



hp calculators

HP 9s Solving Problems Involving Percents

Percents

Practice Working Problems Involving Percents



Percentages

The percentage is defined as the number of parts for each hundred, and is usually abbreviated as *percent*. Its symbol is %. A percentage can also be thought as a fraction multiplied by 100. For example, 25 percent is written 25%, and is 0.25 (one quarter) multiplied by 100.

Percentages are used extensively in business, for example to specify bank rate, interest rates, tax rates, to get a mark-up or a discount price, etc. Percentages are also used outside the business world – scientific or engineering measurements, results, and uncertainties are stated as percentages.

The HP 9s provides the $\overset{2ndF}{\%}$ key for use in calculating percentages.

Practice working problems involving percentages

Example 1: What is 18% of \$1,525.95? And 25% of \$1,525.95?

Solution: In general, the n percent *of* an amount is obtained by *multiplying* this amount by the percent n . In our case, the first calculation is $1525.95 \times 18\%$:

$\boxed{1} \boxed{5} \boxed{2} \boxed{5} \boxed{\cdot} \boxed{9} \boxed{5} \boxed{\times} \boxed{1} \boxed{8} \overset{2ndF}{\%} \boxed{\text{ENTER}}$

Note that in this example “ $x\%$ ” is mathematically equivalent to “ x divided by 100.” So, we can also solve this problem by pressing:

$\boxed{1} \boxed{8} \overset{2ndF}{\%} \boxed{\times} \boxed{1} \boxed{5} \boxed{2} \boxed{5} \boxed{\cdot} \boxed{9} \boxed{5} \boxed{\text{ENTER}}$

But, the former is preferable because it allows us to repeat percentage calculations quickly. Key in the first sequence again and then press:

$\boxed{2} \boxed{5} \overset{2ndF}{\%} \boxed{\text{ENTER}}$

which returns the 25% of \$1,525.95. Note how easily various percents of the same amount can be calculated on the HP 9s.

Answer: The percents are 274.67 and 381.49 when written to the nearest cent.

Example 2: What is 18% added to \$1,525.95?

Solution: In general, n percent *added to* a number can be calculated by multiplying this number by $(1 + n\%)$. But, the HP 9s provides a shortcut: simply *add* the given amount to its $n\%$:

$\boxed{1} \boxed{5} \boxed{2} \boxed{5} \boxed{\cdot} \boxed{9} \boxed{5} \boxed{+} \boxed{1} \boxed{8} \overset{2ndF}{\%} \boxed{\text{ENTER}}$

When the % key is pressed, the 18% of 1525.95 is displayed. Then, the $\boxed{\text{ENTER}}$ key carries out the addition.

Answer: 1,800.62 when written to the nearest cent.

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Example 3: The local grocery store is offering 8% off all tinned foods this week. What will be the cost of buying 5 tins that normally cost \$1.85 each?

Solution: We will use the method used in Example 2. The only difference is that we have to subtract the percentage instead of adding it:

$(1) \cdot (8) (5) \times (5) \text{ [ENTER]} - (8) \text{ [2ndF]} \% \text{ [ENTER]}$

Answer: 8% subtracted from 5 times \$1.85 gives a price of \$8.51 for the 5 tins.

Example 4: Calculate the number that is 10% greater than 25.

Solution: $(2) (5) + (1) (0) \text{ [2ndF]} \% \text{ [ENTER]}$

Answer: 27.5

Example 5: Just before Christmas, Jordy's fish shop marked up its lobster, which had a wholesale cost of \$15 per pound, by 40%. After Christmas, they have marked the lobster down by 11% for a special sale. What is the sale price of this product?

Solution: We will link two percent calculations this time:

$(1) (5) + (4) (0) \text{ [2ndF]} \% \text{ [ENTER]} - (1) (1) \text{ [2ndF]} \% \text{ [ENTER]}$

Answer: \$18.69 per pound.

Example 6: To make a profit of 30%, what is the percentage of markup?

Solution: To find the markup percent M for a given gross profit G, we can use this formula:

$$M = \frac{100G}{100 - G}$$

$(1) (0) (0) \times (3) (0) \div (1) (0) (0) - (3) (0) \text{ [ENTER]}$

Answer: 42.86 % when rounded to two decimal digits.

Example 7: If we add 30% to our cost price, what percent of the selling price will be the profit?

Solution: If M% is added to the cost price, the gross profit will be G% of the selling price, where G is:

$$G = \frac{100M}{M + 100}$$

$(1) (0) (0) \times (3) (0) \div (1) (0) (0) + (3) (0) \text{ [ENTER]}$

Answer: 23.08 % when rounded to two decimal digits.

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Example 8: An investor has \$2,804 and \$25,755 in two market-tracking investment portfolios. The market gains 0.7% overnight. What is the new total value of the investor's portfolios?

Solution: The original total value is first calculated by adding the value of the two investments. Then 0.7 % is calculated as in Example 2:

$(2)(8)(0)(4)(+)(2)(5)(7)(5)(5)(\text{ENTER})(+)(\cdot)(7)(\text{2ndF})\%$ (ENTER)

Answer: The investor's portfolios are worth \$28,758.91 this morning.

Example 9: The investor in Example 8 finds that when the market closes in the afternoon, the investment is worth \$28,701. By how much did the market change during the day?

Solution: On the HP 9s there is no specific key or function for calculating percent *changes*, but they can be easily calculated using the following formula. To find the percent change between two numbers, use:

$$C = \frac{N - V}{V} 100$$

where C is the percent change, N is the new value and V is the original value. Since V is already in the display from the previous example, press:

$(\text{X-M})(+/-)(+)(2)(8)(7)(0)(1)(\text{ENTER})(\times)(1)(0)(0)(\div)(\text{MR})(\text{ENTER})$

The $(\text{2ndF})\%$ key is very useful in these calculations, because dividing by x and multiplying by 100 is the same as dividing by $x\%$ on the HP 9s:

$(\text{MR})(+/-)(+)(2)(8)(7)(0)(1)(\text{ENTER})$ (no changes thus far) $(\div)(\text{MR})(\text{2ndF})\%$ (ENTER)

Answer: The market changed by -0.20 during the day, in other words it fell by 0.2%. Press $(0)(\text{X-M})$ or $(\text{ON/C})(\text{X-M})$ to clear the M register.

Example 10: Find the percent of increase of your rent 15 years ago (\$75 per month) to today (\$320 per month).

Solution: This is another percent change calculation, which we can solve using the above formula:

$(7)(5)(-)(3)(2)(0)(\text{ENTER})(\div)(7)(5)(\times)(1)(0)(0)(\text{ENTER})$

but, using the $(\text{2ndF})\%$ key is a bit faster, though:

$(7)(5)(-)(3)(2)(0)(\text{ENTER})(\div)(7)(5)(\text{2ndF})\%$ (ENTER)

Answer: The percent increase is 326.67%. Note that the result is again negative because the change is calculated as a percentage of the former rent, i.e. $N = 75$.

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Example 11: If 27 out of 1300 units fail a test, what percentage failed?

Solution: What we must calculate is the *percent of total*. If the partial value is P and the total is T then the percent total %T is:

$$\%T = \frac{P}{T} 100$$

(2) (7) (÷) (1) (3) (0) (0) (2ndF) (%) (ENTER) (or (2) (7) (÷) (1) (3) (0) (0) (ENTER) (x) (1) (0) (0) (ENTER)).

Answer: 2.08% failed the test.

Example 12: Total assets for Hydroid Company are \$1,675,840. The firm has inventories of \$234,578. What percentage of total assets is inventory?

Solution: (2) (3) (4) (5) (7) (8) (÷) (1) (6) (7) (5) (8) (4) (0) (2ndF) (%) (ENTER)

Answer: 14.00 %

Example 13: Last year, Hydroid Company incurred salary expenses that were 45% of operating expenses. If operating expenses were \$76,349, what were salary expenses?

Solution: Salary expenses (P) are the operating expenses (T) multiplied by 45% and divided by 100:

(7) (6) (3) (4) (9) (x) (4) (5) (÷) (1) (0) (0) (ENTER) or this shorter alternative:
(7) (6) (3) (4) (9) (x) (4) (5) (2ndF) (%) (ENTER)

Answer: \$34,357.05

Example 14: Tony borrows \$1,250 from a relative, and agrees to repay the loan in a year with 7% simple interest. How much money will Tony owe?

Solution: The total amount is the result of adding the loan to the interest of the loan.

(1) (2) (5) (0) (+) (7) (2ndF) (%) (ENTER)

Answer: \$1,337.50 is the amount that Tony must repay at the end of one year.

Example 15: The profit on a \$895 sale is $23\frac{7}{8}\%$. Calculate how much Gene will receive from the sale if his share on the profit is $17\frac{2}{3}\%$.

Solution: To find the profit, press:

(8) (9) (5) (x) (2) (3) (ab/c) (7) (ab/c) (8) (2ndF) (%) (ENTER)

Gene's share is calculated by pressing:

(x) (1) (7) (ab/c) (2) (ab/c) (3) (2ndF) (%) (ENTER)

Answer: Gene's share of the total profit is \$37.75