

**Key Knowledge/Prior Learning KS2/3 and Retrieval and Suggested Starters**

Ratio Recap:

- Simplify ratios.
- Divide a given quantity into two parts in a given part : part or part : whole ratio
- Solve ratio problems when you are given one of the quantities or the difference between two quantities.
- Apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
- Substitution
- Rearranging formulae.

**Retrieval and Suggested Starters**

- Practising the fluency of the above skills.
- Interleaving & problem-solving questions involving the above topics.

**KS4 National Curriculum – what students will be practicing**

- Solve problems involving direct and inverse proportion, including graphical and algebraic representation
- Solve best buy problems.
- Understand and solve problems involving recipes.

**Specific Ambitious Knowledge**

- Understand that  $X$  is inversely proportional to  $Y$  is equivalent to  $X$  is proportional to  $1/Y$
- Interpret equations that describe direct and inverse proportion
- Interleaving topics & problem-solving scenarios.

**Key Vocabulary/Literacy Opportunities**

- Inverse
- Direct
- Proportion
- Indirect

**Key Formulae/Knowledge:**

### Example 1

The cost of making a dress is directly proportional to the time spent making it. A dress costing £30 takes 6 hours to make. Find the time taken to produce a dress costing £40.

$$c \propto t$$

$$c = kt$$

$$k = c \div t$$

$$k = 30 \div 6$$

$$k = 5$$

$$\therefore c = 5t$$

$$c = 5t$$
$$40 = 5t$$
$$40 \div 5 = t$$
$$t = 8 \text{ hours}$$

### Example

If  $y$  is inversely proportional to the square of  $x$  and  $y = 2$  when  $x = 3$ , find

(i)  $y$  when  $x = 12$

(ii)  $x$  when  $y = 0.5$

$$y = \frac{k}{x^2}$$

$$2 = \frac{k}{3^2}$$

$$18 = k$$

$$y = \frac{18}{x^2}$$

$$(i) y = \frac{18}{12^2}$$

$$y = \frac{1}{8}$$

$$(ii) 0.5 = \frac{18}{x^2}$$

$$x^2 = \frac{18}{0.5}$$

$$x^2 = 36$$

$$x = 6$$

### Which one is cheaper? Division Method



2 pints at £ 2.00

£2.00 divided by 2 pint  
= £1.00 per pint



3 pints at £ 2.50

£2.50 divided by 3 pint  
= £0.83 per pint

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### Salad

Ingredients - Serves 4

50g black olives  
3 medium tomatoes  
1 carrot  
1 red pepper  
1/2 red onion  
30ml olive oil  
150g feta  
1 small lettuce

1) How much of the ingredients would be required to serve 16?

2) If 2 onions were used, how many carrots would be needed?

3) How many olives would be needed to serve 2 people?

4) If 4 peppers were used, how many would this serve?

5) If 100ml of olive oil is used, how much feta is needed?



### Cross Curricular Links

- Links to other areas of the maths curriculum such as algebra, percentages, etc.

**Student' Thinking**

- What happens when one increases if two variables are inversely proportional?
- Can the value of  $k$  change?
- Is there more than one method to determine a best buy?

**Projects/Enrichment/Investigations**

- Shared documents/Maths/Projects/Problem-solving card sorts.