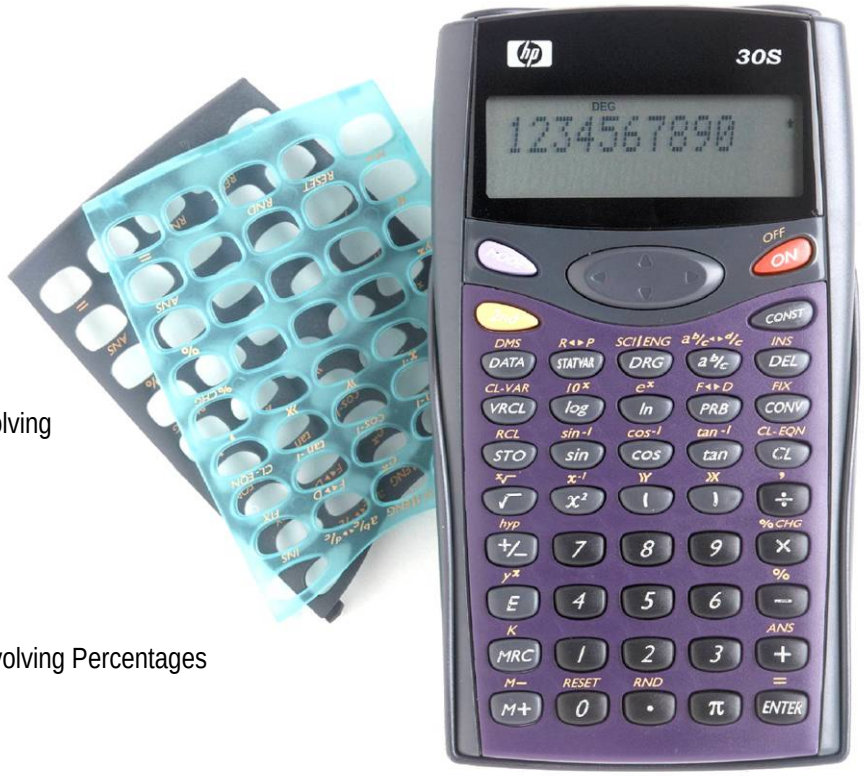
hp calculators



HP 30S Solving Problems Involving Percents

Percentages

Practice Working Problems Involving Percentages

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 30S provides the % ([2nd] [%]) and %CHG ([2nd] [%CHG]) functions to calculate percentages.

Practice working problems involving percentages

Example 1: What is 18% 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 × 18%:

[1] [5] [2] [5] [.] [9] [5] [×] [1] [8] [2nd] [%]

This displays the calculation 1525.95 × 18%. Press [ENTER] to find the result. It is important to note that on the HP 30S "*x* %" is mathematically equivalent to "*x* divided by 100", so we can also solve this problem by pressing

[1] [8] [2nd] [%] [1] [5] [2] [5] [.] [9] [5] [ENTER]

Notice the implicit multiplication after the % symbol.

Answer: 274.67 when written to the nearest cent.

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

Solution: On the HP 30S, *n* percent ***added to*** a number is calculated by multiplying this number by (1 + *n* %). Please note that this method differs from the way other calculators work. In this example, we can press:

[+] [1] [5] [2] [5] [.] [9] [5] [ENTER]

since ANS contains the 18% already. In general, though, we will have to repeat the calculation by pressing

[1] [5] [2] [5] [.] [9] [5] [(] [1] [+] [1] [8] [2nd] [%] [ENTER]

Alternatively, we can store the number in ANS first and do the calculation $\text{ANS} + \text{n}\% \times \text{ANS}$. In fact, you don't need to press the first ANS since it is automatically inserted into the entry line when pressing [+], and the × signs is not necessary either since the multiplication can be implicitly stated after the % symbol. Therefore, we can press

[1] [5] [2] [5] [.] [9] [5] [ENTER] [+] [1] [8] [2nd] [%] [2nd] [ANS] [ENTER]

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

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 last method used in example 2. The only difference is that we have to subtract the percentage instead of adding it:

1 . 8 5 × 5 ENTER − 8 2nd % 2nd ANS 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 ENTER + 1 0 2nd % 2nd ANS 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 ENTER + 4 0 2nd % 2nd ANS ENTER − 1 1 2nd % 2nd ANS 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:

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

E 2 × 3 0 ÷ (E 2 − 3 0 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:

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

E 2 × 3 0 ÷ (3 0 + E 2 ENTER

Answer: 23.08 % when rounded to two decimal digits.

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:

2nd %CHG 2nd ANS 2nd , 2 8 7 0 1 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 30S, there is a specific key for calculating percent changes: 2nd %CHG . This function calculates the percent change between two numbers (separated by 2nd ,) as follows:

$$\%\text{CHG}(a,b) = \frac{b-a}{a}100$$

where *b* is the new value and *a* is the original value. Since *a* is already in ANS from the previous example, press:

2nd %CHG 2nd ANS 2nd , 2 8 7 0 1 ENTER

Answer: The market changed by –0.20 during the day, in other words it fell by 0.2%.

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'll solve using the %CHG function:

2nd %CHG 7 5 2nd , 3 2 0 ENTER

Answer: The percent increase is 326. 67%.

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:

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

The 2nd % 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 30S:

2 7 ÷ 1 3 0 0 2nd % 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 2nd % ENTER

Answer: 14%

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 × 4 5 2nd % 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 ENTER + 7 2nd % 2nd ANS 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 (2 3 a b/c 7 a b/c 8) 2nd % ENTER

Gene's share is calculated by pressing:

× (1 7 a b/c 2 a b/c 3) 2nd % ENTER

Since the percent function takes priority over fractions, these must be enclosed in parentheses.

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