

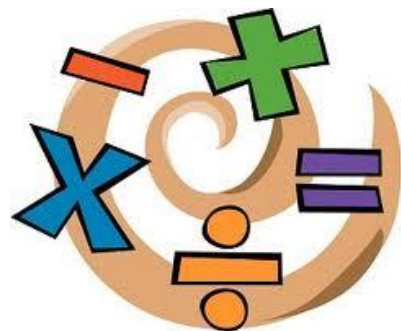
Star Art Education Company

F.3 Mathematics

Teaching Notes and Examples:

Key Topics in Algebra + Quadrilaterals

- Linear Inequalities in One Unknown
- Advanced Percentage and Tax
- Law of Integral Indices and Scientific Notation
- Special Lines and Centers in Triangle
- Quadrilaterals
- Mid-point Theorem and Intercept Theorem



Advanced Percentage and Tax

A. Overview of Percentage

$$1. \textit{Original} \times (1 \pm \%) = \textit{New}$$

$$2. \% \textit{ Change} = \frac{\textit{New} - \textit{Original}}{\textit{Original}} \times 100\%$$

It involves 3 variables, “**Original**”, “**%**” and “**New**”. The question must have the information of either 2, and then you have to find the remaining 1 by substituting the given information in the above formula

Typical Example of “Original”:

Typical Example of “New”:

Example 1:

The marked price of a guitar is \$1500, the shop is offering 20% off discount and member can enjoy extra 5% off on all items

- Gigi is a member of the shop, what is the final selling price she needs to pay?
- Flora (who is a member) has paid for \$494 for a violin, find the marked price
- Another member, Elle, has saved \$216 in buying a drum, what is the marked price?

Example 2:

The volume of a bottle of juice is 360mL. Winnie drank 35% of the juice last night and Kate drank 25% of the remaining juice this morning. How much juice is remained in the bottle?

Example 3:

The price of a house was decreased by 30% from 2000 to 2005 and was increased by 40% from 2005 to 2009. If the price of the house is \$1,225,000 in 2009, find the price of the house in 2000.

Example 4:

Jacky mixes 250mL of solution A with 750mL solution B. Solution A and B contain 22% and 6% of alcohol respectively. What is the percentage of alcohol in the mixture?

Example 5:

A bag contains some silver coins and gold coins which are in the ratio 2 : 5. If the number of silver coins is increased by 40% and that of gold coins is decreased by 16%, find the followings:

- The new ratio of the numbers of silver coins and gold coins in the bag
- The percentage change in the total number of coins

(Hints: Let n be the total number of coins in the bag, express the number of silver coins and gold coins in terms of n)

B. Increase or Decrease at a constant rate

Successive Percentage Increases at a constant rate:

If a value P increases at a constant rate $r\%$ in each period, the new value A after n period is:

$$A = P \times (1 + r\%)^n$$

Successive Percentage Decreases at a constant rate:

If a value P decreases at a constant rate $r\%$ in each period, the new value A after n period is:

$$A = P \times (1 - r\%)^n$$

Example 6:

Oliver invested \$5000 in a company 4 months ago. Since then, the amount increased at a rate of 2% per month. What is the amount he has now? (Give your answer correct to the nearest integer)

Example 7:

The value of a mobile phone is \$2820 now and its value decreased by 12% per year.

Find its value:

- After 2 years
- 3 years ago

(Give your answer correct to the nearest integer)