

14. [Applied Number]

Skill 14.1 Estimating outcomes.

MM9 1 1 2 2 3 3 4 4
MM10 1 1 2 2 3 3 4 4

- Round where appropriate to the nearest whole numbers or multiples of 10.
- Create an equation from the information given.
- Calculate, where necessary, the percentage of the given amount.
(see skills 6.4, page 59 and 6.5, page 60)

<p>Q. A toothpaste box weighs 8.01 g. Estimate how many would be required to make 1 kg of recyclable waste?</p>	<p>A. $8.01 \approx 8$ $1000 \div 8$ $= 125$</p>	<p>Round 8.01 to 8 g. 1 kg = 1000 g It would take 125 toothpaste boxes to make 1 kg of recyclable waste.</p>
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- a)** A dinner costs \$49.90. You tip 6%.
Estimate the size of the tip.

$$49.9 \approx 50 \text{ so } \frac{6}{100} \times \frac{50}{1} = \text{---Simplify: } \div 10$$

$$= 30 \div 10 = \boxed{\$3.00}$$

- b)** Dad donates half a round of golf. You pay the remaining \$19.85 for the round. Estimate the cost of a full round of golf.

$$= \boxed{}$$

- c)** Advertising costs contribute 10% of the \$25 050 development. Estimate the cost of advertising.

$$= \boxed{}$$

- d)** Your backyard is 124.6 m² of which 12% is playground. Estimate the size of your playground.

$$= \boxed{}$$

- e)** Concert tickets were \$149.95 until you found the internet discount of 12%. Estimate the savings if you buy online.

$$= \boxed{}$$

- f)** There are an estimated 8 000 000 species of insects in the world of which 24% are beetles. Estimate the number of beetle species.

$$= \boxed{}$$

- g)** Nearly 6% of Australia's 20 702 000 citizens applied for a passport in 2006. Estimate the number of Australian passports issued in 2006.

$$= \boxed{}$$

- h)** You weigh 44.8 kg. If you gain 3% of your body weight, estimate your weight gain.

$$= \boxed{}$$

- Write a number sentence from the information given.

Q. A 30% increase followed by a 10% decrease on the same item is greater than (>), less than (<) or equal to a 20% increase of the original value?

A.

$\frac{30}{100} \times \frac{40}{1} = 12$	+30%	Assume an amount e.g. 40				
$40 + 12 = 52$						
$\frac{10}{100} \times \frac{52}{1} = 5.2$	-10%					
$52 - 5.2 = 46.8$						
<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">$\frac{20}{100} \times \frac{40}{1} = 8$</td> <td style="padding-right: 10px; text-align: center;">+20%</td> </tr> <tr> <td>$40 + 8 = 48$</td> <td></td> </tr> </table>			$\frac{20}{100} \times \frac{40}{1} = 8$	+20%	$40 + 8 = 48$	
$\frac{20}{100} \times \frac{40}{1} = 8$	+20%					
$40 + 8 = 48$						
⇒ \$6.80 < \$8.00						

a) Litia saves \$5 per day for January. How much does Litia save?

January = 31 days

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 $31 \times 5 = \boxed{\$155}$

b) Lee buys 4 double and 2 single cones for \$16. The next day he buys 2 double and 4 single cones and pays \$14. How much is a double cone?

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c) How much can I save in a month if my pocket money is \$20 per week, and my expenses for 2 fortnights are as shown?

Expense	Cost
Sport	\$28
Entertainment	\$30
Clothes	\$15

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d) Which company has the cheapest car hire over 8 days?

Co.	Rates	Cost
A	Hire fee	\$75
	Daily rate	\$40
B	Hire fee	\$25
	Daily rate	\$60

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e) A 40% increase followed by a 30% decrease on the same item is >, < or = a 10% increase of the original value?

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f) My car uses a litre of petrol every 10 km. Petrol costs me \$1.65 per litre. How much money would I save in one week, if I walk 2.5 km to and 2.5 km from work for 6 days?

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Skill 14.3 Calculating percentages including commissions, lay-bys, taxes, tips, profit and loss.

- Write a number sentence from the information given.
- Calculate the percentage of the given amount. (see skills 6.4, page 59 and 6.5, page 60)

Commission = % × Selling price

<p>Q. Jai sells a property for \$118 000 and gets 3% commission. How much is Jai's commission?</p>	<p>A. $\frac{3}{100} \times \frac{118000}{1} =$ Simplify: ÷ 100</p> <p style="margin-left: 40px;">$= 3 \times 1180$</p> <p style="margin-left: 40px;">$= \mathbf{\\$3540}$</p>
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a) A TV was repaired for \$175, then a 10% GST was added to the price. What was the total cost of the TV repairs?

$\frac{10}{100} \times \frac{175}{1} = 17.5$ Simplify: ÷ 10

$175 + 17.5 =$ **\$192.50**

b) Archie leaves an extra 5% of the restaurant bill as a tip. The bill was \$150. How much was the tip?

$=$

c) A surfboard costing \$700 is sold at a loss of 12%. Calculate the selling price.

$=$

d) Kate is a car sales person, and she sells a car for \$84 000. If her commission is 2%, how much is Kate's commission?

$=$

e) In 2006 we consumed on average 500 g of carbohydrate per day. In 1980 we consumed 80% of this amount. How many grams of carbohydrate did we consume per day in 1980?

$=$

f) Fairy puts up 20% as a lay-by deposit on a shuttle board table. The table costs \$380. She will then make 4 equal payments of the balance. What will the last payment be?

$=$

g) The tap was repaired for \$308. If GST of 10% was included, how much was GST?

$=$

h) Tim pays \$160 000 for a property and sells it for 5% less. Calculate the loss.

$=$

Skill 14.4 Calculating wages.

- Write a number sentence from what you are given.
 - Consider the dollar amount and the time it takes to earn that.
- NB: *In Australia employers pay 9% of their employees base income into a superannuation fund.*

Q. Goldie earns \$238 for 17 hours work.
What is her hourly rate?

A. $\$238 \div 17 h =$
 $= \$14/h$

$$\begin{array}{r} 14 \\ 17 \overline{) 238} \\ \underline{- 17} \\ 68 \\ \underline{- 68} \\ 0 \end{array}$$

a) Sean is an apprentice, and he earns \$7.20 per hour for a 40 hour week. His pay this fortnight is \$595. By how much was Sean overpaid?

$40 \times 2 = 80$

$\$7.20 \times 80 = \$576/\text{fortnight}$

$\$595 - \$576 = \boxed{\$19}$

b) Joey earns \$192 for 16 hours work. What is his hourly rate?

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c) Tamara works from 9 pm to 2 am at a rate of \$13.50/h after tax. From midnight however, the pay rate doubles. What is this shift worth to Tamara?

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d) Today Prue and Trudy together earn \$600 for standard hair cuts. They share 15 customers. If Prue cuts 9 heads of hair, how much does Trudy earn?

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e) If Gary's tax for the year is \$3500, and his pay each fortnight is \$750, how much is his yearly wage before tax? [Hint: There are 26 fortnights in a year.]

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f) Kay is paid \$15/hour for a 20 hour week. Her pay this fortnight is \$485. By how much is Kay underpaid?

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g) Your employer's superannuation contribution is 9% of your base income. If your base income is \$30 000, what is your superannuation guarantee?

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h) How much does his employer pay quarterly (13 weeks) into John's superannuation if John's fortnightly wage, before tax, is \$2000? [Superannuation guarantee = 9%]

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- Write the words as an equation.
- EITHER**
- Bring the percentage to 100% by methods like doubling or first finding 1%, 5% or 10%.
(see skill 6.8, page 63)

- OR**
- Use algebra.

Q. If 75% of 24 students in the class are boys, how many students are in the class?

A. $\frac{75}{100} \times x = 24$
 $x = 24 \times \frac{100^4}{75 \cancel{\times 1}}$
 $x = 8 \times 4$
 $x = 32$

Simplify: ÷ 25 then ÷ 3

Write the words as an equation.
 Get the unknown amount alone on one side of the equation.
 Simplify by dividing both the top and the bottom of the fractions by common factors.
 Complete the multiplication.

a) If 20% of the cost is \$13, what is the total cost?

If 20% of x is \$13 then 10% is half or \$6.50

Find 100% $100\% = 10\% \times 10 = \6.50×10 **\$65**

b) Maria's iPod has 400 songs, and only 20% of its memory is full. How many more songs can Maria load on her iPod?

.....

c) Your tank is 5% full and has 800 L of water in it. How much water would the tank hold when full?

.....

d) In a bag of potatoes, 7 are rotten. If this is 25% of the bag, how many potatoes are in the bag altogether?

.....

e) In the railway carriage there are 95 people. This is 25% more than the number of seats. How many seats are in this carriage?

$x + \frac{25}{100} \times x = 95$

Simplify: ÷ ?
 $x =$

$x =$

f) Petrol has gone up 75% in the last 3 years to \$1.40 cents per litre. How much per litre was petrol 3 years ago?

$x =$

$x =$

Skill 14.6 Increasing or decreasing a quantity by a percentage.

- Calculate the percentage of the given amount. (see skills 6.4, page 59 and 6.5, page 60)
- To increase, add this result to the given amount. (see skill 6.9, page 64)
Hint: If an amount is increased by 20% it will become 120% of its original value.
- To decrease, subtract this result from the given amount. (see skill 6.10, page 65)
Hint: If an amount is decreased by 20% it will become 80% of its original value.

Q. Tickets purchased on weekdays get a 30% discount. If a Sunday ticket costs \$45, what does a Monday ticket cost?

A. $\frac{30}{100} \times \frac{45}{1} =$ *Simplify: $\div 10$*
 $= \frac{135}{10} = 13.5$
 $\$45.00 - \$13.5 =$ *Subtract the result from the original value*
 $= \mathbf{\$31.50}$

a) The sale of small cars increased by 15% in July. There were 40 small cars sold in June. How many small cars were sold in July?

$$\frac{15}{100} \times \frac{40}{1} =$$

Simplify: $\div 10$

$$= \frac{60}{10} = 6$$

Simplify: $\div 10$

$$6 + 40 =$$

Add the result to the original value

b) The global population reached 6 billion in 1999. What will the global population be in 2025 if it will grow by 30%?

$$=$$

c) The average life expectancy at birth in 1995 was 64 years. In 2025 it will grow by 12.5%. What will the life expectancy be in 2025?

$$=$$

d) Last year Sandra invested \$5000 in shares. In the past 12 months they lost 25% of their value. What is the value of her investment?

$$=$$

e) The population of Whyalla in South Australia increased by 20% in the 20 years to 1981. If the population was 13 600 in 1961, what was it in 1981?

$$=$$

f) You get 15% off your car insurance (cost = \$350) and house insurance (cost = \$450) if you combine the two payments. What would the joint payment be?

$$=$$

- Write an equation from the word problem.
- To find the total investment, after interest, add the interest to the principal.

Simple Interest = Principal \times Rate \times Time OR $SI = PRT$

Q. Darcy invests \$1000 at a simple interest rate of 12% per year. What did the investment equal at the end of 2 years?

A. $SI = PRT$
 $= 1000 \times \frac{12}{100} \times 2$ *Simplify: $\div 100$*
 $= 10 \times 12 \times 2 = 240$
 $1000 + 240$ *investment = principal + interest*
 $= \$1240$

a) How much interest would Sean pay on his credit card after 2 years if he owed \$1500 at an interest rate of 8% per year?

$SI = PRT = 1500 \times \frac{8}{100} \times 2$ *Simplify: $\div 100$*
 $= 15 \times 8 \times 2 = \boxed{\$240}$

b) Simple Interest = Principal \times Rate \times Time
 Paula invests \$100 for 1 year. If the interest rate is 14% per year, how much interest would Paula get?

$SI =$
 $=$ $=$

c) Simple Interest = Principal \times Rate \times Time
 A bank account of \$1000 earns 11% simple interest. How much interest is earned after 1 year?

$SI =$
 $=$ $=$

d) How much interest is paid on a loan of \$500 at a simple interest rate of 10% after 2 years?

$SI =$
 $=$ $=$

e) Pedro invested \$1500 at 5% simple interest for 2 years. How much interest did he earn?

$SI =$
 $=$ $=$

f) How much interest would Carey pay on his credit card after 3 years if he owed \$1200 at an interest rate of 12% per year?

$SI =$
 $=$ $=$

g) Guy borrowed \$200 for 3 years at a simple interest rate of 7% per year. How much does Guy owe at the end of 3 years?

$SI =$
 $=$
 $Total =$ $=$

h) Marcie invests \$750 for 4 years at a simple interest rate of 8% per year. How much does Marcie get back?

$SI =$
 $=$
 $Total =$ $=$

$$\text{percentage change} = \frac{\text{amount of change}}{\text{original amount}} \times \frac{100}{1} \%$$

- Find the difference between the amounts (amount of change).
- Divide the amount of change by the original amount.
- Multiply by 100% to find the percentage. (see skill 6.11, page 66)

Q. Petrol prices have risen from \$0.75 per litre in 2000 to \$1.11 per litre in 2006. Find the percentage increase.

A. $\$1.11 - \$0.75 = \$0.36$ *Subtract to find the amount of change*

$$\frac{0.36}{0.75} \times \frac{100}{1} \% = \frac{36}{75} \times \frac{100}{1} \%$$

Simplify: $\div 25$

$$= 144 \div 3$$

$$= 48\%$$

a) Charlie bought a car for \$24 000 and later sold it for \$18 000. Find the percentage loss.

$$24\,000 - 18\,000 = 6\,000$$

$$\frac{6000}{24000} \times \frac{100}{1} \%$$

Simplify: $\div 100$ then $\div 10$

$$= \frac{600}{24} \% = \frac{50}{12} \%$$

Simplify: $\div 12$ then $\div 2$

$$= \boxed{25\%}$$

b) Lou's wage increased from \$90/week to \$99/week. What is the percentage increase?

$$99 - 90 =$$

$$=$$

$$= \boxed{}$$

c) Jeans usually sell for \$88 but today they are discounted to \$66. What is the percentage decrease?

$$=$$

$$= \boxed{}$$

d) Mac bought an old chair for \$80, repaired it and sold it for \$200. What percentage profit did Mac make?

$$=$$

$$= \boxed{}$$

e) Kate's gas bill decreased from \$300 to \$258. What percentage saving is this?

$$=$$

$$= \boxed{}$$

f) Charles sold his \$60 text book at the second hand book shop for \$40. Calculate the loss as a percentage of the cost price.

$$=$$

$$= \boxed{}$$

- Write an equation for the word problem. yearly interest = principal × rate
- Calculate the amount of interest each year on that year's principal.
Hint: Deal with each year separately because in each year there will be a new balance or principal which includes all previous interest.

<p>Q. Luke invests \$2000 at a compound interest rate of 15% per year. After 3 years, how much does Luke have?</p>	<p>A.</p> $2000 + \frac{15}{100} \times \frac{2000}{1} =$ $= 2000 + 300 = 2300$ $2300 + \frac{15}{100} \times \frac{2300}{1} =$ $= 2300 + 345 = 2645$ $2645 + \frac{15}{100} \times \frac{2645}{1} =$ $= 2645 + 396.75 =$ $= \mathbf{\$3041.75}$	<p>Luke starts with \$2000</p> <p>After year 1: Principal is \$2000 plus 15% of \$2000 = \$2300</p> <p>The next year's interest is paid on the new balance of \$2300.</p> <p>After 2 years: Principal is \$2300 plus 15% of \$2300 = \$2645</p> <p>After 3 years: Principal is \$2645 plus 15% of \$2645 = \$3041.75</p>
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a) What is the total amount of interest repaid on a loan of \$800 after 2 years at a compound interest rate of 6%?

Year 1 $\frac{6}{100} \times \frac{800}{1} = 48$ Interest after year 1

$800 + 48 = 848$ New principal after year 1

Year 2 $\frac{6}{100} \times \frac{848}{1} = 50.88$ Interest after year 2

$Yr 1 + Yr 2 = 48 + 50.88 =$

Total Interest after 2 years

b) The population of a city compounded annually at a rate of 10% per year. Initially 1000 people, what was the population after 2 years?

Year 1

Year 2

c) April invests \$5000 at a compound interest rate of 20% per year. What is the total amount of interest April gets after 3 years?

Year 1

Year 2

Year 3

d) What is the total amount of interest repaid on a loan of \$12 000 after 3 years at a compound interest rate of 5%?

Year 1

Year 2

Year 3
