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Goals

Unit goals
- Understand the concepts and techniques introduced in consumer arithmetic, algebra and matrices, and shape and measurement.
- Apply reasoning skills and solve practical problems.

This week the work is on
- Comparing two quantities
- Percentage increase and decrease
- Unitary method

Theoretical Components

Resources:
PDF file: Week 2 Rates and Percentages
On-line resources: linked in the notes and in *Mathspace*

Knowledge Checklist
- Expressing one quantity as a percentage of another
- Increasing or decreasing a quantity by a given percentage
- Finding the whole amount if a percentage of this whole amount is known.

Order
1. Look at the Investigation.
2. Work through the booklet and Mathspace lessons to develop the skills necessary to complete the Investigation
3. Complete the Investigation.
4. Show your completed booklet to Toby/Serene and submit the Investigation for marking.

Practical Components

There are questions to be answered in the booklet *Week 2 Rates and Percentages.*

For this week the *Mathspace* lessons are:

Curriculum: General Maths 11 (AU)
Topic: Rates and Percentages
Subtopics:
→ Percentage Change
→ Unitary Method

Investigation

On HawkerMaths.com and attached to this week's booklet.

Quiz

Skills quiz on Mathspace

COMPARING TWO QUANTITIES

One quantity may be expressed as a percentage of another quantity or number (both quantities must be in the same units).

To find the percentage something is of a whole, take $\dfrac{\text{what you want}}{\text{the total there is}} \times 100$.

EXAMPLE

What percent is 482 of 1780 $\dfrac{\text{what you want}}{\text{the total there is}} \times 100$

$$\frac{482}{1780} \times 100 = 27.08\%$$

QUESTION 1

1. What percentage of 65 is 13?

2. If 12 out of 21 students in a class are girls, then, to the nearest percent, what percent of the class is composed of girls?

3. In a laboratory test on 360 light globes, 16 globes were found to be defective. What percentage were satisfactory (to one decimal place)?

4. After three rounds of a basketball competition, a basketball team had scored 300 points and had 360 points scored against them. Express the points scored by the team as a percentage of the points scored against them.

5. In a population of 3.25 million people, 2115000 are under the age of 50 (including the people who is 50 years old). Calculate the percentage, to two decimal places, of the population who are **OVER** the age of 50.

PERCENTAGE INCREASE AND DECREASE

When increasing or decreasing a quantity by a given percentage, the percentage increase or decrease is always calculated as a percentage of the original amount.

Example: Sally's daily wage of $175 is increased by 15%. Calculate her new daily wage.

15% 0f 175 $\qquad = \frac{15}{100} \times 175$

$\qquad\qquad = 26.25$

Sally's new salary $\qquad = 175 + 26.26$

$\qquad\qquad = \$201.25$

Another method:

100% + 15% = 115%

115% of $175 $= \frac{115}{100} \times 175$

$\qquad\qquad = \$201.25$

QUESTION 2

1. Increase $700 by 25%

2. Decrease 340 km by 18%

3. A restaurant adds a 12% surcharge to bills on public holidays. Calculate the total to be paid if the bill for a dinner for two on Australia Day comes to $74.50

4. A large workshop normally services an average of 240 cars in a week. Due to an outbreak of the flu there is a 35% reduction in the number of cars serviced in a particular week. How many cars were serviced in that week?

5. Due to the closure of a large business in the area, a school is expecting an 11% drop in its student numbers for the next year. If the current enrolment is 684 students, what is the anticipated enrolment for the next year?

FINDING THE WHOLE FROM A GIVEN PERCENTAGE

If a percentage of an amount is known, then the whole amount can be found by using the **unitary method**. This involves dividing to find 1% then multiplying by 100 to find 100%

Example: If 15% of an unknown number is $9, find the whole amount

1% is 9 divided by 15 = $0.6 (or 60 cents)
The whole (100%)   = 0.6 × 100
                       = $60   ie $9 is 15% of $60

Example: A TV discounted by 20% now sells for $2100. What was the original price?

A 20% discount means that that $2100 is 80% of the original price. The original price is 100% and 20% off leaves 80%.
1% is 2100 divided by 80   = 26.25
The whole (100%)   = 26.25 × 100   = $2625

QUESTION 3
1. Find the whole amount if 75% is 150 km.

2. 245 students at a school voted for a new uniform. If this is 35% of the school population, what is the school population?

3. The cost of a holiday is discounted by 25%. The holiday now costs $4800. What was the original cost of the holiday?

4. The profit on an iPod is 65% of the cost price. If the profit is $106, find the cost price correct to the nearest dollar.

QUESTION 4

1. Jemmy spends $1500 on a new pre-built computer and finds out that the cost of buying it pre-built is 15% of the price of the component parts. What is the greatest possible price of the component parts?

2. Nicky wants to be able to run 10 kilometres in under an hour. On the first day of her practice, she is able to run 6750 meters in an hour. How close is she (in percentage values) to achieving her goal?

3. Shaun has a weekly wage of $725 per week. He gets a pay increase of 10%. What is his new weekly wage?

4. Two shops are selling the same TV. One shop usually sells it for $250 but is selling it at a discount of 20%. Another shop usually sells it for $350 but is selling it at a discount of $350. Which shop has the better deal for the TV?

5. A store sells a tablet that originally costs $2000 at a discount of 6%. Marnie negotiates a further discount on the tablet to bring the price down to $1671.

   a) What was the selling price of the tablet after the first discount?

   b) How much further did Marnie manage to discount the product?

   c) Express Marnie's buying price as a percentage of the price after the first discount (that you calculated in question a).

6. A dishwasher that initially sells for $750 is discounted by 12%.

   a) What is the discounted price?

   b) Express the initial price as a percentage of the discounted price.

   c) Hence, determine the percentage you would need to mark up the discounted price in order to restore it to the original price.

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7. Year 11 and Year 12 students were asked their opinion on the statement: 'School hours should change from 9am-3pm to 10am-4pm'.

Roughly 63% of Year 11 students agreed, which amounted to 161 students.

140 of 215 Year 12 students agreed.

Based on the information given, answer the following questions.

a) Which year group had a higher percentage of students agree with the statement?

b) How many students in Year 11 were asked?

c) How many students were asked in total?

d) What percentage of the students did not agree with the statement?

e) A large group of incoming Year 10 students were also asked about the statement. Assume that the same percentage of students as the percentage of students in year 11 and 12 agreed with the statement. If there were 148 Year 10 students asked, roughly how many agreed?

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8. A store buys an oil painting at a cost of $4000 and marked it up 25%. A salesperson named Pablo sells the painting and receives 8% of the selling price as a bonus to his pay. How much extra did he earn from selling the painting?

9. A store buys eggs from a farmer at a price of $1.50 by the dozen. The store then sells the eggs to customers for $2.00 by the dozen. If the store buys 360 packs of eggs, and manages to sell 85% of them, answer the following questions.

   a) How many packs of eggs did the store sell?

   b) How much did the store spend on eggs?

   c) How much revenue did the store make from selling the eggs?

   d) Express the revenue the store made a percentage of the amount the spent on the eggs.

   e) If the store's total selling price is 105% of the buying price, then we can say that it made 5% profit. What was the stores percentage profit of the eggs?

   f) How many eggs did the store need to sell to make any kind of profit from the eggs? Write this number as a percentage of how many they actually sold.

Investigation Week 2

Question 1:

Thomas told me that there was to be a big clearance sale of books, and they were 50% off the already 50% off prices.
I said – are you serious? They are giving them away for free?
Are the books free? Support your answer using mathematics.

Question 2:

When doing moderate exercise, a relatively fit person should have a heart rate between 120-170 (for under 20 years old). This is between 60% and 85% of the maximum heart rate.
What is the maximum heart rate for this age group? The setting out is the critical part of this Investigation.

Marking Rubric

CRITERIA	EXPECTATIONS	POSS	MULT	GIVEN	TOTAL
Practical	Student completes practical work, including exercises and Mathspace task, of the brief to an acceptable standard set by the teacher.	**2**	**3**		**/6**
Investigation Task	Student completes the investigation task of the week to an acceptable standard set by the teacher.	**2**	**2**		**/4**
Reasoning and Communications	Student responses are accurate and appropriate in presentation of mathematical ideas, with clear and logical working out shown.	**4**	**-**		**/4**
Concepts and Techniques	Student submitted work selects and applies appropriate mathematical techniques to solve practical problems and demonstrates proficiency in the use of mathematical facts, techniques and formulae.	**4**	**-**		**/4**
	Submission Guidelines				
Timeliness	Student submits the exercises, Mathspace/online task and investigation by the set deadline. See scoring guidelines for specific details.	**2**	**-**		**/2**
				FINAL	**/20**

Student Reflection: How did you go with this week's work?
What did you learn?

What did you find easy?

What do you need to work on?

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