

Fractions, Ratios and Percentages

MATHEMATICS KEY STAGE 4

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Introduction

SUMMARY:

Use holiday planning to identify and calculate related costs as one important way of using ratios and percentages.

STRUCTURE:

The content is divided into two (approximately) 60 minute lessons.

PRESENTATION:

Italicised text are suggested scripts for the teacher to say. There are explanatory notes to aid quick understanding of some of the finance material.

GCSE ASSESSMENT OBJECTIVES ADDRESSED IN THE LESSON¹

The mathematical content specifications in this presentation are those used in the Mathematics GCSE Subject content and assessment objectives and are identified in **red**.

N11: **identify and work with fractions in ratio problems**

N12: interpret fractions and percentages as operators

R5: **divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)**

R9: define percentage as 'number of parts per hundred'; **interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics**

¹ From government specification content where:

- All students will develop confidence and competence with the content identified by standard type
- All students will be assessed on the content identified by the standard and the underlined type; more highly attaining students will develop confidence and competence with all of this content
- Only the more highly attaining students will be assessed on the content identified by bold type. The highest attaining students will develop confidence and competence with the bold content.

Before lesson 1



HOMEWORK FOR THE PUPILS

The following work to be set before the lesson:

1. Use a search engine to find out what is meant by the term 'package holiday'.
2. What items are included in a package holiday?
3. What are the advantages and disadvantages of going on a package holiday?

FOR THE TEACHER

Review the submitted homework before the lesson and select one or two to discuss in class (detailed in an activity below).

Lesson time



GENERAL NOTES

The associated powerpoint presentation has supporting script notes to help you. These can best be viewed by clicking 'View/Notes Page' in powerpoint. Items in *italics* are a proposed script for you to say. The content of the lesson plan follows closely the notes contained in the powerpoint.

Teaching and activities

CLASS DISCUSSION: INTRODUCE DISCUSSION ON THE HOMEWORK

Ask for volunteers to say or present their homework results to the class. (How this is tackled by the teacher will vary depending on how willing the class is to present their ideas). It may be preferable to have group ideas presented or to choose one or two pieces of homework for the teacher to present.



EXPLANATORY NOTES

A key skill is being comprehensive in identifying all the relevant elements of a problem.



HERE ARE SOME SUGGESTED ANSWERS:

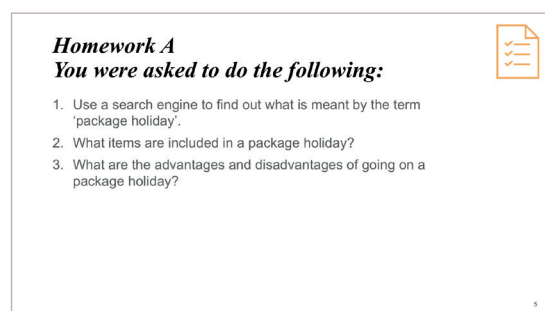
1. A package holiday is a holiday in which all of the key elements are combined to produce a single price. The key elements are likely to include: flight, hotel, transfers, food and, possibly, activities.
2. There are many items. This is not an exhaustive list
 - Flight
 - Hotel
 - Transfers
 - Food
 - Drinks on all-inclusive holidays
 - Activities (sports, rides, trips and excursions)
 - Flight and seat upgrades
 - Hotel room upgrades
 - Insurance
 - Extra baggage
3. Advantages and disadvantages of a package holiday
 - Advantages
 - Can be very cheap
 - Easy to arrange
 - Reliable holidays from trusted operators
 - ATOL protection² which applies when the flight and accommodation are booked through a single company so you can't be left stranded abroad or out of pocket if the travel company collapses

- There is likely to be a tour guide to help deal with any problems
- Disadvantages
 - Only limited routes. You will have to go where the holidays are available
 - Some people prefer to be independent in their holiday choice and not to be part of a group
 - Independent booking via the internet has opened up many more opportunities to take holidays where packages are not available

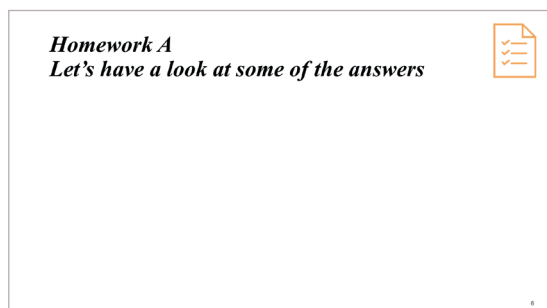
REFERENCE SLIDES



Slide 2



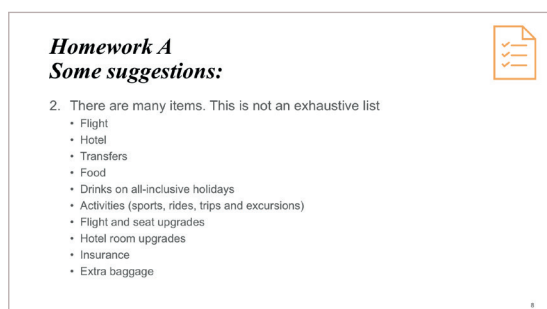
Slide 5



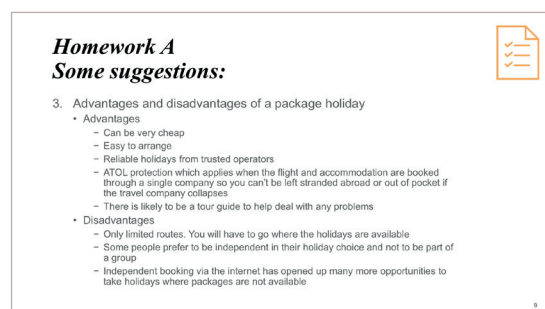
Slide 6



Slide 7



Slide 8



Slide 9

² <https://www.caa.co.uk/atol-protection/consumers/about-atol/>

INTRODUCE THE CLASS TOPIC

Meet Maya and her family. Maya lives with her parents and her brother, Rohan. Her mum and dad have asked Maya and Rohan where they would like to go on their family holiday together.

Rohan would like a beach holiday where it is likely to be warm and sunny and suggests going to Spain. Maya says that they should look at what this is likely to cost and then work out if they can afford it.

Going on holiday is fun but can be expensive! You need to think carefully about the total costs and also the different ways the cost may be paid. For example, the holiday could be paid in full or spread by instalments. Also, if going outside of the UK, foreign currency problems need also to be thought about since they can create a barrier to understanding financial transactions.

There is a lot to think about and your mathematical skills can help us be clearer about what information we might use in order to make some important decisions. Mathematics doesn't provide all the answers to financial problems but it can provide a useful perspective on what can be a complex set of issues.

What we can do together today is to see how realistic financial problems can be thought about in terms of how we interpret and represent data. Let's see how we can apply some of the ideas you have been taught.

REFERENCE SLIDE



Slide 10

Task 1

CLASS PROBLEM: INTRODUCE TASK 1

Task 1 may be omitted if it is felt that the homework answers have dealt with the problem sufficiently or if the homework is not set. The additional item contained in task 1 is that it includes discussion of pre-holiday expenditure versus what will be spent while on holiday. It is a reinforcement activity.

If task 1 is used, ask pupils to consider what should be included in budgeting for a holiday overall, including identifying what items need to be paid for before the holiday and what items should be paid for during the holiday. The importance of this point is that budgeting for foreign currency will have to be considered for items bought while on holiday.



EXPLANATORY NOTES

The important point, here, is to encourage the pupils to be comprehensive about their identification of what spending might be in terms of what is i) necessary or ii) optional. And also between what spending needs to i) take place before the trip and ii) take place during the holiday. This type of categorisation helps with identification of spending. It will be important to suggest that some types of spending are not likely to be optional (holiday insurance) and, so, any choice that is exercised in relation to insurance won't concern paying for insurance cover but may consider the balance between alternatives offering differing levels of cover for different cost.

REFERENCE SLIDE



Task 1: holiday costs

Maya wants to work out how much a holiday is likely to cost but is unsure about what she will need to budget for while on holiday. Rohan wants to go to Spain and that will mean a flight and hotel, at least.

Working in pairs, identify what Maya and her family might need to buy if they book a holiday to Spain.

Hint: think about what they might spend before they depart for the holiday and also while they are on holiday.

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PUPILS ARE ANSWERING TASK 1

EXPLANATORY NOTES



Emphasise that they may have had different answers. Explore in a class discussion which are likely to be essential items. It might be worthwhile exploring what is meant by 'essential': it might be defined as the largest item or an item that cannot be avoided. Ideally, you should get to a point where you are able to emphasise that there are quite a few factors to take account of. What is important in this session is that the pupils are able to see the range of issues and can offer perspective while supporting that with some views about which is important.

REFERENCE SLIDE

Task 1: holiday costs

1. Before departing
 - a. Holiday insurance
 - b. Holiday clothes
 - c. Transport to airport
 - d. Holiday cost
 - e. Converting UK currency to €: costs of currency conversion
2. While in Spain
 - a. Meals in Spain
 - b. Trips and excursions
 - c. Gifts and souvenirs
 - d. Holiday treats eg. beach sports, boat rides, water-park fees, etc.
 - e. Sundries such as sun cream, drinks, ice creams, snacks, etc.

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Slide 12

CLASS DISCUSSION TO EXTEND TASK 1



Raise the issues in the slide and encourage the class to be specific in their comments. The purpose of this discussion is to stretch the range of thinking about the problem as one way of demonstrating how to be comprehensive in an initial assessment of how to approach a problem.

EXPLANATORY NOTES



The discussion here should identify as many alternatives as possible. It should also tease out the reasons why choices might be made so that the pupils can begin to reflect on decision criteria. The decision criteria will be important later on since we will use the maths in this module to help inform choice.

REFERENCE SLIDES

Class discussion

- Which do you think are the essential items that have to be paid for? For example, is insurance essential?
- What alternatives exist for those items on the list which are bought before departure? For example, in travelling to the airport, it may be possible to go by bus, train or taxi.
- What factors do you think would help you make up your mind for the alternatives you have identified?

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Some alternatives identified before departure

1. Holiday insurance
Either: **Take out insurance**, or **Don't take out insurance**
2. Holiday clothes
Either: **Pack a light suitcase**, or **Take a lot of clothes**
3. Transport to airport
Either: **taxi, bus, train**, or **Pay for car, petrol and car parking**
4. Holiday cost
Either: **Package: hotel, flight, and local transfers (bus/coach from Spanish airport to hotel) included**, or **Independently booked: hotel, flight, transfers**
5. Converting UK currency to €: costs of currency conversion
Either: **Converted in the UK**, or **Converted in Spain**

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Task 2

CLASS PROBLEM: HOW TO PAY FOR A HOLIDAY

We will now look specifically about how to pay for a holiday. Having looked at a brochure, there are three options offered:

- Pay in full
- Pay in five instalments
- Pay a deposit plus a final balance

Let's work through the details on the slide ...

Then get the pupils to begin working through the details of the problem assuming a basic holiday cost of £2,700.

REFERENCE SLIDES



Slide 15

BROCHURE DETAILS: HOW TO PAY FOR YOUR HOLIDAY

How to pay: Once you've been told the basic cost of your holiday there are three options you can choose when deciding how to pay.

Option 1: Pay in full. We offer a 5% discount on the basic holiday cost if you do this.


Option 2: Pay in five instalments. An initial instalment of 1/5 of the basic holiday cost is paid. The remaining balance of the basic holiday cost is paid by a further four equal instalments. We will charge an additional 1% of the basic holiday cost for this service which is paid with the final instalment.

Option 3: Pay a deposit plus final balance. Pay an initial low deposit of £100 followed by the remaining balance in full six weeks before you depart for your holiday. We charge an additional 3% of the remaining balance for this service.

It's your choice!

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REFERENCE SLIDES (CONT)

Task 2: best way to pay 

Maya wants to work out which would be the best way to pay for the holiday. She has calculated that the **basic cost of the holiday** for four people is £2,700. Let's help her finish the work.

Working in pairs, from the details in the brochure (previous slide):

1. identify what is the cheapest option to pay for the holiday by working out the cost of the holiday that would be paid under each option; and
2. explain why the cheapest option might not be the best option for Maya's family.

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Slide 17

PUPILS ARE ANSWERING TASK 2



CLASS PROBLEM SOLUTION: TASK 2

Option 1: solution is straightforward.

REFERENCE SLIDE

Task 2: best way to pay 

PAY IN FULL AND GET EARLY PAYMENT DISCOUNT

Basic holiday for four people	£2,700.00
Option 1	£
Basic cost	2,700.00
Discount (5% x £2,700)	-135.00
Cost	2,565.00

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CLASS PROBLEM SOLUTION: TASK 2

Option 2: The straightforward solution to get to the total cost is $£2,700 \times 1.01 = £2,727$.

The schedule of payments is not asked for and it might be worth hinting that to show the schedule might give the pupils more information about which may be the best way to pay for the holiday in the second, discussion part, of the task.

It will be a very good sign if pupils raise questions about the financial implications of the scheduling of the payments at this stage but answers can be left to the discussion part of the task dealt with below.

REFERENCE SLIDE

Task 2: best way to pay 

PAY IN INSTALMENTS AND PAY A 1% CHARGE

Option 2	£
Initial instalment ($1/4 \times 2,700$)	675
Remaining balance = $(2,700 - 675) = 2,025$	
Four equal instalments = $(2,025/4) =$	506.25
	506.25
	506.25
	506.25
Total of basic holiday cost repaid	2,700.00
Additional charge of 1% of basic holiday cost payable	
With the final instalment of the basic holiday cost:	27.00
Total cost plus the 1% charge on the basic holiday cost:	2,727.00

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CLASS PROBLEM SOLUTION: TASK 2

Option 3: The points to bear in mind are keeping attention to the detail.

The specific mathematical tasks undertaken are:

1. Work out percentage increases and decreases
2. Calculate using fractions and percentages

The payment schedule is not asked for but you might hint that it could be useful in further discussions. The payment schedule is:

Payment schedule: immediate payment £100.00. Balance six weeks before holiday £2,678.00.
Total payment £2,778.00.

REFERENCE SLIDE

Task 2: best way to pay 

PAY AN INITIAL LOW DEPOSIT AND A FINAL BALANCE. PAY A 3% CHARGE

Option 3	£
Additional charge calculation	
Basic holiday cost	2,700.00
Less initial deposit	-100.00
Remaining balance	2,600.00
Additional charge of 3% of remaining balance	78.00
Total holiday cost	
Basic cost	2,700.00
Additional 3% charge	78.00
Total holiday cost	2,778.00

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Slide 20



CLASS DISCUSSION: THE FOLLOWING IS DESIGNED TO REINFORCE AND EVALUATE UNDERSTANDING

POINTS FOR THE TEACHER TO RAISE:

Identify the basic costs of each option and highlight that there might be other factors to consider.

Issues:

1. Whichever method of payment is chosen, we still must find a significant amount of money. Is it wise to spend this much money on a holiday?
2. Delaying payments can be advantageous because it allows individuals to save up for the amounts due.
3. Delaying payments is a benefit to the customer but a cost to the business. The longer the business waits for the money, the more it costs them in terms of, for example, bank charges that they may incur. Businesses will always try to pass on these costs and the longer the delay to them the more cost there is to pass on. This is essentially why option 2 is cheaper than option 3.
4. In delaying payment, we may forget to make the payments as they fall due.
5. There may be other items in the holiday contract that we may need to consider before making a final decision (such as penalty payments if we cancel the holiday).

REFERENCE SLIDE

Discussion: the best option

The option costs are:
Option 1 - £2,565
Option 2 - £2,727
Option 3 - £2,778

The cheapest option is to pay in full at the start and get an early payment discount. The best option might raise additional points:

1. Do we have the cash to pay at the start?
2. Is it worth delaying payments which are available under options 2 and 3? What are the advantages of delaying?
3. Both options 2 and 3 offer to delay payment. Why do you think option 2 is cheaper than option 3?
Is there anything else we need to take account of in deciding which is best?

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Slide 21

Homework for lesson 2

INTRODUCING EXCHANGE RATES: GO THROUGH THE SLIDE

EXPLANATORY NOTES

The aim here is to get pupils used to applying exchange rates which will become a key feature of the follow-on lesson. The associated homework will get pupils to research exchange rates.



HOMEWORK

Ask the pupils to complete the homework. This is included in the Tasks folder to print off if necessary.



EXPLANATORY NOTES

Also included in the homework is a task to ask pupils to find the exchange rate for bitcoins. The exchange rate is available on most search engines, and certainly on Google. Bitcoins are very topical and it might be worth introducing the following definition to them:

Bitcoins are a digital currency that does not have a physical presence (unlike a pound coin). Transactions using bitcoins are recorded in secure computer systems, rather like bank accounts. They have been in the news recently because their exchange rates to all other currencies have moved a great deal.

The issue about using bitcoins is that the exchange rate looks odd and will test the confidence of pupils in applying the exchange rate conversion. At the time of writing, the bitcoin : £ exchange rate was Bitcoin 0.00014 : £1. Hence, in order to buy one bitcoin, you would need $1/0.00014 = \text{£}7,142!$

REFERENCE SLIDES

Introducing exchange rates

Exchange rates are mostly expressed using the following format:

Foreign currency amount per £1.

Or, for US dollars, the exchange rate might be US\$ 1.4:£1, or 1.4:1

For example, if the € exchange rate to the £ is 1.2:1 this will mean that a book, for example, that costs £5 in the UK would cost €6 in a country using the € (we multiply the £ amount by the € exchange rate or $5 \times 1.2 = 6$). Alternatively, if we bought a drink for €4 in Spain, we would be able to work out what it would cost in £ sterling by dividing the € cost by the € exchange rate: $\text{€}4/1.2 = \text{£}3.33$.

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Slide 22

Homework B



1. Using the following list, calculate how much the items would cost in £ sterling, by finding out from a search engine what the exchange rate should be:
 - a. Sun lotion: €4.50 (€)
 - b. Book: \$14.00 (US dollar)
 - c. Soft drink: 200 Rupee (Indian)
2. It is also possible to find an exchange rate for the digital currency, bitcoin. What would a car cost in £ sterling if it was selling for 2 bitcoins?

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Slide 23

Lesson time

General notes: The associated powerpoint presentation has supporting script notes to help you. These can best be viewed by clicking 'View/Notes Page' in powerpoint. Items in italics are a proposed script for you to say. The content of the lesson plan follows closely the notes contained in the powerpoint.

Teaching activities

CLASS DISCUSSION: INTRODUCE DISCUSSION ON THE HOMEWORK

Ask for volunteers to say or present their homework results to the class. (How this is tackled by the teacher will vary depending on how willing the class is to present their ideas). It may be preferable to have group ideas presented or to choose one or two pieces of homework for the teacher to present.



EXPLANATORY NOTES

At the time of writing, the exchange rates used were correct. The teacher may need to update the slides to ensure that the exchange rates used are close to those presented by the pupils.



Answer to the problem (pupil answers may differ slightly depending on when exchange rate quotes were accessed)

1. Using a Google search produces the following exchange rates:

- a. € : £ = 1.17
- b. \$: £ = 1.40
- c. Indian Rupee : £ = 90.38

The answer to the questions are as follows:

Sun lotion: $€4.50 / 1.17 = £3.85$

Book: $\$14 / 1.4 = £10$

Soft drink: Indian Rupee 200 / 90.38 = £2.21

2. Bitcoin: £ = 0.00014. Hence 2 bitcoins will cost = $2/0.00014 = £14,285$



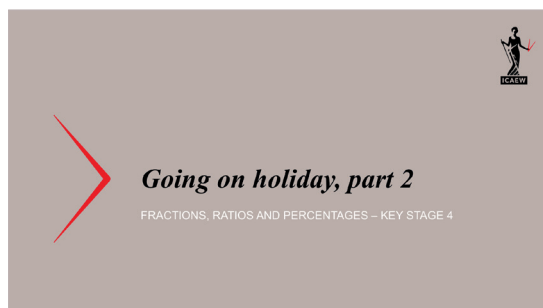
EXPLANATORY NOTES

When the exchange rate is quoted as the 'number of foreign currency units required to buy £1' this is known as an indirect quote for the £. In this case the £ is the base currency, but this is not always the case. By convention, for example, whenever a currency is quoted against the € it is the € that is used as the base currency but that has not been done in the quote above, in order to show a consistent presentation. You will see if your pupils have used the € as the base currency if they have an exchange rate of £ against the € of $£1 < 1$ (assuming the UK economy hasn't collapsed between the time of writing and you reading this!). There is no wrong or right way to quote a currency; it is just the convention that is used.

Pupils may raise the issue that, in their research, they were presented with two quotes for an exchange rate. These are quotes if you want to sell £ to buy a foreign currency or buy £ when you want to sell a foreign currency. When we go on holiday we want to buy foreign currency and when we return we want to sell any foreign currency we have left over. The two quotes are known as 'ask' prices and 'bid' prices (the ask price is sometimes known as the 'offer' price). The bid price is always lower than the ask price.

An ask (offer) price is the quote for the amount of foreign currency that you will receive if you sell £ to buy foreign currency. The bid price is the quote for the amount of foreign currency you will pay if you buy £ by selling foreign currency. As an example, a bid price for US\$: £ may be quoted at 1.40 and the ask price may be quoted at 1.42. It is easy to work out what you will use: you just have to assume that you, dealing with a foreign exchange dealer, will always get the worse rate! For example, if I want to buy \$100 by selling £, how much would it cost in £? Well, using the bid price would give $\$100/1.40 = £71.43$. Using the ask price would give $\$100/1.42 = £70.42$. It is obvious that you will use the bid price because it costs you more to buy \$.

REFERENCE SLIDES



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Homework B

YOU WERE ASKED TO DO THE FOLLOWING:

1. Using the following list, calculate how much the items would cost in £ sterling by finding out from a search engine what the exchange rate should be:
 - a. Sun lotion: €4.50 (€)
 - b. Book: \$14.00 (US dollar)
 - c. Soft drink: 200 Rupee (Indian)
2. It is also possible to find an exchange rate for the digital currency, bitcoin. What would a car cost in £ sterling if it was selling for 2 bitcoins?

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REFERENCE SLIDES (CONT)

Exchange rates

Using a Google search produces the following exchange rates:

1. Various items
 - a. € : £ = 1.17
 - b. \$: £ = 1.40
 - c. Indian Rupee : £ = 90.38
2. Bitcoin : £ = 0.00014

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My answers (yours may be slightly different)

1. Various items:
 - a. Sun lotion: €4.50 / 1.17 = £3.85
 - b. Book: \$14 / 1.4 = £10
 - c. Soft drink: Indian Rupee 200 / 90.38 = £2.21
2. Bitcoin: £ = 0.00014. Hence 2 bitcoins will cost = $2/0.00014 = £14,285$

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Task 3

CLASS PROBLEM: INTRODUCE TASK 3

We are now going to look at a practical problem using exchange rates for our holidays.

Reinforce the use of currencies:

It will be worthwhile at this point to ensure that all pupils are familiar with foreign currencies and that, in Spain, restaurant costs will be expressed in €. At the time of writing, the € exchange rate to the £ was 1.17 : 1. Currencies lend themselves naturally to mathematical ideas related to ratios and proportions and are a good way of learning and testing understanding in this area.

To introduce the idea of currency conversion, indicated in the slide, say the following (the calculation elements in the following may need illustrating on a whiteboard):

If the € exchange rate to the £ is 1.17 : 1 that will mean that a sandwich, for example, that costs £1 in the UK would cost €1.17 in Spain. Alternatively, if we bought a sandwich for €1.17 in Spain, we would be able to work out that it would cost £1 in sterling terms. We can do this for any amount. For example, if we bought a souvenir in Spain for €5 then, in sterling terms, this would be $5/1.17 = £4.27$. We can calculate this by dividing the € cost by the € element of the exchange rate.

Now, have a go at task 3, problems 1 and 2

In the problem, you are going to use exchange rates and also will have to divide up the restaurant bill ...

REFERENCE SLIDES

Maya at the restaurant

Maya has met two of her school friends at the beach, Reena and Suravi. Maya asked them if they would like to go to dinner with her family. After getting permission, it was agreed that Maya, Reena and Suravi would join Rohan and his mum and dad at the restaurant.

Later that evening, all six of them went to the restaurant and had a good time. The dinner bill arrived and showed a total amount due of €120. Maya agreed to help her mum understand the bill as her mum could not remember how to deal with foreign currency. Maya knew that the exchange rate of € to £ sterling is €1.17: £1 as she had seen it in a shop window earlier in the day.



Slide 28

Task 3: at the restaurant

Working in pairs, answer the following questions:

1. Maya's mum would pay the entire bill on her credit card. What amount in £ would appear on her credit card statement for the restaurant bill?
2. Reena and Suravi said that their parents had agreed to pay for their proportion of the bill and that they would settle the bill later in cash. The agreed proportion was 4:2 where Reena and Suravi would pay the lower proportion. What is Reena and Suravi's combined share of the bill in €?

Slide 29



PUPILS ARE ANSWERING TASK 3, PROBLEMS 1, 2

The answer to the problem is ... (go through the slide)



EXPLANATORY NOTES

This should be a straightforward exercise given the preparation is already done.

REFERENCE SLIDE

Task 3: at the restaurant

Problem 1
The sterling cost of the restaurant bill in €120 / 1/17 = £102.56

Problem 2
The total bill of €120 is going to be divided in the proportions of 4:2
For six people, this would result in an individual bill of 120/6 = €20
The bill for Reena and Suravi will be 2 x 20 = €40

Slide 30

Now, have a go at task 3, problem 3

Introduce the additional tasks contained in this slide. In summary, we will ask the pupils to divide the restaurant bill differently to account for the fact that Maya's mum and dad drank wine, which the children did not, and so they should pay proportionately more and Reena and Suravi should pay proportionately less. The idea, here, is to understand that proportions do not necessarily have to reflect the number of people involved.

REFERENCE SLIDE

Task 3: at the restaurant 

3. Maya's mum said that, because she had ordered wine with their meal, it would be fairer if the bill was divided according to ratio $5\frac{1}{2} : 2$

What is Reena and Suravi's combined share of the bill in € now?

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Slide 31

PUPILS ARE ANSWERING TASK 3, PROBLEM 3



The answer to the problem is ... (go through the slide)

EXPLANATORY NOTES



As identified in the previous slide, proportions do not have to reflect the people involved. The learning point here is that proportions may be used to reflect measures (allocating wine costs to the wine drinkers) using different criteria than the objects of attention (people). The proportions used were not linked to anything and, of course, different figures may have been used.

REFERENCE SLIDE

Task 3: at the restaurant 

Problem 3

The total bill of €120 is now going to be divided by $5\frac{1}{2} + 2 = 7\frac{1}{2}$ or 7.5

Dividing the total bill in this way produces $€120 / 7.5 = €16$

The bill for Reena and Suravi will be $2 \times 16 = €32$

The remaining bill will be $5.5 \times 16 = €88$

The total amount paid is $€32 + €88 = €120$

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Slide 32

Now, have a go at task 3, problem 4

REFERENCE SLIDE



Task 3: at the restaurant

4. Maya's mum and dad each drank a glass of wine. Each glass held 125ml of wine. Wine bottles hold 750ml of wine. Maya's mum knew that, at home, a bottle of the same wine would cost £8.25. The cost of the two glasses of wine at the restaurant was €4 and a bottle of the same wine was €11.

- Is it cheaper to buy wine in the restaurant by the glass or by the bottle?
- Is a bottle of wine cheaper in the UK or in Spain?
- What is the percentage difference between the cost of wine in the restaurant compared with the UK?

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Slide 33



PUPILS ARE ANSWERING TASK 3, PROBLEM 4

The answer to the problem is ... (go through the slide)



EXPLANATORY NOTES

Reflect on the consumer skills being demonstrated in terms of looking carefully at bills that are presented, in this case a restaurant bill.

Emphasise the range of mathematical techniques that can be used and how this has been helpful in understanding how to resolve questions concerning the restaurant visit.

REFERENCE SLIDE



Task 3: at the restaurant

Problem 4

- Each bottle holds $750\text{ml}/125\text{ml} = 6$ glasses of wine where each glass contains 125ml of wine. One glass of wine at the restaurant costs $\text{€}4/2 = \text{€}2$. Buying six glasses of wine individually would cost $6 \times \text{€}2 = \text{€}12$. This is more expensive than buying the whole bottle at €11.
- The cost of the restaurant wine is €11. Converting this into £ is $\text{€}11/1.17 = \text{£}9.40$. The cost of wine in the UK is £8.25. The wine is more expensive in Spain compared to the UK.
- The difference in costs between the two wines is $\text{£}9.40 - \text{£}8.25 = \text{£}1.15$. The difference or increase in cost is $\text{£}1.15 / \text{£}8.25 = 14\%$.

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Task 4

CLASS PROBLEM: INTRODUCE TASK 4

We are now going to look at a practical problem using exchange rates for our holidays

EXPLANATORY NOTES

Pupils can either work individually or in pairs.

If time is running short, this task can be skipped.

Note: while this is a minimisation problem, the solution to this should be fairly clear and pupils should be able to proceed with confidence using proportions. As a hint, you might suggest reallocating luggage to the lighter suitcase to the maximum to use the penalty-free allowance.



REFERENCE SLIDE

Task 4: luggage

Maya's mum tries to check in their two suitcases at the airport check-in desk. The suitcases are weighed to see if they meet the 20kg limit for each suitcase. The first suitcase weighs 23.3kg. The second suitcase weighs 18kg. They have bought so many souvenirs that they are returning home with more items in the luggage than when they first arrived.

The airline they are flying with charges for carrying extra luggage on their flights. For luggage over the 20kg limit, the charge is €5 per kg or each part of a kg. Maya's mum decides to reallocate some of the souvenirs from the heavy suitcase to the lighter one.

1. What would be the new proportions of weight to minimise the additional charge?
2. What charge would Maya's mum still have to pay after the reallocation?

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PUPILS ARE ANSWERING TASK 4



The answer to the problem is ... (go through the slide)

Note that the penalty would still be incurred because the first item of luggage is still overweight.

REFERENCE SLIDE

Task 4: luggage 

The current proportions of weight are 23.3 : 18.0. The penalty incurred would be $4 \times €5 = €20$ (the heaviest case is 3.3kgs overweight and the charge is €5 per kg or part of a kg).

1. Re-allocating 2kg of the souvenirs from the heavier to the lighter case to use the maximum free allowance of 20kg would give the following new proportions: $23.3 - 2.0 : 18.0 + 2.0$, or $21.3 : 20$.
2. The first item of luggage is still overweight by $21.3 - 20 = 1.3$. This would now incur a penalty of €10.

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FINAL DISCUSSION

This is a re-visit to the issue of insurance and to explain why it might be necessary once you have considered what insurable events may be covered.

Emphasise that insurance is compensation from events adversely affecting a holiday. It cannot prevent bad things happening!

REFERENCE SLIDE

Discussion: types of travel insurance

Insured event	Risk
Lost luggage	Luggage is sometimes lost at airports
Trip cancellation	Holidays can be cancelled because the travel firm goes bankrupt or possibly because there has been an illness in the family which might stop the whole family travelling
Legal expenses	If involved in a car accident, for example, there might be a court proceeding to face
Medical treatment and prescriptions	Medical treatment and prescriptions for tablets and creams can be expensive
Trip delay	Sometimes flights are delayed or cancelled and there may be hotel costs to pay

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Resources

1. LESSON PLAN (THIS DOCUMENT)
2. POWERPOINT
3. TASK HANDOUTS
4. ALSO AVAILABLE BUT NOT LIKELY TO BE USED: SPREADSHEET

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