students develop competency in selecting the appropriate average based on the desired outcome for a given problem. This section calls upon the student to use skills learned earlier in the chapter, including fractions and order of operations.

Students develop skills working with percent so that they can readily convert percent to both fractional and decimal form. Conversely, it can also be meaningful to express a fraction as a percent.

Finally, applications involving payroll, commissions, GST, PST, HST, and property taxes call upon the use of basic arithmetical operations and percentages. With respect to payroll, students should be able to calculate regular pay, overtime pay, and total pay. Percentages play a big role in calculating the PST, HST, and GST. The text illustrates how to calculate straight commission, graduated commission (sliding scale), and salary plus commission as part of a complete discussion on gross earnings.

There are PowerPoint® slides that accompany the material in Chapter 1, which can be used to highlight the main points.

Learning Objectives:

After studying Chapter 1, your students will be able to:

1. Simplify arithmetic expressions using the basic order of operations.

2. Determine equivalent fractions and convert fractions to decimals, decimals to percents, and vice versa.

3. Through problem solving, compute simple arithmetic and weighted averages.

4. Determine gross earnings for employees remunerated by the payment of salaries, hourly wages, or commissions.

5. Through problem solving, compute GST, HST, PST, sales taxes, and property taxes.

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Suggested Priority of Chapter Topics

Must Cover

- Order of operations (BEDMAS)
- Fractions: definition and conversions
- Percent: definition and conversions
- Averages and weighted averages
- Payroll and wages
- Calculation of GST, PST, HST

Recommended

- Calculation of commission
- Property tax and the mill rate

Chapter Outline

Objective 1: Simplify arithmetic expressions using the basic order of operations.

A. Emphasize that operations within brackets are done first according to the proper order of operations followed by evaluation of exponential expressions. The student may require a brief refresher as to the meaning of an integral exponent at this point. Other forms of the exponent are defined in Chapter 2.

B. Multiplication and division are performed after the evaluation of exponential expressions.

C. Addition and subtraction are done last.

Teaching Tip

Introduce the use of the BEDMAS (Brackets, Exponents, Division, Multiplication, Addition, Subtraction) to help the student remember the order of operations.

D. Examples can be introduced to illustrate the order of operations.

Example #1

$(4\times6-3)\div7$	Operations inside the brackets are done first.
$=(24-3)\div7$	Multiplication is done before subtraction.
$=21\div7$	Subtraction inside the bracket is done next.
$=3$	The last step is to divide 21 by 7 giving a final result of 3.

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Example #2

$5(6-4)^2+(3-4\times 6^3)$	Operations inside the brackets are done first.
$=5(2)^2+(3-4\times 6^3)$	Subtraction is done in the first bracket.
$=5(2)^2+(3-4\times 216)$	In the second bracket, the exponent is evaluated first.
$=5(2)^2+(3-864)$	Multiplication is done next.
$=5(2)^2-861$	Subtraction is done last.
$=5(4)-861$	Now that the brackets are finished we evaluate the exponent: $2^2=4$
$=20-861$	Multiplication is done next.
$=-841$	The final step is subtraction.

Objective 2: Determine equivalent fractions, and convert fractions to decimals and fractions to percents.

A. Introduce fraction terminology to facilitate the discussion of operations involving fractions.

Common fraction - part of a whole
Numerator - appears above the dividing line
Denominator – appears below the dividing line
Proper fraction – numerator less than denominator
Improper fraction – numerator greater than denominator

B. Introduce examples of proper and improper fractions.

Proper: $5/9$
Improper: $9/5$

C. Describe how an equivalent fraction in higher terms can be formed by multiplying the numerator and denominator by the same number.

D. Describe how an equivalent fraction in lower terms can be formed by dividing the numerator and denominator by the same number. This same number should be evenly divisible in both the numerator and denominator. You can continue dividing in this way until the fraction has been reduced to lowest terms.

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E. Introduce examples of finding equivalent fractions. Point out to students that the value of the fraction remains the same because you are multiplying the numerator and denominator by the same number, which is the same as multiplying by one.

Equivalent fraction in higher terms:

$$\frac{2}{3}=\frac{2\times4}{3\times4}=\frac{8}{12}=\frac{8\times3}{12\times3}=\frac{24}{36}$$

Equivalent fraction in lower terms:

$$\frac{125}{225}=\frac{125\div5}{225\div5}=\frac{25}{45}=\frac{25\div5}{45\div5}=\frac{5}{9}$$

F. Demonstrate that fractions can be converted to decimals by simply dividing the numerator by the denominator. This is fairly straightforward for the common fraction. When dealing with a mixed number, which is made up of an integer and a fraction, you can convert the common fraction to a decimal and then add the integer.

Example: $2\frac{3}{4}=2+\frac{3}{4}=2.75$

G. Consider converting $1/3$ to a decimal. Note that $1/3=0.33333...=0.\dot{3}$. Because the conversion of a common fraction could result in a non-terminating decimal, this is a good time to introduce rules for rounding. In many business applications, the final answer is rounded to two places after the decimal point since many answers are in dollars and cents. To round to two places after the decimal point, look at the third digit after the decimal point. If the third digit is 5,6,7,8, or 9, the second digit after the decimal point is increased by one. If the third digit after the decimal point is 0,1,2,3, or 4, do not change the second digit after the decimal point.

Examples: 6.389 = 6.39, 5.6123 = 5.61, 3.994 = 3.99, 5299.9975 = 5300.00

H. A complex fraction can be more challenging to convert to a decimal. Complex fractions from the area of simple interest and discount calculations can be used as examples to help prepare the student for material covered in Chapters 7 and 8.

Teaching Tip

In presenting a complex fraction, use a different colour or much longer line to indicate the dividing line that separates the numerator from the denominator of the main fraction.

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Consider the following example:

$$\frac{4603.56}{1+0.14\left(\frac{60}{365}\right)}$$

Evaluate the denominator starting with brackets $60/365$, then multiplication $\times 0.14$ and finally addition $+1$.

$$= \frac{4603.56}{1.02301...}$$

$$= 4500.00$$

The reciprocal key can then be used to multiply the value of the denominator by the numerator value of 4603.56.

Teaching Tip

Introduce the student to the use of the reciprocal key and the unary minus keys on the calculator. Using the reciprocal key can eliminate having to store and recall numbers. The unary minus key can facilitate making a number negative. See Pointers and Pitfalls on page 11.

I. Explain that percent means "per hundred". This is an important concept for the latter chapters in the book when calculations are performed with rate. In order to convert a percent to a decimal we divide by 100.

For example, converting a percent to a fraction:

$$4.5\% = \frac{4.5}{100}\ \begin{matrix}\times 10\\ \times 10\end{matrix} = \frac{45}{1000}\ \begin{matrix}\div 5\\ \div 5\end{matrix} = \frac{9}{200}.$$

And converting a percent to a decimal: $13.9\% = \frac{13.9}{100} = 0.139$.

To work backwards from fraction and decimal to percent we perform the opposite operation and multiply by 100. Remember to include the percent symbol if you multiply by 100.

Changing decimal to percent: $0.625 = 0.625(100)\% = 62.5\%$

To change fractions to percent we typically convert in two steps: fraction to decimal then decimal to percent.

$$\frac{9}{12} = 0.75(100)\% = 75\%$$

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Objective 3: Through problem solving, compute simple arithmetic and weighted averages.

A. The average is a widely used statistic. Many students are often eager to know what their average grade point average is. This can be used to motivate the study of the average and weighted average. The following example can be used to illustrate the difference between the average and weighted average.

Example:

Consider a grading scheme with two tests and a final exam. The first test counts for 25% of the final grade, the second test counts for 30% of the final grade, and the final exam counts for 45% of the final grade. A student achieves a grade of 50% on the first test, 65% on the second test, and 75% on the final exam.

A straightforward average of the three percentage grades would be:

$$\text{average} = \frac{0.50 + 0.65 + 0.75}{3}$$

$$\text{average} = 63.3\%$$

However, this would be inaccurate because each exam is weighted differently. In this case, the weighted average would be more appropriate. The weighted average can be found by evaluating the expression:

$$\text{weighted average} = \frac{(0.25 \times 0.50 + 0.30 \times 0.65 + 0.45 \times 0.75)}{(0.25 + 0.30 + 0.45)}.$$

$$\text{weighted average} = 65.8\%$$

*Note that this example involves order of operations, converting percents to decimals and decimals to percents, and rounding.

Teaching Tip

There may be some confusion as to which values should be used as weights. There are a number of examples in the text on pages 20-23 that can be used for finding a weighted average. Analyze these problems with students to reinforce which values are to be used as the weights in the calculation of the weighted averages.

B. Students are often interested in what grade they need on the final exam to obtain a certain final average such as 85% for an A. Challenge Problem #2 on page 38 of the text is a worthwhile one to explore in class.

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Objective 4: Determine gross earnings for employees remunerated by the payment of salaries, hourly wages, or commissions.

A. The calculation of regular pay and overtime pay can involve several steps, depending on the information given. Students can find the calculation of overtime pay challenging if they are required to calculate the number of overtime hours and the overtime hourly pay rate. Lead students through an example step by step to demonstrate the process.

Consider the following example:

Marion works as an administrative assistant. Marion's regular work week is 40 hours per week at $18.50 per hour. If she works more than 40 hours per week, she receives one and a half times the regular hourly rate. Find Marion's total weekly pay if she worked 48.5 hours during the week.

i. The regular pay is fairly straightforward and can be found by multiplying 40 × $18.50, which equals $740.

ii. The number of overtime hours is not directly given so the student will have to calculate the number of overtime hours. This can be done by subtracting 40 from 48.5 to get 8.5 overtime hours.

iii. The overtime hourly pay rate is also not directly given so the student will have to multiply $18.50 by 1.5 to get the hourly overtime rate of $27.75.

iv. The overtime pay can be found by multiplying $27.75 by 8.5 to get $235.88.

v. The total pay is then equal to $740 + $235.88 for a total of $975.88.

B. Some payroll problems involve calculating the regular hourly pay rate. Suppose the annual salary is given and there are 26 "two-week" pay periods in the year with a work week of 40 hours. There are several steps involved in calculating the regular hourly pay rate. Consider an annual salary of $50,200. The size of the "two-week" payment is found by dividing $50,200 by 26 to get a value of $1930.77. Since there are 80 hours in the "two-week" period, the last step in finding the regular hourly pay rate is to divide $1930.77 by 80 to get $24.13.

C. Employees may work on a commission basis. Several different methods of calculating commission are presented. The straight commission should be introduced first as it is the most straightforward. After sales returns and allowances are deducted from gross sales, the net sales figure is multiplied by the commission rate. For example, if Alice had net sales of $21,550 over a one-month period after returns were deducted and her commission rate is 12.75%, then she has earned:
$21,550 × 0.1275 = $2747.63.

Additionally, if she took an advance or draw on her salary of $700 midmonth, she would then be due the balance of $2047.67 at month's end.

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D. The graduated commission involves a tiered commission structure. As an example, Andrew receives a commission of 5.5% on his monthly sales up to $10,000. The rate then increases to 6.75% on the next $12,000, and the top rate of 9% applies to all sales above $22,000. There are several steps in evaluating the commission on $33,000 of net sales.

i. $0.055 \times \$10{,}000 = \$550$
ii. $0.0675 \times \$12{,}000 = \$810$
iii. $0.09 \times (33{,}000 - 22{,}000) = 0.09 \times 11{,}000 = \$990.$
iv. Andrew's total commission is then $\$550 + 810 + 990 = \$2350$.

Teaching Tip

The student may miss that the additional sales above $22,000 must be calculated before multiplying by the top commission rate of 9%.

E. Another approach to calculating commission involves granting a weekly salary plus a commission on sales above a certain quota.

Objective 5: Through problem solving, compute GST, HST, PST, sales taxes, and property taxes.

A. A tax is defined in the text as a "contribution levied on persons, properties, or business to pay for services provided by the government." Students will encounter the GST and PST or HST on their purchases. They may pay property taxes directly as an owner or indirectly as a renter. Tax is unavoidable and applies to everyday life. Link examples to everyday occurrences to illustrate the necessity for students to understand the total cost of items.

B. The GST can be calculated by multiplying the current rate of 5% by the value of goods purchased. If Sue purchases a sweater for $38.95, she will pay GST totaling $0.05 \times \$38.95$, or $1.95. If Sue lives in Manitoba, she will also pay provincial sales tax (PST) of 7% on the retail price. Sue's PST will be $\$38.95 \times 0.07 = \$2.73$. Her $38.95 sweater just became a $43.63 sweater. Tax calculation has become increasingly complicated with different rules applying to different provinces and territories. Some provinces (Quebec and Prince Edward Island) apply the PST to the retail price while others apply it after the GST is included. Other provinces have harmonized the GST and PST into one tax called the HST. Be sure to touch on the nuances of each different application.

*A full table of current tax rates can be found on page 30 of the text.

C. The property tax is a municipal tax charged on the assessed value of commercial and residential real estate. The property tax rate is often expressed as a mill rate, where 1 mill = $1/10^{th}$ of a cent ($0.001). The mill rate is defined as the amount of property tax paid for every $1000 of the assessed value of the property.

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Teaching Tip

Since the mill rate is equal to 0.1% of the assessed value of a property, the mill rate is multiplied by 0.001 and not 0.01.
Property Tax = Mill Rate × 0.001 × Assessed Value of Property

Consider the following example:

A homeowner has received a tax notice indicating that his house has been assessed at a value of $245,000. If the total mill rate is 16.9 mills, the property tax = $245,000 × 16.9 × 0.001 = $4140.50.

D. Refer the student to the Canada Revenue Agency website www.ccra-adrc.gc.ca for more information about property taxes and mill rates.

E. Businesses must also pay the GST on goods purchased. When the goods are sold to customers, the customer pays a GST that is collected by the business. If the amount of the GST collected by the business from its customers is less than the amount of GST the business paid on the goods it purchased, the business could file for a refund.

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Assignment Grid

Assignment	Topic(s)	Learning Objectives	Estimated Time in Minutes	Level of Difficulty
Exercise 1.1	Order of Operations	1	15-20	Easy
Exercise 1.2 A, B, C, D, E	Reducing fractions Converting fractions to decimals Rounding	2	20-25	Easy
Exercise 1.2 F	Simplifying complex fractions	2	30-35	Difficult
Exercise 1.3 A, B	Convert percents to decimals and fractions	2	30-40	Medium
Exercise 1.3 C	Convert decimals to percents	2	20-30	Medium
Exercise 1.4 A, B	Compute totals, arithmetic averages, and weighted averages	3	30-40	Medium
Exercise 1.5 #1–15	Determine earnings for employees earning salary, commission or a combination thereof. Include overtime calculations where applicable.	5	30-40	Medium
Exercise 1.5 #16	Determine earnings for employees earning hourly wages.	5	10-15	Medium
Exercise 1.6 #1–7	Perform GST, PST, and HST calculations.	5	30-40	Medium
Exercise 1.6 #8–11	Perform Property tax calculations.	5	20-30	Difficult
Case Study	Business and the GST/HST	5	50-60	Difficult

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Name_____Date_____Section_____

CHAPTER 1
TEN-MINUTE QUIZ

Circle the letter of the best response.

1. Simplify $10-7\times(8-6)$:
   a) - 4
   b) 6
   c) - 40
   d) 18

2. Consider the fraction $6/7$. The decimal representation of this fraction is:
   a) 0.86
   b) 0.086
   c) 0.0086
   d) 0.00086

3. Which of the following is an improper fraction?
   a) 1/2
   b) 7/5
   c) 3/4
   d) 8/12

4. A property has been assessed at $225,000. The mill rate is 14.5. To find the property tax, you would multiply the mill rate by:
   a) 0.10
   b) 0.001
   c) 0.01
   d) 0.0001

5. Sally worked 49 hours this week. A regular work week is 40 hours. The overtime hourly pay rate is 1.5 times the regular hourly pay rate. Find Sally's total pay if her regular hourly rate is $16.00 per hour.
   a) $712
   b) $660
   c) $856
   d) $640

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6. Jack is calculating his weighted grade point average for the following four courses. The grade for a course will be weighted by the credit hours for that course. Find Jack's weighted grade point average.

Course	Grade	Numerical Value of Grade	Credit Hours
Mathematics 12	B	3	3
Physics	C	2	4
Computer Science	B	3	3
English	D	1	3

a) 2.25
b) 2.23
c) 3.22
d) 2.42

7. Ben works as a salesperson in an electronics store. He is entitled to a 7% commission of his first $10,000 of sales and 8¾% commission on sales above $10,000. Find the commission earned this month if Ben's total net sales amounted to $15,000.
a) $1137.50
b) $1312.50
c) $1050
d) $1100

8. Round 18.9999 to one decimal place.
a) 18.9
b) 19.9
c) 19.0
d) 18.0

9. Susan bought a new sweater on sale for $28.93. She was charged HST of 13%. Find the total amount of her bill including taxes.
a) $30.38
b) $32.81
c) $32.69
d) $31.24

10. Convert the mixed number $4\frac{3}{7}$ to decimal form.
a) 4.43
b) 4.42
c) 4.37
d) 4.043

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Answers:

1. a	**2. a**	**3. b**	**4. b**	**5. c**
6. b	**7. a**	**8. c**	**9. c**	**10. a**

Additional Questions

1. Convert $7\frac{2}{5}$ to percent.
   a) 725%
   b) 740%
   c) 7.40%
   d) 7.25%

2. The decimal representation of $\frac{5}{8}$ is:
   a) 0.00625
   b) 0.625
   c) 1.6
   d) 0.16

3. Round the monetary value $85.6449 to the nearest cent.
   a) 85.65
   b) 85.60
   c) 85.64
   d) 85.645

4. A property has been assessed at $340,000. What is the property tax given a mill rate of 14.5?
   a) $4930
   b) $493
   c) $234
   d) $2345

5. Melinda makes $19.60/hour at her job. A regular work week is 40 hours and she is paid time-and-a-half for additional hours worked. What is her gross pay for a week in which she worked 6.5 hours of overtime?
   a) $911.40
   b) $813.40
   c) $974.13
   d) $975.10

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6. Evaluate $\dfrac{3145}{1-0.45\times\dfrac{172}{365}}$.
   a) 3144.79
   b) 3991.39
   c) 4602.75
   d) 2478.09

7. A seed store mixes three different types of bird seed in their wild bird seed mix. The mix consists of 9 kg of seed priced at $2.39/kg, 5 kg of seed priced at $1.98/kg, and 6 kg of seed priced at $3.19/kg. At what price should it sell the mix to realize the same revenue earned by selling the seed separately?
   a) $16.85/kg
   b) $5.06/kg
   c) $6.33/kg
   d) $2.53/kg

8. Determine the sale price of $1987.00 in purchases that are subject to 10% PST and 5% GST in Prince Edward Island, where the PST is applied after adding the GST to the sale price.
   a) $2294.99
   b) $2285.05
   c) $2096.29
   d) $2195.64

9. Convert $2\frac{5}{7}$ to decimal form.
   a) 2.71
   b) 2.72
   c) 2.57
   d) 2.07

10. A salesperson receives a weekly base salary of $950. Additionally, he earns a commission of 6% on all sales over $5000 per week. What are his gross earnings for a week when his sales are $6125?
    a) $1317.15
    b) $1250.00
    c) $1017.50
    d) $1007.00

Answers:

1. b	**2. b**	**3. c**	**4. a**	**5. d**
6. b	**7. d**	**8. a**	**9. a**	**10. c**

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