HAWKER COLLEGE
Engage | Inspire | Achieve

MA1
Consumer arithmetic

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 arising in consumer arithmetic, algebra and matrices, and shape and measurement
- communicate their arguments and strategies, when solving problems, using appropriate mathematical language
- interpret mathematical information, and ascertain the reasonableness of their solutions to problems
- choose and use technology appropriately and efficiently

This week we are going to:

- Review percentages
- Calculate percentage 'of' and percentage 'off'

Theoretical Components

Resources:
PDF file: Week 1 Notes and Exercises

Knowledge Checklist
- Meaning of percentage
- Percentages as fractions and decimals
- Expressing as a percentage
- Percentages 'of' amounts
- Percentages increase and decrease

Order
1. Read through the notes and examples
2. Work through the exercises
3. Complete the investigation at the end of the booklet.
4. Check Mathspace for any quizzes to complete.
5. Complete the reflection at the end of the booklet
6. Come and see your teacher and make sure you are up to date.

Practical Components

Work through the exercises and show the completed tasks to your teacher.

Be sure to ask for help as you need for the successful completion of all tasks.

Remember to regularly check Google Classroom for messages.

Investigation

Complete the task at the end of the booklet and submit your work for checking. ☺

QFO

Quiz/Forum/Other

Remember to check hawkermaths.com **for each week's learning brief.**

Make sure you have joined Google Classroom and Mathspace. If you have not, see your teacher.

WEEK 1 NOTES AND EXERCISES

PERCENTAGES

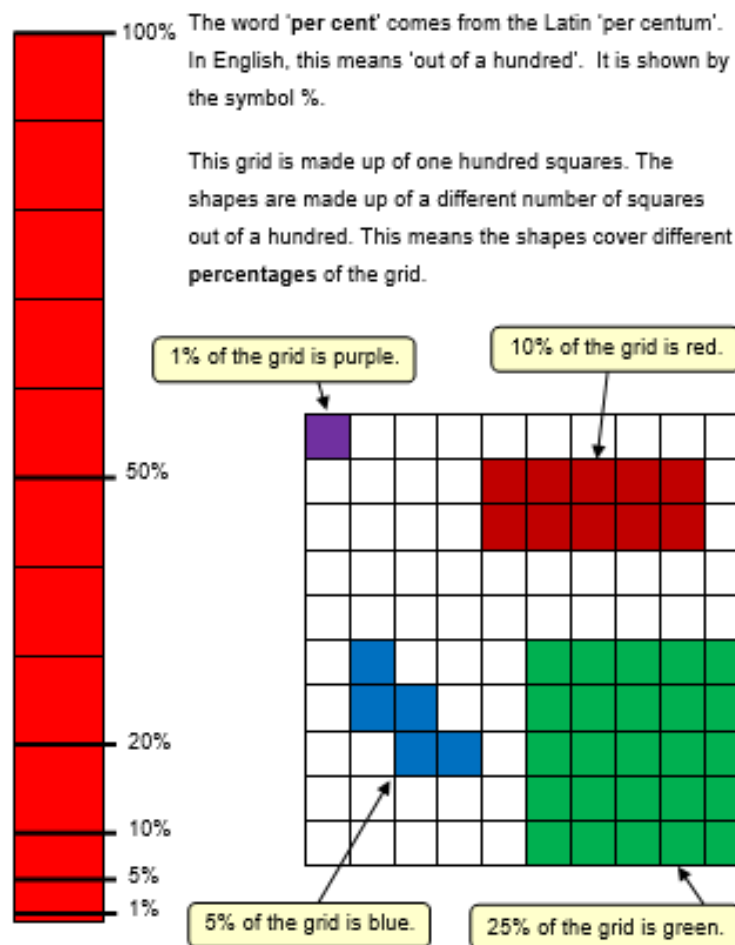Start by watching this 1-minute video on Why Percentages:
https://www.bbc.co.uk/teach/skillswise/percentages/z74vxyc

A longer video to watch:
https://www.homeschoolmath.net/teaching/percent/percent.php

Why compare fractions and percentages? Watch the video here:
http://www.bbc.co.uk/skillswise/topic/comparing-fractions

What is a percentage?

The word 'per cent' comes from the Latin 'per centum'. In English, this means 'out of a hundred'. It is shown by the symbol %.

This grid is made up of one hundred squares. The shapes are made up of a different number of squares out of a hundred. This means the shapes cover different **percentages** of the grid.

1% of the grid is purple.

10% of the grid is red.

5% of the grid is blue.

25% of the grid is green.

Fractions	Divide numerator by denominator	Decimals	Multiply by 100	Percents
$\frac{3}{4}$		0.75		75%
Fractions	Write as fraction and simplify	Decimals	Divide by 100	Percents
$\frac{2}{5}$		0.4		40%

FRACTION	DECIMAL	PERCENT
³⁄₅		
	0.64	
		55%
	0.16	
¹⁷⁄₁₀₀		
	0.35	
		28%
		62.5%
	0.59	
⁴⁄₇		
	0.44	
		32%
³⁄₂		
	0.824	
	0.73	
1 ¾		
		148%

EXPRESSING ONE QUANTITY AS A PERCENTAGE OF ANOTHER

We often change quantities into percentages so that we can compare them.

For example, we often calculate our marks in a test as percentages so we can **compare** our performances in each subject.

Example 3

What percentage is 16 out of 20?

Solution 3

Write 16 out of 20 as a fraction, $\frac{16}{20}$.

All you have to do to change a fraction to a percentage is multiply the fraction by 100.

$$\frac{16}{20} = \frac{16}{20} \times 100 = 80\%$$

On your calculator:

16 $\div$ 20 $\times$ 100 $=$

Example 4

Twenty-one of Patricia's 30 alpacas are white. What percentage of Patricia's alpacas are:

a white?   b not white?

Solution 4

21 out of 30 is $\frac{21}{30}$.

a Percentage white = $\frac{21}{30} \times 100 = 70\%$

b Total of Patricia's flock is 100%.

Percentage not white = $100\% - 70\%$

30% of Patricia's flock is not white.

$$\text{Percentage} = \frac{\text{amount}}{\text{whole amount}} \times 100\% \text{ OR amount} \div \text{whole amount} \times 100\%$$

Example
- (i)   Express 18 out of 25 as a percentage
- (ii)   Express 36 minutes as a percentage of 2 hours.

Solution
- (i) $\frac{18}{25} \times 100 = 72\%$

- (ii)   2 hours = 120 minutes

    $\frac{36}{120} \times 100 = 30\%$

EXERCISE 1

Q1. Change these fractions to percentages.

a) $\frac{3}{5}$ b) $\frac{7}{20}$

c) $\frac{9}{10}$ d) $\frac{3}{4}$

Q2. Write the following as percentages.

a) 32 out of 40   b) 60 out of 75

c) 5 minutes of 1 hour   d) 3 months of 1 year

e) 18 hours of 4 days   f) 50 days of 1 year

Q3. Arti has $50 in his wallet when he goes shopping. He has $5 left when he returns home.

a) How much money does Arni spend?

b) What percentage of his money does he spend?

Q4. Kyle had the following results in his half-yearly exams.

- o English: 45 out of 75
- o Mathematics: 38 out of 70
- o Science: 80 out of 125

a) Calculate Kyle's percentage in each subject. Answer correct to one decimal place.

b) In which subject did Kyle get his highest result?

FINDING A PERCENTAGE OF A QUANTITY

$$\text{Percentage of a quantity} = \frac{\text{Percentage}}{100} \times \text{quantity} \quad \text{OR} \quad \text{Percentage} \div 100 \times \text{quantity}$$

Examples

(i) Calculate 23% of $1650

(ii) Find 32% of 4 m.

Solutions

$\frac{23}{100} \times 1650 = \$379.50$

Change 4 m to 400 cm

$\frac{32}{100} \times 400 = 128$ cm

EXERCISE 2

Q1. Find:

a) 11% of $300

b) 60% of 140 kg

c) 42% of 600 cm

d) 85% of 700 000 people

e) 12% of 8 m

f) 60% of 1 year (answer in days)

g) 87.5% of 16 weeks (answer in days)

h) 40% of 1.5 tonnes (answer in kg)

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 weekly wage.

Solution

15% 0f 175 $= \frac{15}{100} \times 175$
$= 26.25$

Sally's new salary $= 175 + 26.26$
$= \$201.25$

Another method: 100% + 15% = 115%
115% of $175 $= \frac{115}{100} \times 175$
$= \$201.25$

Percentage OFF something – Most often used with regards to money, sales and discounts. Percentage OFF something means find that percentage, and take it off the price. This is a two-step calculation.

Example

What is 12% **off** 480

$12\% \ of \ 480 \ = \ 57.60$

So, 12% **off** is $480 - 57.60 = 422.40$

Do you know of another way to decrease 480 by 12%?

*Write the method down here:

Q1.

    a) increase $700 by 25%   b) decrease $700 by 25%

    c) increase $480 by 30%   d) decrease $60 by 15%

Q2. A tennis racquet is on special at an 8% discount. If it normally costs $150, how much does Maryanne save?

Q3. A clothing store offers 6% discount for cash sales. A customer who paid cash purchased the following items:

- One pair of jeans $95.95
- A leather belt at $29.95
- Two jumpers at $45 each

Calculate:

    a) the total saving

    b) the actual amount paid for the goods

Q4. After a fire, smoke-damaged goods are sold at a mark-down of 20% to clear stock.

      a) What is the marked price of a tracksuit with an original price of $175?
      - remember, this is a two-step process

Step 1: Find the discount.

Step 2: Find the new price.

      b) What would a dress that originally cost $240 sell for?

Q5. Shaun has a weekly wage of $725 per week. He gets a pay increase of 10%. What is his new weekly wage?

Q6. 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 35%. Which shop has the better deal for the TV?

Q7. 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

Q8. A hardware store is having a 15% off sale.

    a) How much would you pay for a router worth $282?

    b) Bob also gets 10% off the discounted price as a builder's discount. How much would he pay for the router?

    c) The cashier didn't know how to ring up two discounts, so she just gave Bob a 25% discount. Was Bob happy with this? Explain.

Q9. 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?

Q10. 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).

Q11. 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.

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

Layla is buying a book that is 25% off. Before Layla pays, the seller tells her that if she pays by cash, she will get extra 10% discount on the 25% discounted price. Is this same as 35% discount on the initial price? Use mathematics to verify your answer.

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	Student completes the investigation task of the brief to an acceptable standard set by the teacher.	2	2		/4
Communication and Reasoning	Student responses are accurate and appropriate in presentation of mathematical ideas in different contexts, with clear and logical working out shown.	4	-		/4
Knowledge and Application	Student submitted work selects and applies appropriate mathematical modelling and problem solving 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 practical work 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 was interesting?

What did you find easy?

What do you need to work on?