4-12 Describe three different debit entries to the Work-in-Process Control T-account under normal costing.

4-13 Describe three alternative ways to dispose of under- or overallocated overhead costs.

4-14 When might a company use budgeted costs rather than actual costs to compute direct-labor rates?

4-15 Describe briefly why Electronic Data Interchange (EDI) is helpful to managers.

Exercises

MyAccountingLab

4-16 Job costing, process costing. In each of the following situations, determine whether job costing or process costing would be more appropriate.

a. A CPA firm
b. An oil refinery
c. A custom furniture manufacturer
d. A tire manufacturer
e. A textbook publisher
f. A pharmaceutical company
g. An advertising agency
h. An architecture firm
i. A flour mill
j. A paint manufacturer
k. A nursing home
l. A landscaping company
m. A cola-drink-concentrate producer
n. A movie studio
o. A law firm
p. A commercial aircraft manufacturer
q. A management consulting firm
r. A plumbing contractor
s. A catering service
t. A paper mill
u. An auto repair shop

4-17 Actual costing, normal costing, accounting for manufacturing overhead. Destin Products uses a job-costing system with two direct-cost categories (direct materials and direct manufacturing labor) and one manufacturing overhead cost pool. Destin allocates manufacturing overhead costs using direct manufacturing labor costs. Destin provides the following information:

	Budget for 2014	Actual Results for 2014
Direct material costs	$2,000,000	$1,900,000
Direct manufacturing labor costs	1,500,000	1,450,000
Manufacturing overhead costs	2,700,000	2,755,000

Required

1. Compute the actual and budgeted manufacturing overhead rates for 2014.
2. During March, the job-cost record for Job 626 contained the following information:

Direct materials used	$40,000
Direct manufacturing labor costs	$30,000

   Compute the cost of Job 626 using (a) actual costing and (b) normal costing.
3. At the end of 2014, compute the under- or overallocated manufacturing overhead under normal costing. Why is there no under- or overallocated overhead under actual costing?
4. Why might managers at Destin Products prefer to use normal costing?

4-18 Job costing, normal and actual costing. Anderson Construction assembles residential houses. It uses a job-costing system with two direct-cost categories (direct materials and direct labor) and one indirect-cost pool (assembly support). Direct labor-hours is the allocation base for assembly support costs. In December 2013, Anderson budgets 2014 assembly-support costs to be $8,000,000 and 2014 direct labor-hours to be 160,000.

At the end of 2014, Anderson is comparing the costs of several jobs that were started and completed in 2014.

	Laguna Model	Mission Model
Construction period	Feb–June 2014	May–Oct 2014
Direct material costs	$106,650	$127,970
Direct labor costs	$ 36,276	$ 41,750
Direct labor-hours	920	1,040

Direct materials and direct labor are paid for on a contract basis. The costs of each are known when direct materials are used or when direct labor-hours are worked. The 2014 actual assembly-support costs were $7,614,000, and the actual direct labor-hours were 162,000.

Creation Co. uses a normal-costing system and allocates overhead to work in process at a rate of $2.60 per direct manufacturing labor dollar. Indirect materials are insignificant so there is no inventory account for indirect materials.

Required

1. Prepare journal entries to record the transactions for 2014 including an entry to close out over- or underallocated overhead to cost of goods sold. For each journal entry indicate the source document that would be used to authorize each entry. Also note which subsidiary ledger, if any, should be referenced as backup for the entry.
2. Post the journal entries to T-accounts for all of the inventories, Cost of Goods Sold, the Manufacturing Overhead Control Account, and the Manufacturing Overhead Allocated Account.

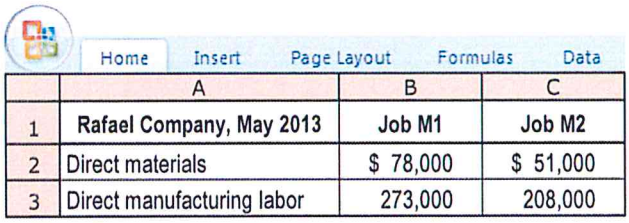
4-26 Job costing, journal entries. Donald Transport assembles prestige manufactured homes. Its job-costing system has two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost pool (manufacturing overhead allocated at a budgeted $31 per machine-hour in 2014). The following data (in millions) show operation costs for 2014:

Materials Control, beginning balance, January 1, 2014	$ 18
Work-in-Process Control, beginning balance, January 1, 2014	9
Finished Goods Control, beginning balance, January 1, 2014	10
Materials and supplies purchased on credit	154
Direct materials used	152
Indirect materials (supplies) issued to various production departments	19
Direct manufacturing labor	96
Indirect manufacturing labor incurred by various production departments	34
Depreciation on plant and manufacturing equipment	28
Miscellaneous manufacturing overhead incurred (ordinarily would be detailed as repairs, utilities, etc., with a corresponding credit to various liability accounts)	13
Manufacturing overhead allocated, 3,000,000 actual machine-hours	?
Cost of goods manufactured	298
Revenues	410
Cost of goods sold	294

Required

1. Prepare an overview diagram of Donald Transport's job-costing system.
2. Prepare journal entries. Number your entries. Explanations for each entry may be omitted. Post to T-accounts. What is the ending balance of Work-in-Process Control?
3. Show the journal entry for disposing of under- or overallocated manufacturing overhead directly as a year-end writeoff to Cost of Goods Sold. Post the entry to T-accounts.
4. How did Donald Transport perform in 2014?

4-27 Job costing, unit cost, ending work in process. Rafael Company produces pipes for concert-quality organs. Each job is unique. In April 2013, it completed all outstanding orders, and then, in May 2013, it worked on only two jobs, M1 and M2:



	A	B	C
1	**Rafael Company, May 2013**	**Job M1**	**Job M2**
2	Direct materials	$ 78,000	$ 51,000
3	Direct manufacturing labor	273,000	208,000

Direct manufacturing labor is paid at the rate of $26 per hour. Manufacturing overhead costs are allocated at a budgeted rate of $20 per direct manufacturing labor-hour. Only Job M1 was completed in May.

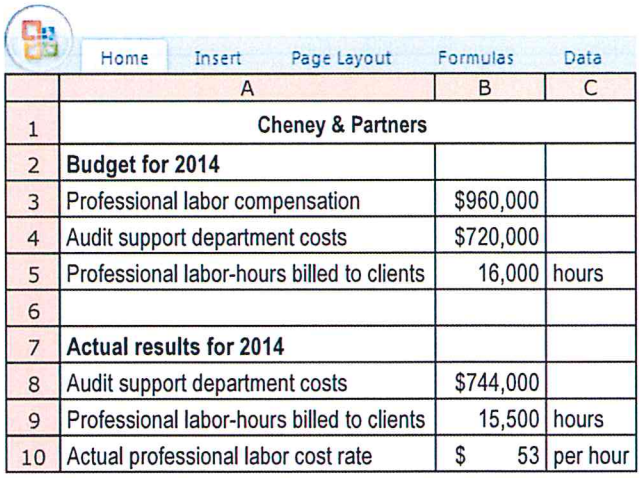
Required

1. Calculate the total cost for Job M1.
2. 1,100 pipes were produced for Job M1. Calculate the cost per pipe.
3. Prepare the journal entry transferring Job M1 to finished goods.
4. What is the ending balance in the Work-in-Process Control account?

4-28 Job costing; actual, normal, and variation from normal costing. Cheney & Partners, a Quebec-based public accounting partnership, specializes in audit services. Its job-costing system has a single direct-cost category (professional labor) and a single indirect-cost pool (audit support, which contains all costs of the

Audit Support Department). Audit support costs are allocated to individual jobs using actual professional labor-hours. Cheney & Partners employs 10 professionals to perform audit services.

Budgeted and actual amounts for 2014 are as follows:



	A	B	C
1	**Cheney & Partners**		
2	**Budget for 2014**		
3	Professional labor compensation	$960,000	
4	Audit support department costs	$720,000	
5	Professional labor-hours billed to clients	16,000	hours
6			
7	**Actual results for 2014**		
8	Audit support department costs	$744,000	
9	Professional labor-hours billed to clients	15,500	hours
10	Actual professional labor cost rate	$ 53	per hour

Required

1. Compute the direct-cost rate and the indirect-cost rate per professional labor-hour for 2014 under (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.
2. Which job-costing system would you recommend Cheney & Partners use? Explain.
3. Cheney's 2014 audit of Pierre & Co. was budgeted to take 170 hours of professional labor time. The actual professional labor time spent on the audit was 185 hours. Compute the cost of the Pierre & Co. audit using (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs. Explain any differences in the job cost.

4-29 Job costing; variation on actual, normal, and variation from normal costing. Creative Solutions designs Web pages for clients in the education sector. The company's job-costing system has a single direct cost category (Web-designing labor) and a single indirect cost pool composed of all overhead costs. Overhead costs are allocated to individual jobs based on direct labor-hours. The company employs six Web designers. Budgeted and actual information regarding Creative Solutions follows:

Budget for 2014:	
Direct labor costs	$273,000
Direct labor-hours	10,500
Overhead costs	$157,500
Actual results for 2014:	
Direct labor costs	$285,000
Direct labor-hours	11,400
Overhead costs	$159,600

Required

1. Compute the direct cost rate and the indirect cost rate per Web-designing labor-hour for 2014 under (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.
2. Which method would you suggest Creative Solutions use? Explain.
3. Creative Solutions' Web design for Greenville Day School was budgeted to take 86 direct labor-hours. The actual time spent on the project was 79 hours. Compute the cost of the Greenville Day School job using (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct cost.

4-30 Proration of overhead. The Ride-On-Wave Company (ROW) produces a line of non-motorized boats. ROW uses a normal-costing system and allocates manufacturing overhead using direct manufacturing labor cost. The following data are for 2014:

Budgeted manufacturing overhead cost	$125,000
Budgeted direct manufacturing labor cost	$250,000
Actual manufacturing overhead cost	$117,000
Actual direct manufacturing labor cost	$228,000

Inventory balances on December 31, 2014, were as follows:

Account	Ending balance	2014 direct manufacturing labor cost in ending balance
Work in process	$ 50,700	$ 20,520
Finished goods	245,050	59,280
Cost of goods sold	549,250	148,200

Required

1. Calculate the manufacturing overhead allocation rate.
2. Compute the amount of under- or overallocated manufacturing overhead.
3. Calculate the ending balances in work in process, finished goods, and cost of goods sold if under- or overallocated manufacturing overhead is as follows:
   a. Written off to cost of goods sold
   b. Prorated based on ending balances (before proration) in each of the three accounts
   c. Prorated based on the overhead allocated in 2014 in the ending balances (before proration) in each of the three accounts
4. Which method would you choose? Justify your answer.

Problems

MyAccountingLab

4-31 Job costing, accounting for manufacturing overhead, budgeted rates. The Pisano Company uses a job-costing system at its Dover, Delaware, plant. The plant has a machining department and a finishing department. Pisano uses normal costing with two direct-cost categories (direct materials and direct manufacturing labor) and two manufacturing overhead cost pools (the machining department with machine-hours as the allocation base and the finishing department with direct manufacturing labor costs as the allocation base). The 2014 budget for the plant is as follows:

	Machining Department	Finishing Department
Manufacturing overhead costs	$9,065,000	$8,181,000
Direct manufacturing labor costs	$ 970,000	$4,050,000
Direct manufacturing labor-hours	36,000	155,000
Machine-hours	185,000	37,000

Required

1. Prepare an overview diagram of Pisano's job-costing system.
2. What is the budgeted manufacturing overhead rate in the machining department? In the finishing department?
3. During the month of January, the job-cost record for Job 431 shows the following:

	Machining Department	Finishing Department
Direct materials used	$13,000	$ 5,000
Direct manufacturing labor costs	$ 900	$1,250
Direct manufacturing labor-hours	20	70
Machine-hours	140	20

   Compute the total manufacturing overhead cost allocated to Job 431.
4. Assuming that Job 431 consisted of 300 units of product, what is the cost per unit?
5. Amounts at the end of 2014 are as follows:

	Machining Department	Finishing Department
Manufacturing overhead incurred	$10,000,000	$7,982,000
Direct manufacturing labor costs	$ 1,030,000	$4,100,000
Machine-hours	200,000	34,000

   Compute the under- or overallocated manufacturing overhead for each department and for the Dover plant as a whole.
6. Why might Pisano use two different manufacturing overhead cost pools in its job-costing system?

Required

1. Calculate the amount of overhead allocated in the fabrication department and the finishing department in May.
2. Calculate the amount of under- or overallocated overhead in each department and in total.
3. How much of the under- or overallocated overhead will be prorated to (a) work in process inventory, (b) finished goods inventory, and (c) cost of goods sold based on the ending balance (before proration) in each of the three accounts? What will be the balance in work in process, finished goods, and cost of goods sold after proration?
4. What would be the effect of writing off under- and overallocated overhead to cost of goods sold? Would it be reasonable for Premier Golf Carts to change to this simpler method?

4-37 General ledger relationships, under- and overallocation. (S. Sridhar, adapted) Southwick Company uses normal costing in its job-costing system. Partially completed T-accounts and additional information for Southwick for 2014 are as follows:

Direct Materials Control		
1-1-2014	25,000	234,000
	240,000	

Work-in-Process Control		
1-1-2014	44,000	
Dir. manuf. labor	348,000	

Finished Goods Control		
1-1-2014	10,000	880,000
	925,000	

Manufacturing Overhead Control		Manufacturing Overhead Allocated	Cost of Goods Sold
514,000			

Additional information follows:

a. Direct manufacturing labor wage rate was $12 per hour.
b. Manufacturing overhead was allocated at $16 per direct manufacturing labor-hour.
c. During the year, sales revenues were $1,050,000, and marketing and distribution costs were $125,000.

Required

1. What was the amount of direct materials issued to production during 2014?
2. What was the amount of manufacturing overhead allocated to jobs during 2014?
3. What was the total cost of jobs completed during 2014?
4. What was the balance of work-in-process inventory on December 31, 2014?
5. What was the cost of goods sold before proration of under- or overallocated overhead?
6. What was the under- or overallocated manufacturing overhead in 2014?
7. Dispose of the under- or overallocated manufacturing overhead using the following:
   a. Writeoff to Cost of Goods Sold
   b. Proration based on ending balances (before proration) in Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold
8. Using each of the approaches in requirement 7, calculate Southwick's operating income for 2014.
9. Which approach in requirement 7 do you recommend Southwick use? Explain your answer briefly.

4-38 Overview of general ledger relationships. Brandon Company uses normal costing in its job-costing system. The company produces custom bikes for toddlers. The beginning balances (December 1) and ending balances (as of December 30) in their inventory accounts are as follows:

	Beginning Balance 12/1	Ending Balance 12/31
Materials Control	$2,100	$ 8,500
Work-in-Process Control	6,700	9,000
Manufacturing Department Overhead Control	—	94,000
Finished Goods Control	4,400	19,400

Additional information follows:

a. Direct materials purchased during December were $66,300.
b. Cost of goods manufactured for December was $234,000.
c. No direct materials were returned to suppliers.
d. No units were started or completed on December 31 and no direct materials were requisitioned on December 31.
e. The manufacturing labor costs for the December 31 working day: direct manufacturing labor, $4,300, and indirect manufacturing labor, $1,400.
f. Manufacturing overhead has been allocated at 110% of direct manufacturing labor costs through December 31.

Solutions

h. Job costing
i. Process costing
j. Process costing
k. Job costing
s. Job costing
t. Process costing
u. Job costing

4-17 (20 min.) **Actual costing, normal costing, accounting for manufacturing overhead.**

1. $$\text{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted direct manufacturing labor costs}}$$

$$= \frac{\$2,700,000}{\$1,500,000} = 1.80 \text{ or } 180\%$$

$$\text{Actual manufacturing overhead rate} = \frac{\text{Actual manufacturing overhead costs}}{\text{Actual direct manufacturing labor costs}}$$

Not required

$$= \frac{\$2,755,000}{\$1,450,000} = 1.9 \text{ or } 190\%$$

2. Costs of Job 626 under actual and normal costing follow:

	Actual Costing	Normal Costing
Direct materials	$ 40,000	$ 40,000
Direct manufacturing labor costs	30,000	30,000
Manufacturing overhead costs		
$30,000 × 1.90; $30,000 × 1.80	57,000	54,000
Total manufacturing costs of Job 626	$127,000	$124,000

3. $$\text{Total manufacturing overhead allocated under normal costing} = \text{Actual manufacturing labor costs} \times \text{Budgeted overhead rate}$$

$$= \$1,450,000 \times 1.80$$

$$= \$2,610,000$$

$$\text{Underallocated manufacturing overhead} = \text{Actual manufacturing overhead costs} - \text{Manufacturing overhead allocated}$$

$$= \$2,755,000 - \$2,610,000 = \$145,000$$

There is no under- or overallocated overhead under actual costing because overhead is allocated under actual costing by multiplying actual manufacturing labor costs and the actual manufacturing overhead rate. This, of course, equals the actual manufacturing overhead costs. All actual overhead costs are allocated to products. Hence, there is no under- or overallocated overhead.

4. Managers at Destin Products might prefer to use normal costing because it enables them to use the budgeted manufacturing overhead rate determined at the beginning of the year to estimate the cost of a job as soon as the job is completed. Managers want to know job costs for ongoing uses, including pricing jobs, monitoring and managing costs, evaluating the success of the job, learning about what did and did not work, bidding on new jobs, and preparing interim financial statements. Under actual costing, managers would only determine the cost of a job at the end of the year when they know actual manufacturing overhead costs.

4-18 (20 -30 min.) **Job costing, normal and actual costing.**

1. Budgeted indirect-cost rate $= \dfrac{\text{Budgeted indirect costs (assembly support)}}{\text{Budgeted direct labor-hours}} = \dfrac{\$8{,}000{,}000}{160{,}000 \text{ hours}}$

$= \$50$ per direct labor-hour

Actual indirect-cost rate $= \dfrac{\text{Actual indirect costs (assembly support)}}{\text{Actual direct labor-hours}} = \dfrac{\$7{,}614{,}000}{162{,}000 \text{ hours}}$

$= \$47$ per direct labor-hour

These rates differ because both the numerator and the denominator in the two calculations are different—one based on budgeted numbers and the other based on actual numbers.

2a.

	Laguna Model	Mission Model
Normal costing		
Direct costs		
Direct materials	$106,650	$127,970
Direct labor	36,276	41,750
	142,926	169,720
Indirect costs		
Assembly support ($50 × 920; $50 × 1,040)	46,000	52,000
Total costs	$188,926	$221,720

2b. Actual costing

Direct costs		
Direct materials	$106,650	$127,970
Direct labor	36,276	41,750
	142,926	169,720
Indirect costs		
Assembly support ($47 × 920; $47 × 1,040)	43,240	48,880
Total costs	$186,166	$218,600

4-27 (15 min.) **Job costing, unit cost, ending work in progress.**

1.

Direct manufacturing labor rate per hour	$26
Manufacturing overhead cost allocated per manufacturing labor-hour	$20

	Job M1	Job M2
Direct manufacturing labor costs	$273,000	$208,000
Direct manufacturing labor-hours ($273,000 ÷ $26; $208,000 ÷ $26)	10,500	8,000
Manufacturing overhead cost allocated (10,500 × $20; 8,000 × $20)	$210,000	$160,000

Job Costs May 2011	Job M1	Job M2
Direct materials	$ 78,000	$ 51,000
Direct manufacturing labor	273,000	208,000
Manufacturing overhead allocated	210,000	160,000
Total costs	$561,000	$419,000

2.

Number of pipes produced for Job M1	1,100
Cost per pipe ($561,000 ÷ 1,100)	$510

3.

Finished Goods Control	561,000	
Work-in-Process Control		561,000

4. Rafael Company began May 2013 with no work-in-process inventory. During May, it started and finished M1. It also started M2, which is still in work-in-process inventory at the end of May. M2's manufacturing costs up to this point, $419,000, remain as a debit balance in the Work-in-Process Inventory account at the end of May 2013.

4-30 (30 min.) **Proration of overhead.**

1. $$\text{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead cost}}{\text{Budgeted direct manufacturing labor cost}}$$

$$= \frac{\$125,000}{\$250,000} = 50\% \text{ of direct manufacturing labor cost}$$

2. Overhead allocated = 50% × Actual direct manufacturing labor cost
= 50% × $228,000 = $114,000

$$\text{Underallocated manufacturing overhead} = \text{Actual manufacturing overhead costs} - \text{Allocated plant overhead costs}$$

$$= \$117,000 - \$114,000 = \$3,000$$

Underallocated manufacturing overhead = $3,000

3a. All underallocated manufacturing overhead is written off to cost of goods sold.

Both work-in-process (WIP) and finished goods inventory remain unchanged.

Account	Dec. 31, 2014 Balance (Before Proration) (1)	Proration of $3,000 Underallocated Manuf. Overhead (2)	Dec. 31, 2014 Balance (After Proration) (3) = (1) + (2)
WIP	$ 50,700	$ 0	$ 50,700
Finished Goods	245,050	0	245,050
Cost of Goods Sold	549,250	3,000	552,250
Total	$845,000	$3,000	$848,000

3b. Underallocated manufacturing overhead prorated based on ending balances:

Account	Dec. 31, 2014 Account Balance (Before Proration) (1)	Account Balance as a Percent of Total (2) = (1) ÷ $845,000	Proration of $3,000 Underallocated Manuf. Overhead (3) = (2) × $3,000	Dec. 31, 201 Account Balan (After Proratic (4) = (1) + (3
WIP	$ 50,700	0.06	0.06 × $3,000 = $ 180	$ 50,880
Finished Goods	245,050	0.29	0.29 × $3,000 = 870	245,920
Cost of Goods Sold	549,250	0.65	0.65 × $3,000 = 1,950	551,200
Total	$845,000	1.00	$3,000	$848,000

3c. Underallocated manufacturing overhead prorated based on 2014 overhead in ending balances:

Account	Dec. 31, 2014 Account Balance (Before Proration) (1)	Allocated Manuf. Overhead in Dec. 31, 2014 Balance (Before Proration) (2)	Allocated Manuf. Overhead in Dec. 31, 2014 Balance as a Percent of Total (3) = (2) ÷ $114,000	Proration of $3,000 Underallocated Manuf. Overhead (4) = (3) × $3,000	Dec. 31, 2014 Account Balance (After Proration) (5) = (1) + (4)
WIP	$ 50,700	$ 10,260[a]	0.09	0.09 × $3,000 = $ 270	$ 50,970
Finished Goods	245,050	29,640[b]	0.26	0.26 × $3,000 = 780	245,830
Cost of Goods Sold	549,250	74,100[c]	0.65	0.65 × $3,000 = 1,950	551,200
Total	$845,000	$114,000	1.00	$3,000	$848,000

[a,b,c] Overhead allocated = Direct manuf. labor cost × 50% = $20,520; $59,280; $148,200 × 50%

4. Writing off all of the underallocated manufacturing overhead to Cost of Goods Sold (CGS) is usually warranted when CGS is large relative to Work-in-Process and Finished Goods Inventory and the underallocated manufacturing overhead is immaterial. Both these conditions apply in this case. ROW should write off the $3,000 underallocated manufacturing overhead to Cost of Goods Sold Account.

4-37 (35 min.) **General ledger relationships, under- and overallocation.**

The solution assumes all materials used are direct materials. A summary of the T-accounts for Southwick Company before adjusting for under- or overallocation of overhead follows:

Direct Materials Control

1-1-2014	25,000	Material used for manufacturing	234,000
Purchases	240,000		
12-31-2014	31,000		

Work-in-Process Control

1-1-2014	44,000	Transferred to finished goods	925,000
Direct materials	234,000		
Direct manuf. labor	348,000		
Manuf. overhead allocated	464,000		
12-31-2014	165,000		

Finished Goods Control

1-1-2014	10,000	Cost of goods sold	880,000
Transferred in from WIP	925,000		
12-31-2014	55,000		

Cost of Goods Sold

Finished goods sold	880,000		

Manufacturing Overhead Control

Manufacturing overhead costs	514,000		

Manufacturing Overhead Allocated

		Manufacturing overhead allocated to work in process	464,000

1. From Direct Materials Control T-account,
Direct materials issued to production = $234,000 that appears as a credit.

2. Direct manufacturing labor-hours $= \dfrac{\text{Direct manufacturing labor costs}}{\text{Direct manufacturing wage rate per hour}}$

$= \dfrac{\$348,000}{\$12 \text{ per hour}} = 29,000 \text{ hours}$

$\text{Manufacturing overhead allocated} = \text{Direct manufacturing labor hours} \times \text{Manufacturing overhead rate}$

$= 29,000 \text{ hours} \times \$16 \text{ per hour} = \$464,000$

3. From the debit entry to Finished Goods T-account,
Cost of jobs completed and transferred from WIP = $925,000

4. From Work-in-Process T-account,

$\text{Work in process inventory on 12/31/2014} = \$44,000 + \$234,000 + \$348,000 + \$464,000 - \$925,000$

$= \$165,000$

5. From the credit entry to Finished Goods Control T-account, Cost of goods sold (before proration) = $880,000

6. Manufacturing overhead underallocated = Debits to Manufacturing Overhead Control − Credit to Manufacturing Overhead Allocated

= $514,000 – $464,000

= $50,000 underallocated

7. a. Write-off to Cost of Goods Sold will increase (debit) Cost of Goods Sold by $50,000. Hence, Cost of Goods Sold = $880,000 + $50,000 = $930,000.

b. Proration based on ending balances (before proration) in Work in Process, Finished Goods, and Cost of Goods Sold.

Account balances in each account after proration follows:

Account (1)	Account Balance (Before Proration) (2)		Proration of $50,000 Underallocated Manufacturing Overhead (3)	Account Balance (After Proration) (4) = (2) + (3)
Work in Process	$ 165,000	(15%)	0.15 × $50,000 = $ 7,500	$ 172,500
Finished Goods	55,000	(5%)	0.05 × $50,000 = 2,500	57,500
Cost of Goods Sold	880,000	(80%)	0.80 × $50,000 = 40,000	920,000
	$1,100,000	100%	$50,000	$1,150,000

8. Needham's operating income using write-off to Cost of Goods Sold and Proration based on ending balances (before proration) follows:

	Write-off to Cost of Goods Sold	Proration Based on Ending Balances
Revenues	$1,050,000	$1,050,000
Cost of goods sold	930,000	920,000
Gross margin	120,000	130,000
Marketing and distribution costs	125,000	125,000
Operating income/(loss)	$ (5,000)	$ 5,000

9. If the purpose is to report the most accurate inventory and cost of goods sold figures, the preferred method is to prorate based on the manufacturing overhead allocated component in the inventory and cost of goods sold accounts. Proration based on the balances in Work in Process, Finished Goods, and Cost of Goods Sold will equal the proration based on the manufacturing overhead allocated component if the proportions of direct costs to manufacturing overhead costs are constant in the Work in Process, Finished Goods, and Cost of Goods Sold accounts. Even if this is not the case, the prorations based on Work in Process, Finished Goods, and Cost of Goods Sold will better approximate the results if actual cost rates had been used rather than the write-off to Cost of Goods Sold method.

Another consideration in Needham's decision about how to dispose of underallocated manufacturing overhead is the effects on operating income. The write-off to Cost of Goods Sold will lead to an operating loss. Proration based on the balances in Work in Process, Finished Goods, and Cost of Goods Sold will help Needham avoid the loss and show an operating income.

The main merit of the write-off to Cost of Goods Sold method is its simplicity. However, accuracy and the effect on operating income favor the preferred and recommended proration approach.