

13

SHORT-RUN DECISION MAKING: RELEVANT COSTING

DISCUSSION QUESTIONS

1. Tactical decisions are short run in nature; they involve choosing among alternatives with an immediate or limited end in view. Strategic decisions involve selecting strategies that yield a long-term competitive advantage.
2. A manager can identify alternatives by using his or her own knowledge and experience and by obtaining input from others who are familiar with the problem.
3. Past costs can be used to help predict future costs.
4. Depreciation is an allocation of a sunk cost. This cost is a past cost and will never differ across alternatives.
5. The salary of the supervisor of an assembly line with excess capacity is an example of an irrelevant future cost for an accept-or-reject decision.
6. Yes. Suppose, for example, that sufficient materials are on hand for producing a part for two years. After two years, the part will be replaced by a newly engineered part. If there is no alternative use for the materials, then the cost of the materials is a sunk cost and not relevant in a make-or-buy decision.
7. If a firm is operating below capacity, then a price that is above variable costs will increase profits.
8. A complementary effect is the loss of revenue on a secondary product when the primary product is dropped. Thus, complementary effects may make it more expensive to drop a product.
9. No. Joint costs are irrelevant. They occur regardless of whether the product is sold at the split-off point or processed further.
10. Yes. The incremental revenue is \$1,400, and the incremental cost is only \$1,000, creating a net benefit of \$400.
11. No. If a scarce resource is used in producing the two products, then the product providing the greatest contribution per unit of scarce resource should be selected. For more than one scarce resource, linear programming may be used to select the optimal mix.

MULTIPLE-CHOICE EXERCISES

13-1. e

13-2. b

13-3. e

13-4. c

13-5. b

13-6. d

13-7. c

13-8. b

13-9. c

13-10. c

13-11. a

13-12. d

CORNERSTONE EXERCISES

CE 13-13

1. There are two alternatives: make the ingredient in-house or purchase it externally.
2. Relevant costs of making the ingredient in-house include direct materials, direct labor, and variable overhead (both manufacturing and marketing). Relevant costs of purchasing the ingredient externally include the purchase price.

3.

	Alternatives		Differential Cost to Make
	Make	Buy	
Direct materials	\$25,000	-	\$ 25,000
Direct labor	15,000	-	15,000
Variable manufacturing overhead	7,500	-	7,500
Variable marketing overhead	10,000	-	10,000
Purchase cost	-	\$60,000	(60,000)
Total relevant cost	<u>\$57,500</u>	<u>\$60,000</u>	<u>\$ (2,500)</u>

It is cheaper to make the ingredient in-house. This alternative is cheaper by \$2,500.

4.

	Alternatives		Differential Cost to Make
	Make	Buy	
Direct materials	\$25,000	-	\$ 25,000
Direct labor	15,000	-	15,000
Variable manufacturing overhead	7,500	-	7,500
Variable marketing overhead	10,000	-	10,000
Avoidable fixed plant overhead	6,000 *	-	6,000
Purchase cost	-	\$60,000	(60,000)
Total relevant cost	<u>\$63,500</u>	<u>\$60,000</u>	<u>\$ 3,500</u>

Now it is cheaper to purchase the ingredient. This alternative is cheaper by \$3,500.

$$* \$6,000 = \$30,000 \times 0.20$$

CE 13-14

1. Relevant costs and benefits of accepting the special order include the sales price of \$4, direct materials, direct labor, and variable overhead. No relevant costs or benefits are attached to rejecting the order.
2. If the problem is analyzed on a unit basis:

	<u>Accept</u>	<u>Reject</u>	<u>Differential Benefit to Accept</u>
Price	\$ 4.00	\$ -	\$ 4.00
Direct materials	(1.50)	-	(1.50)
Direct labor	(2.00)	-	(2.00)
Variable overhead	(1.00)	-	(1.00)
Decrease in operating income	<u>\$ (0.50)</u>	<u>\$ -</u>	<u>\$ (0.50)</u>

Operating income will decrease by \$5,000 [$(\$0.50) \times 10,000$ units], if the special order is accepted; therefore, the special order should be rejected.

CE 13-15

1. The two alternatives are to keep the parquet flooring line or to drop it.
2. The relevant benefits and costs of keeping the parquet flooring line include sales of \$300,000, variable costs of \$250,000, machine rent cost of \$30,000, and supervision cost of \$5,000.

None of the relevant benefits and costs of keeping the parquet flooring line would occur under the drop alternative.

- 3.

	<u>Keep</u>	<u>Drop</u>	<u>Differential Amount to Accept</u>
Sales	\$ 300,000	\$ -	\$ 300,000
Less: Variable expenses	<u>(250,000)</u>	<u>-</u>	<u>(250,000)</u>
Contribution margin	\$ 50,000	\$ -	\$ 50,000
Less: Machine rent	(30,000)	-	(30,000)
Supervision	<u>(5,000)</u>	<u>-</u>	<u>(5,000)</u>
Total relevant benefit (loss)	<u>\$ 15,000</u>	<u>\$ -</u>	<u>\$ 15,000</u>

The difference is \$15,000, thus, in favor of keeping the parquet flooring line.

CE 13-16

1. Previous contribution margin of the strip line was \$175,000. A 25 percent decrease in sales implies a 25 percent decrease in total variable costs, so the contribution margin decreases by 25 percent.

New contribution margin for strip = $\$175,000 - 0.25(\$175,000) = \$131,250$.

The reasoning is the same for the plank line, but the decrease is 20 percent.

New contribution margin for plank = $\$80,000 - 0.20(\$80,000) = \$64,000$.

Therefore, if the parquet floor product line were dropped, the resulting total contribution margin for Hickory would equal \$195,250 (\$131,250 + \$64,000).

2.

	Keep	Drop	Differential Amount to Keep
Contribution margin	\$305,000	\$195,250	\$109,750
Less: Machine rent	(55,000)	(25,000)	(30,000)
Supervision	(30,000)	(25,000)	(5,000)
Total	\$220,000	\$145,250	\$ 74,750

Notice that the contribution margin for the drop alternative equals the new contribution margins of the strip and plank lines (\$131,250 + \$64,000).

Also, machine rent and supervision remain relevant across these alternatives.

Now the analysis even more heavily favors keeping the parquet line. In fact, company income will be \$74,750 higher if all three flooring product lines are kept as opposed to dropping the parquet line.

CE 13-17

- Revenue from logs = $(\$500 \times 8,000) = \$4,000,000$
- Revenue from further processing = $\$0.75 \times (8,000 \times 800) = \$4,800,000$
 Further processing cost = $\$0.15 \times (8,000 \times 800) = \$960,000$
 Income from further processing = $\$4,800,000 - \$960,000 = \$3,840,000$
- Jack's should sell the logs without further processing because the company will make \$4,000,000 versus the \$3,840,000 it would make by processing the logs further for use in regular construction framing.

CE 13-18

	<u>Swoop</u>	<u>Rufus</u>
1. Contribution margin per unit	\$ 5	\$15
÷ Required machine time per unit*	0.10	0.33
Contribution margin per hour of machine time	<u>\$50</u>	<u>\$45</u>
* 0.10 = $\frac{6 \text{ minutes per Swoop unit}}{60 \text{ minutes}}$; 0.33 = $\frac{20 \text{ minutes per Rufus unit}}{60 \text{ minutes}}$		

2. Since the Swoop sweatshirt yields \$50 of contribution margin per hour of machine time (which is higher than the \$45 contribution margin per hour of machine time for Rufus), all machine time (i.e., 7,000 hours) should be devoted to the production of Swoop sweatshirts.

$$\text{Units of Swoop} = \frac{7,000 \text{ total hours}}{0.10 \text{ hour per Swoop sweatshirt}} = 70,000 \text{ units}$$

The optimal mix is Swoop = 70,000 units and Rufus = 0 units.

3. Total contribution margin of optimal mix = (70,000 units Swoop)\$5
= \$350,000

Note: Cornerstone Exercise 13-18 (as well as Cornerstone 13-6) clearly illustrates a fundamentally important point involving relevant decision making with a constrained resource. The point is that when making this relevant decision, one should choose the option with the highest contribution margin *per unit of the constrained resource*—even if that option does not have the highest contribution margin per unit. For instance, in this exercise, Rufus' contribution margin is three times greater than Swoop's contribution margin (\$15 > \$5). However, because each Rufus sweatshirt requires more than three times as much machine time to produce than each Swoop sweatshirt (0.33 machine hour per Rufus sweatshirt > 0.10 machine hour per Swoop sweatshirt), Swoop has a higher contribution margin per machine hour than does Rufus (\$50 > \$45).

CE 13-19

1.

	<u>Swoop</u>	<u>Rufus</u>
Contribution margin per unit	\$ 5	\$15
÷ Required machine time per unit*	0.10	0.33
Contribution margin per hour of machine time	<u>\$50</u>	<u>\$45</u>
* 0.10 = $\frac{6 \text{ minutes per Swoop unit}}{60 \text{ minutes}}$; 0.33 = $\frac{20 \text{ minutes per Rufus unit}}{60 \text{ minutes}}$		

2. Since Swoop yields \$50 of contribution margin per hour of machine time, the first priority is to produce all of the Swoop sweatshirts that the market will take (i.e., demands). Machine time required for maximum amount of Swoop = 40,000 maximum units × 0.10 hours of machine time required per Swoop sweatshirt = 4,000 hours needed to manufacture 40,000 Swoop sweatshirts.

$$\begin{aligned} \text{Remaining machine time for Rufus sweatshirts} &= 7,000 \text{ hours} - 4,000 \text{ hours} \\ &= 3,000 \text{ hours} \end{aligned}$$

$$\begin{aligned} \text{Units of Rufus to be produced in remaining 3,000 hours} &= \frac{3,000 \text{ hours}}{0.33 \text{ hours per unit}} \\ &= 9,091 \text{ units}^* \end{aligned}$$

Now the optimal mix is 40,000 units of Swoop sweatshirts and 9,091 units of Rufus sweatshirts. This mix will precisely exhaust the machine time available.

*Differences due to rounding.

3. Total contribution margin of optimal mix = (40,000 units Swoop × \$5)
+ (9,091 units Rufus × \$15)
= \$336,365

CE 13-20

$$\begin{aligned} \text{Price} &= \text{Cost} + \text{Markup percentage} \times \text{Cost} \\ &= \$95,000 + 0.10(\$95,000) \\ &= \$95,000 + \$9,500 \\ &= \$104,500 \end{aligned}$$

CE 13-21

1. Desired profit = 0.20 × Target price
= 0.20 × \$350
= \$70
2. Target cost = Target price – Desired profit
= \$350 – \$70
= \$280

EXERCISES

E 13-22

The correct order is 4, 5, 2, 6, 3, and 1.

E 13-23

Steps in Austin's decision:

- Step 1:** *Define the problem.* The problem is whether to continue studying at his present university or to study at a university with a nationally recognized engineering program.
- Step 2:** *Identify the alternatives.* Events a and b. (Students may want to include event i—possible study for a graduate degree. However, future events indicate that Austin still defined his problem as in Step 1 above.)
- Step 3:** *Identify the costs and benefits associated with each feasible alternative.* Events c, e, f, and i. (Students may also list e and f in Step 5—they are included here because they may help Austin estimate future income benefits.)
- Step 4:** *Total the relevant costs and benefits for each feasible alternative.* No specific event is listed for this step, although we can assume that it was done, and that three schools were selected as feasible since event j mentions that two of three applications met with success.
- Step 5:** *Assess qualitative factors.* Events d, e, f, g, and h.
- Step 6:** *Make the decision.* Event j is certainly relevant to this and event k is the actual decision. (What did Austin ultimately decide? He decided to stay at SMWU and finish his engineering degree. He also applied for—and won—summer internships with large West coast companies in the aerospace industry. Currently, he's applying for jobs and [Plan B] looking into graduate programs.)

E 13-24

1. The two alternatives are to make the component in-house or to buy it from Bryce.

	Alternatives		Differential Cost to Make
	Make	Buy	
Direct materials	\$12.00	-	\$ 12.00
Direct labor	8.25	-	8.25
Variable overhead	4.50	-	4.50
Purchase cost	-	\$25.00	(25.00)
Total relevant cost	<u>\$24.75</u>	<u>\$25.00</u>	<u>\$ (0.25)</u>

3. Zion should make the component in-house because operating income will be \$2,500 ($\$0.25 \times 10,000$) higher than if the part were purchased from Bryce.

E 13-25

	Alternatives		Differential Cost to Make
	Make	Buy	
Direct materials	\$12.00	-	\$ 12.00
Direct labor	8.25	-	8.25
Variable overhead	4.50	-	4.50
Avoidable fixed overhead*	1.50	-	1.50
Purchase cost	-	\$25.00	(25.00)
Total relevant cost	<u>\$26.25</u>	<u>\$25.00</u>	<u>\$ 1.25</u>

*Avoidable fixed overhead is the 75% of fixed overhead that would be eliminated if the component were no longer made in-house. Avoidable fixed overhead is relevant because if Zion makes the component, it will incur the cost, but if the component is purchased, that fixed overhead will not be incurred ($\$2.00 \times 75\% = \1.50).

Zion should purchase the component from Bryce because it will save \$12,500 ($\$1.25 \times 10,000$) over making it in-house.

E 13-25 (Continued)

2. As the percentage of avoidable fixed cost increases (above 75%), total relevant costs of making the component increases, causing the “purchase” decision to be more financially appealing (compared to the “make” option) than it was when the percentage was 75%. In other words, as the percentage increases, the \$12,500 difference between the “purchase” and “make” options increases resulting in the “purchase” decision being even more attractive. Alternatively, as the percentage of avoidable fixed cost decreases (below 75%), total relevant costs of making the component decreases, causing the “make” option to be more financially appealing. As the percentage of avoidable fixed costs decreases, the “make” option eventually is equally costly (a difference of zero) and as equally appealing financially as the “purchase” option.

3. Total relevant make costs of \$262,500 need to decrease to \$250,000 to equal the total relevant buy costs. Holding all other relevant make costs constant, this decrease of \$12,500 ($\$262,500 - \$250,000$) would reduce the total relevant avoidable fixed overhead from \$15,000 ($0.75 \times \$2.00 \text{ per unit} \times 10,000 \text{ units}$) to \$2,500 ($\$15,000 - \$12,500$). Therefore, for Zion to be indifferent between “making” versus “buying” the component (i.e., incur the same cost), the avoidable fixed overhead cost would need to be \$0.25 per unit ($\$2,500 / 10,000 \text{ units}$), which is 12.5% ($\$0.25 / \2.00). In other words, the 75% figure would need to decrease to 12.5% before Zion is indifferent between “making” versus “buying” the component.

E 13-26

1. The two alternatives are
 - (1) to accept the special order
 - (2) to reject the special order

2. Direct materials	\$3.00
Direct labor	2.25
Variable overhead	1.15
Total	<u>\$6.40</u>

Relevant manufacturing costs are \$6.40 per unit so the contribution margin per unit from the special order is \$0.60 (\$7.00 – \$6.40). The increase in total contribution margin is \$9,000 (15,000 × \$0.60). Therefore, the special order should be accepted.

E 13-27

In this case, it may be easier to deal with the total costs and revenues of the special order:

Revenue (\$7.00 × 15,000).....		\$105,000
Less variable costs:		
Direct materials (\$3.00 × 15,000).....	\$45,000	
Direct labor (\$2.25 × 15,000).....	33,750	
Variable overhead (\$1.15 × 15,000).....	<u>17,250</u>	(96,000)
Less labeling machine.....		(14,000)
Loss on special order.....		<u>(5,000)</u>

Smooth Move should reject the special order because it will reduce income by \$5,000.

E 13-28

If Petoskey drops Conway, overall profit will decrease by \$75,000 as a result of the lost contribution margin (\$300,000 – \$225,000). Note that the direct fixed expense for depreciation is a sunk cost and not relevant to the decision (i.e., it will remain unchanged whether Conway is kept or dropped). Therefore, the overall impact of dropping Conway is that profit decreases by the \$75,000 lost contribution margin. As a result, Petoskey should keep Conway because profits are higher with Conway than without Conway.

E 13-29

If Petoskey drops Conway, overall profit will decrease by \$75,000 as a result of the lost contribution margin (\$300,000 – \$225,000). Note that the fixed expense for depreciation is a sunk cost and not relevant to the decision (i.e., it will remain unchanged whether Conway is kept or dropped). In addition, Petoskey will avoid the \$80,000 supervisory salary cost if it drops Conway. Therefore, the overall impact of dropping Conway is that profit decreases by the \$75,000 lost contribution margin but increases by the lost supervisory salary of \$80,000, which is a net increase in profit of \$5,000. Therefore, Petoskey should drop Conway because profits are higher without Conway than with Conway.

E 13-30

If Petoskey drops Conway, profit will decrease by \$75,000 as a result of the lost contribution margin (\$300,000 – \$225,000). Note that the direct fixed expense for depreciation is a sunk cost and not relevant to the decision (i.e., it will remain unchanged whether Conway is kept or dropped). In addition, Petoskey will avoid the \$80,000 supervisory salary cost if it drops Conway. Finally, if Petoskey drops Conway, 20% of Alanson's contribution margin, or \$33,000 (i.e., $0.20 \times \$165,000$), will also be lost as Conway-loving customers shop elsewhere for Alanson.

Therefore, the overall impact of dropping Conway is that profit decreases by the \$75,000 lost Conway contribution margin, increases by the lost Conway supervisory salary of \$80,000, and decreases by the lost Alanson contribution margin of \$33,000, which is a net decrease in profit of \$28,000. Therefore, Petoskey should keep Conway because profits are higher with Conway than without Conway.

E 13-31

- 1. Contribution margin if HS is sold at split-off = \$8 × 20,000 pounds**
= \$160,000

- ## 2. Contribution margin if HS is processed into CS

Revenue (\$45 × 4,000)	\$180,000
Less further processing cost	34,000
Contribution margin	<u>\$146,000</u>

Bozo should sell HS at split-off; profit from selling at split-off will be \$14,000 higher (\$160,000 – \$146,000) than if it were processed into CS.

E 13-32

- | | | |
|--|----------------------------|---------------------------|
| 1. | <u>Reno</u> | <u>Tahoe</u> |
| Unit contribution margin | <u>\$120</u> | <u>\$75</u> |
| ÷ Painting department hours | <u>5</u> | <u>3</u> |
| Contribution margin per unit scarce resource | <u><u>\$ 24</u></u> | <u><u>\$25</u></u> |
- 2.** Assuming no other constraints, the optimal mix is zero units of Reno and 820 units of Tahoe. Total painting department time is 2,460 hours per year; if all of them are devoted to Tahoe production, then 820 (2,460/3) units of Tahoe can be produced.
- 3.** Contribution margin = $(\$120 \times 0) + (\$75 \times 820) = \$61,500$

E 13-33

- 1.** If 500 units of each product can be sold, then the company will first make and sell 500 units of Tahoe (the product with the higher contribution margin per hour of painting department time). This will take 1,500 (500 units \times 3 hours) hours of painting department time, leaving 960 hours (2,460 hours – 1,500 hours) for Reno production. This time will yield 192 (960 hours/5 hours per unit) units of Reno.
- Optimal mix: 192 units Reno, 500 units Tahoe
- 2.** Total contribution margin = $(\$120 \times 192) + (\$75 \times 500) = \$60,540$

E 13-34

1. Price of carved bear candle = $\$12.00 + (0.80 \times \$12) = \$21.60$
2. Price of scented votive candle = $\$1.10 + (0.80 \times \$1.10) = \$1.98$
3. The financial manager might encounter one or more common challenges to using cost-plus (or markup) pricing. One challenge might be identifying the most appropriate percentage by which to markup gift shop costs. For example, if the percentage is too high (and 80% seems high), the manager risks setting prices too high, thereby causing some customers to decide not to buy the gift shop's products. One factor working in the manager's favor in this environment is that businesses in remote locations, such as many national park gift shops, face little or no competition. This can spur customers to spend more money than they would when more competition exists. Alternatively, if the markup percentage is too low, the manager risks setting prices too low. When prices are too low, profits are less than they would be with higher prices. In extreme cases, profits can be negative if total revenues are less than total costs.

Another challenge might be accurately estimating the costs on which the markup percentage is applied. Even if the markup percentage is appropriate, marking up a grossly inaccurate estimate of costs can result in consequences similar to those described in the previous paragraph. For example, if reported costs are far too low, the price and total revenues that result will be lower than they could be (or need to be) to be profitable. If reported costs are far too high, the price will be too high, and total revenues will be lower than if a more appropriate price, that customers are willing to pay, is set.

E 13-35

1. Desired profit $= 0.20 \times \text{Target price}$
 $= 0.20 \times \$75$
 $= \$15.00$
2. Target cost $= \text{Target price} - \text{Desired profit}$
 $= \$75.00 - \15.00
 $= \$60.00$

E 13-36

1. The amounts Heather has spent on purchasing and improving the Grand Am are irrelevant because these are sunk costs.

- 2.

Cost Item	Alternatives	
	Restore Grand Am	Buy Neon
Transmission	\$2,000	\$ 0
Water pump	400	0
Master cylinder	1,100	0
Sell Grand Am	0	\$(6,400)
Cost of new car	0	9,400
Total	<u>\$3,500</u>	<u>\$ 3,000</u>

Heather should sell the Grand Am and buy the Neon because it provides a net savings of \$500.

Note: Heather should consider the qualitative factors. If she restores the Grand Am, how much longer will it last? What about increased license fees and insurance on the newer car? Could she remove the stereo and put it in the Neon without greatly decreasing the Grand Am's resale value?

E 13-37

1. If the analysis is done using total costs, each variable cost as well as the purchase price will be the unit cost multiplied by 35,000 units. The direct fixed overhead of \$77,000 is avoidable if the part is purchased.

	Make	Buy
Direct materials	\$210,000	\$ 0
Direct labor	70,000	0
Variable overhead	52,500	0
Fixed overhead	77,000	0
Purchase cost	0	385,000
Total relevant costs	<u>\$409,500</u>	<u>\$385,000</u>

Blasingham should purchase the part.

2. Maximum price = $\$409,500 / 35,000 = \11.70 per unit
3. Income would increase by \$24,500 ($\$409,500 - \$385,000$).

E 13-38

	<u>Make</u>	<u>Buy</u>
1. Direct materials	\$210,000	\$ 0
Direct labor	70,000	0
Variable overhead	52,500	0
Purchase cost	0	385,000 (\$11 × 35,000)
Total relevant costs	<u>\$332,500</u>	<u>\$385,000</u>

Blasingham should continue manufacturing the part.

2. Maximum price = $\$332,500 / 35,000 = \9.50 per unit
3. Income would decrease by \$52,500 ($\$332,500 - \$385,000$).

PROBLEMS

P 13-39

1. If the special order is accepted:

Revenues (\$7 × 100,000).....	\$ 700,000
Direct materials (\$2 × 100,000).....	(200,000)
Direct labor (\$1 × 100,000).....	(100,000)
Variable overhead (\$3 × 100,000).....	(300,000)
Total net benefit	<u>\$ 100,000</u>

Fixed overhead and selling costs are irrelevant.

If the special order is rejected, there will be no impact on income.

Therefore, the quantitative analysis is \$100,000 in favor of accepting the special order.

2. The qualitative factors are those that cannot be easily quantified. The company is faced with a problem of idle capacity. Accepting the special order would bring production up to near capacity and allow the company to avoid laying off employees. This would also enhance the company's community image.

The special-order price is well below the company's normal price. Will this have a potential impact on regular customers? Considering the fact that the customer is located in a region not usually served by the company, the likelihood of an adverse impact on regular business is not high.

P 13-40

1. Cost Item

	Make	Buy
Raw materials ^a	\$218,000	\$ 0
Direct labor ^b	70,200	0
Variable overhead ^c	20,800	0
Fixed overhead ^d	58,000	0
Purchase cost ^e	0	340,000
	<u>\$367,000</u>	<u>\$340,000</u>

^a (\$70 × 2,000) + (\$130 × 600).

^b \$27 × 2,600.

^c \$8 × 2,600.

^d \$26,000 + \$32,000.

^e (\$125 × 2,000) + (\$150 × 600).

Net savings by purchasing: \$367,000 – \$340,000 = \$27,000.

Hetrick should purchase the crowns rather than make them.

P 13-40 (Continued)

2. Qualitative factors that Hetrick should consider include quality of crowns, reliability and promptness of producer, and reduction of workforce.
3. It reduces the cost of making the crowns to \$335,000, which is less than the cost of buying.

4. Cost Item	Make	Buy
Raw materials.....	\$316,000 ^a	\$ 0
Direct labor.....	108,000 ^b	0
Variable overhead.....	32,000 ^c	0
Fixed overhead.....	58,000	0
Purchase cost.....	0	515,000 ^d
	<u>\$514,000</u>	<u>\$515,000</u>

Hetrick should produce its own crowns if demand increases to this level because the fixed overhead is spread over more units.

^a\$70 × 3,400 Porcelain + \$130 × 600 Gold = \$316,000

^b\$27 × (3,400 + 600) = \$108,000

^c\$8 × (3,400 + 600) = \$32,000

^d(125 × 3,400) + (\$150 × 600)

P 13-41**@ 600 lbs.**

	Process Further	Sell	Difference
Revenues ^a	\$24,000	\$7,200	\$16,800
Bags ^b	0	(39)	39
Shipping ^c	(384)	(60)	(324)
Grinding ^d	(1,500)	0	(1,500)
Bottles ^e	(2,400)	0	(2,400)
	<u>\$19,716</u>	<u>\$7,101</u>	<u>\$12,615</u>

^a 600 × 10 × \$4 = \$24,000; \$12 × 600.

^b \$1.30 × (600/20).

^c [(10 × 600)/25] × \$1.60 = \$384; \$0.10 × 600 = \$60.

^d \$2.50 × 600.

^e 10 × 600 × \$0.40.

Zanda should process deparyl further.

2. \$12,615/600 = \$21.025 additional income per pound
\$21.025 × 265,000 = \$5,571,625

P 13-42

1.	System A	System B	Headset	Total
Sales	\$45,000	\$32,500	\$8,000	\$85,500
Variable expenses	20,000	25,500	3,200	48,700
Contribution margin	\$25,000	\$ 7,000	\$4,800	\$36,800
Direct fixed cost*	526 *	11,158 **	1,016 ***	12,700
Segment margin	<u>\$24,474</u>	<u>\$ (4,158)</u>	<u>\$3,784</u>	<u>\$24,100</u>
Common fixed cost				18,000
Operating income				<u>\$ 6,100</u>

* $\$45,000/\$85,500 \times \$18,000 = \$9,474$; $\$10,000 - \$9,474 = \$526$.

** $\$32,500/\$85,500 \times \$18,000 = \$6,842$; $\$18,000 - \$6,842 = \$11,158$.

*** $\$8,000/\$85,500 \times \$18,000 = \$1,684$; $\$2,700 - \$1,684 = \$1,016$.

2.	System A	Headset	Total
Sales	\$58,500	\$6,000	\$64,500
Variable expenses	26,000	2,400	28,400
Contribution margin	\$32,500	\$3,600	\$36,100
Direct fixed cost	526	1,016	1,542
Segment margin	<u>\$31,974</u>	<u>\$2,584</u>	<u>\$34,558</u>
Common fixed cost			18,000
Operating income			<u>\$16,558</u>

System B should be dropped.

3.	System A	System C	Headset	Total
Sales	\$45,000	\$26,000	\$7,200	\$78,200
Variable expenses	20,000	13,000	2,880	35,880
Contribution margin	\$25,000	\$13,000	\$4,320	\$42,320
Direct fixed cost*	526	11,158	1,016	12,700
Segment margin	<u>\$24,474</u>	<u>\$ 1,842</u>	<u>\$3,304</u>	<u>\$29,620</u>
Common fixed cost				18,000
Operating income				<u>\$11,620</u>

Replacing B with C is better than keeping B, but not as good as dropping B without replacement with C.

P 13-43

1. Steve should consider selling the part for \$1.85 because his division's profits would increase \$12,800:

	<u>Accept</u>	<u>Reject</u>
Revenues ($2 \times \$1.85 \times 8,000$)	\$29,600	\$0
Variable expenses	16,800	0
Total	<u>\$12,800</u>	<u>\$0</u>

Pat's divisional profits would increase by \$18,400:

	<u>Accept</u>	<u>Reject</u>
Revenues ($\$32 \times 8,000$)	\$ 256,000	\$0
Variable expenses:		
Direct materials ($\$17 \times 8,000$)	(136,000)	0
Direct labor ($\$7 \times 8,000$)	(56,000)	0
Overhead ($\$2 \times 8,000$)	(16,000)	0
Component ($2 \times \$1.85 \times 8,000$)	(29,600)	0
Total relevant benefits	<u>\$ 18,400</u>	<u>\$0</u>

2. Pat should accept the \$2 price. This price will increase the cost of the component from \$29,600 to \$32,000 ($2 \times \$2 \times 8,000$) and yield an incremental benefit of \$16,000 ($\$18,400 - \$2,400$).
- Steve's division will see an increase in profit of \$15,200 ($8,000 \text{ units} \times 2 \text{ components per unit} \times \$0.95 \text{ contribution margin per component}$).
3. Yes. At full price, the total cost of the component is \$36,800 ($2 \times \$2.30 \times 8,000$), an increase of \$7,200 over the original offer. This still leaves an increase in profits of \$11,200 ($\$18,400 - \$7,200$). (See the answer to Requirement 1.)

P 13-44

1. Markup = $\$81,900 / \$130,000 = 0.63$, or 63%

2. Direct materials	\$1,800
Direct labor	1,600
Overhead	800
Total cost	<u>\$4,200</u>
Add: Markup ($\$4,200 \times 63\%$)	2,646
Initial bid	<u>\$6,846</u>

P 13-45

	<u>Basic</u>	<u>Standard</u>	<u>Deluxe</u>
1. Price	\$ 9.00	\$30.00	\$35.00
Variable cost	6.00	20.00	10.00
Contribution margin	\$ 3.00	\$10.00	\$25.00
÷ Machine hours	0.10	0.50	0.75
Contribution margin per machine hour	<u>\$30.00</u>	<u>\$20.00</u>	<u>\$33.33 *</u>

The company should sell only the Deluxe unit with contribution margin per machine hour of \$33.33. Sealing can produce 20,000 (15,000/0.75) Deluxe units per year. These 20,000 units, multiplied by the \$25 contribution margin per unit, would yield a total contribution margin of \$500,000.

2. First, produce and sell 12,000 Deluxe units, which would use 9,000 machine hours. Then, produce and sell 50,000 Basic units, which would use 5,000 machine hours. Finally, with the remaining 1,000 machine hours, produce 2,000 Standard units.

$$\begin{aligned}\text{Total contribution margin} &= (\$25 \times 12,000) + (\$3 \times 50,000) + (\$10 \times 2,000) \\ &= \$470,000\end{aligned}$$

*Rounded

P 13-46

1. The company should not accept the offer because the additional revenue is less than the additional costs (assuming fixed overhead is allocated and will not increase with the special order):

Incremental revenue per box.....	\$ 4.20
Incremental cost per box.....	4.25
Loss per box.....	<u>\$ (0.05)</u>

$$\text{Total loss: } \$0.05 \times 5,000 = (\$250)$$

2. Costs associated with the layoff:

Increase state UI premiums (0.01 × \$1,460,000).....	\$14,600
Notification costs (\$25 × 20).....	500
Rehiring and retraining costs (\$150 × 20).....	3,000
Total.....	<u>\$18,100</u>

The order should be accepted. The loss of \$250 on the order is more than offset by the \$18,100 savings by not laying off employees.

P 13-47

1. Sales.....			\$263,000
Costs.....			223,000
Operating profit.....			<u>\$40,000</u>
2.	<u>Sell</u>	<u>Process Further</u>	<u>Difference</u>
Revenues	\$40,000	\$75,000	\$35,000
Further processing cost	0	23,900	23,900
Operating income (loss)	<u>\$40,000</u>	<u>\$51,100</u>	<u>\$11,100</u>

The company should process Delta further because gross profit would increase by \$11,100 if it were processed further. (Note: Joint costs are irrelevant to this decision because the company will incur them whether or not Delta is processed further.)

P 13-48

1. $(\$30 \times 2,000) + (\$60 \times 4,000) = \$300,000$

2.	<u>Juno</u>	<u>Hera</u>
Contribution margin	\$30	\$60
÷ Pounds of material	2	5
Contribution margin/pound	<u>\$15</u>	<u>\$12</u>

Norton should make as much of Juno as can be sold and then make Hera.

2,000 units of Juno \times 2 lbs per unit = 4,000 pounds

16,000 pounds – 4,000 pounds = 12,000 pounds for Hera

Hera production = 12,000 lbs/5 lbs per unit = 2,400 units

Product mix is 2,000 Juno and 2,400 Hera.

$$\begin{aligned} \text{Total contribution margin} &= (2,000 \times \$30) + (2,400 \times \$60) \\ &= \$204,000 \end{aligned}$$

P 13-49

1.	<u>Sell</u>	<u>Process Further</u>	<u>Differential Amount to Process Further</u>
Revenues	\$24,000	\$33,000	\$ 9,000
Processing cost	-	(4,100)	(4,100)
Total	<u>\$24,000</u>	<u>\$28,900</u>	<u>\$ 4,900</u>

Germain should be processed further as it will increase profit by \$4,900 for every 1,000 liters.

2.	<u>Sell</u>	<u>Process Further</u>	<u>Differential Amount to Process Further</u>
Revenues	\$24,000	\$33,000	\$ 9,000
Processing cost	-	(4,100)	(4,100)
Distribution cost	-	(800)	(800)
Commissions	-	(3,300)	(3,300)
Total	<u>\$24,000</u>	<u>\$24,800</u>	<u>\$ 800</u>

Germain should be processed further as it will increase profit by \$800 for every 1,000 liters. Note that the liability issue was not quantified so it would need to be considered as a qualitative factor, further reducing the attractiveness of making Germain.

P 13-50

1. Monthly cost for FirstBank:

Checking accounts:

Maintenance fees (\$5 × 6).....	\$ 30	
Foreign DR/CR (\$0.10 × 200).....	20	
Returned checks (\$3 × 25).....	75	
Earnings on deposits (\$0.50 × 300).....	(150)	\$ (25)
Credit card fees (\$0.50 × 4,000).....		2,000
Wire transfers [(\$15 × 40) + (\$50 × 60)].....		3,600
Line of credit charges (0.06/12)(100,000).....		500
Internet banking charges.....		20
Total monthly charges.....		<u>\$6,095</u>
One-time Internet setup fees (\$15 × 6 accounts)....		<u>\$ 90</u>

P 13-50 (Continued)**Monthly cost for Community Bank:**

Checking accounts: Returned checks ($\$2 \times 25$).....		\$ 50
Credit card fees		
Per item ($\$0.50 \times 4,000$).....	\$2,000	
Batch processing ($\$7 \times 20$).....	140	2,140
Wire transfers ($\$30 \times 100$).....		3,000
Line of credit charges ($0.07/12$)($\$100,000$)		583 *
Total monthly charges.....		<u>\$5,773</u>

Monthly cost for RegionalOne Bank:**Checking accounts:**

Foreign DR/CR ($\$0.20 \times 200$).....	\$ 40	
Returned checks ($\$3.80 \times 25$).....	95	
Earnings on deposits ($\$0.30 \times 300$).....	(90)	\$ 45
Credit card fees ($\$0.50 \times 4,000$).....		2,000
Wire transfers [$(\$10 \times 40) + (\$55 \times 60)$].....		3,700
Line of credit charges ($0.065/12$)($\$100,000$).....		542 *
Internet banking charges.....		20
Total monthly charges.....		<u>\$6,307</u>

Community Bank has the lowest overall monthly fees. On quantitative factors alone, it would be chosen.

2. If the full online banking access were crucial, Community Bank would be eliminated immediately. This leaves FirstBank and RegionalOne Bank. The two sets of monthly costs are similar, \$6,095 for FirstBank versus \$6,307 for RegionalOne. Now, the banking relationship, comfort level of Kicker with the loan officer, and confidence in the bank's ability to respond quickly and appropriately to Kicker's needs will be the deciding factors. Additionally, some further negotiation would probably be done—for example, on the interest rate on the line of credit.

*Rounded

CASES

Case 13-51

1. Pamela should not have told Roger about the deliberations concerning the power department because this is confidential information. She had been explicitly told to keep the details quiet but deliberately informed the head of the unit affected by the potential decision. (Standard II: 1) Her revelation may be interpreted as actively or passively subverting the attainment of the organization's legitimate and ethical objectives.
2. The romantic relationship between Pamela and Roger sets up a conflict of interest for this particular decision. Pamela should have withdrawn from any active role in it. (Standard III: 1) However, she should definitely provide the information she currently has about the cost of eliminating the power department. To not do so would be active subversion of the organization's legitimate and ethical objectives. Moreover, she has the obligation to communicate information fairly and to disclose all relevant information that could reasonably be expected to influence an intended user's understanding. In addition, however, Pamela should discuss the qualitative effects of eliminating the power department. The effects on workers, community relations, reliability of external service, and any ethical commitments the company may have to its workers should all enter into the decision. Pamela should communicate the short-term quantitative effects and express any concerns about the qualitative factors. She should also project what the costs of operating internally would be for next five years and compare that with the estimates of the costs of external acquisition.

Case 13-52

1. Sales ^a	\$3,751,500
Less: Variable expenses ^b	<u>2,004,900</u>
Contribution margin	\$1,746,600
Less: Direct fixed expenses ^c	<u>1,518,250</u>
Divisional margin	\$ 228,350
Less: Common fixed expenses ^c	<u>299,250</u>
Operating (loss)	<u><u>\$ (70,900)</u></u>

^a Based on sales of 41,000 units

Let X = Units sold

$$\$83X/2 + \$100X/2 = \$3,751,500$$

$$\$183X = \$7,503,000$$

$$X = 41,000 \text{ units}$$

Case 13-52 (Continued)

^b $\$83/1.25 = \66.40 Manufacturing cost

– 20.00 Fixed overhead

\$46.40 Per internal unit variable cost

+ 5.00 Selling expenses

\$51.40 Per external unit variable cost

$$\begin{aligned}\text{Variable costs} &= (\$46.40 \times 20,500) + (\$51.40 \times 20,500) \\ &= \$2,004,900\end{aligned}$$

^c Fixed selling and admin: $\$1,100,000 - \$5(20,500) = \$997,500$

Direct fixed selling and admin: $0.70 \times \$997,500 = \$698,250$

Direct fixed overhead: $\$20 \times 41,000 = \$820,000$

Total direct fixed expenses = $\$698,250 + \$820,000 = \$1,518,250$

Common fixed expenses = $0.30 \times \$997,500 = \$299,250$

2.

	<u>Keep</u>	<u>Drop</u>
Sales	\$ 3,751,500	\$ -
Variable costs	(2,004,900)	(2,050,000) *
Direct fixed expenses	(1,518,250)	-
Annuity	-	100,000
Total	<u>\$ 228,350</u>	<u>\$(1,950,000)</u>

* $\$100 \times 20,500$ (The units transferred internally must be purchased externally.)

The company should keep the division.

Case 13-53

Answers will vary.