

# Discounts, Markups, and Sales Tax

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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Discounts, markups, and sales tax all use percents, but they push a price in different directions—a discount lowers it, a markup raises it, and sales tax tacks on an extra charge at the end. In multi-step problems the *order* matters, so the trick is to slow down and track each amount one step at a time. Once you get the hang of it, you will be able to decode receipts, see through “sale” signs, and understand how businesses set prices. This is real-world math at its finest!

## Key Concepts & Quick Review

**Discount:** Sale price = Original  $\times (1 - d)$ , where  $d$  is the discount rate.

**Markup:** Retail price = Cost  $\times (1 + m)$ , where  $m$  is the markup rate.

**Sales tax:** Total = Sale price  $\times (1 + t)$ , where  $t$  is the tax rate.



*Discount/markup first, then apply tax to the new price.*

## Examples

① A \$80 jacket is on sale at 30% off. Sales tax is 8%. Find the sale price and the total cost after tax.

**Think It Through:** Sale price:  $80 \times (1 - 0.30) = 80 \times 0.70 = \$56.00$ . Tax:  $56 \times 0.08 = \$4.48$ . Total:  $56 + 4.48 = \$60.48$ .

**Answer:** Sale price: \$56.00; total with tax: \$60.48

② A store buys a toy for \$24 (wholesale cost) and applies a 65% markup. A customer then uses a 20% off coupon. What is the final price the customer pays?

**Think It Through:** Retail price:  $24 \times 1.65 = \$39.60$ . After 20% coupon:  $39.60 \times 0.80 = \$31.68$ .

**Answer:** Final price: \$31.68

## Practice Problems

Find the sale price (after discount), retail price (after markup), or total (after tax).

- An item costs \$60 and is discounted 25%. \_\_\_\_\_ Find the sale price.
- An item costs \$120 and is discounted 30%. Find the sale price.
- An item costs \$45 and is discounted 10%. \_\_\_\_\_ Find the sale price.
- An item costs \$200 and is discounted 15%. Find the sale price.
- An item costs \$85 and is discounted 40%. \_\_\_\_\_ Find the sale price.
- An item costs \$35 and is discounted 20%. \_\_\_\_\_ Find the sale price.



7. A store pays \$18 for an item and adds a \_\_\_\_\_ 50% markup. Find the retail price.
8. A store pays \$40 for an item and adds a \_\_\_\_\_ 75% markup. Find the retail price.
9. A store pays \$60 for an item and adds a \_\_\_\_\_ 30% markup. Find the retail price.
10. A store pays \$25 for an item and adds an \_\_\_\_\_ 80% markup. Find the retail price.
11. An item costs \$50 before tax. Sales tax is 6%. Find the total cost.
12. An item costs \$120 before tax. Sales tax is 8.5%. Find the total cost.
13. An item costs \$75 before tax. Sales tax is 7%. Find the total cost.
14. An item costs \$200 before tax. Sales tax is 9%. Find the total cost.
15. An item costs \$90, is discounted 20%, and then has 8% sales tax added. Find the final total.

### Study Tips

-  Use the **one-step multiplier** method: a 25% discount means you pay 75%, so multiply by 0.75 rather than subtracting in two steps.
-  Sales tax is always applied **after** the discount — never to the original price. Sequence: discount first, tax second.
-  A markup of 100% doubles the cost. A markup of 50% gives a retail price  $1.5\times$  the cost.

### Word Problems

16. A sporting goods store buys running shoes at wholesale for \$48 per pair and marks them up by 85%. During a clearance sale the retail price is discounted 30%. Sales tax in the state is 8.25%. Find the retail price, the sale price, and the total a customer pays including tax. \_\_\_\_\_
17. A phone originally costs \$650. A store offers two deals: Deal A is 20% off then 8% tax. Deal B is 8% tax first then 20% off the total. Calculate the final price under each deal. Are they the same? \_\_\_\_\_



## Answer Keys

- |  |  |
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| <p>1) \$45.00<br/>2) \$84.00<br/>3) \$40.50<br/>4) \$170.00<br/>5) \$51.00<br/>6) \$28.00<br/>7) \$27.00<br/>8) \$70.00<br/>9) \$78.00<br/>10) \$45.00</p> | <p>11) \$53.00<br/>12) \$130.20<br/>13) \$80.25<br/>14) \$218.00<br/>15) \$77.76<br/>16) Retail: \$88.80; sale: \$62.16; total with tax: <math>\approx</math> \$67.29.<br/>17) Deal A: \$561.60; Deal B: \$561.60; yes, they are the same.</p> |
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### Step-by-Step Explanations

**Strategy:** For Constant of Proportionality ( $k$ ), divide the output by the input to find the single multiplier that connects every ordered pair. This is where students should get comfortable seeing  $k$  as a multiplier, not just a letter.

**Practice 1:** In the proportional relationship  $y = kx$ , use  $y = 12$  and  $x = 3$  to find  $k$ . **Answer:** 4  
At the beginning of the practice, divide output by input:  $k$  is the multiplier from  $x$  to  $y$ .

**Practice 15:** In the proportional relationship  $y = kx$ , use  $k = 1.5$  and  $x = 10$  to find  $y$ . **Answer:** 15  
For the second model problem, use the given multiplier directly: once  $k$  is known,  $y = kx$ .

**Word-problem notes:**

**16. Answer:**  $k = \frac{3}{4}$  cup/dozen;  $y = \frac{3}{4}x$ ; 10 dozen needs 7.5 cups.

The problem asks for cups per dozen, so divide cups by dozens:  $(\frac{3}{2}) \div 2 = (\frac{3}{2}) \times (\frac{1}{2}) = \frac{3}{4}$ . So the constant of proportionality is  $\frac{3}{4}$  cup per dozen. That gives the equation  $y = \frac{3}{4}x$ , where  $x$  is dozens of cookies. For 10 dozen,  $y = \frac{3}{4} \times 10 = \frac{30}{4} = 7.5$  cups.

**17. Answer:** Painter A:  $k = 0.75$  room/hr; Painter B:  $k = 0.5$  room/hr; Painter A is faster.

Painter A is already given in rooms per hour, so  $k = \frac{3}{4} = 0.75$  room per hour. For Painter B, convert square feet per hour into rooms per hour. If one room is 90 square feet and Painter B completes 45 square feet each hour, then  $45 \div 90 = \frac{1}{2} = 0.5$  room per hour. Comparing 0.75 and 0.5 shows that Painter A works faster.

**18. Answer:** Marked point  $(2, 5)$ ;  $k = \frac{5}{2} = 2.5$  mph;  $y = 2.5x$ ; at 7 hr,  $y = 17.5$  mi.

Read the lattice point on the line: it sits at  $(2, 5)$ . Apply  $k = \frac{y}{x}$ :  $k = \frac{5}{2} = 2.5$ , in miles per hour. The equation is  $y = 2.5x$ . To predict the distance after 7 hours, substitute:  $y = 2.5 \times 7 = 17.5$  mi.



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