



UNIVERSITÀ
DEGLI STUDI
DI BERGAMO

Dipartimento
di Scienze Aziendali

Activity-Based Costing

**Strategic Management
Accounting**

Tutore:

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First tutorial session

2026-10-22

EXERCISE 1

Worley Company



EXERCISE 1 - Worley Company

Worley Company buys surgical supplies from a variety of manufacturers and then resells and delivers these supplies to hundreds of hospitals. Worley sets its prices for all hospitals by marking up its cost of goods sold to those hospitals by 5%. For example, if a hospital buys supplies from Worley that cost Worley \$100 to buy from manufacturers, Worley would charge the hospital \$105 to purchase these supplies.

For years, Worley believed the 5% markup covered its selling and administrative expenses and provided a reasonable profit. However, in the face of declining profits, Worley decided to implement an activity-based costing system to improve its understanding of customer profitability. The company broke its selling and administrative expenses into five activities as shown:

Activity Cost Pool (Activity Measure)	Total Cost	Total Activity	
Customer deliveries (Number of deliveries)	\$ 500,000	5,000	deliveries
Manual order processing (Number of manual orders)	248,000	4,000	orders
Electronic order processing (Number of electronic orders)	200,000	12,500	orders
Line item picking (Number of line items picked)	450,000	450,000	line items
Other organization-sustaining costs (None)	602,000		
Total selling and administrative expenses	\$ 2,000,000		



EXERCISE 1 - Worley Company

Worley gathered the data below for two of the many hospitals it serves—University and Memorial (each hospital purchased medical supplies that cost Worley \$30,000 to buy from manufacturers):

Activity Measure	Activity	
	University	Memorial
Number of deliveries	10	25
Number of manual orders	0	30
Number of electronic orders	15	0
Number of line items picked	120	250

Required:

1. Compute the total revenue Worley would receive from University and Memorial.
2. Compute the activity rate for each activity cost pool.
3. Compute the total activity costs assigned to University and Memorial.
4. Compute Worley's customer margin for University and Memorial. (Hint: Do not overlook the \$30,000 cost of goods sold that Worley incurred serving each hospital.)



EXERCISE 1 - Worley Company

Q1→ Compute the **total revenue** Worley would receive from University and Memorial.

	University	Memorial
Cost of goods sold to the hospital (a)	\$ 30,000	\$ 30,000
Markup percentage	5%	5%
Markup in dollars (b)	\$ 1,500	\$ 1,500
Revenue received from hospitals (a) + (b)	\$ 31,500	\$ 31,500



EXERCISE 1 - Worley Company

Q2→ Compute the **activity rate** for each activity cost pool.

Activity Cost Pool	(a) Estimated Overhead cost	(b) Expected Activity		(a) ÷ (b) Activity Rate	
Customer deliveries	\$ 500,000	5,000	deliveries	\$ 100	per delivery
Manual order processing	\$ 248,000	4,000	orders	\$ 62	per manual order
Electronic order processing	\$ 200,000	12,500	orders	\$ 16	per electronic order
Line item picking	\$ 450,000	450,000	line items	\$ 1	per line item picked



EXERCISE 1 - Worley Company

Q3→ Compute the **total activity costs** assigned to University and Memorial.

University:

Activity Cost Pool	(a) Activity Rate		(b) Activity		(a) × (b) ABC Cost
Customer deliveries	\$ 100	per delivery	10	deliveries	\$ 1,000
Manual order processing	\$ 62	per order	0	orders	0
Electronic order processing	\$ 16	per order	15	orders	240
Line item picking	\$ 1	per line item	120	line items	120
Total activity costs					\$ 1,360



EXERCISE 1 - Worley Company

Q3→ Compute the **total activity costs** assigned to University and Memorial.

Memorial:

Activity Cost Pool	(a) Activity Rate		(b) Activity		(a) × (b) ABC Cost
Customer deliveries	\$ 100	per delivery	25	deliveries	\$ 2,500
Manual order processing	\$ 62	per order	30	orders	1,860
Electronic order processing	\$ 16	per order	0	orders	0
Line item picking	\$ 1	per line item	250	line items	250
Total activity costs					\$ 4,610



EXERCISE 1 - Worley Company

Q4→ Compute Worley's **customer margin** for University and Memorial. (Hint: Do not overlook the \$30,000 cost of goods sold that Worley incurred serving each hospital.)

	University	Memorial
Sales	\$ 31,500	\$ 31,500
Cost of goods sold	30,000	30,000
Gross margin	1,500	1,500
Customer deliveries	1,000	2,500
Manual order processing	0	1,860
Electronic order processing	240	0
Line item picking	120	250
Total activity costs	1,360	4,610
Customer margin	\$ 140	\$ (3,110)



EXERCISE 2

Hi-Tek Manufacturing



EXERCISE 2 - Hi-Tek Manufacturing

Hi-Tek Manufacturing, Incorporated, makes two industrial component parts—B300 and T500. An absorption costing income statement for the most recent period is shown below:

Hi-Tek Manufacturing, Incorporated Income Statement	
Sales	\$ 2,100,000
Cost of goods sold	1,600,000
Gross margin	500,000
Selling and administrative expenses	550,000
Net operating loss	\$ (50,000)

Hi-Tek produced and sold 70,000 units of B300 at a price of \$20 per unit and 17,500 units of T500 at a price of \$40 per unit. The company's traditional cost system allocates manufacturing overhead to products using a plantwide overhead rate and direct labor dollars as the allocation base. Additional information relating to the company's two product lines is shown below:

	B300	T500	Total
Direct materials	\$ 436,300	\$ 251,700	\$ 688,000
Direct labor	\$ 200,000	\$ 104,000	304,000
Manufacturing overhead			608,000
Cost of goods sold			\$ 1,600,000



EXERCISE 2 - Hi-Tek Manufacturing

The company created an activity-based costing system to evaluate the profitability of its products. Hi-Tek's ABC implementation team concluded that \$50,000 and \$100,000 of the company's advertising expenses could be directly traced to B300 and T500, respectively.

The remainder of the selling and administrative expenses was organization-sustaining in nature. The ABC team also distributed the company's manufacturing overhead to four activities as shown below:

Activity Cost Pool (and Activity Measure)	Manufacturing Overhead	Activity		
		B300	T500	Total
Machining (machine-hours)	\$ 213,500	90,000	62,500	152,500
Setups (setup hours)	157,500	75	300	375
Product-sustaining (number of products)	120,000	1	1	2
Other (organization-sustaining costs)	117,000	NA	NA	NA
Total manufacturing overhead cost	\$ 608,000			



EXERCISE 2 - Hi-Tek Manufacturing

Required:

1. Compute the product margins for B300 and T500 under the company's traditional costing system.
2. Compute the product margins for B300 and T500 under the activity-based costing system.
3. Prepare a quantitative comparison of the traditional and activity-based cost assignments.



EXERCISE 2 - Hi-Tek Manufacturing

Q1 → Compute the **product margins** for B300 and T500 under the company's traditional costing system.

Sales: B300 → $70,000 \times 20 = 1,400,000 \$$ T500 → $17,500 \times 40 = 700,000 \$$

Predetermined overhead rate = Estimated total manufacturing overhead cost ÷ Estimated total direct labor dollars
= $\$608,000 \div \$304,000 = \$2.00$ per DL\$

Total manufacturing cost = Direct materials + Direct labor + Manufacturing overhead

Product Margin = Sales - Total manufacturing cost

	B300	T500	Total
Sales	\$ 1,400,000	\$ 700,000	\$ 2,100,000
Direct materials	436,300	251,700	688,000
Direct labor	200,000	104,000	304,000
Manufacturing overhead applied @ \$2.00 per direct labor-dollar	400,000	208,000	608,000
Total manufacturing cost	1,036,300	563,700	1,600,000
Product margin	\$ 363,700	\$ 136,300	\$ 500,000



All the manufacturing overhead cost is applied to the products under the company's traditional costing system.



EXERCISE 2 - Hi-Tek Manufacturing

Q2→ Compute the product margins for B300 and T500 under the activity-based costing system.

The first step is to determine the activity rates:

Activity Cost Pools	(a) Total Cost	(b) Total Activity	(a) ÷ (b) Activity Rate
Machining	\$ 213,500	152,500 MH	\$ 1.40 per MH
Setups	\$ 157,500	375 setup hours	\$ 420 per setup hour
Product sustaining	\$ 120,000	2 products	\$ 60,000 per product



organization-sustaining and idle capacity costs should not be allocated to products.



EXERCISE 2 - Hi-Tek Manufacturing

Q2→ Compute the **product margins** for B300 and T500 **under the activity-based costing system**.

	B300	T500	Total
Sales	\$ 1,400,000	\$ 700,000	\$ 2,100,000
Direct materials	436,300	251,700	688,000
Direct labor	200,000	104,000	304,000
Advertising expense	50,000	100,000	150,000
Machining	126,000	87,500	213,500
Setups	31,500	126,000	157,500
Product sustaining	60,000	60,000	120,000
Total cost	903,800	729,200	1,633,000
Product margin	\$ 496,200	\$ (29,200)	\$ 467,000

Product Margin = Sales - Total cost



EXERCISE 2 - Hi-Tek Manufacturing

Q3 → Prepare a quantitative comparison of the traditional and activity-based cost assignments.

The traditional and activity-based cost assignments differ for some reasons.

The traditional system assigns all \$608,000 of manufacturing overhead to products.

The ABC system assigns only \$491,000 of manufacturing overhead to products. The ABC system does not assign the \$117,000 of Other activity costs to products because they represent organization-sustaining costs.



EXERCISE 2 - Hi-Tek Manufacturing

Q3 → Prepare a quantitative comparison of the traditional and activity-based cost assignments.

The quantitative comparison

Traditional Cost System	B300	T500
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,000 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Manufacturing overhead	$\$400,000 \div \$608,000 = 65.8\%$	$\$208,000 \div \$608,000 = 34.2\%$

Activity-Based Costing System	B300	T500
Direct costs:		
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,800 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Advertising expense	$\$50,000 \div \$150,000 = 33.3\%$	$\$100,000 \div \$150,000 = 66.7\%$
Indirect costs:		
Machining	$\$126,000 \div \$213,500 = 59.0\%$	$\$87,500 \div \$213,500 = 41.0\%$
Setups	$\$31,500 \div \$157,500 = 20.0\%$	$\$126,000 \div \$157,500 = 80.0\%$
Product sustaining	$\$60,000 \div \$120,000 = 50.0\%$	$\$60,000 \div \$120,000 = 50.0\%$



EXERCISE 2 - Hi-Tek Manufacturing

Q3 → Prepare a quantitative comparison of the traditional and activity-based cost assignments.

Traditional Cost System	B300	T500
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,000 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Manufacturing overhead	$\$400,000 \div \$608,000 = 65.8\%$	$\$208,000 \div \$608,000 = 34.2\%$

Activity-Based Costing System	B300	T500
Direct costs:		
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,800 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Advertising expense	$\$50,000 \div \$150,000 = 33.3\%$	$\$100,000 \div \$150,000 = 66.7\%$
Indirect costs:		
Machining	$\$126,000 \div \$213,500 = 59.0\%$	$\$87,500 \div \$213,500 = 41.0\%$
Setups	$\$31,500 \div \$157,500 = 20.0\%$	$\$126,000 \div \$157,500 = 80.0\%$
Product sustaining	$\$60,000 \div \$120,000 = 50.0\%$	$\$60,000 \div \$120,000 = 50.0\%$

The traditional system uses one unit-level activity measure (direct labour dollars), to assign 65.8% of all overhead to the B300 product line and 34.2% of all overhead to the T500 product line.

The ABC system assigns 59.0% of Machining costs to the B300 product line and 41.0% to the T500 product line. Because the Machining cost pool uses a **unit-level activity** measure (machine-hours).

These percentages are almost near, and it is reasonable to expect these cost allocations percentages to be comparable.



EXERCISE 2 - Hi-Tek Manufacturing

Q3 → Prepare a quantitative comparison of the traditional and activity-based cost assignments.

Traditional Cost System	B300	T500
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,000 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Manufacturing overhead	$\$400,000 \div \$608,000 = 65.8\%$	$\$208,000 \div \$608,000 = 34.2\%$

Activity-Based Costing System	B300	T500
Direct costs:		
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,800 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Advertising expense	$\$50,000 \div \$150,000 = 33.3\%$	$\$100,000 \div \$150,000 = 66.7\%$
Indirect costs:		
Machining	$\$126,000 \div \$213,500 = 59.0\%$	$\$87,500 \div \$213,500 = 41.0\%$
Setups	$\$31,500 \div \$157,500 = 20.0\%$	$\$126,000 \div \$157,500 = 80.0\%$
Product sustaining	$\$60,000 \div \$120,000 = 50.0\%$	$\$60,000 \div \$120,000 = 50.0\%$

The ABC system assigns 20.0% of Setup costs to the B300 product line and 80.0% to the T500 product line.

While the traditional system allocates 66% and 34% of all overhead costs to B300 and T500 respectively. These allocation percentages are different because Machine Setups is a **batch-level activity**.

Although B300 is the high-volume product (70,000 units) and T500 is the low-volume product (17,500 units), B300 only consumes 20% of the total machine setups and T500 consumes 80.0% of the total machine setups. While these amounts in manufacturing overhead in traditional system is completely the opposite.



EXERCISE 2 - Hi-Tek Manufacturing

Q3 → Prepare a quantitative comparison of the traditional and activity-based cost assignments.

Traditional Cost System	B300	T500
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,000 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Manufacturing overhead	$\$400,000 \div \$608,000 = 65.8\%$	$\$208,000 \div \$608,000 = 34.2\%$

Activity-Based Costing System	B300	T500
Direct costs:		
Direct materials	$\$436,300 \div \$688,000 = 63.4\%$	$\$251,700 \div \$688,800 = 36.6\%$
Direct labor	$\$200,000 \div \$304,000 = 65.8\%$	$\$104,000 \div \$304,000 = 34.2\%$
Advertising expense	$\$50,000 \div \$150,000 = 33.3\%$	$\$100,000 \div \$150,000 = 66.7\%$
Indirect costs:		
Machining	$\$126,000 \div \$213,500 = 59.0\%$	$\$87,500 \div \$213,500 = 41.0\%$
Setups	$\$31,500 \div \$157,500 = 20.0\%$	$\$126,000 \div \$157,500 = 80.0\%$
Product sustaining	$\$60,000 \div \$120,000 = 50.0\%$	$\$60,000 \div \$120,000 = 50.0\%$

The ABC system assigns 50% of Product sustaining costs to each product line.

While the traditional system allocates 66% and 34% of all overhead costs to B300 and T500 respectively.

These allocation percentages are different because Product sustaining costs is a **product-level activity**.

The traditional system does not trace any advertising expenses to the two products. The ABC system traces \$50,000 of advertising to the B300 and \$100,000 of advertising to the T500 product line.



EXERCISE 3

Fogerty Company



EXERCISE 3 - Fogerty Company

Fogerty Company makes two products—titanium Hubs and Sprockets. Data regarding the two products follow:

	Direct Labor-Hours per Unit	Annual Production	
Hubs	0.80	10,000	units
Sprockets	0.40	40,000	units

Additional information about the company follows:

- Hubs require \$32 in direct materials per unit, and Sprockets require \$18.
- The direct labor wage rate is \$15 per hour.
- Hubs require special equipment and are more complex to manufacture than Sprockets.
- The ABC system has the following activity cost pools:

Activity Cost Pool (Activity Measure)	Estimated Overhead Cost	Activity		
		Hubs	Sprockets	Total
Machine setups (number of setups)	\$ 72,000	100	300	400
Special processing (machine-hours)	\$ 200,000	5,000	0	5,000
General factory (organization-sustaining)	\$ 816,000	NA	NA	NA



EXERCISE 3 - Fogerty Company

Required:

1. Compute the activity rate for each activity cost pool.
2. Determine the unit product cost of each product according to the ABC system.



EXERCISE 3 - Fogerty Company

Q1 → Compute the activity rate for each activity cost pool.

Activity rates are computed as follows:

Activity Cost Pool	(a) Estimated Overhead Cost	(b) Expected Activity		(a) ÷ (b) Activity Rate	
Machine setups	\$ 72,000	400	setups	\$ 180	per setup
Special processing	\$ 200,000	5,000	MHs	\$ 40	per MH

Note: There is no activity rate for the General Factory activity because it is an organization-sustaining activity. Organization-sustaining costs should not be allocated to products.



EXERCISE 3 - Fogerty Company

Q2 → Determine the unit product cost of each product according to the ABC system.

Hubs:

Activity Cost Pool	(a) Activity Rate		(b) Activity		(a) × (b) ABC Cost
Machine setups	\$ 180	per setup	100	setups	\$ 18,000
Special processing	\$ 40	per MH	5,000	MHs	200,000
Total					\$ 218,000

Sprockets:

Activity Cost Pool	(a) Activity Rate		(b) Activity		(a) × (b) ABC Cost
Machine setups	\$ 180	per setup	300	setups	\$ 54,000
Special processing	\$ 40	per MH	0	MHs	0
Total					\$ 54,000



EXERCISE 3 - Fogerty Company

Q2 → Determine the **unit product cost** of each product according to the ABC system.

	Hubs	Sprockets
Direct materials	\$ 32.00	\$ 18.00
Direct labor:		
\$15 per DLH × 0.80 DLHs per unit	12.00	
\$15 per DLH × 0.40 DLHs per unit		6.00
Overhead:		
\$218,000 ÷ 10,000 units	21.80	
\$54,000 ÷ 40,000 units		1.35
Unit cost	\$ 65.80	\$ 25.35

