Unit 11 · Percents & Consumer Math Cheat Sheet

Unit 11 focus: find sale prices, tax, tips and percent change

1 PERCENT WORDS

Term	Meaning / quick example
Percent	Per hundred: 18% = 0.18.
Discount	Amount off the regular price.
Markup	Amount added to a store's cost.
Unit price	Price ÷ quantity.

2 MULTIPLIERS

Change	Multiply by
25% off	0.75
40% off	0.60
6% sales tax	1.06
15% increase	1.15

One multiplication does the whole change: $\text{new} = \text{old} \times (1 \pm r)$.

3 SALE PRICE

Multiply by what is left after the discount.

Example: \$120 jacket, 30% off.
Multiplier: $1 - 0.30 = 0.70$
Sale price: $0.70(120) = 84$

Answer: \$84

4 STACKED DISCOUNTS

The second discount comes off the sale price.

Example: \$100, 20% off, then an extra 10% off.
First: $0.80(100) = 80$
Second: $0.90(80) = 72$

Answer: \$72 — a 28% total discount, not 30%

5 TAX, TIP AND SPLIT

Tip on the pre-tax bill (custom). Total = bill + tax + tip.

Example: \$84 bill, 6.25% tax, 20% tip, 3 people.
Tax and tip: $84(0.0625) = 5.25;\ 84(0.20) = 16.80$
Each: $\dfrac{84 + 5.25 + 16.80}{3} = 35.35$

Answer: \$35.35 each

6 WORK BACKWARD

If a known change gave the new amount, divide by the multiplier:

$$\text{original} = \frac{\text{new}}{\text{multiplier}}$$

Paid \$54 after 25% off: $54 \div 0.75 = 72$.
Receipt \$53 with 6% tax: $53 \div 1.06 = 50$.

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More practice: compare unit prices, coupons and memberships

1 PERCENT CHANGE

$\frac{\text{new} - \text{original}}{\text{original}}$ — always divide by the original.

Example: Gas: \$3.20 → \$3.60.
Change: $3.60 - 3.20 = 0.40$
Rate: $0.40 \div 3.20 = 0.125$

Answer: 12.5% increase

2 MARKUP AND PROFIT

Price = cost × (1 + markup rate); profit = price − cost.

Example: Cost \$12, 60% markup, 50 sold.
Price: $12(1.60) = 19.20$
Profit: $50(19.20 - 12) = 360$

Answer: \$19.20 each; \$360 profit

3 SUCCESSIVE CHANGES

Changes	Overall
+10% then −10%	$1.1(0.9) = 0.99$ → −1%
+50% then −50%	$1.5(0.5) = 0.75$ → −25%
−20% then −20%	$0.8(0.8) = 0.64$ → −36%

Percent changes multiply; they do not add.

4 UNIT PRICES

Package	Unit price
12 oz for \$3.60	$3.60 \div 12 = 0.30$ per oz
18 oz for \$5.94	$5.94 \div 18 = 0.33$ per oz

Here the smaller box is the better buy. Use the same unit for every option.

5 MEMBERSHIP BREAK-EVEN

A fee F that returns rate r of spending pays for itself at $S = \frac{F}{r}$

\$60 fee, 5% back: $60 \div 0.05 = 1{,}200$ of spending a year.

Below that, the membership costs more than it saves.

6 REMINDERS & MISTAKES

✓ Do remember

- Use one multiplier for each change.
- Divide by the original for percent change.

✗ Common mistakes

- 20% + 20% = 40% off: it is 36% off.
- Undo +10% with −10%: divide by 1.10 instead.
- Bigger box = better deal: check the unit price.
- Tip on the after-tax total: tip on the pre-tax bill by custom.