Business Math Formulas Cheat Sheet

Percents

Portion
Portion = Base × Rate
Example: 15% of $240 = $240 × 0.15 = $36.00

Rate
Rate = Portion ÷ Base
Example: $36 ÷ $240 = 0.15 = 15%

Base
Base = Portion ÷ Rate
Example: $36 ÷ 0.15 = $240.00

Percent change
(New − Old) ÷ Old
Example: $50 to $65: $15 ÷ $50 = 0.3 = 30% increase

Trade and series (chain) discounts

Trade discount
Trade discount = List price × Rate
Example: $480 less 15%: $480 × 0.15 = $72.00

Net price
Net price = List price − Trade discount = List price × (1 − Rate)
Example: $480 − $72 = $408.00

Net price equivalent rate
$(1 - d_1) \times (1 - d_2) \times (1 - d_3) \ldots$
Example: 25/10/5: 0.75 × 0.9 × 0.95 = 0.64125

Net price, chain
Net price = List price × Net price equivalent rate
Example: $1,200 × 0.64125 = $769.50

Single equivalent discount rate
1 − Net price equivalent rate
Example: 1 − 0.64125 = 0.35875 = 35.875%

List price
List price = Net price ÷ Net price equivalent rate
Example: $769.50 ÷ 0.64125 = $1,200.00

Cash discounts

Terms 2/10, n/30
2% off if paid within 10 days of the invoice date; the full net price is due within 30 days

Cash discount
Cash discount = Net price × Cash discount rate
Example: $1,500 invoice, 2/10, n/30, paid on day 8: $1,500 × 0.02 = $30.00

Amount paid
Net price − Cash discount = Net price × (1 − Rate)
Example: $1,500 − $30 = $1,470.00

Partial payment
Amount credited = Partial payment ÷ (1 − Cash discount rate)
Example: $588 paid within 10 days: $588 ÷ 0.98 = $600.00 credited

Balance due
Net price − Amount credited
Example: $1,500 − $600 = $900.00

Take the cash discount on the merchandise amount after any trade discount and returns; leave freight and sales tax out of it.

Markup and markdown

Selling price
Selling price = Cost + Markup
Example: Cost $40, selling price $50: markup $10.00

Markup on cost
Markup % on cost = Markup ÷ Cost
Example: $10 ÷ $40 = 0.25 = 25%

Markup on selling price
Markup % on selling price = Markup ÷ Selling price
Example: $10 ÷ $50 = 0.2 = 20%

Price from markup on cost
Selling price = Cost × (1 + Markup % on cost)
Example: $40 × 1.25 = $50.00

Price from markup on selling price
Selling price = Cost ÷ (1 − Markup % on selling price)
Example: $40 ÷ 0.8 = $50.00

Convert cost → selling price
% on selling price = % on cost ÷ (1 + % on cost)
Example: 0.25 ÷ 1.25 = 0.2 = 20%

Convert selling price → cost
% on cost = % on selling price ÷ (1 − % on selling price)
Example: 0.2 ÷ 0.8 = 0.25 = 25%

Markdown
Markdown = Original selling price − Reduced price; Markdown % = Markdown ÷ Original selling price
Example: $80 reduced to $60: $20 ÷ $80 = 0.25 = 25%

Simple interest

Simple interest
I = P × R × T (T in years)
Example: $2,000 at 6% for 9 months: $2,000 × 0.06 × 9/12 = $90.00

Exact interest
T = Days ÷ 365
Example: $5,000 at 8% for 90 days: $5,000 × 0.08 × 90/365 ≈ $98.63

Ordinary interest (banker's rule)
T = Days ÷ 360
Example: $5,000 × 0.08 × 90/360 = $100.00

Maturity value
MV = P + I = P × (1 + R × T)
Example: $5,000 + $100 = $5,100.00

Solve for P, R or T
P = I ÷ (R × T); R = I ÷ (P × T); T = I ÷ (P × R)

Promissory notes and bank discount

Bank discount
Bank discount = Maturity value × Discount rate × Time
Example: $6,000 simple discount note, 9%, 120 days: $6,000 × 0.09 × 120/360 = $180.00

Proceeds
Proceeds = Maturity value − Bank discount
Example: $6,000 − $180 = $5,820.00

Effective rate
Effective rate = Bank discount ÷ (Proceeds × Time)
Example: $180 ÷ ($5,820 × 120/360) ≈ 9.2784%

Discounting an interest-bearing note
1. MV = Face value × (1 + R × T). 2. Discount period = days from the discount date to maturity. 3. Bank discount = MV × Discount rate × Discount period ÷ 360. 4. Proceeds = MV − Bank discount.
Example: $4,000 at 7% for 90 days: MV = $4,070.00; discounted at 9% with 60 days left: $4,070 × 0.09 × 60/360 = $61.05; proceeds $4,008.95

Business metrics

Gross margin
(Revenue − COGS) ÷ Revenue × 100

Profit margin
(Revenue − Total cost) ÷ Revenue × 100

Customer acquisition cost
Total acquisition cost ÷ New customers acquired

Customer lifetime value
(Average revenue per customer × Gross margin) ÷ Churn rate

LTV:CAC ratio
Customer lifetime value ÷ Customer acquisition cost

Economic order quantity
EOQ = √(2 × D × S ÷ H)

Reorder point
Lead-time demand + Safety stock

Safety stock
z × Daily demand standard deviation × √(Lead time in days)

Inventory carrying cost
Average inventory value × Carrying-cost rate

Labor cost percentage
Total labor cost ÷ Revenue × 100

Employee turnover cost
Departures per year × Cost per departure