Percent Changes

One month Rob spent $8.02 on his phone. The next month he spent $6.00. To work out the average amount Rob spends over the two months, you could press the calculator keys:

$(\; 8 \; . \; 0 \; 2 \; + \; 6 \;) \; \div \; 2 \; =$

1. Tom usually earns $40.85 per hour.
   He has just heard that he has had a 6% pay raise.
   He wants to work out his new pay on this calculator.
   It does not have a percent button.

   Which keys must he press on his calculator?
   Write down the keys in the correct order.
   (You do not have to do the calculation.)

2. Maria sees a dress in a sale. The dress is normally priced at $56.99.
   The ticket says that there is 45% off.
   She wants to use her calculator to work out how much the dress will cost.
   It does not have a percent button.

   Which keys must she press on her calculator?
   Write down the keys in the correct order.
   (You do not have to do the calculation.)

3. Last year, the price of an item was $350. This year it is $450.
   Lena wants to know what the percentage change is.
   Write down the calculation she will need to do to get the correct answer.
   (You do not have to do the calculation.)

4. In a sale, the prices in a shop were all decreased by 20%.
   After the sale they were all increased by 25%.
   What was the overall effect on the shop prices?
   Explain how you know.

Common issues:	Suggested questions and prompts:
Student makes the incorrect assumption that a percentage increase means the calculation must include an addition For example: $40.85 + 0.6$ or $40.85 + 1.6$. (Q1.) *A single multiplication by 1.06 is enough.*	• Does your answer make sense? Can you check that it is correct? • "Compared to last year 50% more people attended the festival." What does this mean? Describe in words how you can work out how many people attended the festival this year. Give me an example. • Can you express the increase as a single multiplication?
Student makes the incorrect assumption that a percentage decrease means the calculation must include a subtraction For example: $56.99 - 0.45$ or $56.99 - 1.45$. (Q2.) *A single multiplication by 0.55 is enough.*	• Does your answer make sense? Can you check that it is correct? • In a sale, an item is marked "50% off." What does this mean? Describe in words how you calculate the price of an item in the sale. Give me an example. • Can you express the decrease as a single multiplication?
Student converts the percentage to a decimal incorrectly For example: 40.85×0.6. (Q1.)	• How can you write 50% as a decimal? How can you write 5% as a decimal?
Student uses inefficient method For example: First the student calculates 1%, then multiplies by 6 to find 6%, and then adds this answer on: $(40.85 \div 100) \times 6 + 40.85$. (Q1.) Or: $56.99 \times 0.45 = $ ANS, then $56.99 - $ ANS (Q2.) *A single multiplication is enough.*	• Can you think of a method that reduces the number of calculator key presses? • How can you show your calculation with just one step?
Student is unable to calculate percentage change For example: $450 - 350 = 100\%$ (Q3.) Or: The difference is calculated, then the student does not know how to proceed or he/she divides by 450. (Q3.) *The calculation $(450 - 350) \div 350 \times 100$ is correct.*	• Are you calculating the percentage change to the amount \$350 or to the amount \$450? • If the price of a t-shirt increased by \$6, describe in words how you could calculate the percentage change. Give me an example. Use the same method in Q3.
Student subtracts percentages For example: $25 - 20 = 5\%$. (Q4.) *Because we are combining multipliers: $0.8 \times 1.25 = 1$, there is no overall change in prices.*	• Make up the price of an item and check to see if your answer is correct.
Student fails to use brackets in the calculation For example: $450 - 350 \div 350 \times 100$. (Q4.)	• In your problem, what operation will the calculator carry out first?
Student misinterprets what needs to be included in the answer For example: The answer is just operator symbols.	• If you just entered these symbols into your calculator would you get the correct answer?