

# SOLUTIONS TO END-OF-CHAPTER QUESTIONS

## CHAPTER 13

### ► DEVELOP YOUR UNDERSTANDING

#### ► Question 13.1

(a) The total expected costs of the orchard for the past year

	£
Fertiliser: 5 doses at £4.00 for 30 trees	600
Labour: 30 trees × 10 hours per tree × £7.50 per hour	2,250
Total expected costs of the orchard for the past year	<u><u>2,850</u></u>

(b) The actual total costs of the orchard for the past year

	£
Fertiliser: 4 doses at £4.50 for 30 trees	540
Labour: 270 hours × £8.00 per hour	2,160
Total actual costs of the orchard for the past year	<u><u>2,700</u></u>

(c) Material total variance

	£
Expected cost of fertiliser	600
Actual cost of fertiliser	540
Total material variance (favourable)	<u><u>60</u></u>

(c) Material price variance

	£
4 doses for 30 trees should have cost: $4 \times 30 \times £4.00$	480
4 doses for 30 trees actually cost: $4 \times 30 \times £4.50$	540
Material price variance (unfavourable)	<u><u>(60)</u></u>

Solution to end-of-chapter questions **Chapter 13****(c)** Material usage variance

	<b>Number</b>
Expected number of doses of fertiliser: $5 \times 30$	150
Actual number of doses of fertiliser: $4 \times 30$	120
Material usage variance in number of doses (favourable)	<u>30</u>
	<b>£</b>
Material usage variance in £s: $30 \times £4.00$ (favourable)	<u>120</u>

(£60) material price variance (unfavourable) + £120 material usage variance (favourable) = £60 (favourable).

**(d)** Labour total variance

	<b>£</b>
Expected cost of labour: $30 \text{ trees} \times 10 \text{ hours} \times £7.50 \text{ per hour}$	2,250
Actual cost of labour: $270 \text{ hours} \times £8 \text{ per hour}$	2,160
Total labour variance (favourable)	<u>90</u>

**(d)** Labour rate variance

	<b>£</b>
270 hours of labour should have cost: $270 \times £7.50$	2,025
270 hours of labour actually cost: $270 \times £8.00$	2,160
Labour rate variance (unfavourable)	<u>(135)</u>

**(d)** Labour efficiency variance

	<b>Hours</b>
Labour hours for 30 trees should have been: $30 \times 10$	300
Actual labour hours for 30 trees	270
Efficiency variance in number of hours (favourable)	<u>30</u>
	<b>£</b>
Efficiency variance in £s: $30 \times £7.50$ (favourable)	<u>225</u>

(£135) labour rate variance (unfavourable) + £225 labour efficiency variance (favourable) = £90 (favourable).

Solution to end-of-chapter questions **Chapter 13****Question 13.2****Fred****(a) Sales price variance**

- Number of cakes sold:  $\pounds 14,725 \div \pounds 15.50 = 950$ .
- Sales price variance: number of cakes sold  $\times$  (actual selling price per cake – the expected selling price per cake) =  $950 \times (\pounds 15.50 - \pounds 15.00) = \pounds 475$ . This variance is favourable as the actual selling price was higher than the expected selling price.

**(b) Sales volume variance**

- (Number of cakes sold – expected number of cakes to be sold)  $\times$  the expected contribution per cake.
- $(950 - 1,000) \times (\pounds 15.00 - \pounds 6.00) = (\pounds 450)$ . This variance is unfavourable as fewer cakes than expected were sold.

Total sales variances:  $\pounds 475$  favourable sales price variance –  $\pounds 450$  unfavourable sales volume variance =  $\pounds 25$  favourable total sales variances.

Proof that  $\pounds 25$  favourable is the correct figure for the two sales variances

	Expected: 1,000 cakes	Actual: 950 cakes	Variances
	£	£	£
Sales: $1,000 \times \pounds 15$ /actual sales value	15,000	14,725	275 (u)
Variable costs: $1,000 \times \pounds 6$ /950 $\times \pounds 6$	6,000	5,700	300 (f)
Contribution/total variances	<u>9,000</u>	<u>9,025</u>	<u>25 (f)</u>

**» TAKE IT FURTHER****» Question 13.3****Sanguinary Services**

- (a) The profit that the centre expected to make in April, based on the original forecast of 3,000 blood tests in the month:

	£	£
Sales: 3,000 blood tests at £15		45,000
Chemicals used in blood tests: 3,000 × £5	15,000	
Laboratory workers 3,000 × £4	12,000	
Fixed overheads £72,000 ÷ 12 months	6,000	
Total costs	<u>33,000</u>	
Expected profit for April		<u><u>12,000</u></u>

- (b) Variances

<b>Sales volume variance (Actual blood tests – standard blood tests) × standard contribution per blood test</b>	<b>Units</b>
Actual blood tests undertaken	3,600
Budgeted blood tests	<u>3,000</u>
Variance (favourable)	<u><b>600</b></u>
	<b>£</b>
Sales volume variance at standard contribution 600 × £(15 – 5 – 4) (favourable)	<u><u><b>3,600</b></u></u>

Remember that the fixed costs are not variable but fixed and so do not form part of the calculation of contribution from each blood test undertaken. Only the costs that vary with the level of activity are deducted from the selling price to give the contribution per unit of sales.

Solution to end-of-chapter questions **Chapter 13**

<b>Sales price variance (actual selling price – budgeted selling price) × number of blood tests performed</b>	<b>£</b>
Actual selling price	15.50
Standard selling price	15.00
Variance (favourable)	<u><u>0.50</u></u>
Sales price variance at actual sales 3,600 × £0.50 (favourable)	<u><u>1,800.00</u></u>
<b>Direct materials total variance</b>	
<b>Standard quantity at standard cost v. actual quantity at actual cost</b>	<b>£</b>
Chemicals for 3,600 blood tests should have cost 3,600 × £5	18,000
Chemicals for 3,600 blood tests actually cost	16,200
Direct materials total variance (favourable)	<u><u>1,800</u></u>
<b>Direct materials price variance</b>	
<b>Actual quantity at standard cost v. actual quantity at actual cost</b>	<b>£</b>
33,750 millilitres should have cost (33,750 × £0.50)	16,875
33,750 millilitres actually cost (33,750 × £0.48)	16,200
Direct material price variance (favourable)	<u><u>675</u></u>
<b>Direct materials usage variance</b>	
<b>(Standard quantity – actual quantity) × standard cost</b>	<b>Millilitres</b>
3,600 blood tests should have used 10 millilitres × 3,600	36,000
3,600 blood tests actually used	33,750
Direct material usage variance in millilitres (favourable)	<u><u>2,250</u></u>
Direct material usage variance in millilitres × standard price per ml 2,250 × £0.50 (favourable)	<u><u>£1,125</u></u>
<b>Labour total variance</b>	
<b>Standard hours at standard cost v. actual hours at actual cost</b>	<b>£</b>
3,600 blood tests should have cost (900 hours × £16 per hour)	14,400
3,600 blood tests actually cost	14,985
Direct labour total variance (unfavourable)	<u><u>(585)</u></u>
<b>Labour rate variance</b>	
<b>Actual labour hours at standard cost – actual labour hours at actual cost</b>	<b>£</b>
925 labour hours should have cost (925 × £16.00)	14,800
925 labour hours actually cost	14,985
Direct labour rate variance (unfavourable)	<u><u>(185)</u></u>
<b>Labour usage variance</b>	
You should calculate the standard number of hours needed to complete 3,600 blood tests.	
Each blood test should take 15 minutes, making 4 tests per hour. Therefore, 3,600 blood tests should take 900 hours (3,600 ÷ 4)	
<b>(Standard hours for actual quantity – actual hours for actual quantity) × standard cost per hour</b>	<b>Hours</b>
3,600 blood tests should have used 900 hours	900
3,600 blood tests actually used	925
Direct labour efficiency variance in hours (unfavourable)	<u><u>(25)</u></u>
Direct labour efficiency variance in hours × standard rate/hour 25 × £16.00 (unfavourable)	<u><u>£(400)</u></u>

Solution to end-of-chapter questions **Chapter 13****Fixed overhead expenditure variance**

<b>Standard fixed overhead expenditure – actual fixed overhead expenditure</b>	<b>£</b>
Standard fixed overhead expenditure (3,000 × £2) or (72,000 ÷ 12 months)	6,000
Actual fixed overhead expenditure	7,500
Fixed overhead expenditure variance (unfavourable)	<u><u>(1,500)</u></u>

(c) Statement reconciling the expected profit to the actual profit for April

	(Unfavourable)	Favourable	Profit
	£	£	£
Expected profit (part (a))			12,000
Sales price variance		1,800	
Sales volume variance		3,600	
Direct materials price variance		1,125	
Direct materials usage variance		675	
Direct labour rate variance	(185)		
Direct labour efficiency variance	(400)		
Fixed overhead expenditure variance	(1,500)		
Total variances	<u>(2,085)</u>	<u>7,200</u>	
Add: favourable variances			7,200
Deduct: unfavourable variances			<u>(2,085)</u>
Actual profit for April			<u><u>17,115</u></u>

**» Question 13.4****Smashers Tennis Club**

(a) Calculation of the original expected surplus from the coaching course

	<b>£</b>
Revenue: 12 juniors × £70 each	840
Costs: balls: 12 × £10	120
Coach: 10 hrs × £30	300
Expected surplus	<u><u>420</u></u>

(b) Calculation of the expected surplus from the coaching course for 16 juniors

	<b>£</b>
Revenue: 16 juniors × £70 each	1,120
Costs: balls: 16 × £10	160
Coach: 10 hrs × £30	300
Expected surplus	<u><u>660</u></u>

Solution to end-of-chapter questions **Chapter 13**

(c) Calculation of the actual surplus from the coaching course:

	£
Revenue: 16 juniors × (£70 × 90%) each	1,008
Costs: balls: 400 balls × 60p	240
Coach: 10 hrs × £33	330
Actual surplus	<u><u>438</u></u>

(d) Variances

(i) Sales price variance:  $(£63 - £70) \times 16 = £112$  (unfavourable) as the price is lower than expected

(ii) Sales volume variance: additional participants:  $16 - 12 = 4$

Contribution per participant: £70 (price for one junior participant) – £10 (variable cost of balls for each junior member: remember that the cost of the coach is a fixed cost) = £60

Sales volume variance: £60 contribution × 4 participants = £240 (favourable) as more juniors participated than expected

(iii) Direct materials total variance: this relates to the tennis balls:

	£
Expected cost of balls for 16 participants: $16 \times £10$	160
Actual cost of balls for 16 participants $400 \times 60$ pence	240
Direct materials total variance	<u><u>(80)</u></u> Unfavourable

(iv) Direct materials price variance (tennis balls):

	£
400 balls at 50 pence each	200
400 balls at 60 pence each	240
Direct materials price variance	<u><u>(40)</u></u> Unfavourable

(v) Direct materials usage variance (tennis balls):

	Balls
16 participants should use 20 balls × 16 participants	320
16 participants actually used	400
Direct materials usage variance (in tennis balls)	<u><u>(80)</u></u> Unfavourable
	£
Direct materials usage variance: 80 balls × 50 pence	<u><u>(40)</u></u> Unfavourable

The unfavourable price variance of £40 + the unfavourable usage variance of £40 = the total unfavourable direct materials variance of £80.

Solution to end-of-chapter questions **Chapter 13**

(vi) Fixed expenditure variance (coaching costs): £300 (expected) – £330 (actual) = £30 unfavourable as more cost has been incurred than expected

Reconciliation of expected surplus to actual surplus:

	Unfavourable £	Favourable £	Surplus £
Expected surplus (part (a))			420
Sales price variance	(112)		
Sales volume variance		240	
Direct materials price variance	(40)		
Direct materials usage variance	(40)		
Fixed overhead expenditure variance	(30)		
Total variances	<u>(222)</u>	<u>240</u>	
Add: favourable variances			240
Deduct: unfavourable variances			(222)
Actual surplus for the 10-week coaching course			<u><u>438</u></u>

### » Question 13.5

#### Vijay Manufacturing

	(a) Sales of 2,000 garden gnomes at standard cost	(b) Sales of 1,800 garden gnomes at standard cost	(c) Sales of 1,800 garden gnomes at actual cost	Variance: (b) – (c) favourable (f) or unfavourable (u)
	£	£	£	£
Sales	30,000	27,000	25,200	(1,800) (u)
Materials	9,000	8,100	8,750	(650) (u)
Labour	8,000	7,200	7,125	75 (f)
Variable overhead	6,000	5,400	5,500	(100) (u)
Fixed overhead	2,000	2,000	1,600	400 (f)
Net profit	<u><u>5,000</u></u>	<u><u>4,300</u></u>	<u><u>2,225</u></u>	<u><u>(2,075) (u)</u></u>

(d) Variance analysis and reconciliation statement:

#### Sales price variance

<b>(Actual selling price – budgeted selling price) × number of gnomes sold</b>	<b>£</b>
Actual selling price	14.00
Standard selling price	15.00
Variance (unfavourable)	<u><u>(1.00)</u></u>
Sales price variance of actual sales 1,800 × £1.00 (unfavourable)	<u><u>(1,800.00)</u></u>

Solution to end-of-chapter questions **Chapter 13****Sales volume variance**

Contribution per garden gnome sold: £15 (selling price) – £4.50 (direct materials) – £4.00 (direct labour) – £3.00 (variable overhead) = £3.50. Remember that fixed overheads are fixed and do not form part of the variable cost of production and so are not part of the contribution calculation.

<b>Actual sales units v. standard sales units</b>	<b>Units</b>
Actual units sold	1,800
Budgeted sales units	2,000
Variance (unfavourable)	<u>(200)</u>
Sales volume variance at standard contribution $200 \times £3.50$ (unfavourable)	<u><u>£(700)</u></u>

**Direct materials total variance****Standard quantity at standard cost v. actual quantity at actual cost**

Materials for 1,800 gnomes should have cost $(1,800 \times £2.25 \times 2)$	£ 8,100
Materials for 1,800 gnomes did cost $(3,500 \times £2.50)$	8,750
Direct materials total variance (unfavourable)	<u>(650)</u>

**Direct materials price variance****Actual quantity at standard cost v. actual quantity at actual cost**

3,500 kg of material should have cost $(3,500 \times £2.25)$	£ 7,875
3,500 kg actually cost $(3,500 \times £2.50)$	8,750
Direct material price variance (unfavourable)	<u>(875)</u>

**Direct materials usage variance****(Standard quantity – actual quantity) × standard cost**

1,800 gnomes should have used $(1,800 \times 2 \text{ kg})$	kg 3,600
1,800 gnomes actually used	3,500
Direct material usage variance in kg (favourable)	<u>100</u>

Direct material usage variance in kg × standard price per kg  $100 \times £2.25$  (favourable)

£225

**Direct labour total variance****Standard hours at standard cost v. actual hours at actual cost**

1,800 gnomes should have cost $(1,800 \times £4.00)$	£ 7,200
1,800 gnomes actually cost	7,125
Direct labour total variance (favourable)	<u>75</u>

**Direct labour rate variance****Actual labour hours at standard cost – actual labour hours at actual cost**

950 labour hours should have cost $(950 \times £8.00)$	£ 7,600
950 labour hours actually cost $(950 \times £7.50)$	7,125
Direct labour rate variance (favourable)	<u>475</u>

**Direct labour efficiency variance****(Standard hours for actual quantity – actual hours for actual quantity) × standard cost per hour**

1,800 gnomes should have used $1,800 \times 0.5$ hours	Hours 900
1,800 gnomes actually used	950
Direct labour efficiency variance in hours (unfavourable)	<u>(50)</u>

Direct labour efficiency variance in hours × standard rate/hour  $50 \times £8$  (unfavourable)

£(400)

Solution to end-of-chapter questions **Chapter 13**

<b>Variable overhead total variance</b>	<b>£</b>
1,800 gnomes should have cost (1,800 × £3.00)	5,400
1,800 gnomes actually cost	5,500
Variable overhead total variance (unfavourable)	<u><u>(100)</u></u>
<b>Variable overhead expenditure variance</b>	
<b>Actual labour hours at standard cost – actual labour hours at actual cost</b>	<b>£</b>
7,000 machine hours should have cost (7,000 × £0.75)	5,250
7,000 machine hours actually cost	5,500
Variable overhead rate variance (unfavourable)	<u><u>(250)</u></u>
<b>Variable overhead efficiency variance</b>	
<b>(Standard hours for actual quantity – actual hours for actual quantity) × standard cost per hour</b>	<b>Hours</b>
1,800 gnomes should have used (1,800 × 4 hours)	7,200
1,800 gnomes actually used	7,000
Variable overhead efficiency variance in hours (favourable)	<u><u>200</u></u>
Variable overhead efficiency variance in hours × standard rate/hour 200 × £0.75 (favourable)	<u><u>£150</u></u>
<b>Fixed overhead expenditure variance</b>	
<b>Standard fixed overhead – actual fixed overhead</b>	<b>£</b>
Standard fixed overhead expenditure	2,000
Actual fixed overhead expenditure	1,600
Fixed overhead expenditure variance (favourable)	<u><u>400</u></u>

**Statement reconciling the expected profit to the actual profit for June**

	(Unfavourable) £	Favourable £	Profit £
Expected profit (part (a))			5,000
Sales price variance	(1,800)		
Sales volume variance	(700)		
Direct materials price variance	(875)		
Direct materials usage variance		225	
Direct labour rate variance		475	
Direct labour efficiency variance	(400)		
Variable overhead expenditure variance	(250)		
Variable overhead efficiency variance		150	
Fixed overhead expenditure variance		400	
Total variances	<u><u>(4,025)</u></u>	<u><u>1,250</u></u>	
Add: favourable variances			1,250
Deduct: unfavourable variances			<u><u>(4,025)</u></u>
Actual profit for June			<u><u>2,225</u></u>