Exmouth Community College Academy Trust

Year 7 Spring 1   **Knowledge Organiser Unit 7 FRACTIONS AND PERCENTAGES**

Key vocabulary

Fraction: Part of a whole e.g. $\frac{3}{4}$ Numerator: How many parts we have

Denominator: How many equal parts the whole has been divided into
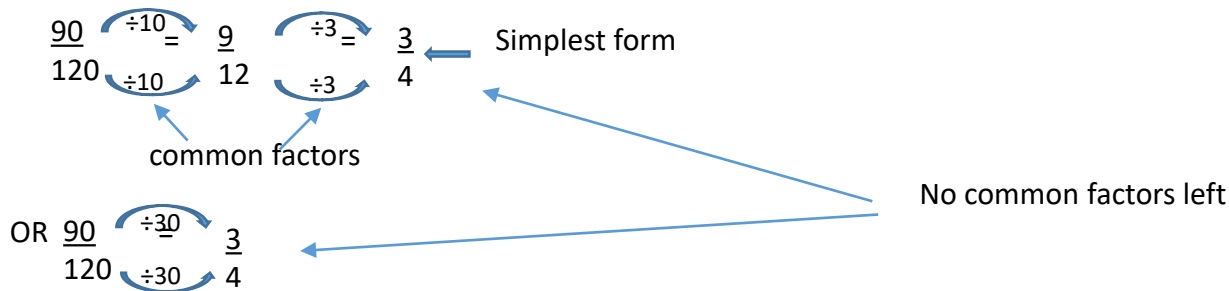
Unit Fraction: Always has a numerator of 1 e.g. $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{17}$

Improper Fraction: Numerator is bigger than the denominator e.g. $\frac{4}{3}$ $\frac{7}{5}$ $\frac{10}{3}$ $\frac{9}{2}$

Mixed Numbers: Has a whole number and a fraction part e.g. $3\frac{1}{4}$ $7\frac{2}{3}$ $10\frac{14}{15}$
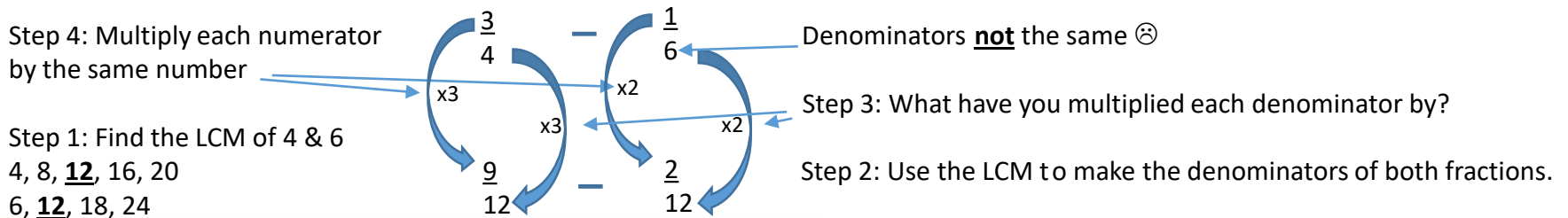
Equivalent Fractions: Fractions that use different numbers but have the same value e.g. $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{30}{60} = \frac{17}{34} = \frac{85}{170} = \frac{5}{10}$

Simplest Form: To get a fraction into its simplest form, divide the top and the bottom by any common factors e.g.

$\frac{90}{120}$ ÷10 = $\frac{9}{12}$ ÷3 = $\frac{3}{4}$ ← Simplest form

common factors

No common factors left

OR $\frac{90}{120}$ ÷30 = $\frac{3}{4}$

Key Skills

Adding and Subtracting Fractions: Must have the **same** denominator e.g.

Step 4: Multiply each numerator by the same number

$\frac{3}{4}$ − $\frac{1}{6}$ Denominators **not** the same ☹

x3   x2

x3   x2

Step 3: What have you multiplied each denominator by?

Step 1: Find the LCM of 4 & 6

4, 8, **12**, 16, 20

6, **12**, 18, 24

$\frac{9}{12}$ − $\frac{2}{12}$ Step 2: Use the LCM to make the denominators of both fractions.

You can try a few:

1) $\dfrac{1}{9}$ ➕ $\dfrac{2}{3}$ 2) $\dfrac{7}{10}$ ➖ $\dfrac{2}{5}$ 3) $\dfrac{5}{12}$ ➕ $\dfrac{1}{8}$ 4) $1 - \dfrac{2}{7}$ [think of as $\dfrac{7}{7}$]

ANSWERS 1) 7/9   2) 3/10   3) 13/24   4) 5/7

Finding a fraction of a quantity: Divide the quantity by the denominator and then multiply by the numerator e.g.

$\dfrac{2}{3}$ of £45 ⟶ 45 ÷ 3 = 15 ⟶ 15 x 2 = £30

You can try a few:

1) $\dfrac{3}{4}$ of 24   2) $\dfrac{7}{8}$ of 40   3) $\dfrac{2}{5}$ of 25

ANSWERS 1) 18   2) 35   3) 10

Place Value Table: Gives the values of each digit in a number

billions	millions			thousands				t	h	th	tth	hth	m
B	HM	TM	M	HTh	Tth	Th	H	T	U . 1/10	1/100	1/1000	1/10000	1/100000	1/1000000
									0 . 6	5				

$\dfrac{65}{100}$

Converting decimals into fractions:

e.g. 0.65 = $\dfrac{65}{100}$ ÷5 = $\dfrac{13}{20}$ ÷5 ← Leave your final answer in its simplest form

You can try a few:
1) 0.26   2) 0.8 3) 0.02 4) 0.35

ANSWERS 1) 15/30   2) 4/5   3) 1/50   4) 7/20

Converting fractions into decimals: Find an equivalent fraction with a denominator of 100 e.g.

$\dfrac{2}{5}$ x2 = $\dfrac{4}{10}$ x10 = $\dfrac{40}{100}$ = 0.40   = 0.4   [Bonus skill: Also 40%]

$$\frac{11}{25} \quad \overset{x4}{\underset{x4}{=}} \quad \frac{44}{100} \quad = \quad 0.44 \quad \text{[and 44\%]}$$

You can try a few:

1) $\dfrac{3}{5}$ 2) $\dfrac{9}{20}$ 3) $\dfrac{19}{50}$

Converting percentages into fractions: Start as a fraction over 100

e.g. $71\% = \dfrac{71}{100}$ and $32\% = \dfrac{32}{100} = \dfrac{16}{50} = \dfrac{8}{25}$ ← Leave as simplest form

You can try a few:

1) 17%   2) 64%

Converting percentages to decimals: Divide by 100 i.e. two places down

e.g. $14\% = 14 \div 100 = 0.14$ and $30\% = 30 \div 100 = 0.3$

You can try a few:

1) 23%   2) 70%

Converting decimals to percentages: Multiply by 100 i.e. two places up

e.g. $0.38 = 0.38 \times 100 = 38\%$ and $0.05 = 0.05 \times 100 = 5\%$ and $1.52 = 1.52 \times 100 = 152\%$ and $0.9 = 0.9 \times 100 = 90\%$

You can try a few:

1) 0.47   2) 0.08   3) 2.08   4) 0.1

Using a multiplier (decimal equivalent of the percentage) to work out percentages of amounts

e.g. To find 85% of 140   = $0.85 \times 140 = 119$

You can try a few:
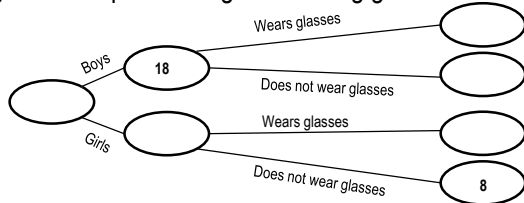
1) 46% of 750   2) 3% of 8400

On your calculator!

	Topic/Skill	Definition/Tips	Example
1.	Probability	The **likelihood/chance** of something happening	
2.	Probability Scale	Ac scale expressed as a number **between 0 (impossible) and 1(certain)** (0%-100%) Can be expressed as a fraction, decimal, percentage or in words (likely, unlikely, even chance etc)	impossible unlikely even chance likely certain 0 ———————————————— 1 1-in-6 chance 4-in-5 chance
3.	Event and outcome	Event is an activity. Outcome is the actual result of an activity	Throw a 2 on a die is event – 1, 2, 3, 4,5 and 6 are outcomes
4.	Fair/bias	Fair is **not giving priority** to one happening. Bias is **favouring** one happening	A biased die would come up more often with certain number than others
5.	Equally likely	Equally likely outcomes have the **same** probability of happening	
6.	Mutually exclusive	Events are mutually exclusive if the **cannot happen at the same time**. Outcomes are **exhaustive** if they **cover the entire range of possible outcomes**. Probabilities of an exhaustive set of **mutually exclusive** events **adds up to 1**.The **probability of something not happening** is **1 minus the probability that it does happen**	Examples of mutually exclusive events: – Turning left and right – heads and tails on coin Example of non mutually exclusive events: – King and hearts from a deck of cards because you can pick the king of hearts
7.	Probability Notation	**P(A)** refers to **the probability that outcome of the event is A**	P (red queen) refers to the probability of picking a red queen from a pack of cards
8.	Theoretical Probability	$$\frac{number\ of\ favourable\ outcomes}{total\ number\ of\ possible\ outcomes}$$	Probability of rolling a 4 on a fair-sided die is P(4)=$\frac{1}{6}$
9.	Trials	**Repeatedly** doing the same thing. The probability is **more accurate** if there are many repetitions	Flipping a coin 50 times; more accurate if flipped 500 times
10.	Experimental probability = relative frequency	$$\frac{number\ of\ successful\ trials}{total\ number\ of\ trials}$$	A coin is flipped 50 times ad lands on tails 29 times. The relative frequency of getting tails = $\frac{29}{50}$
11.	Expected outcomes	To find the number of expected outcomes, **multiply** the **probability** by the **number of trails**	The probability that a football team wins in 0.2. How many games would you expect them to win out of 40? 0.2 x 40 = 8 games
12.	Sample	A **sample** is a small selection of items from a population	A sample could selecting 10 students from a year group at school
13.	Sample size	The larger a sample size, the closer those probabilities will be to the true probability	A sample size of 100 gives a more reliable result that a sample size of 10

13. Sample space	A diagram showing the **set of all possible outcomes** of an experiment, in a table	The outcomes from two mutually exclusive events are added

*	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

14. Frequency Tree	A diagram showing how information is categorised into various categories, and all possible outcomes. The **lines** connected the numbers are called **branches**. The **numbers** at the ends of branches tells us how often something happened (**frequency**)	Frequencies of boys/girls in sample wearing/not wearing glasses

Boys 18 — Wears glasses / Does not wear glasses
Girls — Wears glasses / Does not wear glasses 8

15. Probability tree diagram	A branched tree diagram showing **all outcomes** and **all probabilities**. The probabilities **along the branches** are **multiplied**, while the probabilities going **down** are **added** (give a total of 1)	Probabilities of picking a black disc or white disc from a bag

1st draw	2nd draw	Outcomes	Probability
$3/8$ B	$3/8$ B	(B,B)	$3/8 \times 3/8 = 9/64$
	$5/8$ W	(B,W)	$3/8 \times 5/8 = 15/64$
$5/8$ W	$3/8$ B	(W,B)	$5/8 \times 3/8 = 15/64$
	$5/8$ W	(W,W)	$5/8 \times 5/8 = 25/64$

Try these . . .

1. There are three 5p coins and three 10p coins in a bag. Amelita takes at random a coin from the bag

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|-----------|-----------|
0          1/2          1
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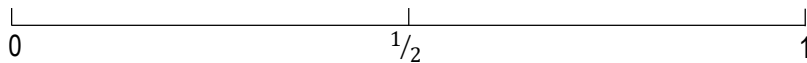
On the probability scale:
a) Mark with the letter X the probability that Amelita takes a 5p coin
b) Mark with the letter Y the probability that Amelita takes a coin with a value of less than 5p

2. There are 5 red counters, 3 yellow counters and 1 blue counter in a bag. Harry takes at random a counter from the bag. Find the probability that the counter is

a) red   b) not blue   c) red or blue   d) pink

3. The probability that a spinner lands on blue is 0.4. Find the probability that it does not land on blue

4. During the past 30 days Josh has missed his school bus on 4 of those days. Estimate the probability that Josh will miss his school bus tomorrow.

Topic/Skill	Definition/Tips	Example
Ratio	Ratio compares the size of **one part** to **another part**	3:1
Proportion	Proportion compares the size of the **one part** to the size of the **whole** Usually written as a fraction	In a class with 13 boys and 9 girls, the proportion of boys is $^{13}/_{22}$ and the proportion of girls is $^{9}/_{22}$
Simplifying ratios	**Divide** all parts of the ratio by the **common factor**	5:10 = 1:2 (divide both by 5) 14:21 = 2:3 (divide both by 7)
Connection between ratio and percentages	**Add** both parts of the ratio to get **denominator**. The multiply by 100 to get the **percentage**	3:2 $^{3}/_{5}$ X 100 = 60% $^{2}/_{5}$ X 100 = 40%
Sharing in a ratio	1. **Add** the total parts of the ratio 2. **Divide** the amount to be shared by this value to find the value of one part 3. **Multiply** this value by each part of the ratio Use only if you **know the total**	Share £60 in the ratio of 3:2 3+2=5 60+5=12 3x12=36, 2x12=24 £36:£24
Proportional Reasoning	Comparing two things using **multiplicative reasoning** and applying this to a new situation. Identify one multiplicative link and use this to find missing quantities	30 minutes →x2→ 60 pages ? minutes →x2→ 150 pages
Unitary Method	Finding the **value of a single unit** and then finding the necessary value by **multiplying** the single unit value	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes. 3 cakes = 450g So 1 cake = 150g (÷ by 3) So 5 cakes = 750g (x by 5)
Ration already shared	Find what one part of the ratio is worth using the unitary method	Money was shared in the ration 3:2:5 between Ann, Bob and Cat. Given that Bob has £16, find out the total amount of money shared. £16 = 2 parts So £8 = 1 part 3 + 2 + 5 = 10 parts, so 8 x 10 = £80
Best buys	Find the **unit cost** by **dividing** the **price by the quantity**. The **lowest** number is the best value.	8 cakes for £1.28 → 16p each (÷ by 8) 13 cakes for £2.05 → 15.8p each (÷ by 13) Pack of 13 cakes is best value

Try these . . .

1. The total cost of 6 identical pends is £3
a) Work out the cost of 1 of these pens.
b) Work out the cost of 5 of these pens

2. Bill makes toy trains and cars. For every train he makes 3 cars. On Monday, he made 7 trains.
a) How many cars did he make?
On Tuesday, he made 27 cars.
b) How many trains did he make?

3. Write each of these ratios in its simplest form.
a) 4 : 12
b) 24 : 32

4. Carlton takes 10 shots in practice for a basketball game. The scores on 6 of these shots. What proportion of his shots does he score?
Give your answer as a percentage

5. There are 27 children in Mrs Rahkit's class. 12 of the children are boys.
Write the ratio number of boys : number of girls
Give your answer in the simplest form

6. Ahmad makes compost by mixing 0.5kg of sand with 2kg of peat.
a) Write the ratio of sand to peat. Give your answer in its simplest form.
b) What percentage of the compost is sand?

7. Ginny makes an orange drink by mixing 2 parts squash with 7 parts water. She has 400ml of squash.
How much orange drink can she make?

8. £240 is split into the ration 5 : 3. what are the two amounts?