

Ch 3

Cost Allocation for Joint Products and By-Products

تخصيص التكاليف للمنتجات المشتركة والمنتجات العرضية

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Joint products: المنتجات المشتركة

The **joint products** may be defined as Two or more products produced simultaneously by the same process up to the 'split-off' point.

يمكن تعريف المنتجات المشتركة على أنها منتجات أو أكثر يتم إنتاجهما في وقت واحد بنفس العملية حتى نقطة الانفصال.

Joint product , a primary output of a joint process; each joint product individually has substantial revenue-generating ability

المنتج المشترك، هو الناتج الأساسي لعملية مشتركة؛ يتمتع كل منتج مشترك على حدة بقدرة أساسية على توليد الإيرادات

The point at which these products emerge in their separately identifiable form is known as *point of separation* or **split-off point**. At this point, some of the joint products have an economic value and can be sold to customers while others require a further processing before they can be placed in the salable condition.

تعرف النقطة التي تظهر عندها هذه المنتجات في شكلها القابل للتحديد بشكل منفصل بنقطة الانفصال أو نقطة الانقسام. في هذه المرحلة، تتمتع بعض المنتجات المشتركة بقيمة اقتصادية ويمكن بيعها للعملاء بينما يحتاج البعض الآخر إلى معالجة إضافية قبل وضعها في حالة قابلة للبيع.

The common examples of businesses where the production of joint products can be found include chemical companies, refineries, coke manufacturers, flour mills, coal mines, gas companies, lumber mills, meat processors and packers, dairies and canners etc.

تشمل الأمثلة الشائعة للشركات التي يمكن العثور على إنتاج منتجات مشتركة فيها شركات الكيماويات ومصافي التكرير ومصنعي فحم الكوك ومطاحن الدقيق ومناجم الفحم وشركات الغاز ومطاحن الأخشاب ومعالجات اللحوم وتعبئتها ومصانع الألبان والمعلبات وما إلى ذلك

Raw milk is mostly the primary product which is further processed using different ways to extract other products like cream, cheese, yogurt, butter and saturated oil (ghee) etc. Raw milk in its purest form can be called as "whole fat milk". This product is further passed through different processes and screens to extract further products.

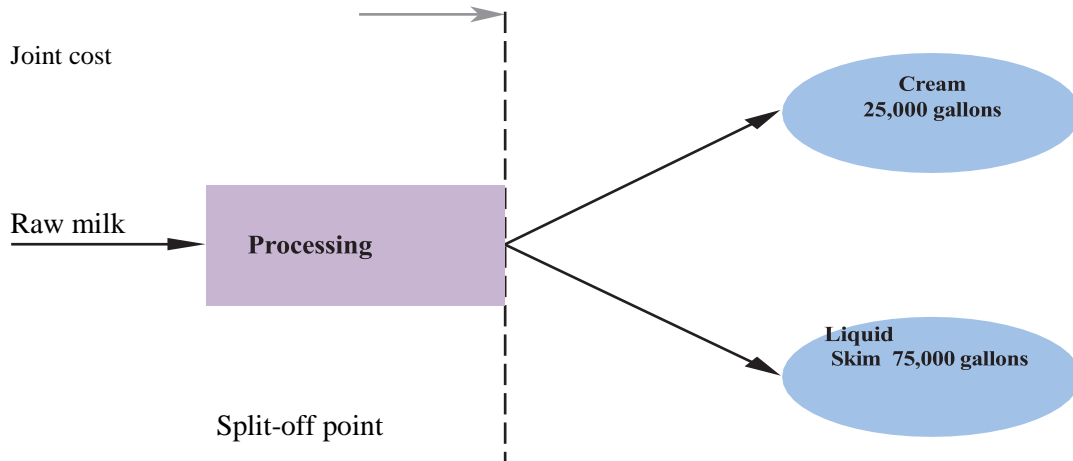
حليب الخام هو في الغالب المنتج الأساسي الذي تتم معالجته باستخدام طرق مختلفة لاستخلاص منتجات أخرى مثل الكريمة والجبن والزبادي والزبدة والزيت المشبع (السمن) وما إلى ذلك. ويمكن تسمية الحليب الخام في أنقى صورته باسم "حليب كامل الدسم". يتم تمرير هذا المنتج من خلال عمليات وشاشات مختلفة لاستخراج المزيد من المنتجات.

Joint costs: costs incurred for material, labor, and overhead during a joint process up to the split-off point

التكاليف المشتركة: التكاليف المتكبدة مقابل المواد والعمالة والتكاليف غير المباشرة خلال عملية مشتركة حتى نقطة الانفصال

By-product: an incidental output of a joint process; it is salable, but the sales value is not substantial enough for management to justify undertaking the joint process; it is viewed as having a higher sales value than scrap

المنتج العرضي أو الثانوي: ناتج عرضي لعملية مشتركة؛ وأن تكون قابلة للبيع، ولكن قيمة المبيعات ليست كبيرة بما يكفي للإدارة لتبرير القيام بالعملية المشتركة؛ يُنظر إليها على أنها ذات قيمة مبيعات أعلى من الخردة



التمييز بين المنتجات المشتركة والعرضية Distinction between joint and by-products

- Distinction is based upon the relative importance of their sales value
- A by-product is the secondary product recovered in the course of manufacturing a primary product
- The by-product is a product whose total sales value is relatively minor in comparison with the sales value of the main product(s)

* يعتمد التمييز على الأهمية النسبية لقيمة مبيعاتها
• المنتج العرض أو الثانوي هو المنتج الثانوي الذي يتم تحمله أو نغيطه أثناء تصنيع المنتج الأساسي أو الأولي
• المنتج الثانوي هو منتج تكون قيمة مبيعاته الإجمالية ضئيلة نسبيًا مقارنة بقيمة مبيعات المنتج (المنتجات) الرئيسية

Approaches to Allocating Joint Costs

المدخل لتخصيص التكاليف المشتركة:-

Two approaches are used to allocate joint costs. مدخلين يستخدمان لتخصيص التكاليف المشتركة.

- **Approach 1. المدخل الأول** Allocate joint costs using *physical measures*, such as the weight, quantity (physical units) method, or volume of the joint products.
تخصيص التكاليف المشتركة باستخدام المقاييس المادية أو الكمية مثل طريقة الوزن , أو الكمية (عدد الوحدات المنتجة أو المخرجات) أو الحجم للوحدات المشتركة
- **Approach 2. المدخل الثاني** Allocate joint costs using *market-based* data such as revenues. This chapter illustrates three methods that use this approach
تخصيص التكاليف المشتركة باستخدام البيانات المبنية على أساس السوق, في هذا الفصل سيتم استخدام ثلاثة طرق لهذا المدخل فقط وهي :
 1. Sales value at split-off method طريقة القيمة السوقية عند نقطة الانفصال
 2. Net realizable value (NRV) method طريقة صافي القيمة القابلة للتحقق
 3. Constant gross-margin percentage NRV method طريقة نسبة مجمل الربح الثابت

Example 1:-

Farmers' Dairy purchases raw milk from individual farms and processes it until the split-off point, when two products—cream and liquid skim- emerge. These two products are sold to an independent company, which markets and distributes them to supermarkets and other retail outlets.

تقوم شركة ألبان المزارعين بشراء الحليب الخام من المزارع الفردية ومعالجته حتى نقطة الانفصال، عندها يظهر منتجان - الكريمة والقشطة السائلة (الحليب المكثف). يتم بيع هذين المنتجين إلى شركة مستقلة تقوم بتسويقهما وتوزيعهما على محلات السوبر ماركت ومنافذ البيع بالتجزئة الأخرى.

In May 2023, Farmers' Dairy processes 110,000 gallons of raw milk. During processing, 10,000 gallons are lost due to evaporation and spillage, yielding 25,000 gallons of cream and 75,000 gallons of liquid skim. Summary data follow:

في أيار 2023، قامت شركة ألبان المزارعين بمعالجة 110.000 جالون من الحليب الخام. أثناء المعالجة، يتم فقدان 10000 جالون بسبب التبخر والانسكابات، مما ينتج عنه 25000 جالون من الكريمة و75000 جالون من السائل المقشود. البيانات الموجزة كالآتي :

	A	B	C
1		Joint Costs	
2	Joint costs (costs of 110,000 gallons raw milk and processing to split-off point)	\$400,000	
4		Cream	Liquid Skim
5	Beginning inventory (gallons)	0	0
6	Production (gallons)	25,000	75,000
7	Sales (gallons)	20,000	30,000
8	Ending inventory (gallons)	5,000	45,000
9	Selling price per gallon	\$ 8	\$ 4

Required :- How much of the \$400,000 joint costs should be allocated to the cost of goods sold of 20,000 gallons of cream and 30,000 gallons of liquid skim, and how much should be allocated to the ending inventory of 5,000 gallons of cream and 45,000 gallons of liquid skim?

المطلوب :- ما هو المقدار الذي يجب تخصيصه من التكاليف المشتركة البالغة 400.000 دولار لتكلفة البضائع المباعة المكونة من 20.000 جالون قشدة و30.000 جالون من الدسم السائل، وما هو المقدار الذي يجب تخصيصه للمخزون النهائي البالغ 5.000 جالون قشدة و45.000 جالون من القشدة المقشود السائل؟

طريقة القياس المادي (الكمية) :- Physical-Measure Method

The **physical-measure method** allocates joint costs to joint products produced during the accounting period on the basis of a *comparable* physical measure, such as the relative weight, quantity, or volume at the split-off point. In Example 1, the \$400,000 joint costs produced 25,000 gallons of cream and 75,000 gallons of liquid skim. Using the number of gallons produced as the physical measure, Exhibit 1 , Panel A, shows how joint costs are allocated to individual products to calculate the cost per gallon of cream and liquid skim.

Because the physical-measure method allocates joint costs on the basis of the number of gallons, cost per gallon is the same for both products. Exhibit 1 , Panel B, presents the product-line income statement using the physical-measure method. The gross-margin percentages are 50% for cream and 0% for liquid skim.

تقوم طريقة القياس المادي (الكمي) بتوزيع التكاليف المشتركة على المنتجات المشتركة المنتجة خلال الفترة المحاسبية على أساس قياس مادي أو كمي قابل للمقارنة، مثل الوزن النسبي أو الكمية المنتجة أو الحجم عند نقطة الانفصال. في المثال 1، أنتجت التكاليف المشتركة البالغة 400000 دولار 25000 جالون من القشدة و75000 جالون من السائل خالي الدسم. باستخدام عدد الجالونات المنتجة كمقياس مادي، يوضح الشكل 1، اللوحة أ، كيفية تخصيص التكاليف المشتركة للمنتجات الفردية لحساب تكلفة الجالون الواحد من الكريمة والسائلة منزوعة الدسم. ونظرًا لأن طريقة القياس الفيزيائي تقوم بتوزيع التكاليف المشتركة على أساس عدد الجالونات، فإن التكلفة لكل جالون هي نفسها لكلا المنتجين. يعرض الشكل 1، اللوحة (ب)، بيان دخل خط الإنتاج باستخدام طريقة القياس المادي. النسب المئوية للهامش الإجمالي هي 50% للكريمة و0% للسائلة منزوعة الدسم.

Exhibit 1

	A	B	C	D
1	PANEL A: Allocation of Joint Costs Using Physical-Measure Method	Cream	Liquid Skim	Total
2	Physical measure of total production (gallons)	25,000	75,000	100,000
3	Weighting (25,000 gallons ÷ 100,000 gallons; 75,000 gallons ÷ 100,000 gallons)	0.25	0.75	
4	Joint costs allocated (0.25 × \$400,000 ; 0.75 × \$400,000)	\$100,000	\$300,000	\$400,000
5	Joint production cost per gallon (\$100,000 ÷ 25,000 gallons; \$300,000 ÷ 75,000 gallons)	\$ 4.00	\$ 4.00	
6				
7	PANEL B: Product-Line Income Statement Using Physical-Measure Method for May	Cream	Liquid Skim	Total
8	Revenues (20,000 gallons × \$8 per gallon; 30,000 gallons × \$4 per gallon)	<u>\$160,000</u>	<u>\$120,000</u>	<u>\$280,000</u>
9	Cost of goods sold (joint costs)			
10	Production costs (0.25 × \$400,000; 0.75 × \$400,000)	100,000	300,000	400,000
11	Deduct ending inventory (5,000 gallons × \$4 per gallon; 45,000 gallons × \$4 per gallon)	<u>20,000</u>	<u>180,000</u>	<u>200,000</u>
12	Cost of goods sold (joint costs)	<u>80,000</u>	<u>120,000</u>	<u>200,000</u>
13	Gross margin	<u>\$ 80,000</u>	<u>\$ 0</u>	<u>\$ 80,000</u>
14	Gross margin percentage (\$80,000 ÷ \$160,000; \$0 ÷ \$120,000; \$80,000 ÷ \$280,000)	50%	0%	28.6%

Sales Value at Split-off Method :- طريقة القيمة البيعية عند نقطة الانفصال

The **sales value (market value) at split-off method** allocates joint costs to joint products produced during the accounting period on the basis of the relative total sales value at the split-off point. Using this method for Example 1, Exhibit 2, Panel A, shows how joint costs are allocated to individual products to calculate cost per gallon of cream and liquid skim for valuing ending inventory. This method uses the sales value of the *entire production of the accounting period* (25,000 gallons of cream and 75,000 gallons of liquid skim), not just the quantity sold (20,000 gallons of cream and 30,000 gallons of liquid skim). The reason this method does not rely solely on the quantity sold is that the joint costs were incurred on all units produced, not just the portion sold during the current period. Exhibit 2, Panel B, presents the product-line income statement using the sales value at split-off method. Note that the gross-margin percentage for each product is 20%, because the sales value at split-off method allocates joint costs to each product in proportion to the sales value of total production (cream: \$160,000 , \$200,000 = 80%; liquid skim: \$240,000 , \$300,000 = 80%). Therefore, the gross-margin percentage for each product manufactured in May 2023 is the same: 20%.

تقوم طريقة قيمة المبيعات (القيمة السوقية) عند نقطة الانفصال بتخصيص التكاليف المشتركة للمنتجات المشتركة المنتجة خلال الفترة المحاسبية على أساس إجمالي قيمة المبيعات النسبية عند نقطة الانفصال . باستخدام هذه الطريقة للمثال 1، يوضح الشكل 2، اللوحة أ، كيفية التكاليف المشتركة يتم تخصيصها للمنتجات الفردية لحساب التكلفة لكل جالون من الكريمة والقشطة السائلة لتقييم المخزون النهائي. تستخدم هذه الطريقة قيمة المبيعات لكامل إنتاج الفترة المحاسبية (25.000 جالون قشطة و 75.000 جالون قشطة سائلة)، وليس فقط الكمية المباعة (20.000 جالون قشطة و 30.000 جالون قشطة سائلة). والسبب في أن هذه الطريقة لا تعتمد فقط على الكمية المباعة هو أن التكاليف المشتركة تم تكبيدها على جميع الوحدات المنتجة، وليس فقط الجزء المباعة خلال الفترة الحالية. يعرض الشكل التوضيحي 2، اللوحة ب، بيان دخل لكل خط الإنتاج باستخدام قيمة المبيعات بطريقة التقسيم. لاحظ أن نسبة هامش الربح الإجمالي لكل منتج هي 20%، لأن قيمة المبيعات بطريقة التجزئة توزع التكاليف المشتركة لكل منتج بما يتناسب مع قيمة مبيعات إجمالي الإنتاج (كريم: 160,000 دولار / 200,000 دولار = 80%؛ القشطة: 240,000 دولار / 300,000 دولار = 80%). ولذلك فإن نسبة هامش الربح الإجمالي لكل منتج تم تصنيعه في مارس 2023 هي نفسها: 20%

Exhibit 2

joint-Cost Allocation and Product-Line Income Statement Using Sales Value at Split-off Method:
Farmers' Dairy for May 2023

	A	B	C	D
1	PANEL A: Allocation of Joint Costs Using Sales Value at Split-off Method	Cream	Liquid Skim	Total
2	Sales value of total production at split-off point			
3	(25,000 gallons × \$8 per gallon; 75,000 gallons × \$4 per gallon)	\$200,000	\$300,000	\$500,000
4	Weighting (\$200,000 ÷ \$500,000; \$300,000 ÷ 500,000)	0.40	0.60	
5	Joint costs allocated (0.40 × \$400,000; 0.60 × \$400,000)	\$160,000	\$240,000	\$400,000
6	Joint production cost per gallon			
7	(\$160,000 ÷ 25,000 gallons; \$240,000 ÷ 75,000 gallons)	\$ 6.40	\$ 3.20	
8				
9	PANEL B: Product-Line Income Statement Using Sales Value at Split-off Method for May 2012	Cream	Liquid Skim	Total
10	Revenues (20,000 gallons × \$8 per gallon; 30,000 gallons × \$4 per gallon)	\$160,000	\$120,000	\$280,000
11	Cost of goods sold (joint costs)			
12	Production costs (0.40 × \$400,000; 0.60 × \$400,000)	160,000	240,000	400,000
13	Deduct ending inventory (5,000 gallons × \$6.40 per gallon; 45,000 gallons × \$3.20 per gallon)	<u>32,000</u>	<u>144,000</u>	<u>176,000</u>
14	Cost of goods sold (joint costs)	<u>128,000</u>	<u>96,000</u>	<u>224,000</u>
15	Gross margin	<u>\$ 32,000</u>	<u>\$ 24,000</u>	<u>\$ 56,000</u>
16	Gross margin percentage (\$32,000 ÷ \$160,000; \$24,000 ÷ \$120,000; \$56,000 ÷ \$280,000)	20%	20%	20%

طريقة صافي القيمة القابلة للتحقق :- Net Realizable Value Method

In many cases, products are processed beyond the split-off point to bring them to a marketable form or to increase their value above their selling price at the split-off point. For example, when crude oil is refined, the gasoline, kerosene, benzene, must be processed further before they can be sold. To illustrate, let's extend the Farmers' Dairy example.

في كثير من الحالات، تتم معالجة المنتجات بعد نقطة الانفصال للوصول بها إلى شكل قابل للتسويق أو لزيادة قيمتها فوق سعر بيعها عند نقطة الانقسام. على سبيل المثال، عندما يتم تكرير النفط الخام، يجب معالجة البنزين والكيروسين بشكل إضافي أو لاحق قبل بيعها. للتوضيح، دعونا نوسع مثال منتجات الألبان للمزارعين.

Example 2: Assume the same data as in Example 1 except that both cream and liquid skim can be processed further:

أفترض نفس البيانات كما في المثال 1 باستثناء أنه يمكن معالجة كل من الكريمة والقشطة بشكل إضافي أو لاحق لنقطة الانفصال:

- Cream → Buttercream: 25,000 gallons of cream are further processed to yield 20,000 gallons of buttercream at additional processing costs of \$280,000. Buttercream, which sells for \$25 per gallon, is used in the manufacture of butter-based products.

الكريمة → كريمة الزبدة: تتم معالجة 25.000 جالون من الكريمة لإنتاج 20.000 جالون من كريمة الزبدة بتكاليف معالجة إضافية قدرها 280.000 دولار. يتم استخدام كريمة الزبدة، التي تباع بسعر 25 دولارًا للجالون الواحد، في صناعة المنتجات المعتمدة على الزبدة.

- Liquid Skim → Condensed Milk: 75,000 gallons of liquid skim are further processed to yield 50,000 gallons of condensed milk at additional processing costs of \$520,000. Condensed milk sells for \$22 per gallon.

القشطة السائلة ← الحليب المكثف: تتم معالجة 75.000 جالون من الحليب خالي الدسم بشكل إضافي لإنتاج 50.000 جالون من الحليب المكثف بتكاليف معالجة إضافية قدرها 520.000 دولار. ويبيع الحليب المكثف بسعر 22 دولارًا للجالون الواحد.

- Sales during May 2023 are 12,000 gallons of buttercream and 45,000 gallons of condensed milk.

Exhibit 5, Panel A, depicts how (a) raw milk is converted into cream and liquid skim in the joint production process, and (b) how cream is separately processed into butter-cream and liquid skim is separately processed into condensed milk. Panel B shows the data for Example 2

المبيعات خلال شهر مايو 2023 هي 12000 جالون كريمة الزبدة و 45000 جالون حليب مكثف. يوضح الشكل 5، اللوحة أ، كيف (أ) يتم تحويل الحليب الخام إلى قشدة وسائلة منزوعة الدسم في عملية الإنتاج المشترك، و (ب) كيف تتم معالجة القشدة بشكل منفصل إلى قشدة زبدة والسائلة بشكل منفصل إلى حليب مكثف. تعرض اللوحة B بيانات المثال 2.

The **net realizable value (NRV) method** allocates joint costs to joint products produced during the accounting period on the basis of their relative NRV—final sales value minus separable costs. The NRV method is typically used in preference to the sales value at split-off method only when selling prices for one or more products at split-off do not exist. Using this method for Example 2, Exhibit 3, Panel A, shows how joint costs are allocated to individual products to calculate cost per gallon of buttercream and condensed milk.

تقوم طريقة صافي القيمة القابلة للتحقق (NRV) بتوزيع التكاليف المشتركة على المنتجات المشتركة المنتجة خلال الفترة المحاسبية على أساس صافي القيمة القابلة للتحقق - (NRV) قيمة المبيعات النهائية مطروحًا منها التكاليف القابلة للفصل. تُستخدم طريقة NRV عادةً لتفضيل قيمة المبيعات عند طريقة التجزئة فقط عندما لا تكون أسعار البيع لمنتج واحد أو أكثر عند التجزئة موجودة. باستخدام هذه الطريقة في المثال 2، يوضح الشكل 3، اللوحة أ، كيفية تخصيص التكاليف المشتركة للمنتجات الفردية لحساب تكلفة الجالون الواحد من كريمة الزبدة والحليب المكثف.

Exhibit 3, Panel B presents the product-line income statement using the NRV method.

Gross-margin percentages are 22.0% for buttercream and 26.4% for condensed milk.

The NRV method is often implemented using simplifying assumptions. For example, even when selling prices of joint products vary frequently,

يعرض الشكل التوضيحي 3، اللوحة ب، بيان دخل خط الإنتاج باستخدام طريقة NRV تبلغ نسبة هامش الربح الإجمالي 22.0% لكريمة الزبدة و 26.4% للحليب المكثف. غالبًا ما يتم تنفيذ طريقة NRV باستخدام افتراضات مبسطة. على سبيل المثال، حتى عندما تختلف أسعار بيع المنتجات المشتركة بشكل متكرر،

Exhibit 3

Example 2: Overview of Farmers' Dairy (continued)

PANEL B: Data for Example 2

	Joint Costs		Buttercream	Condensed Milk
1				
2	Joint costs (costs of 110,000 gallons raw milk and processing to splitoff point)			
		\$400,000		
	A	B	C	D
				E
4	Separable cost of processing 75,000 gallons liquid skim into 50,000 gallons condensed milk			\$520,000
5				
6		Cream	Liquid Skim	Buttercream
7	Beginning inventory (gallons)	0	0	0
8	Production (gallons)	25,000	75,000	20,000
9	Transfer for further processing (gallons)	25,000	75,000	
10	Sales (gallons)			12,000
				45,000
11	Ending inventory (gallons)	0	0	8,000
				5,000
12	Selling price per gallon	\$ 8	\$ 4	\$ 25
				\$ 22

Exhibit -4

Joint-Cost Allocation and Product-Line Income Statement Using NRV Method: Farmers' Dairy for May 2023

	A	B	C	D
1	PANEL A: Allocation of Joint Costs Using Net Realizable Value Method	Buttercream	Condensed Milk	Total
2	Final sales value of total production during accounting period			
3	(20,000 gallons × \$25 per gallon; 50,000 gallons × \$22 per gallon)	\$500,000	\$1,100,000	\$1,600,000
4	Deduct separable costs	<u>280,000</u>	<u>520,000</u>	<u>800,000</u>
5	Net realizable value at split-off point	<u>\$220,000</u>	<u>\$ 580,000</u>	<u>\$ 800,000</u>
6	Weighting (\$220,000 ÷ \$800,000; \$580,000 ÷ \$800,000)	0.275	0.725	
7	Joint costs allocated (0.275 × \$400,000; 0.725 × \$400,000)	\$110,000	\$ 290,000	\$ 400,000
8	Production cost per gallon			
9	[((\$110,000 + \$280,000) ÷ 20,000 gallons); (\$290,000 + \$520,000) ÷ 50,000 gallons)	\$ 19.50	\$ 16.20	
10				
11	PANEL B: Product-Line Income Statement Using Net Realizable Value Method for May 2023	Buttercream	Condensed Milk	Total
12	Revenues (12,000 gallons × \$25 per gallon; 45,000 gallons × \$22 per gallon)	\$300,000	\$ 990,000	\$1,290,000
13	Cost of goods sold			
14	Joint costs (0.275 × \$400,000; 0.725 × \$400,000)	110,000	290,000	400,000
15	Separable costs	<u>280,000</u>	<u>520,000</u>	<u>800,000</u>
16	Production costs	390,000	810,000	1,200,000
17	Deduct ending inventory (8,000 gallons × \$19.50 per gallon; 5,000 gallons × \$16.20 per gallon)	<u>156,000</u>	<u>81,000</u>	<u>237,000</u>
18	Cost of goods sold	<u>234,000</u>	<u>729,000</u>	<u>963,000</u>
19	Gross margin	<u>\$ 66,000</u>	<u>\$ 261,000</u>	<u>\$ 327,000</u>
20	Gross margin percentage (\$66,000 ÷ \$300,000; \$261,000 ÷ \$990,000; \$327,000 ÷ \$1,290,000)	22.0%	26.4%	25.3%

Constant Gross-Margin Percentage Method:-

طريقة النسبة المئوية الثابتة لمجمل الربح

The **constant gross-margin percentage method** allocates joint costs to joint products produced during the accounting period in such a way that each individual product achieves an identical gross-margin percentage. The method works backward in that the overall gross margin is computed first. Then, for each product, this gross-margin percentage and any separable costs are deducted from the final sales value of production in order to back into the joint cost allocation for that product. The method can be broken down into three discrete steps. Exhibit -5 Panel A, shows these steps for allocating the \$400,000 joint costs between buttercream and condensed milk in the Farmers' Dairy example. As we describe each step, refer to Exhibit 5, Panel A, for an illustration of the step.

قوم طريقة النسبة المئوية الثابتة لمجمل الربح بتخصيص التكاليف المشتركة للمنتجات المشتركة المنتجة خلال الفترة المحاسبية بحيث يحقق كل منتج على حدة نسبة هامش إجمالي متطابقة. تعمل الطريقة بشكل عكسي حيث يتم حساب هامش الربح الإجمالي أولاً. بعد ذلك، بالنسبة لكل منتج، يتم خصم نسبة هامش الربح الإجمالي وأي تكاليف قابلة للفصل من قيمة المبيعات النهائية للإنتاج من أجل العودة إلى تخصيص التكلفة المشتركة لهذا المنتج. يمكن تقسيم الطريقة إلى ثلاث خطوات منفصلة. يوضح الشكل - 5 اللوحة أ هذه الخطوات لتخصيص التكاليف المشتركة البالغة 400000 دولار بين كريمة الزبدة والحليب المكثف في مثال ألبان المزارعين. أثناء وصفنا لكل خطوة، راجع الشكل 5 اللوحة أ، للحصول على توضيح للخطوة.

Step 1: Compute overall gross margin percentage. The overall gross-margin percentage for all joint products together is calculated first. This is based on the final sales value of *total production* during the accounting period, not the *total revenues* of the period. Note, Exhibit 5, Panel A, uses \$1,600,000, the final expected sales value of the entire output of buttercream and

condensed milk, not the \$1,290,000 in actual sales revenue for the month of May.

الخطوة 1: حساب النسبة المئوية الإجمالية للهامش الإجمالي. يتم حساب النسبة المئوية الإجمالية للهامش الإجمالي لجميع المنتجات المشتركة معاً أولاً. ويعتمد ذلك على قيمة المبيعات النهائية لإجمالي الإنتاج خلال الفترة المحاسبية، وليس إجمالي إيرادات الفترة. ملاحظة، الشكل 5، اللوحة أ، يستخدم مبلغ 1,600,000 دولار، وهو قيمة المبيعات النهائية المتوقعة لكامل إنتاج كريمة الزبدة والحليب المكثف، وليس 1,290,000 دولار من إيرادات المبيعات الفعلية لشهر ايار.

Step 2: Compute total production costs for each product. The gross margin (in dollars) for each product is computed by multiplying the overall gross-margin percentage by the product's final sales value of total production. The difference between the final sales value of total production and the gross margin then yields the total production costs that the product must bear.

الخطوة الثانية: حساب إجمالي تكاليف الإنتاج لكل منتج. يتم حساب هامش الربح الإجمالي (بالدولار) لكل منتج عن طريق ضرب نسبة إجمالي هامش الربح الإجمالي في قيمة المبيعات النهائية للمنتج من إجمالي الإنتاج. إن الفرق بين قيمة المبيعات النهائية لإجمالي الإنتاج وإجمالي الهامش يؤدي إلى إجمالي تكاليف الإنتاج التي يجب أن يتحملها المنتج.

Step 3: Compute allocated joint costs. As the final step, the separable costs for each product are deducted from the total production costs that the product must bear to obtain the joint-cost allocation for that product.

الخطوة 3: حساب التكاليف المشتركة المخصصة. وكخطوة أخيرة، يتم خصم التكاليف القابلة للفصل لكل منتج من إجمالي تكاليف الإنتاج التي يجب أن يتحملها المنتج للحصول على تخصيص التكلفة المشتركة لهذا المنتج.

Exhibit 5, Panel B, presents the product-line income statement for the constant gross-margin percentage metho

Exhibit 5
Joint-Cost Allocation and Product-Line Income Statement Using Constant Gross-Margin Percentage NRV Method: Farmers' Dairy for May 2023

	A	B	C	D
1	PANEL A: Allocation of Joint Costs Using Constant Gross-Margin Percentage NRV Method			
2	Step 1			
3	Final sales value of total production during accounting period: (20,000 gallons × \$25 per gallon) + (50,000 gallons × \$22 per gallon)	\$1,600,000		
4	Deduct joint and separable costs (\$400,000 + \$280,000 + \$520,000)	<u>1,200,000</u>		
5	Gross margin	<u>\$ 400,000</u>		
6	Gross margin percentage (\$400,000 ÷ \$1,600,000)	25%		
7		Buttercream	Condensed Milk	Total
8	Step 2			
9	Final sales value of total production during accounting period: (20,000 gallons × \$25 per gallon; 50,000 gallons × \$22 per gallon)	\$ 500,000	\$1,100,000	\$1,600,000
10	Deduct gross margin, using overall gross-margin percentage (25% × \$500,000; 25% × \$1,100,000)	<u>125,000</u>	<u>275,000</u>	<u>400,000</u>
11	Total production costs	375,000	825,000	1,200,000
12	Step 3			
13	Deduct separable costs	<u>280,000</u>	<u>520,000</u>	<u>800,000</u>
14	Joint costs allocated	<u>\$ 95,000</u>	<u>\$ 305,000</u>	<u>\$ 400,000</u>
16	PANEL B: Product-Line Income Statement Using Constant Gross-Margin Percentage Method for May 2023	Buttercream	Condensed Milk	Total
17	Revenues (12,000 gallons × \$25 per gallon; 45,000 gallons × \$22 per gallon)	<u>\$ 300,000</u>	<u>\$ 990,000</u>	<u>\$1,290,000</u>
18	Cost of goods sold			
19	Joint costs (from Panel A)	95,000	305,000	400,000
20	Separable costs	<u>280,000</u>	<u>520,000</u>	<u>800,000</u>
21	Production costs	375,000	825,000	1,200,000
22	Deduct ending inventory			
23	(8,000 gallons × \$18.75 per gallon ^a ; 5,000 gallons × \$16.50 per gallon ^b)	<u>150,000</u>	<u>82,500</u>	<u>232,500</u>
24	Cost of goods sold	<u>225,000</u>	<u>742,500</u>	<u>967,500</u>
25	Gross margin	<u>\$ 75,000</u>	<u>\$ 247,500</u>	<u>\$ 322,500</u>
26	Gross margin percentage (\$75,000 ÷ 300,000; \$247,500 ÷ \$990,000; \$322,500 ÷ \$1,290,000)	25%	25%	25%
28	^a Total production costs of buttercream ÷ Total production of buttercream = \$375,000 ÷ 20,000 gallons = \$18.75 per gallon.			
29	^b Total production costs of condensed milk ÷ Total production of condensed milk = \$825,000 ÷ 50,000 gallons = \$16.50 per gallon.			

Example (2):-

Inorganic Chemicals (IC) processes salt into various industrial products. In July 2023, IC incurred joint costs of \$100,000 to purchase salt and convert it into two products: caustic soda and chlorine. Although there is an active outside market for chlorine, IC processes all 800 tons of chlorine it produces into 500 tons of PVC (polyvinyl chloride), which is

مثال (2) :- تقوم شركة المواد الكيميائية غير العضوية (IC) بمعالجة الملح وتحويله إلى منتجات صناعية مختلفة. في يوليو 2023، تكبدت شركة IC تكاليف مشتركة قدرها 100 ألف دولار لشراء الملح وتحويله إلى منتجين: الصودا الكاوية والكلور. على الرغم من وجود سوق خارجي نشط للكلور، تقوم شركة IC بمعالجة كل 800 طن من الكلور الذي تنتجه إلى 500 طن من PVC (كلوريد البوليفينيل)، والذي يتم بعدها بيعه.

then sold. There were no beginning or ending inventories of salt, caustic soda, chlorine, or PVC in July. Information for July 2023 production and sales follows

	A	B	C	D
1		Joint Costs		PVC
2	Joint costs (costs of salt and processing to Split-off point)	\$100,000		
3	Separable cost of processing 800 tons chlorine into 500 tons PVC			\$20,000
4				
5		Caustic Soda	Chlorine	PVC
6	Beginning inventory (tons)	0	0	0
7	Production (tons)	1,200	800	500
8	Transfer for further processing (tons)		800	
9	Sales (tons)	1,200		500
10	Ending inventory (tons)	0	0	0
11	Selling price per ton in active outside market		\$ 75	
12	Selling price per ton for products sold	\$ 50		\$ 200

Required :-

1. Allocate the joint costs of \$100,000 between caustic soda and PVC under (a) the sales value at split-off method and (b) the physical-measure method.
2. Allocate the joint costs of \$100,000 between caustic soda and PVC under the NRV method.
3. Under the three allocation methods in requirements 1 and 2, what is the gross-margin percentage of (a) caustic soda and (b) PVC?
4. Lifetime Swimming Pool Products offers to purchase 800 tons of chlorine in August 2012 at \$75 per ton. Assume all other production and sales data are the same for August as they were for July. This sale of chlorine to Lifetime would mean that no PVC would be produced by IC in August. How would accepting this offer affect IC's August 2012 operating income

المطلوب:-

1. قم بتخصيص التكاليف المشتركة البالغة 100000 دولار بين الصودا الكاوية والـ PVC تحت (أ) طريقة القيمة البيعية عند نقطة الانفصال (ب) طريقة القياس المادي او الطريقة الكمية.
2. تخصيص التكاليف المشتركة البالغة 100.000 دولار بين الصودا الكاوية والـ PVC بموجب طريقة NRV.
3. بموجب طرق التخصيص في المتطلبات 1 و 2، ما هي نسبة هامش الربح الإجمالي لـ (أ) الصودا الكاوية و(ب) PVC ؟
4. تعرض شركة Lifetime Swimming Pool Products شراء 800 طن من الكلور في أب 2023 بسعر 75 دولارًا للطن. افترض أن جميع بيانات الإنتاج والمبيعات الأخرى لشهر أب هي نفسها لشهر تموز. إن بيع الكلور لشركة Lifetime يعني أنه لن يتم إنتاج PVC بواسطة IC في أب. كيف سيؤثر قبول هذا العرض على الدخل التشغيلي لشركة IC لشهر أغسطس 2012

Solution

1a. Sales value at split-off method:-

	A	B	C	D
1	Allocation of Joint Costs Using Sales Value at Split-off Method	Caustic Soda	PVC / Chlorine	Total
2	Sales value of total production at split-off point			
3	(1,200 tons × \$50 per ton; 800 × \$75 per ton)	\$60,000	\$60,000	\$120,000
4	Weighting (\$60,000 ÷ \$120,000; \$60,000 ÷ \$120,000)	0.50	0.50	
5	Joint costs allocated (0.50 × \$100,000; 0.50 × \$100,000)	\$50,000	\$50,000	\$100,000

1b. Physical-measure method

	A	B	C	D
8	Allocation of Joint Costs Using Physical-Measure Method	Caustic Soda	PVC / Chlorine	Total
9	Physical measure of total production (tons)	1,200	800	2,000
10	Weighting (1,200 tons ÷ 2,000 tons; 800 tons ÷ 2,000 tons)	0.60	0.40	
11	Joint cost allocated (0.60 × \$100,000; 0.40 × \$100,000)	\$60,000	\$40,000	\$100,000

2. Net realizable value (NRV) method

	A	B	C	D
14	Allocation of Joint Costs Using Net Realizable Value Method	Caustic Soda	PVC	Total
15	Final sales value of total production during accounting period			
16	(1,200 tons × \$50 per ton; 500 tons × \$200 per ton)	\$60,000	\$100,000	\$160,000
17	Deduct separable costs to complete and sell	<u>0</u>	<u>20,000</u>	<u>20,000</u>
18	Net realizable value at split-off point	<u>\$60,000</u>	<u>\$ 80,000</u>	<u>\$140,000</u>
19	Weighting (\$60,000 ÷ \$140,000; \$80,000 ÷ \$140,000)	3/7	4/7	
20	Joint costs allocated (3/7 × \$100,000; 4/7 × \$100,000)	\$42,857	\$ 57,143	\$100,000

3a. Gross-margin percentage of caustic soda

	A	B	C	D
23	Caustic Soda	Sales Value at Split-off Point	Physical Measure	NRV
24	Revenues (1,200 tons × \$50 per ton)	\$60,000	\$60,000	\$60,000
25	Cost of goods sold (joint costs)	<u>50,000</u>	<u>60,000</u>	<u>42,857</u>
26	Gross margin	<u>\$10,000</u>	<u>\$ 0</u>	<u>\$17,143</u>
27	Gross margin percentage (\$10,000 ÷ \$60,000; \$0 ÷ \$60,000; \$17,143 ÷ \$60,000)	16.67%	0.00%	28.57%

3b. Gross-margin percentage of PVC

	A	B	C	D
30	PVC	Sales Value at Split-off Point	Physical Measure	NRV
31	Revenues (500 tons × \$200 per ton)	<u>\$100,000</u>	<u>\$100,000</u>	<u>\$100,000</u>
32	Cost of goods sold			
33	Joint costs	50,000	40,000	57,143
34	Separable costs	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
35	Cost of goods sold	<u>70,000</u>	<u>60,000</u>	<u>77,143</u>
36	Gross margin	<u>\$ 30,000</u>	<u>\$ 40,000</u>	<u>\$ 22,857</u>
37	Gross margin percentage (\$30,000 ÷ \$100,000; \$40,000 ÷ \$100,000; \$22,857 ÷ \$100,000)	30.00%	40.00%	22.86%

4. Sale of chlorine versus processing into PVC

	A	B
40	Incremental revenue from processing 800 tons of chlorine into 500 tons of PVC	
41	(500 tons × \$200 per ton) □ (800 tons × \$75 per ton)	\$40,000
42	Incremental cost of processing 800 tons of chlorine into 500 tons of PVC	<u>20,000</u>
43	Incremental operating income from further processing	<u>\$20,000</u>

If IC sells 800 tons of chlorine to Lifetime Swimming Pool Products instead of further processing it into PVC, its August 2023 operating income will be reduced by \$20,000

Example (3) :-

Joint costs for the period \$ 60 000
Output and sales price

X = 4 000 units at \$7.50

Y = 2 000 units at \$25

Z = 6 000 units at \$3.33

There are no further processing costs after split-off point.

Required :-

Allocate the joint costs of \$60,000 between three product under (a) the sales value at split-off method and (b) the physical-measure method.

Solution :-

a-Physical Measures Method

Computational example of joint-cost apportionments

Joint costs for the period \$ 60 000
Output and sales

X = 4 000 units at \$7.50

Y = 2 000 units at \$25

Z = 6 000 units at \$3.33

There are no further processing costs after split-off point.

	Product X	Product Y	Product Z	Total
Output(units)	4,000	2,000	6,000	12,000
Selling price	7.50	25	3.333	
= sales value	30,000	50,000	20,000	100,000
Less: allocated joint costs:- X= (4,000/12,000) x 60,000 Y= (2,000/12,000) x 60,000 Z = (6,000/ 12,000) x 60,000	20,000	10,000	30,000	60,000
Gross margin	10,000	40,000	(10,000)	40,000

b.Sales Value Method

	Product X	Product Y	Product Z	Total
Sales value	30,000	50,000	20,000	100,000
Sales ratio	(30,000/100,000) =30%	(50,000/100,000) =50%	(20,000/100,000) =20%	100%
Less: allocated joint costs: X=60,000x30% Y=60,000x50% Z= 60,000x20%	18,000	30,000	12,000	60,000
Gross margin	12,000	20,000	8,000	40,000

Example (4)- Net realizable value method

- Further processing(**separable**) costs are deducted from sales value to estimate NRV at split-off point

Joint costs for the period \$ 60 000
Output and sales

X = 4 000 units at \$7.50

Y = 2 000 units at \$ 25

Z = 6 000 units at \$ 3.33

Further process costs:-

X = 8,000

Y = 10,000

Z = 2,000

Required :-

Allocate the joint costs of \$60,000 between three product under **NRV** method.

Products	sales	Further process (separable) costs	Net realizable value	
			amount	Ratio
x	30,000	8,000	22,000	(22,000/80,000)27.5%
Y	50,000	10,000	40,000	(40,000/80,000)50%
Z	20,000	2,000	18,000	(18,000/80,000)22.5%
Total	100,000	20,000	80,000	100%

Products	sales	Total costs			Income
		Costs allocated	Further process costs	Total costs	
X	30,000	(60,000x27.5%)16,500	8,000	24,500	5,500
Y	50,000	(60,000 x50%) 30,000	10,000	40,000	10,000
Z	20,000	(60,000 x22.5%)13,500	2,000	15,500	4,500
Total	100,000	60,000	20,000	80,000	40,000

Constant gross profit percentage method

Example (5) :-

Using the previous example and assuming that joint costs are:-

Required :-

Allocate the joint costs of \$60,000 between three product under the gross-margin percentage method.

£60 000, the gross profit is \$20 000 (\$100 000 sales less \$80000 total costs). Therefore, the total gross profit is 20%.

	Product A	Product B	Product C	Total
Sales value	30 000	50 000	20 000	100 000
Gross profit (20%)	6 000	10 000	4000	20 000
Cost of goods sold	24 000	40 000	16 000	80 000
Less further processing costs	8 000	10 000	2 000	20 000
Allocated joint costs (balance)	16 000	30 000	14 000	60 000

Example (6) :-

a corporation incurred joint costs of \$2,400 in manufacturing Product A and Product B to the split-off point;

Product A weighed 700 pounds and had a sales value at the split-off point of \$1,800;
Product B weighed 300 pounds and had a sales value at the split-off point of \$1,200

Total	1,000	\$ 3,000
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Cost Allocation:

Product A = $(700 / 1,000) \times 2,400 = 1,680$
Product B = $(300 / 1,000) \times 2,400 = 720$
2,400

Income Statement:

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	1,800	1,200	3,000
Less : Cost of Goods Sold	<u>1,680</u>	<u>720</u>	<u>2,400</u>
Gross Margin	<u>120</u>	<u>480</u>	<u>600</u>

Gross Margin %:

Product A = $120 / 1,800 = 7\%$
Product B = $480 / 1,200 = 40\%$
Total = $600 / 3,000 = 20\%$

2. Sales Value Method

a. sales Value Method--if the sales value at the split-off point is known, joint costs are allocated to the joint products based on their relative sales value at the split-off point

Cost Allocation:

Product A = $(1,800 / 3,000) \times 2,400 = 1,440$
Product B = $(1,200 / 3,000) \times 2,400 = 960$
2,400

Income Statement:

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	1,800	1,200	3,000
Less : Cost of Goods Sold	<u>1,440</u>	<u>960</u>	<u>2,400</u>
Gross Margin	<u>360</u>	<u>240</u>	<u>600</u>

Gross Margin %:

Product A = $360 / 1,800 = 20\%$
Product B = $240 / 1,200 = 20\%$
Total = $600 / 3,000 = 20\%$

3) Net Realizable Value Method:-

Example (7) --a corporation incurred joint costs of \$2,400 in manufacturing Product A and Product B to the split-off point;

Product A weighed 700 pounds and had a sales value of \$3,600 after incurring additional processing costs of \$675;

Product B weighed 300 pounds and had a sales value of \$1,400 after incurring additional processing costs of \$425

Estimated Net Realizable Value:

Product A = $3,600 - 675 = 2,925$
Product B = $1,400 - 425 = 975$
Total = $3,900$

Cost Allocation:

$$\begin{aligned} \text{Product A} &= (2,925 / 3,900) \times 2,400 = 1,800 \\ \text{Product B} &= (975 / 3,900) \times 2,400 = \underline{600} \\ & \qquad \qquad \qquad \underline{2,400} \end{aligned}$$

Cost of Goods Sold:

$$\begin{aligned} \text{Product A} &= 1,800 + 675 = 2,475 \\ \text{Product B} &= 600 + 425 = 1,025 \end{aligned}$$

Income Statement:

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	3,600	1,400	5,000
Cost of Goods Sold	<u>2,475</u>	<u>1,025</u>	<u>3,500</u>
Gross Margin	<u>1,125</u>	<u>375</u>	<u>1,500</u>

Gross Margin %:

$$\begin{aligned} \text{Product A} &= 1,125 / 3,600 = 31\% \\ \text{Product B} &= 375 / 1,400 = 27\% \\ \text{Total} &= 1,500 / 5,000 = 30\% \end{aligned}$$

4) Constant Gross Margin Percentage Method--

Example (8) --a corporation incurred joint costs of \$2,400 in manufacturing Product A and Product B to the split-off point;

Product A weighed 700 pounds and had a sales value of \$3,600 after incurring additional processing costs of \$675;

Product B weighed 300 pounds and had a sales value of \$1,400 after incurring additional processing costs of \$425

Constant Gross Margin Percentage:

$$\begin{aligned} \text{Total Sales} &= 3,600 + 1,400 = 5,000 \\ \text{Total Cost of Goods Sold} &= 2,400 + 675 + 425 = 3,500 \\ \text{Total Gross Margin} &= 5,000 - 3,500 = 1,500 \\ \text{Total Gross Margin Percentage} &= 1,500 / 5,000 = 30\% \end{aligned}$$

	Product A	Product B	Total
Sales value	3,600	1,400	5,000
Gross profit (30%)	<u>1,080</u>	<u>420</u>	<u>1,500</u>
Cost of goods sold	2,520	980	3,500
Less further processing costs	<u>675</u>	<u>425</u>	<u>1,095</u>
Allocated joint costs (balance)	<u>1,845</u>	<u>555</u>	<u>2,400</u>

Income Statement:

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	3,600	1,400	5,000
Cost of Goods Sold	<u>2,520</u>	<u>980</u>	<u>3,500</u>
Gross Margin	<u>1,080</u>	<u>420</u>	<u>1,500</u>

Gross Margin %:

$$\begin{aligned} \text{Product A} &= 1,080 / 3,600 = 30\% \\ \text{Product B} &= 420 / 1,400 = 30\% \end{aligned}$$

$$\text{Total} = 1,500 / 5,000 = 30\%$$

Example (7) :--Rolling Meadow Farms incurred \$65,000 of production cost in 2023, in a joint process to grow a crop with two joint products, Alpha and Beta. The following are data related to 2023 operations:

(1) Joint Products	(2) Tons of Production	(3) Sales Price per Ton at Split-Off	(4) Per Ton Separate Costs if Sold at Split-Off	(5) Per Ton Separate Costs if Processed Further	(6) Per Ton Final Sales Price
Alpha	45	\$ 950	\$ 50	\$236	\$1,450
Beta	<u>20</u>	1,200	110	200	1,600
Total	65				

Required:

- Allocate the joint process cost to Alpha and Beta using physical method (Ton) as the allocation base.
- Allocate the joint process cost to Alpha and Beta using the sales values at split-off method.
- Allocate the joint process cost to Alpha and Beta using the net realizable values at split-off.

Solution

a. physical method :-

product	Allocation of joint costs
Alpha	$(45 / 65) \times 65,000 = \$ 45,000$
Beta	$(20 / 65) \times 65,000 = \$ 20,000$
Total	$= \$ 65,000$

Another approach :-

Alpha portion of joint cost = $(45 / 65) \times 100\% = 69.23\%$
 Beta portion of joint cost = $(20 / 65) \times 100\% = 30.77\%$
 Allocation joint costs to Alpha = $69.23\% \times 65,000 = \$ 45,000$
 Allocation joint costs to Beta = $30.77\% \times 65,000 = \$ 20,000$

Another approach :-

Weighted average joint cost per ton = $60,000 \div 65 = \$ 1,000$ per ton			
products	Tons of production	Cost per ton	Allocation of joint costs
alpha	45	\$ 1,000	\$ 45,000
Beta	20	\$1,000	\$ 20,000
Total	65		\$ 65,000

(b) sales values at split-off method.

Product	production	Selling price at split-off	Sales value	Sales ratio
Alpha	45	\$ 950	\$ 42,750	64%
Beta	20	1,200	\$ 24,000	36%
Total	65		\$ 66,750	100%

Product	Sales value ratio	Allocation of joint cost
Alpha	64%	(65,000 x 64%) = \$ 41,600
Beta	36%	(65,000 x 36%) = \$ 23,400
Total	100	= \$ 65,000

c- NRV method :-

Product	production	Selling price at split-off	Per ton separate costs	Per ton NPV At split – off	Total NRV at split -off	NRV Ratio
Alpha	45	950	50	900	\$ 40,500	65%
Beta	20	1,200	110	1,090	\$ 21,800	35%
Total	65				\$ 62,300	100%

Product	NRV ratio	Allocation of joint cost
Alpha	65%	(65,000 x 65%) = \$ 42,250
Beta	35%	(65,000 x 35%) = \$ 22,750
Total	100	= \$ 65,000

By-products--by product accounting attempts to reflect the economic relationship between the by-products and the joint products with a minimum of recordkeeping costs

By-product: an incidental output of a joint process; it is salable, but the sales value is not substantial enough for management to justify undertaking the joint process; it is viewed as having a higher sales value than scrap

a. Sales Value of By-product Sold--the proceeds from the sale of the by-product are treated either as a reduction of cost of goods so or as other revenue

Example (9)--a corporation incurred joint costs of \$16,000 in manufacturing Product A, Product B, and Product C to the split- off point; Product C is considered a by-product; joints costs are allocated to the joint products using their relative weights; Product A weighed 2,000 pounds and was processed beyond the split-off point at a cost of \$4,000; Product B weighed 3,000 pounds and was sold at the split-off point; Product C weighed 500 pounds and had a estimated net realizable value of \$1,000; 1,400 pounds of Product A were sold; 2,700 pounds of Product B were sold; 400 pounds of Product C were sold

Cost Allocation:-

a- physical method

$$\begin{aligned} \text{Product A} &= 2,000 / (2,000 + 3,000) \times 16,000 = 6,400 \\ \text{Product B} &= 3,000 / 5,000 \times 16,000 = \underline{9,600} \\ &\quad \underline{16,000} \end{aligned}$$

Cost of Goods Sold:

$$\begin{aligned} \text{Product A} &= 1,400 / 2,000 \times (6,400 + 4,000) = 7,280 \\ \text{Product B} &= 2,700 / 3,000 \times 9,600 = 8,640 \\ \text{Product C} &= 400 / 500 \times 1,000 = (\underline{800}) \\ &\quad \underline{15,120} \end{aligned}$$

b. Net Realizable Value--the estimated realizable value of the by-product manufactured is treated as a reduction of the joint costs

1) example 2 --a corporation incurred joint costs of \$16,000 in manufacturing Product A, Product B, and Product C to the split-off point; Product C is considered a by-product; joint costs are allocated to the joint products using their relative weights; Product A weighed 2,000 pounds and was processed beyond the split-off point at a cost of \$4,000; Product B weighed 3,000 pounds and was sold at the split-off point; Product C weighed 500 pounds and had an estimated net realizable value of \$1,000; 1,400 pounds of Product A were sold; 2,700 pounds of Product B were sold; 400 pounds of Product C were sold

Cost Allocation:

$$\begin{aligned} \text{Product A} &= 2,000 / (2,000 + 3,000) \times (16,000 - 1,000) = 6,000 \\ \text{Product B} &= 3,000 / 5,000 \times 15,000 = \underline{9,000} \\ &\quad \underline{15,000} \end{aligned}$$

Cost of Goods Sold:

$$\begin{aligned} \text{Product A} &= 1,400 / 2,000 \times (6,000 + 4,000) = 7,000 \\ \text{Product B} &= 2,700 / 3,000 \times 9,000 = \underline{8,100} \\ &\quad \underline{15,100} \end{aligned}$$

Example (10) : Joint product costing – Constant gross margin percentage method

The Northern Company manufactures three products at a joint production cost of \$1,250,000. The Data for the month of January is provided to you:

Product	Quantity	Processing cost after split-off	Selling price per unit
X	25,000	\$ 750,000	\$ 40
Y	40,000	750,000	50
Z	35,000	210,000	20

Required: Allocate the joint production cost to products X, Y and Z using constant gross margin percentage method.

Solution

	X	Y	Z	Total
Sales revenue	\$1,000,000	\$2,000,000	\$700,000	\$3,700,000
Cost of goods sold:				
Joint cost				\$1,250,000
Separable cost	750,000	750,000	\$210,000	1,710,000
				<u>\$2,960,000</u>
Gross margin				<u>\$ 740,000</u>

$$\begin{aligned}
 \text{Gross margin percentage} &= \text{Gross margin} / \text{Sales revenue} \\
 &= \$740,000 / \$3,700,000 \\
 &= 0.2 \text{ or } 20\%
 \end{aligned}$$

	X	Y	Z	Total
Ultimate sales value	\$1000,000	\$2,000,000	\$700,000	\$3,700,000
Less 20% gross margin	200,000	400,000	140,000	740,000
Total cost	\$ 800,000	\$1,600,000	\$560,000	\$2,960,000
Separable cost	750,000	750,000	210,000	1,710,000
Joint cost allocation	<u>\$ 50,000</u>	<u>\$ 850,000</u>	<u>\$350,000</u>	<u>\$1,250,000</u>

CHAPTER EXERCISES.:-

Exercises (1) -

LS Company manufactures two products, Product L and Product S in a joint process. The joint (common) costs incurred are \$420,000 for a standard production run that generates 180,000 units of L and 120,000 units of S. Product L sells for \$2.40 per unit while Product S sells for \$3.90 per unit. Assuming both products are sold at the split-off point,

Required:

Allocate the joint cost to the each products using four methods

Exercises (2) -

. Products A and B are manufactured in a joint process. The joint (common) costs incurred are \$252,000 for a standard production run that generates 108,000 gallons of Product A which sells for \$2.40 per gallon and 72,000 gallons of Product B which sells for \$3.90 per gallon. If no additional costs are incurred after the split-off point,

Required:

Allocate the joint cost to the each products using four methods

Exercises (3) -

Products X and Y are manufactured in a joint process. The joint (common) costs incurred are \$420,000 for a standard production run that generates 180,000 gallons of Product X which sells for \$2.40 per gallon and 120,000 gallons of Product Y which sells for \$3.90 per gallon. If additional processing costs beyond the split-off point are \$1.40 per gallon for Product X and \$0.90 per gallon for Product Y,

Required:

Allocate the joint cost to the each products using four methods

Exercises (4)

Products X and Y are manufactured in a joint process. The joint (common) costs incurred are \$420,000 for a standard production run that generates 180,000 gallons of Product X which sells for \$2.40 per gallon and 120,000 gallons of Product Y which sells for \$3.90 per gallon. If additional processing costs beyond the split-off point are \$1.40 per gallon for Product X and \$0.90 per gallon for Product Y

Required:

Allocate the joint cost to the each products using four methods

Exercises (5)

Barry Company manufactures two products, Glossy and Shiny, from a joint production process.

One production run costs £6000 and results in 1000 units of Glossy and 4000 units of Shiny. Neither product is saleable at split-off, but both must be further processed such that the separablecost for Glossy is £3 per unit and for Shiny is £2 per unit. The eventual market price for Glossy is £12 and for Shiny is £14.

Required:

Allocate joint production costs to each product using four methods.

Exercises (6)

The NEC Company operates a simple chemical process to convert a single material into three separate items, referred to here as X, Y, and Z. All three end products are separated simultaneously at a single split-off point. Products X and Y are ready for sale immediately upon split-off without further processing or any other additional costs. Product Z, however, is processed further before being sold. There is no available market price for Z at the split-off point.

The selling prices quoted here are expected to remain the same in the coming year. During 2023, the selling prices of the items and the total amounts sold were as follows:

- X— 75 tons sold for \$180 per ton
- Y— 225 tons sold for \$130 per ton
- Z— 280 tons sold for \$80 per ton

The total joint manufacturing costs for the year were \$32,800. NEC spent an additional \$12,000 to finish product Z.

There were no beginning inventories of X, Y, or Z. At the end of the year, the following ending inventories of completed units were on hand: X, 175 tons; Y, 75 tons; Z, 70 tons. There was no beginning or ending work in process.

Required :-

Compute the cost of inventories of X, Y, and Z for balance sheet purposes and the cost of goods sold for income statement purposes as of December 31, 2023, using the following joint cost allocation methods:

- a. NRV method
- b. Constant gross-margin percentage NRV method

Exercises (7)

Joint cost allocation: sell immediately or process further. Iowa Soy Products (ISP) buys soy beans and processes them into other soy products. Each ton of soy beans that ISP purchases for \$300 can be converted for an additional \$200 into 500 pounds of soy meal and 100 gallons of soy oil. A pound of soy meal can be sold at split-off for \$1 and soy oil can be sold in bulk for \$4 per gallon.

ISP can process the 500 pounds of soy meal into 600 pounds of soy cookies at an additional cost of \$300. Each pound of soy cookies can be sold for \$2 per pound. The 100 gallons of soy oil can be packaged at a cost of \$200 and made into 400 quarts of Soyola. Each quart of Soyola can be sold for \$1.25.

Required :-

Allocate the joint cost to the cookies and the Soyola using the following:

1. Sales value at split-off method

2. NRV

Exercises (8)

The T&T Company produces three chemicals – chemical P, chemical Q and chemical R. Chemical P is sold for \$7 per liter, chemical Q for \$5 per liter and chemical R for \$8 per liter. During the month of July, 20,000 liters of chemical P, 50,000 liters of chemical Q and 30,000 liters of chemical R were produced and sold.

The cost data for July is given below:

Joint cost:				
Direct materials	\$180,000			
Direct labor	100,000			
Factory overhead	<u>70,000</u>			
Total joint cost	<u>\$350,000</u>			
		<u>Chemical P</u>	<u>Chemical Q</u>	<u>Chemical R</u>
Processing cost after split off:				
Direct labor	\$25,000	\$35,000	\$18,000	
Factory overhead	15,000	25,000	12,000	

There were no inventories at the start and end of the month. The company uses market value method for allocating joint cost to joint products.

Required:

1. Allocate joint cost and compute gross profit for each chemical using four methods.
2. Decide whether chemical P should be sold at split-off point for \$4.50 per liter or processed further and sold for \$7