# CHAPTER FOUR

## Answers to Self Test-Questions

1. Set 1 2.33. ε = (200–100) x100 / (2.0 – 1.5) x 100 = 66.6%/28.6%

150 1.75

Set II 0.65. ε = (1800–1600) x 100/ (120 – 100) x 100 = 11.76%/18.18%

1700 110

Set III 0.93. ε = (48–40) x 100 / (22.5 – 18.5) x 100 = 18.1%/19.5%

44 20.5

2. a) Set I 5.67. ε = (2–1) x100 / (9 – 8) x 100 = 66.66%/11.76%

1.5 8.5

Set II 0.18. ε = (9–8) x100 / (2 – 1) x 100 = 11.76%/66.66%

8.5 1.5

b) They are not the same because the $1 change in price is a small % change in Set 1, but a big % change in Set 2. Similarly, 1 unit is a big % change in Set 1, but a small % change in Set 2.

3. a) rises. .

1. rises.
2. falls

d) falls.

4. a) 80%. (20% x 4)

b) 10%. (20% x 0.5)

c) 20%. (20% x 1)

d) 0. (20% x 0)

5. a) inelastic (<1).

b) inelastic (<1).

c) elastic (>1).

d) elastic (>1)

e) elastic (>1)

f) inelastic (<1)

6. a) See the following figure:

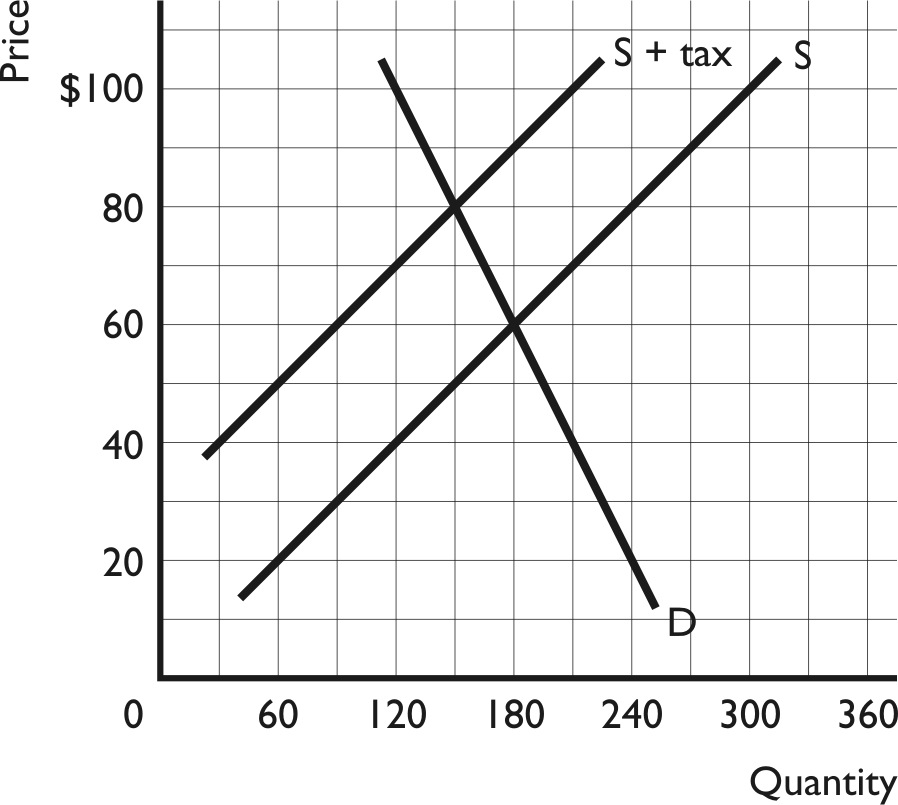
1. – 1/2 (∆P/∆Q) = 1/–2

c) The elasticity coefficient for a price change from, say, 4 to 5 is 0.82 which is quite different from the slope of – 1/2. In fact, elasticity varies along any curve despite the fact that the slope is constant.

7.

a) $60 and 180 units

b) See the following figure



c) $80 and 150 units

d) Since the price increases by $20, consumers pay 2/3 of the $30 tax and therefore sellers pay the other $10 or 1/3.

8. a) $380 and 1 600 000.

b) $608 000 000. ($380 x 1 600 000)

c) $320 and 1 800 000.

d) $576 000 000. ($320 x 1 800 000)

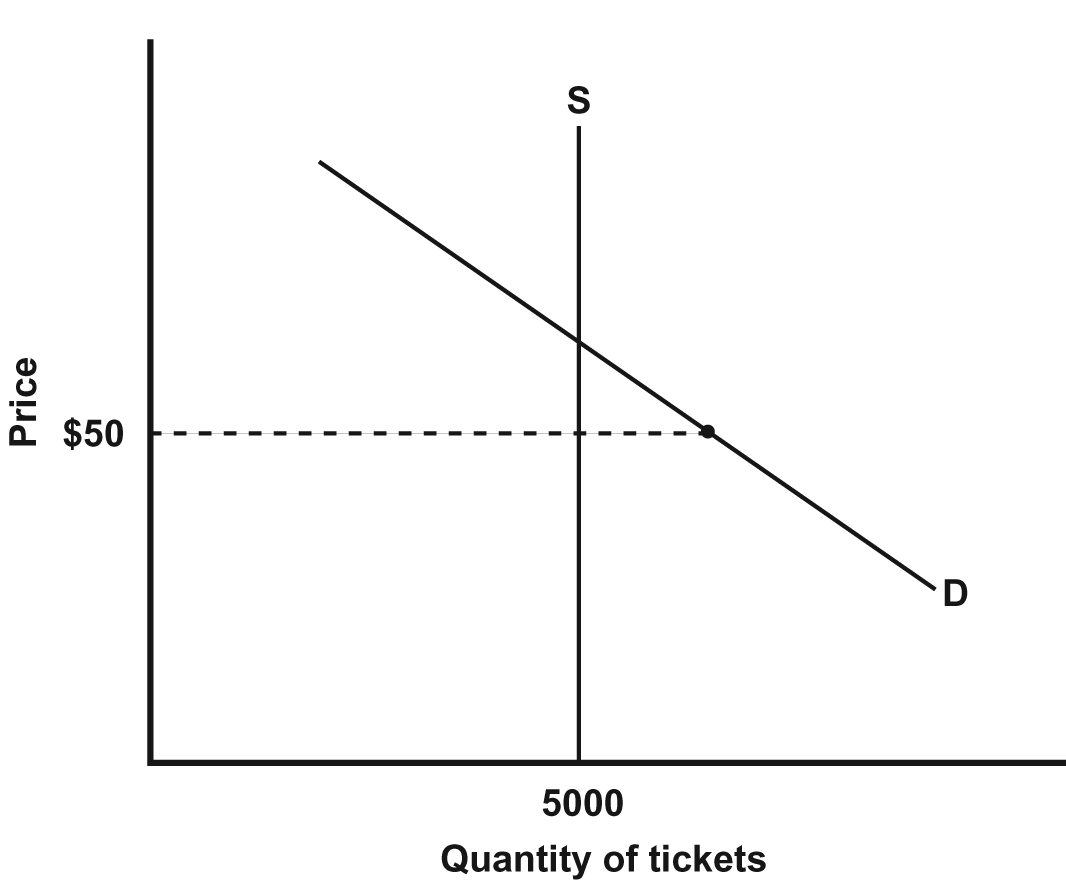
e) 0.69 ε = (1 800 000–1 600 000)x100 / (380 – 320) x 100 = 11.8%/17.1%

1 700 000 350

9. 0.625 ε = (45–35) x100 / (3 – 2) x 100 = 25%/40%

40 2.5

10. a) See the following figure:



b) below

11. a) X: **+ 1.36**; ε = (350–200) x100/(15 000 – 10 000) x 100 +54.5%/+40%

275 12 500

Y = **+ 0.19**. ε = (54–50) x100 / (15 000 – 10 000) x100 = +7.6%/+40%

52 12 500

b) **Yes** (Both products have a positive co-efficient; product X is a luxury with a co-efficient greater than 1, Y is a necessity with a co-efficient between 0 and 1.)

12. Since Mars and Snicker bars are competitive products, the cross elasticity will be positive. However, since there are many different brands of snack bars, the coefficient is unlikely to be high.. Since beer and beer nuts are complementary products the cross elasticity will be negative. However, since there are many other complements to beer, the coefficient is unlikely to be high.

## Answers to Study Guide Questions

1. False: price times ***quantity.***

2. True.

3. False: total revenue will ***fall*.**

4. False: total revenue will ***fall*.**

5. False: total revenue will ***remain unchanged*.**

6. False: the number of ***substitute*** products available.

7. True.

8. False: divided by the percentage change in ***price*.**

9. True

10. False: the product in question is a ***normal*** good.

11. a 16. b 21. b 26. c 31. b

12. b 17. a 22. a 27. a 32. d

13. a 18. d 23. c 28. b 33. c

14. c 19. b 24. c 29. b 34. a

15. a 20. d 25. b 30. d 35. b

36A. Key Problem

a) See Table 4.12

Table 4.12 (completed)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Price of Movies** | **Quantity of Movies Demanded** | **Total Revenue** | **Price of Videos** | **Quantity of Videos Demanded** | **Total Revenue** |
| $3 | 450 | **$1350** | $2.00 | 950 | **$1900** |
| 4 | 400 | **1600** | 2.50 | 900 | **2250** |
| 5 | 350 | **1750** | 3.00 | 825 | **2475** |
| 6 | 300 | **1800** | 3.50 | 750 | **2625** |
| 7 | 250 | **1750** | 4.00 | 650 | **2600** |
| 8 | 200 | **1600** | 4.50 | 550 | **2475** |
| 9 | 150 | **1350** | 5.00 | 425 | **2125** |

b) **$6** for movies and **$3.50** for videos.

c) The elasticity of demand for the price change from $6 to $5 is:

50/325 x 100 15.4

εp = 1/5.50 x 100 = 18.2 = **0.85**

The change in total revenue is:  **– $50.**

For the price change from $6 to $7 :

50/275 X 100 18.2

εp = 1/6.50 X 100 = 15.4 = **1.18**

The change in total revenue is = **– $50.**

d) For movie prices below $6, demand must be inelastic since reducing price results in a decrease in total revenue. For prices above $6, demand must be elastic since raising price also results in a decrease in total revenue. Therefore, **$6 is the point of unitary elasticity** and it is the price that maximizes total revenue for the seller. (Calculations of price changes for videos from $3.50 to $3.00 and from $3.50 to $4.00 would lead us to the same conclusion for videos.)

**e) Yes.** As can be seen in the following table, total revenue is still maximized when price is $6.

|  |  |  |
| --- | --- | --- |
| **Price of Movies** | **(New) Quantity of Movies Demanded** | **Total Revenue** |
| $3 | 470 | $1410 |
| 4 | 420 | 1680 |
| 5 | 370 | 1850 |
| 6 | 320 | 1920 |
| 7 | 270 | 1890 |
| 8 | 220 | 1760 |
| 9 | 170 | 1530 |

f) At the $6 price for movies, the quantity demanded rises from the original 300 to 320 as a result of the price of videos increasing from $3.50 to $4.50. Thus, the cross-elasticity of movies for videos is:

20/310 x 100 6.4

εx = 1/4 x 100 = 25 = **0.26**

Since the coefficient is positive, the two **products are substitutes.**

g) At the $6 price for movies, the quantity demanded for movies rises from 300 to 360 (by 20%) as incomes rise from 500 to 550 so the income elasticity or movies is:

+60/330 x 100 +18.2

εy = +50/525 x100 = +9.5 = +**1.91**

Since the coefficient is positive, **movies are a normal good** and, in addition, since it is greater than one, **movies are a luxury good**.

**37A.**  a) $382.50 ($4.50 x 85) and $402.50 ( $3.50 x 115).

b) 25% ($1/$4 x 100)

c) 30% (30/100 x 100)

d) 1.2 (30%/25%)

e) elastic (co-efficient is greater than 1)

**38A.** 1.2 (12%/10%)

**39A**. a) + 0.625 ε = (164–156) x100 / (52 000 – 48 000) x100 = 5%/8%

160 50 000

b) necessity (Elasticity is less than 1)

**40A.** a) + 1.6

ε = (192–128) x100 / (9 – 7) x100 = – 40%/– 25% x 100

160 8

b) They are substitutes.

**41A.** a) graphically it is a **constant – 1** (one square down for one square to the right). Using the numbers on the axis and calculating “rise over run” it is – 0.4

b)4.33 and 0.23.

c) $16 (this is the mid point of the demand curve).

d) $16 (Q = 40 X P = $16 = $640 TR).

e) Between a price of  **zero** and a price of **$16.**

**42A.** a) See the following figure:

**Figure 4.17A (completed)**

The point of unitary elasticity is the mid point of the demand curve, at P = $10 and Q =15.

1. See the following table:

**Table 4.13 (completed)**

|  |  |  |
| --- | --- | --- |
| **Price** | **Quantity** | **TR** |
| $20 | 0 | 0 |
| 18 | 3 | 54 |
| 16 | 6 | 96 |
| 14 | 9 | 126 |
| 12 | 12 | 144 |
| 10 | 15 | 150 |
| 8 | 18 | 144 |
| 6 | 21 | 126 |
| 4 | 24 | 96 |

1. See following figure:

**Figure 4.17B (completed)**

d) Price: $10; quantity: 15. Total revenue is maximized where elasticity is unitary (the mid-point of the demand curve.)

**43A.** Price elasticity of demand is the responsiveness of quantity demanded to a change in price. If the elasticity co-efficient is less than 1, then the demand is said to be inelastic meaning that the quantity is unresponsive to a change in price.

**44A.** The price elasticity of demand for carrots is much higher than it is for cigarettes because there are many other vegetables that could substitute for carrots whereas there are few (if any) substitutes for cigarettes.

**45A.** a) high

b) low

c) low

d) high

e) low

1. negative

**46A**. a) Price elasticity of M: **0.93**

Between Years 1 and 2:

ε = (100–90) x 100 / (2.80 – 2.50) x 100 = 10.5%/11.3%

95 2.65

b) Price elasticity of N: **0.17**

Between Years 2 and 3 ε = (750–700) x100 / (30 – 20) x 100 = 6.9%/40%

750 25

c) Income elasticity of M: **+ 1.24**

Between Years 3 and 4 ε = (90–80) x 100/(55 000 – 50 000) x 100 = +11.8%/+9.5%

85 52 500

d) Income elasticity of N: **+ 0.30**

Between Years 3 and 4 ε = (720–700) x 100/(55 000–50 000) x 100 =2.8%/+9.5%

710 52 500

e) Cross elasticity of M for N: **− 0.29**

Between Years 2 and 3 ε = (90–80) x100/(30 – 20) x100 = – 11.76%/+40%

85 25

**47A**. a) The price elasticity of demand for seniors is **6.75**

The price elasticity of demand for other customers is **0.9.**

The elasticity of demand is greater for seniors than for the other customers because the $4 price change results in a much larger percentage change in quantity demanded. (Presumably, getting a haircut is less important for seniors than for other customers.)

b) **$12**  (Q of 26 X $12 = $312 TR).

**48A**. **ε** = **0.46**. First month: price = $20; total revenue = $800; therefore, quantity = $800/$20 = 40.

Next month: price = $18; total revenue = $756; therefore, quantity = $756/$18 = 42.

ε = (42–40) x100/($20 – $18) x 100 = 4.9%/10.5%

41 $19

**49A.** a) $100 ( total expenditures = total revenue = $10 000)

b) 1 (total revenue is maximized where elasticity is unitary)

**50A.** See following table:

**Table 4.17 (completed)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Town A | | | Town B | | |
| **Price** | **Quantity Demanded** | **Total Revenue** | **Price** | **Quantity Demanded** | **Total Revenue** |
| $5 | 15 | **$75** | $5 | 11 | **$55** |
| 10 | 14 | **140** | 10 | 10 | **100** |
| 15 | 13 | **195** | 15 | 9 | **135** |
| 20 | 12 | **240** | 20 | 8 | **160** |
| 25 | 11 | **275** | 25 | 7 | **175** |
| 30 | 10 | **300** | 30 | 6 | **180** |
| 35 | 9 | **315** | 35 | 5 | **175** |
| 40 | 8 | **320** | 40 | 4 | **160** |
| 45 | 7 | **315** | 45 | 3 | **135** |
| 50 | 6 | **300** | 50 | 2 | **100** |
| 55 | 5 | **275** | 55 | 1 | **55** |
| 60 | 4 | **240** | 60 | 0 | **0** |
| 65 | 3 | **195** | 65 |  |  |
| 70 | 2 | **140** | 70 |  |  |
| 75 | 1 | **75** | 75 |  |  |

Town A: 3 boxes; town B 1 box. Total revenue is $250.

This can be seen by looking at all possibilities in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Town A | | Town B | |  |
| **Quantity** | **Total Revenue** | **Quantity** | **Total Revenue** | **Total Revenue- both towns** |
| 4 | $240 | 0 | 0 | $240 |
| **3** | **195** | **1** | **55** | **250** |
| 2 | 140 | 2 | 100 | 240 |
| 1 | 75 | 3 | 135 | 210 |
| 0 | 0 | 4 | 160 | 160 |

b) Town A: 4; town B: 2 Total revenue is $340.

This can be seen by looking at all possibilities in the following table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Town A | | Town B | |  |
| **Quantity** | **Total Revenue** | **Quantity** | **Total Revenue** | **Total Revenue- both towns** |
| 6 | 300 | 0 | 0 | $300 |
| 5 | 275 | 1 | 55 | 330 |
| **4** | **$240** | **2** | **100** | **340** |
| 3 | 195 | 3 | 135 | 330 |
| 2 | 140 | 4 | 160 | 300 |
| 1 | 75 | 5 | 175 | 250 |
| 0 | 0 | 6 | 180 | 180 |

c) Town A: 8; town B: 6 Total revenue is $500.

**51A.** a) P = $120; Q = 860

1. See the following table:

Table 4.18 (completed)

|  |  |  |  |
| --- | --- | --- | --- |
| **Price** | **Demand** | **Supply**  **(S1)** | **Supply**  **(tax)** |
| $100 | 900 | 820 | **[780]** |
| 110 | 880 | 840 | **[800]** |
| 120 | 860 | 860 | **820** |
| 130 | 840 | 880 | **840** |
| 140 | 820 | 900 | **860** |
| 150 | 800 | 920 | **880** |

c) P = **$130;** quantity = **840**

d) Each pays **$10** (i.e. 50% each). (Price to the consumer has gone up by $10; amount received by producer has gone down $10)

**52A.** a) $7.50 and 640 (where the quantity supplied and demanded is equal in both

markets)

b) $4 800 ($7.50 x 640)

c) They would be happier in Market 1.

d) The total revenue of blueberry farmers in Market 1 would be $5 320 (new price

of $9.50 x 560). The total revenue of blueberry farmers in Market 2 would be

$4 760 (new price of $8.50 x 560). The demand for blueberries in Market 1

is more inelastic (the demand curve would be steeper). This means that the

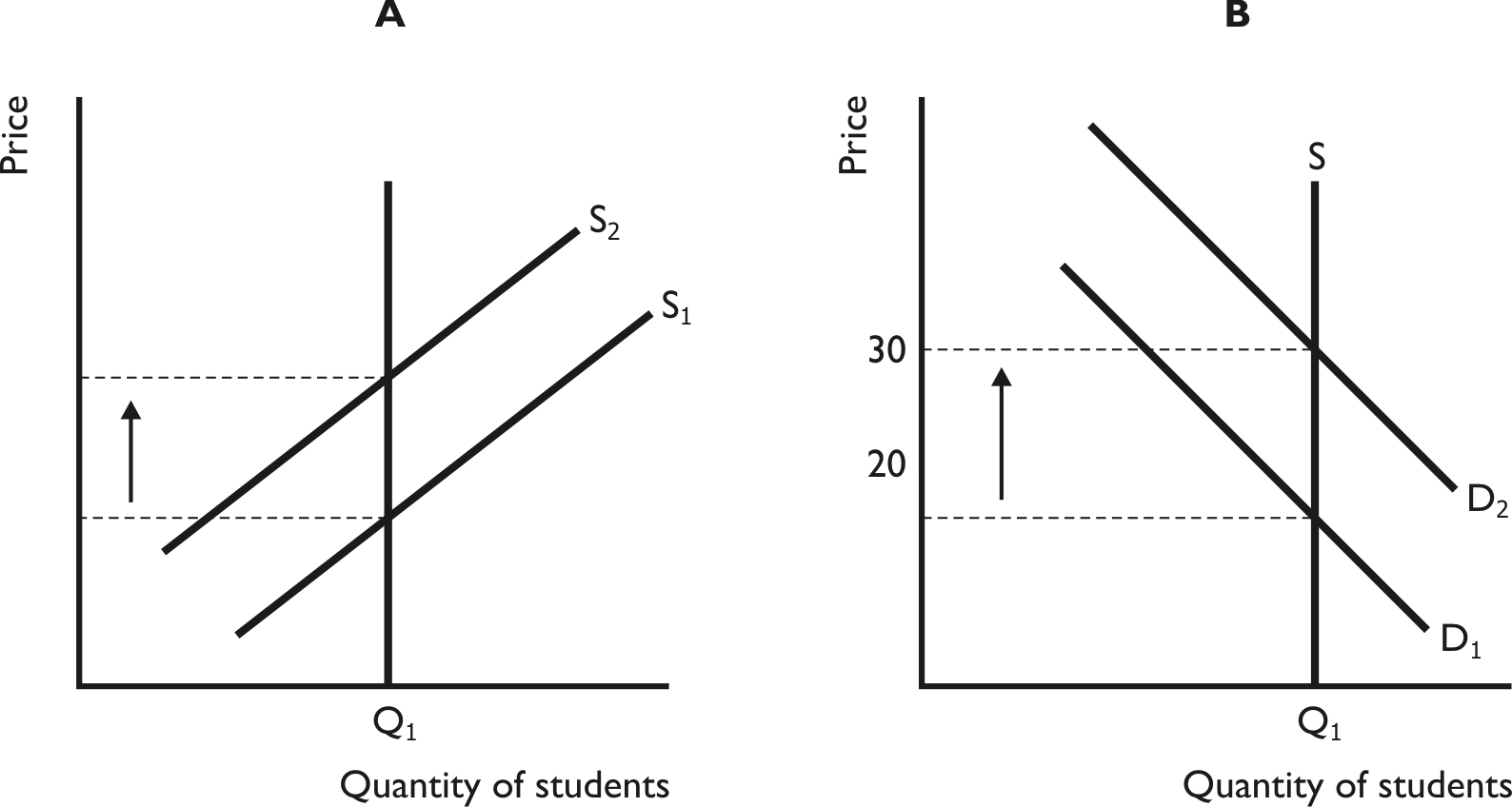
drop in supply would cause a higher rise in the price.

**53A**. The consumer will pay all of the excise tax if demand is **perfectly inelastic**. (Or if the supply is perfectly elastic.)

**54A.** at P1: **D1** (The change in quantity is relatively bigger for curve D1 than for D2)

at P2: **D1** (Again, the change in quantity is relatively bigger for curve D1 than for D2)

**55A.** Figures A and B below indicate the two possibilities:



The Dean could be right if the supply of seats in post-secondary education has, in fact, decreased in the last 10 years as illustrated on graph A. More likely, the demand for seats has increased while the supply has remained constant as illustrated in graph B.

**56A.** Any calculations of price elasticity would be invalid since average consumer income has changed which violates the *ceteris paribus* assumption.

CHAPTER FIVE

## Answers to Self-Test Questions

1. See the following table:

|  |  |  |
| --- | --- | --- |
| **Quantity** | **Total Utility (TU)** | **Marginal Utility (MU)** |
| 1 | 20 | **20** |
| 2 | 35 | **15** |
| 3 | **45** | 10 |
| 4 | **53** | 8 |
| 5 | 58 | **5** |
| 6 | 60 | **2** |
| 7 | **60** | 0 |
| 8 | **55** | -5 |

2. A rational consumer would choose an apple because it has the highest MU per $ as seen here:

**Apple Beer Ice Cream Hot Dog**

MU/Price 80 75 70 50

3. 5 pears and 4 apples

The order of purchasing would be (with MU per $ spent in brackets): 1st purchase, apple (18); 2nd, apple (14); 3rd, apple (10); 4th, pear (9); 5th, pear (8); 6th, pear (7); 7th, apple or pear (6); 8th, pear or apple (6); 9th pear (5). .

4. The parents should allocate **$6 to Jan and $4 to Dean.** Combined total utility is **1585.**

To maximise total utility we allocate each dollar to the child who derives the greatest marginal utility from it. The marginal utilities are:

Jan: 200, 180, 160, 140, 120, 100, 80, 60, 40, 20

Dean: 400, 100, 95, 90, 85, 80, 75, 70, 65, 60

Each dollar would be allocated to: 1st, Dean (400); 2nd, Jan (200); 3rd, Jan (180); 4th, Jan (160); 5th, Jan (140); 6th, Jan (120); 7th, Jan or Dean (100); 8th, Dean or Jan (100); 9th, Dean (95); 10th, Dean (90).

5. **5 drinks** and a total consumer surplus of **$12.** This is calculated as follows:

$6 (8 - 2) on the 1st drink; $3 (5 - 2) on the 2nd drink; $2 (4 - 2) on the 3rd drink; $1 (3 - 2)) on the 4th drink; and 0 (2 - 2) on the 5th drink. Alternatively, the total consumer surplus can be calculated as the total utility from 5 drinks (8 + 5 + 4 + 3 + 2) = $22 less the total costs of those 5 drinks (5 x $2) = $10.

6. **Quantity Price willing to pay Actual Price Marginal**

**Consumer**

**Surplus**

1st unit $10 $6 $4

2nd unit 9 6 $3

3rd unit 8 6 $2

4th unit 7 6 $1

5th unit 6 6 0

**Total consumer surplus = $10**

7. a) **$12**, (which gives a total sales revenue of$312).

This is found by calculating the combined total revenue for each price:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Seniors** |  | Others | **Combined** |
| **Price** | **Quantity** | **TR** | **Quantity** | **TR** | **TR** |
| $20 | 1 | $20 | 9 | $180 | $200 |
| **18** | 4 | 72 | **10** | **180** | 252 |
| 16 | 7 | 112 | 11 | 176 | 288 |
| 14 | 10 | 140 | 12 | 168 | 308 |
| **12** | **13** | **156** | **13** | **156** | **312** |
| **10** | **16** | **160** | 14 | 140 | 300 |
| 8 | 19 | 152 | 15 | 120 | 282 |

b) **$10** to seniors, (giving a total sales revenue of $160). **$18** (or $20) to the other customers (for a total revenue of $180). (In total, then, the sales revenue would be$340.)

# Answers to Study Guide Questions

1. False: it means the difference between ***totals.***

2. True

3. True

4. False: it is the ***increase*** in total utility that declines.

5. False: should purchase more of ***product A***.

6. True

7. False: it is the amount that they would be ***willing*** to pay.

8. True

9. False: it is charging different prices for ***the same product****.*

10. True

11. d 16. a 21. b 26. b 31. c

12. b 17. c 22. b 27. a 32. c

13. a 18. c 23. a 28. a 33. d

14. b 19. a 24. c 29. a 34. d

15. c 20. c 25. b 30. b 35. c

**36A.** **Key Problem**

a) See the following table:

Table 5.18 (completed)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Windsurfing | | Snorkelling | |
| **Number of Hours** | **Marginal Utility** | **Total Utility** | **Marginal Utility** | **Total Utility** |
| 1 | 85 | **85** | 100 | **100** |
| 2 | 80 | **165** | 90 | **190** |
| 3 | 65 | **230** | 75 | **265** |
| 4 | 60 | **290** | 70 | **335** |
| 5 | 55 | **345** | 50 | **385** |
| 6 | 40 | **385** | 25 | **410** |
| 7 | 30 | **415** | 20 | **430** |
| 8 | 5 | **420** | 10 | **440** |

b) **$20** and 2 hours on windsurfing and **$40** and 4 hours on snorkelling. 2 hours of windsurfing produces 165 utils and 4 hours of windsurfing gives 335 utils. The total therefore is **500 utils.**

To find the best allocation, look at the marginal utility of each activity in turn. 1st hour: snorkelling (100 utils); 2nd hour: snorkelling (90); 3rd hour: windsurfing (85); 4th hour: windsurfing (80); 5th hour: snorkelling (75); 6th hour: snorkelling (70).

c) The extra $20 would be spent on windsurfing to give a total of **$40** and 4 hours on windsurfing, and **$40** and 4 hours on snorkelling. 4 hours of windsurfing produces 290 utils and 4 hours of snorkelling gives 335 utils. The total therefore is **625 utils**.

Since you have already worked out the first six hours of activities, continue from that point and work out the 7th and 8th hours. 7th hour: windsurfing (65); 8th hour: windsurfing (60).

d) See the following table:

**Table 5.19 (completed)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Windsurfing** | | | **Snorkelling** | | |
| **Number of Hours** | **Marginal Utility** | **Total Utility** | **MU per Dollar Spent** | **Marginal Utility** | **Total Utility** | **MU per Dollar Spent** |
| 1 | 85 | 85 | **8.5** | 100 | 100 | **6.67** |
| 2 | 80 | 165 | **8.0** | 90 | 190 | **6.0** |
| 3 | 65 | 230 | **6.5** | 75 | 265 | **5.0** |
| 4 | 60 | 290 | **6.0** | 70 | 335 | **4.67** |
| 5 | 55 | 345 | **5.5** | 50 | 385 | **3.33** |
| 6 | 40 | 385 | **4.0** | 25 | 410 | **1.67** |
| 7 | 30 | 415 | **3.0** | 20 | 430 | **1.33** |
| 8 | 5 | 420 | **0.5** | 10 | 440 | **0.67** |

**$50** (5 hours) on windsurfing and **$30** (2 hours) on snorkelling. 5 hours of snorkelling produces 345 utils and 2 hours of windsurfing gives 190 utils. The total therefore is **535** utils.

Comparing the MU per dollar purchase by purchase gives:

1st hour: windsurfing (8.5) 2nd hour: windsurfing (8.0)

3rd hour: snorkelling (6.67) 4th hour: windsurfing (6.5)

5th hour: snorkelling or 6th hour: windsurfing or

windsurfing(6.0) snorkelling (6.0)

7th hour: windsurfing (5.5)

e) See the following figure:

**Figure 5.7 (completed)**

f) An increase in the price of snorkelling causes an increase in the demand (a rightward shift in the demand curve) of a substitute product (windsurfing).

**37A.** See the following table:

|  |  |  |
| --- | --- | --- |
| Quantity | Total utility | Marginal utility |
| 1 | 60 | **60** |
| 2 | 110 | **50** |
| 3 | 140 | **30** |
| 4 | 155 | **15** |
| 5 | 167 | **12** |
| 6 | 177 | **10** |
| 7 | 186 | **9** |
| 8 | 192 | **6** |
| 9 | 195 | **3** |
| 10 | 196 | **1** |

**38A.** See the following table:

|  |  |  |
| --- | --- | --- |
| Quantity | Total utility | Marginal utility |
| 1 | **38** | 38 |
| 2 | **64** | 26 |
| 3 | **86** | 22 |
| 4 | **104** | 18 |
| 5 | **118** | 14 |
| 6 | **128** | 10 |
| 7 | **136** | 8 |
| 8 | **141** | 5 |
| 9 | **144** | 3 |
| 10 | **146** | 2 |

**39A.** a) potato chips: 40 (50/1.25); cheese whirls: 45 (36/0.80); nacho chips: 35 (42/1.20)

1. cheesewhirls

**40A.** See the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Quantity | $MU | Price | Marginal Consumer Surplus($MU – Price) |
| 1 | $3 | $1.20 | $1.80 |
| 2 | 2.50 | $1.20 | 1.30 |
| 3 | 1.80 | $1.20 | 0.60 |
| 4 | 1.50 | $1.20 | 0.30 |
| 5 | 1.25 | $1.20 | 0.05 |
| **Total consumer surplus** |  |  | **$4.05** |

**41A.** a) 11 slices.

This is obtained by working out the MU of each slice and finding out where it equals zero:

|  |  |
| --- | --- |
| **Quantity** | **$MU** |
| 1 | $5.00 |
| 2 | $4.50 |
| 3 | $4.00 |
| 4 | $3.50 |
| 5 | $3.00 |
| 6 | $2.50 |
| 7 | $2.00 |
| 8 | $1.50 |
| 9 | $1.00 |
| 10 | $0.50 |
| 11 | 0 |

b) 7 slices;

(This is where the price = $MU in the above table.)

total consumer surplus = $10.50.

(Total value = $5 + $4.50 + $4 + $3.50 + $3 + $2.50 + $2 = $24.50. Total cost = 7 x $2 = $14. Total consumer surplus is the difference.)

**42A**. See the following table:

a) See following table:

**Table 5.20 (completed)**

|  |  |  |
| --- | --- | --- |
| Quantity | MU | TU |
| 1 | 50 | **50** |
| 2 | **40** | 90 |
| 3 | **35** | 125 |
| 4 | 25 | **150** |
| 5 | 20 | **170** |
| 6 | **18** | 188 |
| 7 | **12** | 200 |
| 8 | 6 | **206** |
| 9 | **0** | 206 |
| 10 | **-6** | 200 |

b) 9 units

c) 0.

**43A.** Marginal utility is the amount of additional utility derived from the consumption of an extra unit of a product. The law of diminishing marginal utility suggests that marginal utility decreases as successive units of a product are consumed.

**44A.** A rational consumer does not spend all of her income buying only her favourite product because her favourite product remains her favourite only up to a point. With increased consumption of that product its marginal utility falls to the point that some other product eventually becomes more desirable at which point she will switch products.

**45A.** a) 4 ice creams and 2 cookies. It’s a good idea to make a table showing the marginal utilities as follows:

|  |  |  |
| --- | --- | --- |
| Quantity | **Ice Cream MU** | **Cookies MU** |
| 1 | $4.00 | $2.75 |
| 2 | 3.50 | 2.50 |
| 3 | 3.00 | 2.25 |
| 4 | 2.50 | 2.00 |
| 5 | 2.00 | 1.75 |
| 6 | 1.50 | 1.50 |

In order, his purchases would be: 1st ice cream (4); 2nd ice cream (3.50); 3rd ice cream (3); 4th cookie (2.75); 5th cookie or ice cream (2.50); 6th cookie or ice cream (2.50);

b) 5 ice creams and 5 cookies. Continue with 4 more purchases as follows:

7th cookie (2.25); 8th cookie or ice cream (2.00); 9th cookie or ice cream (2.00); 10th cookie (1.75);

**46A.** a) 7 hours working and 9 hours leisure.

It’s a good idea to make a table as follows:

|  |  |
| --- | --- |
| Successive hours | **Activity (MU**) |
| 1st | Employment (100) |
| 2nd | Employment (90) |
| 3rd | Employment or leisure (80) |
| 4th | Employment or leisure (80) |
| 5th | Leisure (75) |
| 6th | Employment or leisure (70) |
| 7th | Employment or leisure (70) |
| 8th | Leisure (65) |
| 9th | Employment or leisure (60) |
| 10th | Employment or leisure (60) |
| 11th | Leisure (55) |
| 12th | Employment or leisure (50) |
| 13th | Employment or leisure (50) |
| 14th | Leisure (45) |
| 15th | Employment or leisure (40) |
| 16th | Employment or leisure (40) |

b) 5 hours working and 5 hours leisure. (see the above table)

**47A**. 2 muffins, 2 soups, 1 cappuccino.

First you need to work out her MU per $ spent as follows:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Muffins | | | Soup | | | Cappuccinos | | |
| **Quantity** | **TU** | **MU** | **MU per $** | **TU** | **MU** | **MU per $** | **TU** | **MU** | **MU per $** |
| 1 | 60 | 60 | 60 | 120 | 120 | 80 | 70 | 70 | 35 |
| 2 | 110 | 50 | 50 | 186 | 66 | 44 | 130 | 60 | 30 |
| 3 | 140 | 30 | 30 | 234 | 48 | 32 | 160 | 30 | 15 |
| 4 | 160 | 20 | 20 | 273 | 39 | 26 | 170 | 10 | 5 |
| 5 | 162 | 2 | 2 | 291 | 18 | 12 | 175 | 5 | 2.5 |

The purchases in order are: 1st  soup (60) $1.50 spent; 2nd muffin (60) $2.50 spent; 3rd muffin (50) $3.50 spent; 4th soup (44) $5.00 spent; 5th cappuccino (35) $7.00 spent.

**48A.** **Table 5.23** **(completed)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Teenagers | | Parents | | Both |
| Admission  **Price ($)** | **Quantity Demanded** | **Total**  **Revenue ($)** | **Quantity Demanded** | **Total**  **Revenue ($)** | **Total**  **Revenue ($)** |
| 8 | 100 | 800 | 0 | 0 | 800 |
| 7 | 150 | 1050 | 5 | 35 | 1085 |
| **6** | 180 | **1080** | 15 | 90 | **1170** |
| 5 | 200 | 1000 | 30 | 150 | 1150 |
| 4 | 210 | 840 | 55 | 220 | 1060 |
| 3 | 215 | 645 | 80 | **240** | 885 |
| 2 | 218 | 436 | 100 | 200 | 636 |
| 1 | 220 | 220 | 150 | 150 | 370 |

a) P = $6, TR = $1170

b) $6 for teenagers (TR = $1080) and $3 for parents (TR = $240) for a total revenue of $1320.

**49A**. a) 4 pieces of toast; 3 cans of pop.

His purchases would be: 1st purchase toast ($3); 2nd purchase toast ($2.50); 3rd purchase toast ($2); 4th purchase pop ($1.50); 5th purchase pop ($1.40); 6th purchase toast ($1.20); 7th purchase pop ($1).

b) $12.60 (Adding successive $MUs: $3+$2.50+$2+$1.50+$1.40+$1.20+$1)

c) Toast: $4.70; (Total $MU = $8.70; total cost of 4 toast = $4; )

pop: $0.90 (Total $MU = $3.90; total cost of 3 pop = $3; )

d) 5 pieces of toast; 5 cans of pop. (He would never consumer a unit that has negative MU.)

e) Toast: $8.90; (Total $MU = $8.90; total cost of 5 toast = $0; )

pop: $4.70 (Total $MU = $4.70; total cost of 5 pop = $0; )

**50A**. The demand curve is derived from the MU curve. The reason the demand curve is downward sloping is the same reason the MU curve is: because each successive purchase is valued less by consumers, i.e. the law of diminishing returns.

**51A.** Price discrimination is the practice of selling an identical product at a different price to different customers for reason other than differences in the cost of production. Three example of price discrimination would be:

* movie theatres that charge different prices for different age groups
* transit companies that charge higher prices during peak periods
* bi companies get loans at lower interest rates than do smaller companies

(There are many other examples.)

**52A**. a) 2 videos and 3 pieces of sushi; total utility: 201 utils.

You need first to work out the marginal utilities of both products as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Video Movies** | | | **Sushi Pieces** | | |
| **Number** | **Total Utility** | **Marginal Utility** | **Number** | **Total Utility** | **Marginal Utility** |
| 1 | 48 | **48** | 1 | 45 | **45** |
| 2 | 86 | **38** | 2 | 85 | **40** |
| 3 | 112 | **26** | 3 | 115 | **30** |
| 4 | 130 | **18** | 4 | 134 | **19** |
| 5 | 142 | **12** | 5 | 150 | **16** |
| 6 | 150 | **8** | 6 | 158 | **8** |

The purchases in order are: 1st purchase video (48); 2nd purchase sushi (45); 3rd purchase sushi (40); 4th purchase video (38); 5th purchase sushi (30).

b) 2 videos (86), 0 pieces of sushi and 1 sushi pack (134); 220 utils.

**53A.** a) $4.80

We can work out the answer by constructing a table of total revenues as follows:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Tea Price** | **Liberals quantity** | **Liberals TR** | **Conservatives**  **Quantity** | **Conservatives**  **TR** | **NDP**  **Quantity** | **NDP**  **TR** | **Total Revenue All** |
| $6.00 | 4 | $24.00 | 6 | $36.00 | 8 | $48.00 | 108.00 |
| **5.40** | 5 | 27.00 | 7 | 37.80 | **9** | **48.60** | 113.40 |
| **4.80** | 6 | 28.80 | **8** | **38.40** | 10 | 48.00 | **115.20** |
| **4.20** | **7** | **29.40** | 9 | 37.80 | 11 | 46.20 | 113.40 |
| 3.60 | 8 | 28.80 | 10 | 36.00 | 12 | 43.20 | 108.00 |
| 3.00 | 9 | 27.00 | 11 | 33.00 | 13 | 39.00 | 99.00 |

b) $115.20

c) Liberal party: $4.20; Conservative party: $4.80; NDP party: $5.40

d) $116.40

e) Liberal party: 2.11; Conservative party: 1.47; NDP party: 1.11

f) The higher the elasticity, the lower the price charged.

**54A.** a) $6 (MU from each purchase is: $9+$8+$7+$6 = $30. Cost of each is $6+$6+$6+$6 = $24. Or marginal consumer surplus for each purchase is: $3 + $2 + $1 + 0)

b) $28 ((MU from each purchase is: $9+$8+$7+$6+$5+$4+$3+$2 = $44. Cost of each is $2+$2+$2+$2+$2+$2+$2+$2 = $16. Or marginal consumer surplus for each purchase is: $7 + $6 + $5 + $4 + $3 + $2 + $1 + 0)

**55A.** a) quantity of A = 4; quantity of B = 4.

. It’s a good idea to make a table showing the marginal utilities as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Quantity | **Product A MU** | **Product A MU per $ (at $2)** | **Product B MU** |
| 1 | 24 | 12 | 12 |
| 2 | 20 | 10 | 11 |
| 3 | 16 | 8 | 10 |
| 4 | 12 | 6 | 9 |
| 5 | 8 | 4 | 8 |
| 6 | 4 | 2 | 7 |

Marshall’s 8 purchases, in order, are:

1st purchase: A (24), 2nd: A (20); 3rd: A (16); 4th: A or B (12); 5th: A or B (12); 6th B (11); 7th: B (10); 8th B (9).

1. quantity of A = 2; quantity of B = 4.

Since the prices are now different, we need to work out MU per $. Since PB is still $1, MU = MU per $. Therefore, we need to work out MU per $ for product A as shown in the above table. Marshall’s purchases, in order, are:

1st purchase: A or B (12); 2nd purchase: A or B (12); $3 spent; 3rd purchase: B (11), $4 spent; 4th purchase: A or B (10); 5th purchase: A or B (10), $7 spent; 6th purchase: B(9), $8 spent.

**56A.** a) $100 Consumer surplus = area of the triangle above the price line = ½ x $1 x 200

b) $900 Consumer surplus = area of the triangle above the price line = ½ x $3 x 600

**57A.** a) $810 ($9 x 90 haircuts.)

b) $1170 ($15 x 60 = $900 PLUS $9 x 30 = $270)

c) $360. The difference between the two total revenues: $1170 minus $810.

d) See figure:

**Figure 5.12 (completed)**



The captured consumer surplus is equal to the area $6 x 60 = $360.

**58A** No this is incorrect. It doesn’t matter whether the marginal utility is increasing, decreasing or remaining constant, if it has a positive value then total utility must be increasing. In other words, the statement would be correct only if the marginal utility is both decreasing *and negative.*