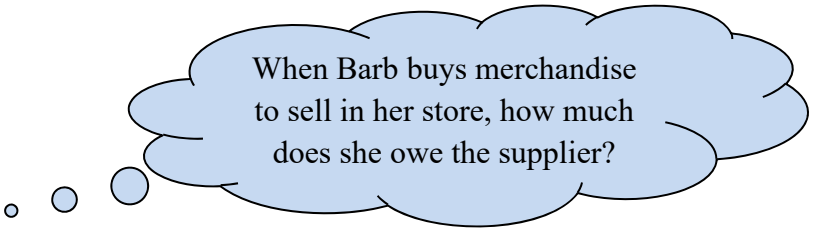


Business Mathematics
Class notes
Invoices and Trade Discounts (section 7.1)

Stores buy merchandise from a manufacturer or wholesaler and then sell it. They will receive an **invoice** which is a record of what they bought and the terms. These **terms** include the due date and any discounts that may apply. We will explore more about due dates in later sections. In this section, we will apply discounts to figure a buyer's **net cost**.

There are many abbreviations in this section. Here are several followed by some brief definitions.

Invoice Abbreviations

ea.	each	drm.	drum
doz.	dozen	cs.	case
gro.	gross (144 items)	pr.	pair
gr gro.	great gross (12 gross)	C	Roman numeral for 100
qt.	quart	M	Roman numeral for 1000
gal.	gallon (4 quarts)	cwt.	per hundredweight
bbl.	barrel	cpm.	cost per thousand
cL	centiliter	lb.	pound
L	liter	oz.	ounce
in.	inch	g	gram
ft.	foot	kg	kilogram
yd.	yard	ROG	receipt of goods
mm	millimeter	ex. or x	extra dating
cm	centimeter	FOB	free on board
m	meter	EOM	end of month
km	kilometer	COD	cash on delivery
ct.	crate	FAS	free alongside ship

Free on board (FOB) shipping point	Buyer pays for shipping costs. Ownership of goods passes to the purchaser prior to the shipment.
FOB destination	Seller pays the shipping charge and retains ownership until goods reach the destination.
Cash on delivery (COD)	Payment for goods is made at the time of delivery.
Free alongside ship (FAS)	Goods are delivered to the dock with all freight charges to that point paid by the seller.

(source: Business Mathematics, Clendenen & Salzman, 2018)

Trade Discounts: Single Discounts:

Definition: Net cost: This is how much the buyer will actually pay (*not* including shipping or insurance charges). It is also called **net price**. A formula, using our terminology, is

Net cost = List price – Trade discount

Take the price listed on the invoice and apply a discount, usually a percentage taken off.

expl 1: Suppose an invoice totals $500 and has a 20% discount. Find the net cost.

Remember to convert all percents to decimal form.

An alternative to this formula is the **complement method**. Think about this. If the discount is 20%, then what percentage do you *pay*? How do you use that with the invoice total to find the net cost?

Complements are two pieces of one whole.

Trade Discounts: Series Discounts:

expl 2: The invoice total is $500. The trade discount stated on the invoice is 20/10. Find the net cost.

This means to take a 20% discount, and *then take an additional* 10% off of that.

Is that the same as a 30% discount?

Why write a series discount like that? Different situations require price changes for certain buyers and *not* for others. Factors such as quantity purchased, location, seasonal fluctuations, levels of stock inventory, etc. affect whether a supplier will give a discount or not.

You probably did the previous example in two steps, first applying the 20% discount, and then calculating, from there, the 10% discount. But that is *not* how they are usually figured. There is an easier way. It is called the **Net Cost Equivalent** and is explained below.

Recall, the previous example, using the complement method, could have been done like the top line below. I then manipulate this to show what we call the Net Cost Equivalent**.**

$$(.8 \times 500) \times .9$$
$$= 500 \times .8 \times .9$$
$$= 500 \times .72$$
$$= 360$$

Find 80% of the total, and then 90% of that.

This 72% is called the **Net Cost Equivalent**.

This exploration leads to a procedure for finding this Net Cost Equivalent for any series discount we are given.

Procedure for Finding Net Cost Equivalent and Net Cost:

The **Net Cost Equivalent** (NCE) is the percent of the bill that will be paid.

1. Find the complement of each discount in the series.

2. Multiply these complements together to figure the **Net Cost Equivalent**.

3. Multiply the Net Cost Equivalent by the list price to find the **Net Cost**.

This is particularly helpful when the series discount has 3 or 4 discounts.

expl 3: Using complements, find the net cost equivalent of the following series discount. Do *not* round.

20/20/10

Never round these values or your net cost, when you find it, will be wrong.

Table for Finding Net Cost Equivalents:

It is good to be able to do that by hand, but we do have a table that will do these calculations for many common series discounts.

Worksheet: Net Cost Equivalents of Series Discounts:
This worksheet will give you the table below and explain how to use it. It has a few practice problems.

	Net Cost Equivalents of Series Discounts						
	5%	10%	15%	25%	30%	35%	40%
5	.9025	.855	.8075	.7125	.665	.6175	.57
10	.855	.81	.765	.675	.63	.585	.54
10/5	.81225	.7695	.72675	.64125	.5985	.55575	.513
15	.8075	.765	.7225	.6375	.595	.5525	.51
15/10	.72675	.6885	.65025	.57375	.5355	.49725	.459
20	.76	.72	.68	.6	.56	.52	.48
20/15	.646	.612	.578	.51	.476	.442	.408
25	.7125	.675	.6375	.5625	.525	.4875	.45
25/20	.57	.54	.51	.45	.42	.39	.36
25/25	.534375	.50625	.478125	.421875	.39375	.365625	.3375
30	.665	.63	.595	.525	.49	.455	.42
40	.57	.54	.51	.45	.42	.39	.36

Remember, do *not* round these values.

(source: Business Mathematics, Clendenen & Salzman, 2018)

How to read table: Look down the first column for the first one or two discounts listed. You find the last discount listed along the top row (that reads 5% 10% 15% …). The net cost equivalent is given where the appropriate row and column meet.

For instance, the highlighted row and column above shows the net cost equivalent of 15/10/25 to be .57375 or 57.375%.

This is the same as the net cost equivalent of 10/25/15. Do you know why?

Let's look up the series 10/35/5. Notice the first column does *not* have 10/35. However, you can find an equivalent series which could be looked up. Find it.

Here is some miscellaneous terminology you will encounter.

Definition: Unit price: the price for one item

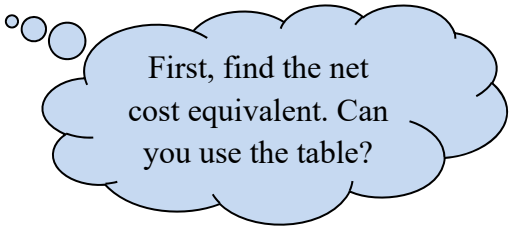
Definition: Extension total: the total price for multiples of an item. We find this by multiplying the number of items times its unit price.

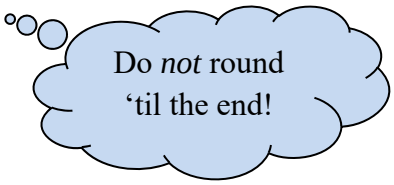
Definition: Invoice total: the total amount due for the entire invoice (all extension totals), *not* including shipping and insurance charges

Definition: List price: the suggested price to sell to the public. It is more helpful to think of this as the invoice price *before* the discount is applied.

expl 4: Find the net cost of the list price. Round to the nearest cent.

$380 less 20/10/20





Some problems may ask for extension or invoice totals. This is a matter of multiplying unit price times number purchased for extension totals. Invoice totals are simply the sum of all of the extension totals. To that, we might add shipping and insurance charges to find the total amount due.