

Chapter 6: Mathematics of Buying

6.1) Invoices and Trade Discounts

Manufacturing and Retail businesses make a profit by buying items and then reselling for more than they cost.

Manufacturers:

- Buy raw materials and assemble them into products that they sell to wholesalers

Wholesalers:

- Buy goods from manufactures or other wholesalers and sell them to retailers

Retailers:

- Sell the goods to the consumer

Examples:

- Finish plywood manufacturers in Finland sold wood to wholesalers in USA
- Wholesalers in USA sold aircraft plywood to Gel Boomerangs
- Gel Boomerangs manufactured boomerangs
- Gel Boomerangs sold boomerangs to retailers
- Retailers sold boomerangs to consumers

**Dell's operations span all three categories

Invoices:

- Record of sales and purchases
- Proof that transaction occurred – very important document for business efficiency and for the audit trail

Purchase invoice:

- For the buyer it records a purchase – usually inventory or supplies → example →

Sales Invoice:

- For the seller is records a sale – Proof that revenue was earned → example →

Plywood Wholesalers
 5543 92nd Ave. S.
 Alderwood, CA 92110

Invoice No. 104963

Gel Boomerangs is customer

INVOICE

Customer

Name Gel Boomerangs
 Address 2124 Kittredge St. PMB 61
 City Berkeley State CA ZIP 94704
 Phone _____

Misc

Date 2/28/2003
 Order No. _____
 Rep _____
 FOB _____ Destination _____

Qty	Description	Unit Price	TOTAL
5	Sheets 10 ply, 5mm, Finish Birch	\$ 90.00	\$ 450.00
Terms: 1/15,N/45			

SubTotal	\$ 450.00
Shipping	
TOTAL	\$ 450.00

Payment Select One...

Comments _____
 Name _____
 CC # _____
 Expires _____

Tax Rate(s) _____

Office Use Only

clean example

Sales Invoice because Gel Boomerang's name is at the top of the invoice. Gel Boomerangs did the selling.

*Gel Boomerangs
is
seller*

*Gel Boomerangs
2124 Kittredge St. PMB 61
Berkeley, CA 94704*

Invoice No. 4369

INVOICE

Customer			
Name	Kite Flight		
Address	1414 43rd Ave.		
City	Watermore	State	MD ZIP 40025
Phone			

Misc	
Date	2/23/2003
Order No.	
Rep	
FOB	Shipping Point

Qty	Description	Unit Price	TOTAL
15	Bellens	\$ 10.00	\$ 150.00
8	Duece	\$ 12.50	\$ 100.00
Terms: 2/10,N/30			

SubTotal	\$ 250.00
Shipping	
TOTAL	\$ 250.00

Payment	Select One...
Comments	
Name	
CC #	
Expires	

Tax Rate(s)

Office Use Only

Our Customers Have Many Happy Returns!

clean example

Plywood Wholesalers
5543 92nd Ave. S.
Alderwood, CA 92110

Invoice No. 104963

INVOICE

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Address: 2124 Kittredge St. PMB 61
City: Berkeley State CA ZIP 94704
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Misc

Date: 2/28/2003
Order No.
Rep
FOB Destination

Qty	Description	Unit Price	TOTAL
5	Sheets 10 ply, 5mm, Finish Birch	\$ 90.00	\$ 450.00
Terms: 1/15, N/45			
SubTotal			\$ 450.00
Shipping			
TOTAL			\$ 450.00

Payment Select One...

Comments
Name
CC #
Expires

Tax Rate(s)

TOTAL \$ 450.00

Office Use Only

① $5 * 90 = 450$

② **Cash** Discount date = **March 15**

③ So if Gel Boomerangs pays before or on March 15, they get **Cash discount** of 1%

④ Due date without receiving **cash discount** March has 31 days
 $45 - 31 = 14$ days
April 14 is due date

⑤ Amount to pay if Gel Boomerangs pays on March 10

$$450 - 450 * .01 = 450 - 4.5 = \$445.50$$

OR

$$450 * (1 - .01) = 450 * .99 = \$445.50$$

Sales Invoice because Gel Boomerang's name is at the top of the invoice. Gel Boomerangs did the selling.

Gel Boomerangs
2124 Kittredge St. PMB 61
Berkeley, CA 94704

Invoice No. 4369

INVOICE

Customer

Name Kite Flight
Address 1414 43rd Ave.
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Misc

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Rep _____
FOB Shipping Point

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SubTotal			\$ 250.00
Shipping			
TOTAL			\$ 250.00

Payment Select One...

Comments
Name _____
CC # _____
Expires _____

Tax Rate(s)

Office Use Only

Our Customers Have Many Happy Returns!

$$\begin{array}{r} 15 * 10 = \$150 \\ 8 * 12.5 = 100 \\ \hline \text{total} \quad 250 \end{array}$$

- ② Discount date = (A) (28-23) = 5 days in Feb. (B) 10 total
 (C) 10-5 = 5
 (D) Discount date = March 5.

③ so if Gel Boomerangs receives payment post marked by March 5, they will allow kite Flight to take cash Discount

④ Due date = 30 - 5 = 25 → March 25

⑤ Amount Gel Boomerangs will receive from Kite Flight if they pay on March 1 = $250 - 250 * .02 = 250 - 5 = 245$

$$250 * (1 - .02) = 250 * .98 = 245$$

1) Complete an invoice

Number of items purchased * price per item = total for that item
Number of items purchased * price per item = total for that item
= Total for invoice

units * price = total
or units * price = total

= total for invoice

15 Bellen Boomerangs * \$10.00 each = 150
8 Duce Boomerangs * \$12.50 each = 100
total \$ 250

From the next section,
the \$10.00 & the \$12.50 are
called "Net Cost"

2) Understand common shipping terms

FOB Shipping Point:

- Free on Board Shipping Point
- Title of goods is transferred to the purchaser when the goods are handed over to the shipper
- Purchaser must pay for shipping

FOB Destination:

- Free on Board Destination
- Title of goods transfers to the purchaser when they receive the goods
- Seller pays for the shipping

FAS:

- Free Alongside Ship
- Term used when goods delivered by a ship
- Sender pays for shipping costs up to the dock

3) Calculate trade discounts

Trade Discount:

- Given to businesses that resell the items
- Example: If Foot Locker sells the shoes for \$150.00, Foot Locker did not pay \$150.00 for the shoes. Foot Locker got a "trade discount" when they bought the shoes. When they bought the shoes they paid "net cost":

Net cost = List price - Trade discount

Formula

Net cost is the number you see on the invoice

Example:

The list price of the shoes is \$150.00. If the trade discount percentage is 25% what is the net cost?

① shoes price = 150
trade Discount = 25% of List price
what is net cost?

② $150 - 150 * .25 = 150 - 37.5 = 112.50$
or

$150 * (1 - .25) = 150 * .75 = 112.50$

③ The net cost was \$112.50

Series (Chain) discounts:

A type of (Trade Discount)

- Hold over from the past
- Each industry does it differently
- Example: discount is written as follows: 20/10
 - A 20% discount is subtracted from the list price, and from this difference, another 10% discount is subtracted

Three methods to calculate series discounts and net cost:

- 1) Discounts separately method
- 2) Compliment method
- 3) Table method

Discounts separately method: (Trade Discount)

Example:

The list price of a circular saw is \$150. If the trade discount 20/10 what is the net cost?

① circular saw List Price = ~~150~~
Trade discount = 20/10
What is net cost?

②

150	
-	150 * .2 (30) ← first discount in series
<hr/>	
=	120

120	
-	120 * .1 (12) ← second discount in series
<hr/>	
	108

③ After the series trade discount of 20/10, the circular saw (with a list of 150) had a net cost of \$108.00.

↑

This is the net cost number that shows up on the invoice. example:
Units * price = 8 * 108 = \$864.00

"wow that is a really nice ^{Mispelling} compliment [←]

Compliment method:

complement method:

~~Compliment~~

Complement:

- The number that must be added to the discount to get one
- The complement of a 20% discount is 80% because: $80\% + 20\% = 100\%$ or $.8 + .2 = 1$

The 80% is called the net cost equivalent (percent paid)

Net Cost = List price * net cost equivalent (percent paid)

Formula

Net cost equivalent (percent paid) for a series discount:

Complement of the first single discount * complement of the second single discount

Formula

Example:

Find the net cost equivalent (percent paid) for a 20/10 series discount.

$$(1 - .2) * (1 - .1) = .8 * .9 = .72 = \text{Net cost equivalent or percent paid}$$

compliments: .2 and .8 are compliments
.1 and .9 are compliments

Example:

The list price of a circular saw is \$150. If the trade discount 20/10 what is the net cost?

$$\left\{ \begin{array}{l} \text{Net cost equivalent} \\ \text{or} \\ \text{\% paid} \end{array} \right\} = (1 - .2) * (1 - .1) = .72$$

$$\begin{aligned} \text{Net cost} &= \text{List Price} * \text{Net cost equivalent} \\ \downarrow & \qquad \qquad \downarrow \qquad \qquad \downarrow \\ ? &= 150 * .72 \\ \text{(Net cost)} &= 108 \end{aligned}$$

Example:

Find the net cost equivalent of 20/10/15

$$(1 - .2) * (1 - .1) * (1 - .15) = .8 * .9 * .85 = .612$$

we don't need to round net cost equivalents.

Table method:

- Table on page 227

6.2) Single Discount Equivalents (Trade Discounts)

1) Express a series discount as an equivalent single discount

Single discount equivalent = 1 - net cost equivalent (percent paid)

Formula

Example:

If a 20/10 series discount is given, find the single discount equivalent.

1st) Net cost equivalent = $(1 - .2) * (1 - .1) = .72$

2nd) single discount equivalent = $1 - .72 = .28$

3rd) The single Trade Discount would be .28

example: to find net cost on \$100 List price

$$\text{Net cost} = 100 - 100 * .28 = 100 - 28 = 72.00$$

2) Find the net cost by multiplying the list price by the complements of the single discounts in a series

(we did this already on previous page)

Example:

The list price for a small compressor motor is \$100.00, if the trade discount is 20/15/5, find the net cost.

Step 1) List price = 100
trade discount = 20/15/5
Find net cost

Step 2) $100 * (1 - .2) * (1 - .15) * (1 - .05) =$

$$100 * .8 * .85 * .95 =$$

$$100 * .646 = \$64.60$$

Step 3) The net cost for the compressor motor is \$64.60. This is the net cost that appears on the invoice.

$$\frac{\text{Net cost}}{\left(\frac{\text{Net cost equivalent \% paid}}{100}\right)} = \text{List Price}$$

3) Find the list price given the series discount and the net cost

Net cost = list price x net cost equivalent (percent paid)
 Net cost / net cost equivalent (percent paid) = list price
 (P/R = B)

$$\frac{P}{R} = B$$

Example:

Series discount is 20/15/5 and the net cost after trade discount is \$64.60. Find the list price.

step 1

Series Trade Discount = 20/15/5

Net cost = 64.60

Find List price

step 2

$$\frac{P}{R} = B \text{ or } \frac{\text{Net cost}}{\% \text{ paid}} = \left\{ \text{List price} \right\}$$

$$\frac{64.60}{(1-.2) * (1-.15) * (1-.05)} = \frac{64.60}{.646} = \$100$$

Check:

$$100 * .646 = 64.60 \checkmark$$

step 3

With a series discount of 20/15/5 and a net cost of 64.60, the list price was \$100⁰⁰.

6.3) Cash Discounts: Ordinary Dating Method

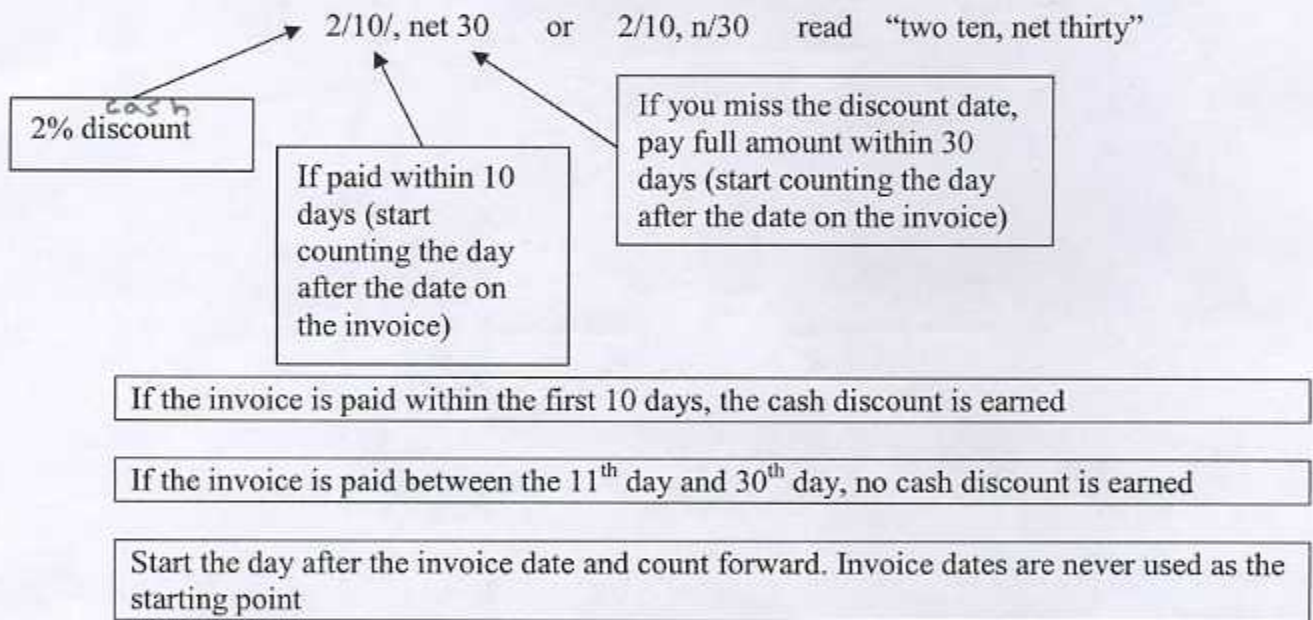
Trade Discounts

- When you purchase to resell

Cash Discounts

- Incentive to pay early
 - “If you pay me by this date, I will give you a discount”
- The business wants to get paid quickly so they have cash to conduct their business
- Is applied to the invoice subtotal for the items only (not the shipping or insurance) “If you pay me by this date, I will give you a discount”
- The business wants to get paid quickly so they have cash to conduct their business
- Net cost = (List price – trade discount) – cash discount

Use the ordinary dating method



Example:

Invoice date is October 20. The terms are 2/5, net 15. What is the due date?

Invoice date = Oct. 20

Cash Discount % = 2% \Rightarrow .02

of days until discount offer expires = 5

with No discount you still must pay within = 15 days

① There are 31 days in Oct.

② $31 - 20 = 11$ days used up in Oct

③ $15 - 11 = 4$ days into Nov.

④ Due date is November 4th date

Example:

Invoice date is October 20. The terms are 2/5, net 15. What date must the invoice be paid in order to take the discount?

Details

① There are 31 days in Oct.

② 11 days still to go if it is Oct. 20

③ so we just add 5 days to Oct. 20

④ $20 + 5 = 25$

⑤ The due date is Oct. 25

Comprehensive Example:

Invoice date is October 20

The terms are 2/5, net 15

The Invoice total is \$100.00 and the "FOB shipping point" shipping charges are \$8.00

Invoice is paid on October 22

What is the total amount due?

Step 1: Can the cash discount be taken?

$20 + 5 = 25 \Rightarrow$ Discount date = Oct. 25

Because we pay on Oct. 22, before Oct. 25, we CAN take the cash discount

Step 2: How much is the cash discount? (Shipping is not included in calculation)

$100 * .02 = \$2.00$

Step 3: Find amount due before considering shipping

$100 - 2 = \$98$

Step 4: Add total owed for merchandise and shipping

$98 + 8 = \$106$

Use postdating when calculating cash discounts

Sometimes on an invoice you will see a date like this

3/22/2007 AS OF 4/01/2007

Multiple offers for discounts

Invoice date = May 18
Terms = 4/10, 3/25, 1/40, n/60
First cash discount date
Second cash discount date
Third cash discount date
Net Payment Date

= 18 + 10 = 28
= 25 - (31 - 18) = 12
= 40 - (31 - 18) = 27
= 60 - (30) - (31 - 18) = 17

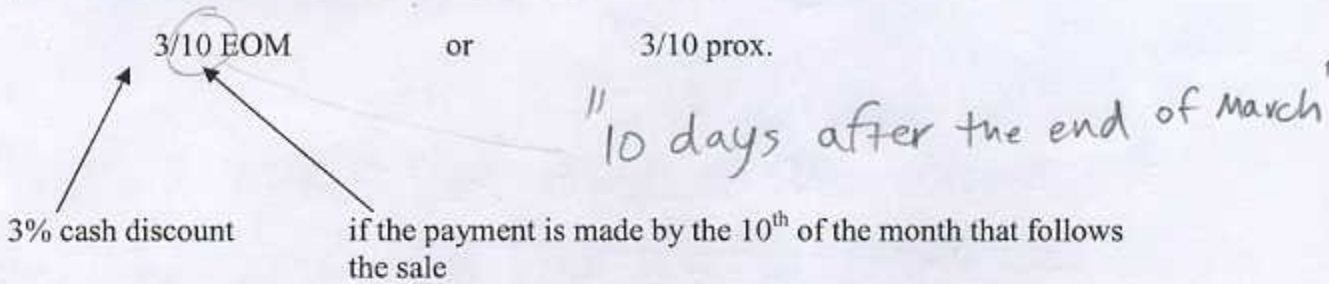
→ May 28
→ June 12
→ June 27
→ July 17

} depending on what day you pay determines what is cash discount rate is.

you would count days after April 1st

6.4) Cash Discounts: Other Dating Methods

Use the end-of-the month dating method



- **If the invoice is dated the 26th to the 31st then you add one extra month *P. 245 good example*
- **If no due date is given, it is assumed to be 20 days after the discount date
- **If due date falls on a Saturday or holiday, the following day becomes the due date

Example:

Invoice from Bay Air has an invoice date of April 6 with terms of 3/20 EOM, what is the discount date and what is the net payment date?

Discount date: May comes after April, so it is May 20

Net payment date: May has 31 days
 $31 - 20 = 11$ days left in May $20 - 11 = 9$

Because there is no net payment date given it is assumed to be 20 days after May 20

so the
 Net payment
 Date is
 JUNE 9

Example:

Find amount paid given the following information:

Invoice total = \$782.00

Invoice date: August 3

Terms: 1/10 prox.

Invoice paid on September 4

→ means same thing as 1/10/EOM

Step 1: find discount date

1/10 prox. means 10 days after end of August. So Discount Date is Sep. 10.

Step 2: Calculate amount owed

$$782 * (1 - .1) = \$703.80$$

We paid before discount date