Complete Mathematics

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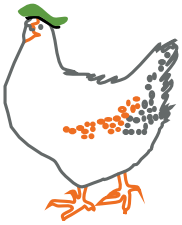
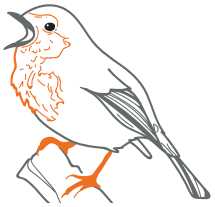
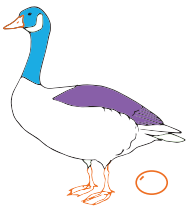
12 Days of Christmas

Price of one item from the gift in 2015

Percentage increase on 2014 price

A partridge in a pear tree  $214.99 | 3.5%	Two turtle doves  $145.00 | 11.5%	Three French hens  $60.50 | 0%
Four calling birds  $149.99 | 0%	Five gold rings  $150.00 | 0%	Six geese a-laying  $60.00 | 0%
Seven swans a-swimming  $1,875.00 | 0%	Eight maids a-milking  $7.25 | 0%	Nine ladies dancing  $839.20 | 0%
Ten lords a-leaping  $550.87 | 3%	Eleven pipers piping  $239.56 | 0%	Twelve drummers drumming  $237.90 | 0%

1. How many gifts in total would you receive in the entire song?
2. The individual prices are shown in US dollars, what is the full cost in UK pounds?
3. What would the total cost in 2014 have been in UK pounds?
4. What is the total percentage increase from 2014 to 2015?

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Day	Gift	Price of one gift item	Number of days given	Number of gifts required	Cost
1	A partridge in a pear tree	$214.99			
2	Two turtle doves	$145.00			
3	Three French hens	$60.50			
4	Four calling birds	$149.99			
5	Five gold rings	$150.00			
6	Six geese a-laying	$60.00			
7	Seven swans a-swimming	$1,875.00			
8	Eight maids a-milking	$7.25			
9	Nine ladies dancing	$839.20			
10	Ten lords a-leaping	$550.87			
11	Eleven pipers piping	$239.56			
12	Twelve drummers drumming	$237.90			
				Total Cost:	

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Teacher Notes

Strand: Number
Group: Mental Methods of Calculation, Written Methods of Calculation, Fractions and Decimals, Percentages
Suggested Age: 9 - 15

This apparently simple question can work across a wide ability range of pupils. The task can span a full lesson and homework by asking pupils to explore extension tasks such as introducing new currencies or not supplying them with the values of each item and asking them to undertake research to determine suitable values.

For many, the leap of recognising that there are not 12 gifts in total will take some time. It will help to play the song to the pupils so that they appreciate the repetition of gifts each verse.

The values given are deliberately units – so rather than a cost of 'eight maids a-milking', the pupils are told the price of just one maid! Again, working out the total figures for the gift, in this case eight maids, will be a trivial activity for some but a challenging activity for others. You can decide whether or not to allow calculators for this stage, which again can introduce new challenge.

Once the costs of a single instance of each 'gift' is calculated and the number of occasions this gift is given, it is a simple case of multiplying and summing the results to get the total cost of the 12 Days of Christmas – but look out, the values are all in US Dollars. There is now a conversion activity to carry out. In our solutions, we have used 1 USD = 0.80 GBP. You could extend the task by converting to other currencies or by changing the conversion factor, which might lead to discussions around why currencies do not remain constant relative to each other.

The first table shows the calculations to find the total cost in GBP. The pupil pages include a blank table that pupils can use to order their work. Alternatively, you might wish to extend the task by not providing this table and asking the pupils to come up with a sensible and efficient way of presenting their work.

Question 3, asks pupils to work out the total cost in 2014. They are provided with the percentage increase this year from last and will need to use this information to calculate the values for 2014. Mostly, the individual items have 0% increase. You might wish to ask the pupils why this might be – this is not often the case in the history of the Christmas Price Index, but we are currently experiencing very low inflation globally.

12 Days of Christmas

Many pupils will initially make errors in converting the prices, by assuming that a percentage increase is undone by a percentage decrease of the same amount. Of course, this is not the case. You could point this out to them beforehand, or let them make the errors first and try to work out where they went wrong. For example, pupils may try to calculate the 2014 cost of a Partridge in a Pear Tree by reducing $214.99 by 3.5% rather than recognising that the initial increase was achieved by multiplying by 1.035 and therefore, reversing this change requires a division by 1.035.

Solution

Data from the 2014 PNC Christmas Price Index (https://en.wikipedia.org/wiki/Christmas_Price_Index)
https://www.pncchristmaspriceindex.com/
Calculating total cost in 2015

	Gift	Unit Cost 2015	Cost per gift 2015	Variance on 2014	Unit Cost 2015 UK	Cost per gift 2015 UK	Days	Cost	Total number of Gifts
1	Partridge in a pear tree	$214.99	$214.99	3.5%	£171.99	£171.99	12	£2,063.90	12
2	Two turtle doves	$145.00	$290.00	11.5%	£116.00	£232.00	11	£2,552.00	22
3	Three French hens	$60.50	$181.50	0%	£48.40	£145.20	10	£1,452.00	30
4	Four calling birds	$149.99	$599.96	0%	£119.99	£479.97	9	£4,319.71	36
5	Five gold rings	$150.00	$750.00	0%	£120.00	£600.00	8	£4,800.00	40
6	Six geese a-laying	$60.00	$360.00	0%	£48.00	£288.00	7	£2,016.00	42
7	Seven swans a-swimming	$1,875.00	$13,125.00	0%	£1,500.00	£10,500.00	6	£63,000.00	42
8	Eight maids a-milking	$7.25	$58.00	0%	£5.80	£46.40	5	£232.00	40
9	Nine ladies dancing	$839.20	$7,552.80	0%	£671.36	£6,042.24	4	£24,168.96	36
10	Ten lords a-leaping	$550.87	$5,508.70	3%	£440.70	£4,406.96	3	£13,220.88	30
11	Eleven pipers piping	$239.56	$2,635.16	0%	£191.65	£2,108.13	2	£4,216.26	22
12	Twelve drummers drumming	$237.90	$2,854.80	0%	£190.32	£2,283.84	1	£2,283.84	12
			1.00 US dollars =	0.8	British Pounds			£124,325.55	364

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	Gift	2015 Cost	Divisor	2014 Cost
1	Partridge in a pear tree	£2,063.90	1.035	£1,994.11
2	Two turtle doves	£2,552.00	1.115	£2,288.79
3	Three French hens	£1,452.00	1.100	£1,320.00
4	Four calling birds	£4,319.71	1.000	£4,319.71
5	Five gold rings	£4,800.00	1.000	£4,800.00
6	Six geese a-laying	£2,016.00	1.000	£2,016.00
7	Seven swans a-swimming	£63,000.00	1.000	£63,000.00
8	Eight maids a-milking	£232.00	1.000	£232.00
9	Nine ladies dancing	£24,168.96	1.000	£24,168.96
10	Ten lords a-leaping	£13,220.88	1.030	£12,835.81
11	Eleven pipers piping	£4,216.26	1.000	£4,216.26
12	Twelve drummers drumming	£2,283.84	1.000	£2,283.84
			Total 2014 Cost	£123,475.47

1. How many gifts in total would you receive in the entire song?
364

2. The individual prices are shown in US dollars, what is the full cost in UK pounds?
£124,325.55

3. What would the total cost in 2013 have been in UK pounds?
£123,475.47

4. What is the total percentage increase from 2013 to 2014?
0.69% (2 d.p.)

Mathematics. Solved.