

Paper 3 (HL) markschemes**Microeconomics****Chapter 2 Competitive markets: demand and supply****Question 1**

- (a) See textbook, page 33.
- (b) See textbook, page 33.
- (c) We can solve the equation to find any two points, but it is simplest to solve for the two intercepts, which give the endpoints of the demand curve. Solving for Q_d when $P = 0$, gives the Q -intercept (i.e. the horizontal intercept), which is $Q = 35$, or the point $(35,0)$. Solving for P when $Q_d = 0$, gives the P -intercept (i.e. the vertical intercept), which is $P = \$7$, or the point $(0,7)$. A straight line joining the two intercepts gives the demand curve.
- (d) When $P = \$3$, $Q_d = 20$ (thousand) units; when $P = \$4$, $Q_d = 15$ (thousand) units.
- (e) When $Q_d = 5$ (thousand), $P = \$6$; when $Q_d = 25$ (thousand) units, $P = \$2$.
- (f) This was done in part (c) above.
- (g) This was done in part (c) above as part of graphing the demand curve.
- (h) Note that this question presupposes that Z is an inferior good. The equation for the new demand function is $Q_d = 30 - 5P$, obtained by $35 - 5 = 30$ for the parameter a .
- (i) The new Q -intercept (horizontal intercept) is $Q = 30$, or the point $(30,0)$. The new demand curve can be graphed by drawing a curve beginning at the new Q -intercept that is parallel to the initial demand curve. The new P -intercept (vertical intercept) is $P = 6$, or the point $(0,6)$.
- (j) The equation for the new demand function is $Q_d = 45 - 5P$, obtained by $35 + 10 = 45$ for the parameter a .
- (k) The new demand curve can be graphed by drawing a curve beginning at the new Q -intercept, $Q = 45$, or the point $(45,0)$, that is parallel to the initial demand curve.
- (l) The new demand function is $Q_d = 35 - 3P$. The new demand curve becomes steeper (recall the rule given in the textbook, page 35, the greater the absolute value of the slope, the flatter the demand curve).
- (m) See textbook, page 22.

Question 2

- (a) See textbook, page 35.
- (b) See textbook, page 36.

- (c) Since $c = -10$, we know that the Q -intercept is in the negative range of the horizontal axis. We must therefore find the P -intercept of the supply curve. Setting $Q_s = 0$ and solving for P we find $P = \$1$, giving the point $(0,1)$. When $P = 5$, we find that $Q_s = 40$, thus giving the point $(40,1)$. Joining the two points we obtain a graph of the supply curve.
- (d) When $P = \$3$, $Q_s = 20$ (thousand) units; when $P = \$4$, $Q_s = 30$ (thousand) units.
- (e) When $Q_s = 10$ (thousand), $P = \$2$; when $Q_s = 25$ (thousand), $P = \$3.5$.
- (f) The vertical intercept was calculated above in part (c) and is $P = \$1$, or point $(0,1)$. The horizontal intercept is -10 , or parameter c . The horizontal intercept does not appear in the supply curve.
- (g) This is the P -intercept.
- (h) The new supply function is $Q_s = -5 + 10P$, obtained by $-10 + 5 = -5$ for the parameter c .
- (i) The new horizontal intercept is $Q = -5$. The new vertical intercept is $P = \$\frac{1}{2}$.
- (j) The new supply curve begins at the new P -intercept, or $P = \$\frac{1}{2}$, and is parallel to the initial supply curve. When $P = \$4$, $Q_s = 35$ (thousand) units. Therefore the supply curve ends at the point $(35,4)$.
- (k) The new supply function is $Q_s = -15 + 10P$, obtained by $-10 - 5 = -15$ for the parameter c .
- (l) The new supply curve begins at the new P -intercept, or $P = \$1.5$, and is parallel to the initial supply curve.
- (m) The new supply function is $Q_s = -10 + 15P$. The new supply curve becomes flatter (recall the rule on page 37 of the textbook: the greater the value of the slope, the flatter the curve).
- (n) See textbook, page 27.

Question 3

(a) $35 - 5P = -10 + 10P \Rightarrow 45 = 15P \Rightarrow P = \3

Substituting into the demand equation:

$$Q = 35 - 5(3) \Rightarrow Q = 20 \text{ (thousand) units}$$

Substituting into the supply equation (as a check):

$$Q = -10 + 10(3) \Rightarrow Q = 20 \text{ (thousand) units}$$

- (b) See question 1(c) on the demand curve and question 2(c) on the supply curve.
- (c) When $P = 6$, $Q_d = 35 - 5(6) \Rightarrow Q_d = 5$ (thousand) units; $Q_s = -10 + 10(6) \Rightarrow Q_s = 50$ (thousand) units. There is therefore excess supply of 45 (thousand) units.
 When $P = 2$, $Q_d = 35 - 5(2) \Rightarrow Q_d = 25$ (thousand) units; $Q_s = -10 + 10(2) \Rightarrow Q_s = 10$ (thousand) units. There is therefore excess demand of 15 (thousand) units.

- (d) If there is excess demand, a shortage in the market arises, and producers (firms) begin to raise the price. As the price rises, there is an upward movement along the demand curve, so quantity demanded begins to fall, and an upward movement along the supply curve, so quantity supplied increases. This process continues up to the point where quantity demanded is equal to quantity supplied.

If there is excess supply, a surplus in the market arises, and producers begin to lower the price. As the price falls, there is a downward movement along the demand curve, so quantity demanded begins to rise, and a downward movement along the supply curve, so quantity supplied falls. This process continues up to the point where quantity demanded is equal to quantity supplied.

- (e) The new supply equation is $Q_s = -25 + 10P$, obtained by $-10 - 15 = -25$ for the parameter c . The new supply curve can be plotted by drawing a curve that is parallel to the initial one and 15 units to the left measured along the horizontal axis.

(f) $35 - 5P = -25 + 10P \Rightarrow 60 = 15P \Rightarrow P = \4

Substituting into the demand equation:

$$Q = 35 - 5(4) \Rightarrow Q = 15 \text{ (thousand) units}$$

Substituting into the supply equation (as a check):

$$Q = -25 + 10(4) \Rightarrow Q = 15 \text{ (thousand) units}$$

You can now check to see that the point you have found mathematically, where $Q = 15$ and $P = 4$, or the point (15,4) corresponds to the point of equilibrium in your graph.

- (g) When supply decreases, causing a leftward shift in the supply curve, excess demand (or a shortage) at the initial price results. The shortage causes the price to begin to rise. As the price rises, it conveys information (acts as a signal) to producers that a shortage has been created. It also acts as an incentive to producers to increase the quantity supplied, and as they do so there is a movement upward along the new supply curve. The new higher price is also a signal and incentive for consumers; as the price rises, it signals that the good is more expensive, and it acts as an incentive for consumers to consume less of the good, as shown by the upward movement along the demand curve toward the new equilibrium that occurs at the higher price. At the new equilibrium, quantity demanded and quantity supplied are in balance again.

Chapter 3 Elasticities

Question 4

- (a) Provide a graph of the data in the table, making sure you put P on the vertical axis and Q on the horizontal axis.

(b) $PED = \frac{\frac{25-30}{30}}{\frac{10-5}{5}} = \frac{-5/30}{5/5} = -1/6$; taking the absolute value, $PED = \frac{1}{6}$

$$(c) \quad PED = \frac{\frac{10-15}{15}}{\frac{25-20}{20}} = \frac{-\frac{5}{15}}{\frac{5}{20}} = \frac{-\frac{1}{3}}{\frac{1}{4}} = -\frac{4}{3}; \text{ taking the absolute value, } PED = \frac{4}{3}$$

- (d) At high prices and low quantities, demand is elastic ($PED > 1$), whereas at low prices and large quantities, demand is inelastic ($PED < 1$), i.e. PED falls as we move downward and to the right along a straight-line demand curve. The reason is purely mathematical. At high prices and low quantities, the percentage change in Q is relatively large, since the denominator in $\frac{\Delta Q}{Q}$ is small, while the percentage change in P is relatively small, since the denominator in $\frac{\Delta P}{P}$ is large. Therefore the value of PED is high. At low prices and large quantities, the opposite holds: the percentage change in Q is relatively small, since the denominator in $\frac{\Delta Q}{Q}$ is large, while the percentage change in P is relatively large, since the denominator in $\frac{\Delta P}{P}$ is small. This gives rise to a low PED .

$$(e) \quad PED = \frac{\% \text{ change in } Q}{\% \text{ change in } P}. \quad \text{Therefore} \quad 2 = \frac{\% \text{ change in } Q}{10\%} \Rightarrow \% \text{ change in } Q = -20\%,$$

meaning a 20% decrease in quantity demanded.

(f)

Price per unit (\$)	5	10	15	20	25	30
Q demanded	30	25	20	15	10	5
Total revenue (\$)	150	250	300	300	250	150

- (g) As price increases in the inelastic part of the demand curve, total revenue increases; this can be seen in the price increase from \$5 to \$10, where $PED = \frac{1}{6}$ (i.e. demand is inelastic since $PED < 1$), and total revenue increases from \$150 to \$250. This happens because since $PED < 1$, the percentage decrease in quantity demanded is smaller than the percentage increase in price; therefore there is an increase in total revenue.
- (h) As price increases in the elastic part of the demand curve, total revenue falls; this can be seen in the price increase from \$20 to \$25, where $PED = \frac{4}{3}$ (i.e. demand is elastic since $PED > 1$), and total revenue falls from \$300 to \$250. This happens because since $PED > 1$, the percentage decrease in quantity demanded is larger than the percentage increase in price; therefore there is a decrease in total revenue.
- (i) The slope of the demand curve, defined as the coefficient of P in the demand function $Q_d = a - bP$, or $-b$, is given by:

$$\text{slope} = \frac{\Delta Q}{\Delta P}, \text{ which is constant along a straight-line demand curve.}$$

Price elasticity of demand is given by:

$$PED = \frac{\frac{\% \Delta Q}{\% \Delta P}}{\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}} = \text{slope} \times \frac{P}{Q}$$

Therefore PED is equal to the slope (constant along a straight line) multiplied by $\frac{P}{Q}$, which varies along the straight-line demand curve. Therefore PED changes continuously, falling throughout the range of the demand curve as price falls.

(See 'Quantitative techniques' chapter on the CD-ROM, page 28.)

- (j) When demand is perfectly elastic, $PED = \infty$. See Figure 3.1(e), textbook, page 49.

When demand is perfectly inelastic, $PED = 0$. See Figure 3.1(d), textbook, page 49.

- (k) If $PED = 0$, an increase in price of 5% (or any change in price) will lead to a zero change in quantity demanded, as a PED of zero indicates zero responsiveness of quantity demanded to changes in price.

Question 5

- (a) $PED = \frac{-12\%}{10\%} = -1.2$; taking the absolute value it is 1.2. Demand for meat is price elastic (since $PED > 1$).
- (b) $XED = \frac{9\%}{10\%} = 0.9$; meat and fish are substitutes, as indicated by the positive value of the XED .
Two goods are substitutes if they tend to satisfy the same need and have an $XED > 0$. As the price of meat increases, the quantity demanded of meat falls, and the demand for fish increases.
- (c) $PED = \frac{14\%}{-15\%} = -0.93$; taking the absolute value it is 0.93. Demand for pizzas is price inelastic (since $PED < 1$).
- (d) $XED = \frac{17\%}{-15\%} = -1.13$; pizza and colas are complements, as indicated by the negative sign of the XED . Two goods are complements if they tend to be used together, and have an $XED < 0$. As the price of pizzas falls, the quantity demanded of pizzas increases, and the demand for colas increases.
- (e) Income elasticity of demand (YED).

To find the YED s, you must first calculate the % change in income:

$$\% \Delta \text{ in income} = \frac{20 - 16}{16} \times 100 = 25\%$$

$$\text{Bread: } YED = \frac{-5\%}{25\%} = -0.20$$

$$\text{Food: } YED = \frac{15\%}{25\%} = 0.60$$

$$\text{Restaurants: } YED = \frac{30\%}{25\%} = 1.20$$

- (f) Bread is an inferior good, because $YED < 0$.

Food is a necessity, because $0 < YED < 1$.

Eating in restaurants is a luxury, because $YED > 1$.

- (g) After one month: $PES = \frac{2\%}{5\%} = 0.40$

$$\text{After one year: } PES = \frac{7\%}{5\%} = 1.40$$

- (h) Supply was price inelastic after one month, because $PES < 1$, meaning that quantity supplied has a relatively low responsiveness to changes in price.

Supply was price elastic after one year, because $PES > 1$, meaning that quantity supplied has a relatively high responsiveness to changes in price.

- (i) Any two of the following possible factors can account for price inelastic supply after one month and price elastic supply after one year:

- length of time
- mobility of factors of production
- unused capacity
- ability to store stocks

See textbook, pages 68–9, for more information on each of these factors.

- (j) If $PES = 0$, an increase in price of 10% (or any change in price) will lead to a zero change in quantity supplied, as a PES of zero indicates zero responsiveness of quantity supplied to changes in price.

Question 6

(a) $XED = \frac{-20\%}{25\%} = -0.80$

- (b) Alpha and Beta are complements, since the $XED < 0$; as the price of Alpha increases, the quantity demanded of Alpha falls, and therefore the demand for Beta also falls since the two goods tend to be used together.

- (c) A & B, C & D: substitutes, since $XED > 0$.

E & F, G & H: complements, since $XED < 0$.

I & J: they are unrelated, since $XED = 0$; a change in the price of one will have no effect on the demand of the other.

- (d) (i) C & D have a greater substitutability between them than A & B, because they have a higher XED ($0.7 > 0.3$). For example, a 10% increase in the price of C would lead to a 7% increase in the demand for D, whereas a 10% increase in the price of A would lead to only a 3% increase in the demand for B.
- (ii) G & H have a stronger complementarity between them than E & F, because the absolute value of the XED of G & H is larger than the absolute value of the XED of E & F ($0.8 > 0.4$). For example, a 10% increase in the price of G would lead to an 8% decrease in the demand for H, whereas a 10% increase in the price of E would lead to only a 4% decrease in the demand for F.
- (e) $XED = +1.2 = \frac{X\%}{-10\%} \Rightarrow X\% = -12\%$, i.e. there will be a 12% decrease in the quantity demanded of laptops. The reason is that as the price of desktop computers falls, consumers will increase the quantity demanded of desktops, thus leading to a fall in the demand for laptops.
- (f) The mathematical value of PED is negative because of the law of demand: price and quantity demanded are negatively (inversely) related to each other; as price increases, quantity demanded decreases, and vice versa.
- (g) When supply is perfectly elastic, $PES = \infty$. See Figure 3.11(e), textbook, page 67.
When supply is perfectly inelastic, $PES = 0$. See Figure 3.11(d), textbook, page 67.
- (h) See Figure 3.11(c), textbook, page 67.
- (i) A price inelastic supply curve extends upward and to the right from the horizontal axis, i.e. it has a positive Q -intercept (in the supply function $Q_s = c + dP$, $c > 0$). See Figure 3.11(a), textbook, page 67.
A price elastic supply curve extends upward and to the right from the vertical axis, i.e. it has a negative Q -intercept (in the supply function $Q_s = c + dP$, $c < 0$). See Figure 3.11(b), textbook, page 67.
- (j) The slope of the supply curve, defined as the coefficient of P in the supply function $Q_s = c + dP$, or $+d$, is given by:

$$\text{slope} = \frac{\Delta Q}{\Delta P}, \text{ which is constant along a straight-line supply curve.}$$

Price elasticity of supply is given by:

$$PES = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \text{slope} \times \frac{P}{Q}$$

Therefore PES is equal to the slope (constant along a straight line) multiplied by $\frac{P}{Q}$, which varies along the straight-line supply curve. However, note that this does not apply to any supply curve that passes through the origin; such supply curves have a constant $PES = 1$ throughout their range, because not only the slope but also $\frac{P}{Q}$ is constant (because P and Q change in the same proportion).

Chapter 4 Government intervention

Question 7

(a) $10 - 4P = -2 + 8P \Rightarrow 12 = 12P \Rightarrow P = \1

Substituting into the demand equation:

$$Q = 10 - 4 \Rightarrow Q = 6 \text{ units}$$

Substituting into the supply equation (as a check):

$$Q = -2 + 8 \Rightarrow Q = 6 \text{ units}$$

Therefore the point of equilibrium in this market is given by the point (6,1).

(b) For the demand curve, find the Q -intercept:

When $P = 0$, $Q = 10$; this gives the point (10,0), or the horizontal intercept where $Q = 10$.

Since you are asked to plot the demand curve up to where $P = \$2.00$, you can find the Q that corresponds to this price, which gives you the endpoint of the demand curve:

$$Q = 10 - 4(2) = 2. \text{ You therefore have a second point (2,2).}$$

You can now draw a demand curve between the two points.

For the supply curve, since $c < 0$, the Q -intercept is negative, and so it is convenient to find the P -intercept. Setting $Q = 0$ in the supply function and solving for P , you find that $P = \frac{1}{4}$, which gives the point (0, $\frac{1}{4}$), or the point on the vertical axis where $P = \frac{1}{4}$. To find a second point, you are given that the supply curve is to be drawn up to where $P = \$2.00$, and so can set $P = 2$ in the supply equation and solve for Q ; $Q = -2 + 8(2) \Rightarrow Q = 14$. A second point is therefore (14, 2). Note that since you have already found the point of equilibrium in this market, you can also use the point (6,1) found in part (a), since the supply curve must go through the equilibrium.

You can now draw a supply curve between the two points.

(c) Price elasticity of demand: $PED = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$

A price increase from \$1.00 to \$1.50 represents a 50% increase in price.

To find the percentage change in quantity demanded:

Using $Q_d = 10 - 4P$, when $P = \$1.00$, $Q_d = 10 - 4 = 6$ units. When $P = \$1.50$,
 $Q_d = 10 - 4(1.5) = 4$ units

There is therefore a fall in quantity demanded from 6 units to 4 units, which is a 33.3% decrease, or -33.3%. Therefore

$$PED = \frac{-33.3\%}{50.0\%} = -0.66; \text{ taking the absolute value, } PED = 0.66. \text{ Since this } PED < 1, \text{ demand is inelastic in this price range.}$$

$$\text{Price elasticity of supply: } PES = \frac{\% \text{ change in quantity supplied}}{\% \text{ change in price}}$$

As above, the price increase from \$1.00 to \$1.50 represents a 50% increase in price.

To find the percentage change in quantity supplied:

Using $Q_s = -2 + 8P$, when $P = \$1.00$, $Q_s = -2 + 8 = 6$ units.

When $P = \$1.50$, $Q_s = -2 + 8(1.50) = 10$ units

There is therefore an increase in quantity supplied from 6 units to 10 units, which is a 66.7% increase.

Therefore

$$PES = \frac{66.7\%}{50.0\%} = 1.33; \text{ since this } PES > 1, \text{ supply is elastic in this price range.}$$

- (d) Initial supply function: $Q_s = -2 + 8P$. To find the new, after-tax supply function, use $Q_s = c + d(P - t)$, where t = tax per unit (see textbook, page 76, on the use of this rule):

$$Q_s = -2 + 8(P - 0.75) = -2 + 8P - 6 = -8 + 8P \Rightarrow Q_s = -8 + 8P$$

To draw the new post-tax supply curve, you can simply shift the supply curve upward by \$0.75, measured along the vertical axis, which is the amount of tax per unit.

- (e) $10 - 4P = -8 + 8P \Rightarrow 18 = 12P \Rightarrow P = \1.5

Substituting into the demand equation:

$$Q = 10 - 4(1.5) = 4 \text{ units}$$

Substituting into the supply equation (as a check):

$$Q = -8 + 8(1.5) = 4 \text{ units}$$

- (f) In the post-tax situation:

The price paid by consumers is $P = \$1.5$

The price received by producers = price paid by consumers – tax per unit =

$$\$1.5 - \$0.75 = \$0.75$$

The quantity that is bought and sold is 4 units.

- (g) Government revenue from the tax = tax per unit \times number of units sold = $\$0.75 \times 4 \text{ units} = \3

- (h) Tax incidence on consumers = $(\$1.5 - \$1.0) \times 4 \text{ units} = \$0.5 \times 4 = \$2$

$$\text{Tax incidence on producers} = (\$1.0 - \$0.75) \times 4 \text{ units} = \$0.25 \times 4 = \$1.0$$

- (i) $PED = 0.66$, i.e. price inelastic demand. $PES = 1.33$, i.e. price elastic supply.

When price elasticity of demand is low, and price elasticity of supply is high, the tax incidence is mainly on consumers.

Note the following general principle: When $PES > PED$, the tax incidence is mainly on consumers. (In the opposite situation, when $PED > PES$, the tax incidence is mainly on producers.)

Question 8

- (a) $10 - P = -4 + P \Rightarrow 2P = 14 \Rightarrow P = \text{Rvl } 7$

Substituting into the demand equation:

$$Q = 10 - 7 = 3 \text{ units}$$

Substituting into the supply equation (as a check):

$$Q = -4 + 7 = 3 \text{ units}$$

- (b) To graph the demand curve, you can first find the Q -intercept by setting $P = 0$; this is $Q = 10$. To find a second point, you can solve for Q when $P = \text{Rvl } 10$ (as this is an end point of the demand curve according to the problem): $Q = 10 - P = 10 - 10 = 0$, i.e. when $P = \text{Rvl } 10$, $Q = 0$ (note that this is the P -intercept). You therefore have the two end points of the demand curve: (10,0) and (0,10).

To graph the supply curve, noting that the Q -intercept is negative (-4) you can find the P -intercept by setting $Q = 0$: $0 = -4 + P \Rightarrow P = 4$. To find a second point, you can solve for Q when $P = \text{Rvl } 10$ (an end point of the supply curve according to the problem): $Q = -4 + 10 = 6$, i.e. when $P = \text{Rvl } 10$, $Q = 6$. You therefore have the two end points of the supply curve: (0,4) and (6,10).

- (c) Draw a new supply curve that is parallel to the initial supply curve and 2 Rvl above it.
- (d) Using $Q_s = c + d(P - t)$, where t = tax per unit (see textbook, page 76, on the use of this rule),
 $Q_s = -4 + P - 2 \Rightarrow Q_s = -6 + P$
- (e) $10 - P = -6 + P \Rightarrow 2P = 16 \Rightarrow P = \text{Rvl } 8$

Substituting into the demand equation:

$$Q = 10 - 8 = 2 \text{ units}$$

Substituting into the supply equation (as a check):

$$Q = -6 + 8 = 2 \text{ units}$$

- (f) The equilibrium price has increased from Rvl 7 to Rvl 8, i.e. by Rvl 1. The price does not increase by the full amount of the tax because the tax drives a wedge between the price paid by consumers and the price paid by producers, with the first price being above the pre-tax equilibrium price and the second price lying below the pre-tax equilibrium price. As a result, the tax incidence (burden) is shared between consumers and producers.

- (g) Tax incidence on consumers: $(\text{Rvl } 8 - \text{Rvl } 7) \times 2 \text{ units} = \text{Rvl } 2$

To find the tax incidence on producers, you need to first find the price received by producers after the imposition of the tax = price paid by consumers – tax per unit = $\text{Rvl } 8 - \text{Rvl } 2 = \text{Rvl } 6$

Tax incidence on producers = $(\text{Rvl } 7 - \text{Rvl } 6) \times 2 \text{ units} = \text{Rvl } 2$

The sum of the two tax burdens is equal to the government's tax revenue:

$\text{Rvl } 2 + \text{Rvl } 2 = \text{Rvl } 4$ is the total tax revenue from the excise tax.

Tax revenue per unit of kappa = $\text{Rvl } \frac{4}{2} \text{ units} = \text{Rvl } 2$.

- (h) The total amount of tax paid by consumers and by producers is equal to their respective tax incidence, and the sum of the two is equal to the government's tax revenue, or $\text{Rvl } 4$.
- (i) See Figure 4.4(b), textbook, page 77.
- (j) The condition for allocative efficiency is $MB = MC$. The imposition of the tax has the effect of creating allocating inefficiency, because at the new point of equilibrium $MB > MC$. There is an underallocation of resources to the production of this good, meaning that society would be better off if more of the good were produced. The optimal (or best) quantity is determined at the point where $MB = MC$, or where the demand curve intersects the pre-tax supply curve.

Question 9

- (a) See Figure 2.17, textbook, page 43.
- (b) See the discussion in the textbook, pages 43 (bottom of second column) and 44.

(c) Consumer surplus before the tax = $\frac{(10 - 7) \times 3}{2} = \frac{3 \times 3}{2} = \frac{9}{2} = \text{Rvl } 4.5$

Producer surplus before the tax = $\frac{(7 - 4) \times 3}{2} = \frac{3 \times 3}{2} = \frac{9}{2} = \text{Rvl } 4.5$

Social surplus = $\text{Rvl } 4.5 + \text{Rvl } 4.5 = \text{Rvl } 9$

(d) Consumer surplus after the tax = $\frac{(10 - 8) \times 2}{2} = \frac{2 \times 2}{2} = \text{Rvl } 2$

Producer surplus after the tax = $\frac{(6 - 4) \times 2}{2} = \frac{2 \times 2}{2} = \text{Rvl } 2$

- (e) Change in consumer surplus: $\text{Rvl } 4.5 - \text{Rvl } 2 = \text{Rvl } 2.5$, i.e. consumer surplus is reduced by $\text{Rvl } 2.5$ due to the tax.

Change in producer surplus: $\text{Rvl } 4.5 - \text{Rvl } 2 = \text{Rvl } 2.5$, i.e. producer surplus is reduced by $\text{Rvl } 2.5$ due to the tax.



- (f) Consumer expenditure and producer revenue before the imposition of the tax are equal to each other:

$$\text{Rvl } 7 \times 3 \text{ units} = \text{Rvl } 21.$$

- (g) The tax drives a wedge between the price paid by the consumer and the price received by the producer, and the equilibrium quantity falls from 3 units to 2 units.

$$\text{Consumer expenditure: Rvl } 8 \times 2 \text{ units} = \text{Rvl } 16$$

$$\text{Producer revenue: Rvl } 6 \times 2 \text{ units} = \text{Rvl } 12.$$

- (h) Consumer expenditure falls by $\text{Rvl } 21 - \text{Rvl } 16 = \text{Rvl } 5$.

$$\text{Producer revenue falls by } \text{Rvl } 21 - \text{Rvl } 12 = \text{Rvl } 9.$$

- (i) Government revenue has increased by the tax per unit \times number of units sold = $\text{Rvl } 2 \times 2 \text{ units} = \text{Rvl } 4$.

- (j) Social surplus before the tax was calculated above (part (c)) to be Rvl 9.

Social surplus after the tax is equal to consumer surplus + producer surplus + government tax revenue = $\text{Rvl } 2 + \text{Rvl } 2 + \text{Rvl } 4 = \text{Rvl } 8$.

Therefore social surplus fell by Rvl 1. This has occurred because of the appearance of deadweight loss by the imposition of the tax. $\text{Deadweight loss} = \frac{(8 - 6) \times (3 - 2)}{2} = \frac{2}{2} = \text{Rvl } 1$, which is equal to the loss of social surplus. The appearance of deadweight loss signifies that allocative inefficiency has been introduced.

Question 10

- (a) This question is the same as parts (a) and (b) of question 8.
- (b) Using $Q_s = c + d(P + s)$, where s = subsidy per unit (see textbook, page 85, on the use of this rule):

$$Q_s = -4 + (P + 2) \Rightarrow Q_s = -2 + P$$

- (c) $10 - P = -2 + P \Rightarrow 2P = 12 \Rightarrow P = \text{Rvl } 6$

Substituting into the demand equation:

$$Q = 10 - 6 = 4 \text{ units}$$

Substituting into the supply equation (as a check):

$$Q = -2 + 6 = 4 \text{ units}$$

- (d) Draw a new supply curve that is parallel to the initial supply curve and 2 Rvl below it.

The price paid by consumers is the post-subsidy equilibrium price of Rvl 6.

The price received by producers is equal to the price paid by consumers plus the subsidy per unit = Rvl 6 + Rvl 2 = Rvl 8.

The post-subsidy quantity bought and sold is the new equilibrium quantity of 4 units.

- (e) The equilibrium quantity produced increases because the subsidy causes supply to increase (the supply curve shifts downward or to the right) thus intersecting the demand curve at a larger quantity.
- (f) The subsidy is shared by consumers and producers because consumers buy the good at a lower price than before (Rvl 6 rather than Rvl 7) and producers receive a higher price for the good (Rvl 8 rather than Rvl 7).
- (g) See Figure 4.10, textbook, page 86.
- (h) The condition for allocative efficiency is $MB = MC$. The granting of the subsidy has the effect of creating allocating inefficiency, because at the new point of equilibrium $MB < MC$. There is an overallocation of resources to the production of this good, meaning that society would be better off if less of the good were produced. The optimal (or best) quantity is determined at the point where $MB = MC$, or where the demand curve intersects the pre-subsidy supply curve.

Question 11

- (a) Consumer expenditure and producer revenue before the granting of the subsidy are equal to each other:

$$\text{Rvl } 7 \times 3 \text{ units} = \text{Rvl } 21$$

- (b) After the subsidy is granted:

$$\text{Consumer expenditure: Rvl } 6 \times 4 \text{ units} = \text{Rvl } 24$$

$$\text{Producer revenue: Rvl } 8 \times 4 \text{ units} = \text{Rvl } 32$$

- (c) Consumer expenditure increases by Rvl 3 (24 – 21).

Producer revenue increases by Rvl 9 (32 – 21).

- (d) Government spending on the subsidy is equal to the subsidy per unit \times the number of units sold = Rvl 2 \times 4 units = Rvl 8.

It can also be calculated by taking the difference between producer revenue and consumer expenditure after the subsidy = Rvl 32 – Rvl 24 = Rvl 8.

- (e) Consumer and producer surplus in the pre-subsidy equilibrium are the same as in the pre-tax equilibrium calculated in question 9, part (c) (due to the use of the same demand and supply equations).

- (f) Consumer surplus after the granting of the subsidy:

$$\frac{(10 - 6) \times 4}{2} = \frac{4 \times 4}{2} = \frac{16}{2} = \text{Rvl } 8$$

Producer surplus after the granting of the subsidy:

$$\frac{(8 - 4) \times 4}{2} = \frac{4 \times 4}{2} = \frac{16}{2} = \text{Rvl } 8$$

- (g) Both consumer and producer surplus increased by Rvl 3.5 each, or a total of Rvl 7.
- (h) See Figure 4.10, textbook, page 86.
- (i) Social welfare is reduced after the granting of the subsidy because the government's spending to provide the subsidy is larger than the increase in consumer and producer surplus. Government spending on the subsidy is Rvl 8 (calculated in part (d) above). The increase in consumer and producer surplus is Rvl 7. Therefore there is a welfare loss of Rvl 1. This can also be calculated by:
- $$\text{welfare loss} = \frac{(8 - 6) \times 1}{2} = \frac{2}{2} = \text{Rvl } 1.$$
- (j) Any two of the reasons listed in the textbook, pages 81–2.

Question 12

- (a) $14 - 2P = 2 + 2P \Rightarrow 4P = 12 \Rightarrow P = \3

Substituting into the demand equation:

$$Q = 14 - 2(3) = 14 - 6 = 8 \text{ tonnes per day}$$

Substituting into the supply equation (as a check):

$$Q = 2 + 2(3) = 2 + 6 = 8 \text{ tonnes per day.}$$

Using the same methods as in earlier questions, graph the demand and supply curves.

- (b) The price ceiling at $P = \$2$ appears as in Figure 4.12, textbook, page 89.
- (c) To calculate the amount of the shortage, you must first calculate the quantity demanded and quantity supplied at $P = \$2$.

Quantity demanded:

$$Q_d = 14 - 2P = 14 - 2(2) = 14 - 4 = 10 \text{ tonnes per day}$$

Quantity supplied:

$$Q_s = 2 + 2P = 2 + 2(2) = 2 + 4 = 6 \text{ tonnes per day}$$

Therefore the shortage = $10 - 6 = 4$ tonnes per day.



- (d) Consumer expenditure and producer revenue before the price ceiling are equal to each other and are:

$$\$3 \times 8 \text{ tonnes per day} = \$24 \text{ per day}$$

Consumer expenditure and producer revenue are equal to each other also after the price ceiling is imposed, and are:

$$\$2 \times 6 \text{ tonnes per day} = \$12 \text{ per day}$$

Therefore both consumer expenditure and producer revenue have each fallen by \$12 per day (= \$24 – \$12).

- (e) See Figure 4.13, textbook, page 90.
- (f) The price floor at $P = \$5$ appears as in Figure 4.15, textbook, page 93.
- (g) To calculate the amount of the surplus, you must first calculate the quantity demanded and quantity supplied at $P = \$5$.

Quantity demanded:

$$Q_d = 14 - 2P = 14 - 2(5) = 14 - 10 = 4 \text{ tonnes per day}$$

Quantity supplied:

$$Q_s = 2 + 2P = 2 + 2(5) = 2 + 10 = 12 \text{ tonnes per day}$$

Therefore the surplus = $12 - 4 = 8$ tonnes per day.

- (h) Consumer expenditure and producer revenue before the price floor are equal to each other and are:

$$\$3 \times 8 \text{ tonnes per day} = \$24 \text{ per day}$$

Consumer expenditure after the price floor:

$$\$5 \times 4 \text{ tonnes per day} = \$20 \text{ per day}$$

Therefore consumer expenditure fell by \$4 per day (= \$24 – \$20).

Producer revenue after the price floor:

$$\$5 \times 12 \text{ tonnes per day} = \$60 \text{ per day}$$

Therefore producer revenue increased by \$36 per day (= \$60 – \$24).

Government expenditure needed to purchase the surplus:

$$\text{Price at the price floor} \times \text{the amount of the surplus} = \$5 \times 8 \text{ tonnes per day} = \$40 \text{ per day}$$

- (i) See Figure 4.17, textbook, page 94. The deadweight loss is the area shaded green, because the gain in consumer plus producer surplus (area f) is smaller than the loss due to government expenditure to buy the surplus quantity (i.e. the excess supply).
- (j) See Figure 4.19, textbook, page 97.

- (k) To calculate the number of unemployed workers, you must first calculate the quantity of workers demanded and the quantity of workers supplied at the minimum wage of \$4 per hour.

Quantity of workers demanded at the minimum wage:

$$Q_d = 14 - 2P = 14 - 2(4) = 14 - 8 = 6 \text{ million unskilled workers}$$

Quantity of workers supplied at the minimum wage:

$$Q_s = 2 + 2P = 2 + 2(4) = 2 + 8 = 10 \text{ million unskilled workers}$$

Therefore the number of unemployed workers due to the minimum wage is $10 - 6 = 4$ million workers.

Since the equilibrium quantity of labour demanded and supplied when there is no minimum wage is 8 million workers (calculated in part (a) above), this means that:

Unemployment due to the fall in the quantity of labour demanded is $8 - 6 = 2$ million workers.

Unemployment due to the increase in the quantity of labour supplied is $10 - 8 = 2$ million workers.

Chapter 5 Market failure

No topics covered by HL paper 3.

Chapter 6 The theory of the firm I: Production, costs, revenues and profit

Question 13

(a)

Units of variable input (labour)	TP (thousand kg)	MP (thousand kg)	AP (thousand kg)
0	—	—	—
1	3	3	3
2	7	4	3.5
3	12	5	4
4	16	4	4
5	19	3	3.8
6	21	2	3.5
7	22	1	3.1
8	22	0	2.7
9	21	-1	2.3

- (b) The data describe production in the short run, because marginal product at first increases with increasing units of variable input and then continuously declines, illustrating the law of diminishing returns.
- (c) See Figure 6.1, textbook, page 141, and the discussion on pages 140–41 explaining the relationship between the curves.
- (d) Law of diminishing returns; see textbook, page 142.
- (e) Diminishing returns begin with 4 units of variable input (labour).
- (f) Explain constant, increasing and decreasing returns to scale (see textbook, page 151).

Firm 1: increasing returns to scale

Firm 2: Decreasing returns to scale

Firm 3: Constant returns to scale

- (g) See Figure 6.6(a), textbook, page 154.

Firm 1 is experiencing economies of scale, and is therefore in the downward-sloping part of the *LRATC* curve.

Firm 2 is experiencing diseconomies of scale, and is therefore in the upward-sloping part of the *LRATC* curve.

Firm 3 is experiencing constant returns to scale, and is therefore in the horizontal portion of the *LRATC* curve.

- (h) See textbook, pages 153–4, for a list of factors.
- (i) See Figure 6.5(b), textbook, page 152. The *LRATC* curve is an envelope curve of a series of *SRATC* curves, representing a firm's planning horizon in the long run. See textbook, pages 151–2, for more details.

Question 14

(a) This firm is operating in the short run, as it has fixed costs.

(b)

Total product	0	1	2	3	4	5	6
<i>TC</i> (000 €)	10	50	60	65	75	95	140
<i>TFC</i> (000 €)	10	10	10	10	10	10	10
<i>TVC</i> (000 €)	0	40	50	55	65	85	130
<i>AFC</i> (€)	–	10	5	3.3	2.5	2	1.7
<i>AVC</i> (€)	–	40	25	18.3	16.2	17	21.7
<i>ATC</i> (€)	–	50	30	21.7	18.7	19	23.4
<i>MC</i> (€)	–	40	10	5	10	20	45
<i>TR</i> (000 €)	0	20	40	60	80	100	120
<i>MR</i> (€)	–	20	20	20	20	20	20

(c)

Total product (000 units)	1	2	3	4	5	6
Total revenue (000 €)	20	40	60	80	100	120
Total cost (000 €)	50	60	65	75	95	140
Total profit (000 €)	–30	–20	–5	5	5	–20

Profit is maximised at $TP = 4$ and 5 (thousand) units. Taking the larger of the two values of output, the profit-maximising level of output is 5 thousand units. (See the note at the bottom of Test your understanding 6.8, textbook, page 164.)

(d) The firm earns profit of €5000.

(e) According to this rule, the firm maximises profit when $MC = MR$. Examining the table in part (b) above, $MC = MR = €20$ when the level of output is 5000 units, thus matching the results of part (c).

(f) You should get curves that have the general shape as in Figure 6.10(a), textbook, page 162.

(g) You should get curves that have the general shape as in Figure 6.12(a), textbook, page 163.

(h) You should get curves that have the general shape as in Figure 6.2(d), textbook, page 148.

(i) The shape of these curves is due to the law of diminishing returns.

Question 15

(a)

Total product (units)	0	1	2	3	4	5
Price (\$)	–	30	25	20	15	10
TC (\$)	5	25	40	50	65	85
MC (\$)	–	20	15	10	15	20
TR (\$)	–	30	50	60	60	50
AR (\$)	–	30	25	20	15	10
MR (\$)	–	30	20	10	0	-10

(b) You should get curves that have the general shape as in Figure 6.22(b), textbook, page 163.

(c) No it would not.

(i) At 2 units of output, $MC = \$15$ and $MR = \$20$. Since $MR > MC$, the profit-maximising firm should increase its output up to the point where $MC = MR$.

(ii) At 4 units of output, $MC = \$15$ and $MR = 0$. Since $MR < MC$, the profit-maximising firm should reduce its output up to the point where $MC = MR$.

(d) The profit-maximising firm will produce where $MR = MC$, which is where output is equal to 3 units. At this level of output $TR = \$60$ and $TC = \$50$, therefore profit = $\$10$ ($= \$60 - \50).

(e) Negative economic profit (which is the same as loss) is earned when $TC > TR$. For example, where total output is 5 units, $TC = \$85$ and $TR = \$50$, and the firm is making a negative economic profit (or loss) of $\$35$ ($= \$85 - \50).

(f) They are the same. Since $AR = \frac{TR}{Q}$, and $TR = P \times Q$, it follows that $AR = \frac{P \times Q}{Q} = P$.

(g) MR is downward-sloping because price varies with output; there is an inverse, or negative relationship between them, so that as price falls total product (output) increases. This happens when the firm has some control over price.

(h) At the profit-maximising level of output (3 units), the firm's total costs are $\$50$. This represents the firm's total opportunity costs (explicit plus implicit costs).

(i) See textbook, page 144, for an explanation of the distinction between implicit and explicit costs. The sum of implicit and explicit costs is equal to economic costs.

(j) See textbook, page 161, for an explanation of alternative goals of firms (other than profit maximisation).

Chapter 7 The theory of the firm II: Market structures

Question 16

(a)

Units of output	TC (£)	TVC (£)	ATC (£)	AVC (£)	MC (£)
0	50	–	–	–	–
1	80	30	80	30	30
2	90	40	45	20	10
3	95	45	31.7	15	5
4	105	55	26.25	13.75	10
5	125	75	25	15	20
6	170	120	28.3	20	45

(b) The curves in your graph should have the same general shapes as in Figure 6.2(d), textbook, page 148 (not including the AFC curve).

(c) The firm's break-even price is $P = \text{minimum } ATC$.

The firm's short-run shut-down price is $P = \text{minimum } AVC$.

(d) The firm's long-run shut-down price is the same as the breakeven price, $P = \text{minimum } ATC$.

(e) The firm earns normal profit when it breaks even, which occurs at $P = \text{minimum } ATC = £25$, and units of output = 5. (Note that these figures are approximate.)

(f) Condition for productive efficiency: production occurs at minimum ATC , which occurs at the level of output = 5.

(g) Condition for allocative efficiency: $P = MC$, which occurs at $P = £25$.

(h) See textbook, page 168, for the characteristics of perfect competition.

(i) **Important note:** The price given per unit in the question is incorrect. It should be £10 per unit (not £20).

Since the data refer to a firm in perfect competition, the firm profit maximises by the rule $P = MC$ (since in perfect competition $P = MR$). Using the $P = MC$ rule, you find that the firm will produce 4 units of output. At this level of output, profit per unit = $P - ATC = £10 - £26.25 = -£16.25$. Negative profit is equal to loss; therefore this firm is making a loss per unit of £16.25. Multiplying by the number of units produced, you get total loss = $£16.25 \times 4 \text{ units} = £65$.

This firm should not stay in business in the short run because P at the loss-minimising level of output is less than AVC , indicating that the firm is making a loss that is greater than its fixed costs. If it shuts down, its losses in the short run will be equal to its fixed costs.

Question 17**(a)**

Price (\$)	Quantity (units)	MC (\$)	TR (\$)	MR (\$)	AR (\$)
6	1	5	6	6	6
5	2	3	10	4	5
4	3	2	12	2	4
3	4	3	12	0	3
2	5	5	10	-2	2
1	6	7	6	-4	1

(b) Plot the data for *MR*, *AR* and *MC* that you calculated in part (a) above.

The demand curve is the firm's *AR* curve.

(c) This firm cannot be a perfectly competitive firm because $MR < P$ for all units of output except the first, and the firm faces a downward-sloping demand curve, indicating that it has some degree of market power (the ability to control price).**(d)** The price elasticity of demand (*PED*) is relatively high in the upper left portion of the demand curve, i.e. demand is price elastic with $PED > 1$, and is relatively low in the lower right portion of the demand curve, i.e. demand is price inelastic with < 1 .**(e)** The maximum level of output this firm would produce is $Q = 4$ units, where $MR = 0$, which occurs where $PED = 1$ (unit elastic demand). For higher levels of output *MR* becomes negative and the firm would not be willing to produce output giving rise to negative *MR*.**(f)** Using your diagram for part (b) identify:

the revenue-maximising level of output where $MR = 0$, i.e. $Q = 4$ units

the profit-maximising level of output where $MR = MC$, i.e. $Q = 3$ units.

(g) See textbook, page 181, for the assumed characteristics of monopoly.**(h)** See textbook, page 195, for the assumed characteristics of monopolistic competition.**(i)** The profit-maximising level of output (where $MR = MC$) is 3 units of output. At this level of output, $P = \$4$ per unit. Profit per unit = $P - ATC = \$4 - \$3 = \$1$; therefore the firm is making a profit per unit = \$1. Total profit = profit per unit \times number of units produced = $\$1 \times 3 \text{ units} = \3 .

Macroeconomics

Chapter 8 The level of overall economic activity

Question 18

- (a) $GDP = C + I + G + (X - M) = 950.9 + 300.7 + 350.3 + 95.3 - 132.4 = 1564.8$,
i.e. Lkl 1564.8 million
- (b) $GNI = GDP + \text{income from abroad} - \text{income sent abroad}$
 $GNI = 1564.8 + 25.8 - 173.2 = 1417.4$, i.e. Lkl 1417.4 million
- (c) Lakeland's GDP is larger than its GNI because income sent abroad is greater than income received from abroad. You may refer to any one of the following two factors to explain this:
- Lakeland may host multinational corporations that remit (send back) their profits to their home country.
 - Lakeland may have foreign workers who remit a portion of their incomes to their home country.
- (d) $GDP \text{ per capita} = \frac{GDP}{\text{population}} = \frac{1564.8 \text{ million}}{1.2 \text{ million}} = 1304.0$, i.e. Lkl 1304
- $GNI \text{ per capita} = \frac{GNI}{\text{population}} = \frac{1417.4 \text{ million}}{1.2 \text{ million}} = 1181.2$, i.e. Lkl 1181.2
- (e) Possible factors accounting for Lakeland's larger GDP compared to its green GDP:
- GDP does not account for the losses of environmental resources; the value of these losses should be subtracted from GDP to arrive at green GDP.
 - GDP includes expenditures undertaken to clean up pollution and to treat people for health problems resulting from pollution; these expenditures would not be included in green GDP.
- (f) Nominal GDP measures the value of current output valued at current prices, whereas real GDP measures the value of current output valued at constant (base year) prices.
- (g) 2008.

(h) $\text{real GDP} = \frac{\text{nominal GDP}}{\text{price deflator}} \times 100$
 2008: 301.5

2009: $\frac{311.3}{104.1} \times 100 = 299.0$

2010: $\frac{309.7}{102.7} \times 100 = 301.6$

2011: $\frac{314.0}{103.9} \times 100 = 302.2$

(i) 2009: $\frac{299.0 - 301.5}{301.5} \times 100 = -0.83\%$

2010: $\frac{301.6 - 299.0}{299.0} \times 100 = 0.87\%$

2011: $\frac{302.2 - 301.6}{301.6} \times 100 = 0.20\%$

- (j) Real GDP increased because the amount of output produced in 2010 valued in constant (2008) prices actually increased relative to the amount of output produced in 2009, i.e. a larger amount of output was produced. On the other hand, nominal GDP fell because prices on average fell (this can be seen in the decrease in the GDP deflator) lowering the value of output in nominal terms.

- (k) A decrease in real GDP occurred in 2009.

A decrease in real GDP growth occurred in 2011.

Chapter 9 Aggregate demand and aggregate supply

Question 19

- (a) An initial increase in spending (which is autonomous, i.e. not caused by an increase in income) leads to an equivalent increase in real GDP. This real GDP increase corresponds to an increase in incomes arising from payments to factors of production, which causes a further increase in consumption spending (induced spending). The increase in consumption spending causes a further increase in real GDP and incomes, which produce more consumption spending, and so on *ad infinitum*. Therefore the final increase in real GDP is greater than the initial increase in autonomous spending by a multiple of the initial increase in spending; this multiple is known as the Keynesian multiplier.

(For more information see textbook, page 261.)

- (b) The multiplier shows that an autonomous increase in any of the components of real GDP is likely to lead to a multiplied effect on real GDP. Policy-makers using demand-side policies (fiscal and monetary policy) to influence the level of economic activity would be interested in the size of the multiplier as this provides information on the size of the change in real GDP that could be expected given an autonomous change in spending.
- (c) Leakages (withdrawals) represent income that does not get passed on as spending in the income-spending flow but rather is withdrawn in the form of saving, taxes and spending on imports.

Injections represent income that enters into the income-spending flow in the form of investment, government spending and exports.

Any autonomous injection into the spending stream has a multiplier effect. The size of this effect depends on the size of induced consumption spending, which in turn depends on the size of the marginal propensity to consume (*MPC*, defined as the fraction of additional income consumers spend on domestically produced goods and services). The multiplier is $\frac{1}{1 - MPC}$, indicating that the larger the *MPC*, the larger the size of the multiplier.

(For more information see textbook, page 261.)

- (d) An *MPC* = 0.75 means that for any change in income, 75% of it will be a change in consumption, and the remaining 25% will involve changes in saving, taxes or spending on imports. For example, a \$10 million increase in income will correspond to a \$7.5 million increase in consumption, and \$2.5 million increase in the sum of saving, taxes and spending on imports.
- (e) If *MPC* = 0.75, the multiplier = 4. The change in real GDP = the change in investment × the multiplier = £200 million × 4 = £800 million.
- (f) *MPS* = the fraction of additional income that is saved
MPT = the fraction of additional income that is taxed
MPM = the fraction of additional income that is spent on imported goods and services.
- (g) *MPC* + *MPS* + *MPT* + *MPM* = 1; therefore *MPC* = 1 – (*MPS* + *MPT* + *MPM*), or $1 - MPC = \frac{1}{MPS + MPT + MPM}$. This means that the multiplier can be rewritten as $\frac{1}{MPS + MPT + MPM}$, so that the larger the sum of these propensities, the smaller the size of the multiplier.
- (h) If *MPS* + *MPT* + *MPM* = ¼, this means that *MPC* = ¾; therefore the multiplier = 4.
 Real GDP will fall by an amount equal to the fall in exports times the multiplier = Rvl 5 million × 4 = Rvl 20 million. Therefore the new level of real GDP = Rvl 470 – Rvl 20 = Rvl 450.
- (i) The multiplier = 4; therefore government spending must increase by $\frac{Rvl\ 40\ million}{4} = Rvl\ 10$ million.

- (j) See Figure 9.17, textbook, page 262. Note that the changes in real GDP appearing in this diagram presuppose that the increases in aggregate demand occur along the horizontal portion of the Keynesian AS curve (see Figure 9.18, page 263, for an explanation).

Chapter 10 Macroeconomic objectives I: Low unemployment, low and stable rate of inflation

Question 20

- (a) See textbook, page 265, for definition.

- (b) Unemployment rate = $\frac{\text{number of unemployed}}{\text{labour force}} \times 100$, where ‘unemployed’ excludes discouraged workers, part-time workers and underemployed workers (discouraged workers are not part of the labour force, and part-time and underemployed workers are counted as employed).

To calculate the unemployment rate you must first calculate the number of unemployed = labour force – number of employed = 2 500 000 – (1 900 000 + 200 000 + 150 000) = 2 500 000 – 2 250 000 = 250 000.

Therefore the unemployment rate = $\frac{250\,000}{2\,500\,000} \times 100 = 10\%$.

- (c) See textbook, page 266, for explanation.
- (d) See textbook, page 265, for explanation.
- (e)

Good/service	Q in basket (weight)	Price per unit (Rvl) 2008	Value of basket (Rvl) 2008	Price per unit (Rvl) 2009	Value of basket (Rvl) 2009	Price per unit (Rvl) 2010	Value of basket (Rvl) 2010	Price per unit (Rvl) 2011	Value of basket (Rvl) 2011
X	3	5	15	5	15	6	18	5	15
Y	2	3	6	4	8	6	12	5	10
Z	7	6	42	7	49	7	49	7	49
Total value of basket			63		72		79		74

(f) 2008: 100.00

$$2009: \frac{72}{63} \times 100 = 114.28$$

$$2010: \frac{79}{63} \times 100 = 125.40$$

$$2011: \frac{74}{63} \times 100 = 117.46$$

(g) 2008–9: 14.28% (rate of inflation)

$$2009–10: \frac{125.40 - 114.28}{114.28} \times 100 = \frac{11.12}{114.28} \times 100 = 9.73 \text{ (rate of inflation)}$$

$$2010–11: \frac{117.46 - 125.40}{125.40} \times 100 = \frac{-7.94}{125.40} \times 100 = -6.33 \text{ (rate of deflation)}$$

(h) Deflation refers to a sustained decrease in the general price level; disinflation refers to a decrease in the rate of inflation.

Deflation occurred in 2010–11; disinflation occurred in 2009–10.

Chapter 11 Macroeconomic objectives II: Economic growth and equity in the distribution of income

Question 21

(a) Real GDP growth 2010: $\frac{5100 - 5000}{5000} \times 100 = 2\%$

Real GDP growth 2011: $\frac{5151 - 5100}{5100} \times 100 = 1\%$

(b) Real GDP *per capita* growth 2010: $\frac{1980 - 2000}{2000} \times 100 = -1\%$

Real GDP *per capita* growth 2011: $\frac{1960 - 1980}{1980} \times 100 = -1\%$

(c) This is occurring because the rate of growth of the population is greater than the rate of growth of real GDP, with the result that the amount of real GDP that corresponds to each person in the population on average falls.

(d) A quintile is one part of five equal parts into which a population has been divided with respect to the distribution of a variable. In this case, the population has been divided into five equal parts with respect to the distribution of income. If income shares were shown by population deciles, the population would have been divided into ten equal parts.

- (e) In general, the more equal the shares of income within each quintile of the population, the more equal the distribution of income. The poorest 20% of the population concentrates 9% of total income in Lakeland and only 4% in Riverland. At the same time, the wealthiest 20% of the population concentrates the much higher share of 58% of income in Riverland than the 36% of income in Lakeland. Therefore Lakeland has a more equal distribution of income.

(f)

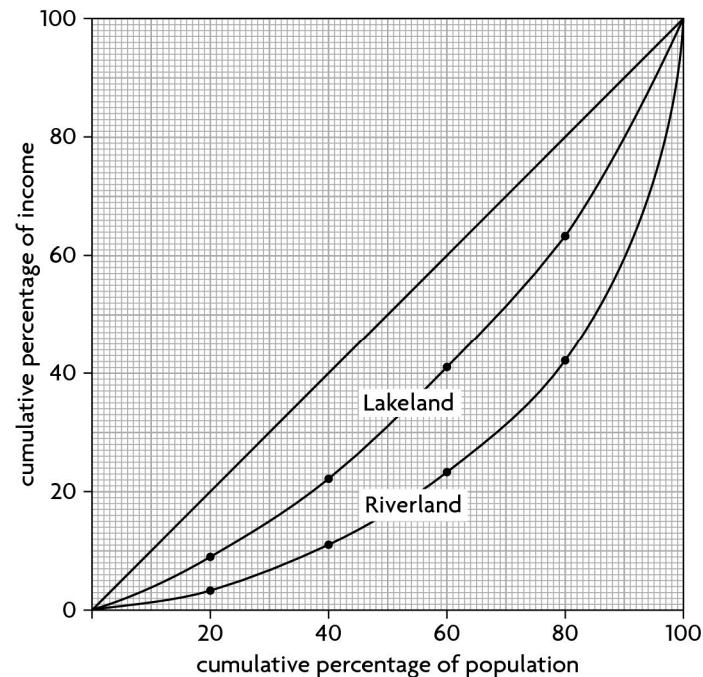


Figure 1

The further away lies a country's Lorenz curve from the diagonal, the more unequal the income distribution. Therefore Riverland has a more unequal distribution of income than Lakeland.

- (g) The Gini coefficient is derived as the area between the diagonal and the country's Lorenz curve divided by the entire area under the diagonal. Therefore the greater the Gini coefficient, the further away lies the country's Lorenz curve from the diagonal, and the more unequal the income distribution. Riverland, whose Lorenz curve lies further away from the diagonal, has a higher Gini coefficient than Lakeland.
- (h) The Gini coefficient can take values from a minimum of 0, which would indicate completely equal income distribution, to a maximum of 1, indicating completely unequal income distribution, where one individual/family takes all the income.
- (i) Increased emphasis on indirect taxes and lower emphasis on direct taxes will result in a new Lorenz curve for the country that is further away from the diagonal.

- (j) The new tax policies are likely to make the income distribution of a country less equal. Indirect taxes are regressive (tax as a share of income falls as income increases), while direct taxes are usually proportional or progressive (tax as a share of income remains constant or increases, respectively, as income increases). The more progressive (less regressive) a tax system, the greater the income redistribution in favour of increased equality.

Question 22

- (a) See textbook, page 316.

- (b) (i) Income of 10 000 Mnl:

tax bracket	tax paid (Mnl)
0–7000 Mnl	0
7001–20 000 Mnl	$0.10 \times 3000 \text{ Mnl} = 300 \text{ Mnl}$
Total tax	300 Mnl

- (ii) Income of 35 000 Mnl:

tax bracket	tax paid (Mnl)
0–7000 Mnl	0
7001–20 000 Mnl	$0.10 \times 13\,000 \text{ Mnl} = 1300 \text{ Mnl}$
20 001–45 000 Mnl	$0.25 \times 15\,000 \text{ Mnl} = 3750 \text{ Mnl}$
Total tax	5050 Mnl

- (iii) Income of 107 000 Mnl:

tax bracket	tax paid (Mnl)
0–7000 Mnl	0
7001–20 000 Mnl	$0.10 \times 13\,000 \text{ Mnl} = 1300 \text{ Mnl}$
20 001–45 000 Mnl	$0.25 \times 25\,000 \text{ Mnl} = 6250 \text{ Mnl}$
45 001–100 000 Mnl	$0.35 \times 55\,000 \text{ Mnl} = 19\,250 \text{ Mnl}$
100 001 or more Mnl	$0.45 \times 7000 \text{ Mnl} = 3150 \text{ Mnl}$
Total tax	29 950 Mnl

- (c) (i) Income of 10 000 Mnl:
average tax rate is $\frac{300}{10\ 000} \times 100 = 3.0\%$; marginal tax rate is 10%
- (ii) Income of 35 000 Mnl:
average tax rate is $\frac{5050}{35\ 000} \times 100 = 14.4\%$; marginal tax rate is 25%
- (iii) Income of 107 000 Mnl:
average tax rate is $\frac{29\ 950}{107\ 000} \times 100 = 28.0\%$; marginal tax rate is 45%
- (d) (i) $\frac{6000}{30\ 000} \times 100 = 20\%$
- (ii) $\frac{6000}{35\ 000} \times 100 = 17.1\%$
- (iii) average income tax (direct tax) rate = 14.4%; average indirect tax rate = 17.1%; total average tax rate = 14.4% + 17.1% = 31.5%
- (e) A regressive tax is defined as one where as income increases, the fraction of income paid as tax decreases. An indirect tax applied on all spending is regressive. A given amount of tax on spending to buy a particular good makes up a smaller fraction of income as income increases.
- (See textbook, page 314, for an explanation.)
- (f) To answer this question you must first calculate the amount of income tax paid as a fraction of income for the two states, as shown in the table.

Annual income (Snl)	Fraction of income paid as income tax	Fraction of income paid as income tax
25 000	23%	23%
36 000	23%	20%
43 000	23%	19%
47 000	23%	18%

Upper Snowland has a proportional tax system, where the tax rate is constant as income increases, and Lower Snowland has a regressive tax system, where the tax rate decreases as income increases.

- (g) Mountainland has a progressive tax system, shown by the increasing marginal tax rate, which indicates that as income increases the fraction of income paid as tax (the average tax rate) increases. A progressive tax system can make the greatest contribution to making income distribution more equal. As higher income groups are taxed at a higher rate, their after-tax income is reduced proportionately more, thus reducing the income differences between higher income groups and lower income groups. A proportional tax system (Upper Snowland) can also make a contribution to improving income equality but to a smaller extent. In a proportional tax system, all income groups are taxed at the same rate, but as income increases the absolute amount of tax increases, thus allowing for some degree of income redistribution in favour of greater equality. A regressive tax system (Lower Snowland) works to redistribute income leading to greater inequality.

Chapter 12 Demand-side and supply-side policies

No topics covered by HL paper 3.

International economics

Chapter 13 International trade

Question 23

- (a) Draw a diagram as in Figure 13.3(b) (textbook, page 359), where country A is Grassland and country B is Oceanland, and where good Y is dairy products and good X is seafood.
- (b) According to the theory of comparative advantage, each country should produce and export the good in which it has a comparative advantage. Grassland should produce and export dairy products and Oceanland should produce and export seafood.
- (c) If Oceanland and Grassland specialise completely in the good in which they each have a comparative advantage, Oceanland will produce only seafood (at the horizontal intercept of its production possibilities curve) and Grassland will produce only dairy products (at the vertical intercept of its production possibilities curve). Grassland will now export some of its dairy products to Oceanland in exchange for seafood, and Oceanland will export some of its seafood to Grassland in exchange for dairy products. This will allow both countries to consume at a point outside their *PPCs*.
- (d) See textbook, pages 354 and 361.
- (e)

	Opportunity cost of good A	Opportunity cost of good B
Country X	$\frac{20}{40} = \frac{1}{2}$	$\frac{40}{20} = 2$
Country Y	$\frac{100}{50} = 2$	$\frac{50}{100} = \frac{1}{2}$

- (f) Country X has a comparative advantage (lower opportunity cost) in the production of good A and country Y has a comparative advantage (lower opportunity cost) in the production of good B.

Country Y has an absolute advantage in the production of both goods as it can produce more of good A and more of good B than country X.

(g)

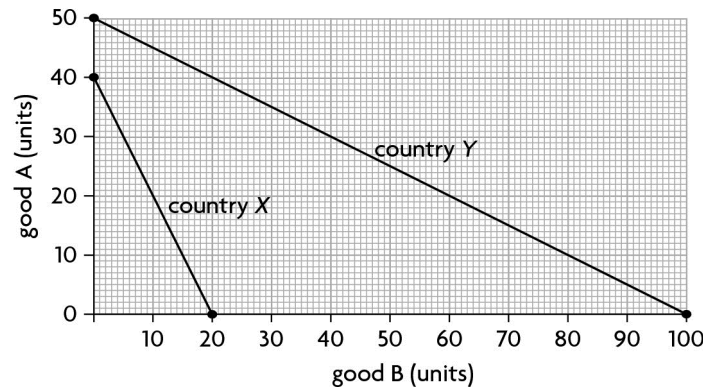


Figure 2

- (h) Neither of the two countries can benefit from specialisation and trade because as their parallel *PPCs* indicate, they have identical opportunity costs, meaning that neither one has a comparative advantage in the production of either good.
- (i) Country B has an absolute advantage in both goods, and a comparative advantage in good X. Country A has a comparative advantage in good Y. (Recall the rule: the country that has the flatter *PPC* has a comparative advantage in the good measured on the horizontal axis.)

Question 24

- (a) Quantity of imports with the tariff = domestic consumption – domestic production =
 $150\,000\text{ kg} - 70\,000\text{ kg} = 80\,000\text{ kg per week}$
- Quantity of imports without the tariff = domestic consumption – domestic production =
 $180\,000\text{ kg} - 50\,000\text{ kg} = 130\,000\text{ kg per week}$
- (b) Price of seafood paid by consumers and received by producers after removal of the tariff =
 price with the tariff – tariff per unit = $25\text{ Rvl} - 5\text{ Rvl} = 20\text{ Rvl}$
- (c) Draw a diagram as in Figure 13.7(a) (textbook, page 366), and label $P_w = 20\text{ Rvl}$; $P_w + t = 25\text{ Rvl}$; $Q_1 = 50\,000$ (domestic production without the tariff); $Q_2 = 70\,000\text{ kg}$ (domestic production with the tariff); $Q_3 = 150\,000$ (domestic consumption with the tariff); $Q_4 = 180\,000$ (domestic consumption without the tariff); $Q_3 - Q_2 = 150\,000 - 70\,000 = 80\,000\text{ kg}$ (quantity of imports with the tariff); $Q_4 - Q_1 = 180\,000 - 50\,000 = 130\,000\text{ kg}$ (quantity of imports without the tariff).

- (d) Consumer expenditure with the tariff = price of seafood with tariff \times quantity of seafood bought by domestic consumers with the tariff = 25 Rvl \times 150 000 kg = 3 750 000 Rvl, or 3.75 million Rvl

Consumer expenditure without the tariff = price of seafood without the tariff \times quantity of seafood bought by domestic consumers without the tariff = 20 Rvl \times 180 000 kg = 3 600 000 Rvl, or 3.6 million Rvl

Therefore consumer expenditure decreased after the removal of the tariff by 3.75 million Rvl – 3.6 million Rvl = 0.15 million Rvl (= 150 000 Rvl).

- (e) Producer revenue with the tariff = price of seafood with tariff \times quantity of seafood produced with the tariff = 25 Rvl \times 70 000 kg = 1 750 000 Rvl, or 1.75 million Rvl

Producer revenue without the tariff = price of seafood without the tariff \times quantity of seafood produced without the tariff = 20 Rvl \times 50 000 kg = 1 000 000 Rvl, or 1 million Rvl

Therefore producer revenue decreased after the removal of the tariff by 1.75 million Rvl – 1 million Rvl = 0.75 million Rvl (= 750 000 Rvl).

- (f) The amount of revenues for the government due to the tariff is the tariff per unit \times the quantity of imports with the tariff = 5 Rvl \times 80 000 kg = 400 000 Rvl. This tariff revenue is lost with the removal of the tariff.

- (g) Foreign producers' export revenue generated by exports to Riverland with the tariff = the world price of seafood \times quantity of Riverland's seafood imports with the tariff = 20 Rvl \times 80 000 kg = 1 600 000 Rvl, or 1.6 million Rvl

Foreign producers' export revenue generated by exports to Riverland without the tariff = the world price of seafood \times quantity of Riverland's seafood imports without the tariff = 20 Rvl \times 130 000 kg = 2 600 000 Rvl, or 2.6 million Rvl

Therefore foreign producers revenues increased by 2.6 million Rvl – 1.6 million Rvl = 1 million Rvl.

- (h) Consumers gained because they are buying more of the product while at the same time paying less for it due to the fall in price (expenditures decreased). Foreign producers gained because they have increased their exports and therefore have a gain in export revenues.
- (i) Domestic producers lost because they are selling less of the product and receiving a lower price for it, resulting in a loss of revenues. The government lost due to the loss of tariff revenues.
- (j) Riverland's trading partners, the seafood exporters, have a comparative advantage in seafood production. This is obvious from the point that the world price of seafood lies below Riverland's domestic price of seafood under autarky (no international trade; this is the equilibrium price in Riverland's seafood market), indicating that Riverland is less efficient in the production of seafood than other countries. This causes it to have excess demand (a shortage) for seafood when it opens up to trade, which is satisfied by imports.
- (k) Refer to Figure 13.7(b) (textbook, page 366), which shows areas d and f as the welfare loss arising from the imposition of a tariff. When the tariff is removed, d and f represent welfare that is regained.

Question 25

- (a) Domestic consumption with the quota = domestic production with quota + quota = 350 000 kg + 150 000 kg = 500 000 kg per week

Domestic consumption without the quota = domestic production without quota + imports without quota = 250 000 kg + 400 000 kg = 650 000 kg per week

- (b) Imports with quota = the amount of the quota = 150 000 kg

Imports without the quota = 400 000 kg (given in the question)

Therefore imports increased by 400 000 kg – 150 000 kg = 250 000 kg.

- (c) Draw a diagram as in Figure 13.9(a) (textbook, page 369) and label $P_q = 20$ Ftl; $P_w = 15$ Ftl; $Q_1 = 250$ 000 kg (domestic quantity produced without the quota); $Q_2 = 350$ 000 kg (domestic quantity produced with the quota); $Q_3 = 500$ 000 kg (domestic consumption with the quota); $Q_4 = 650$ 000 kg (domestic consumption without the quota); $Q_3 - Q_2 = 150$ 000 kg (quantity of imports with the quota); $Q_4 - Q_1 = 400$ 000 kg (quantity of imports without the quota).

- (d) Consumer expenditure with the quota = price with quota \times quantity of dairy products bought by domestic consumers with the quota = 20 Ftl \times 500 000 kg = 10 000 000 kg, or 10 million Ftl

Consumer expenditure without the quota = price without quota \times quantity of dairy products bought by domestic consumers without the quota = 15 Ftl \times 650 000 kg = 9 750 000 kg, or 9.75 million Ftl

Therefore consumer expenditure decreased by 10 million Ftl – 9.75 million Ftl = 0.25 million Ftl (or 250 000 Ftl).

- (e) Producer revenue with the quota = price with quota \times domestic production with quota = 20 Ftl \times 350 000 kg = 7 000 000 Ftl, or 7 million Ftl

Producer revenue without the quota = price without quota \times domestic production without quota = 15 Ftl \times 250 000 kg = 3 750 000 Ftl, or 3.75 million Ftl

Therefore producer revenue decreased by 7 million Ftl – 3.75 million Ftl = 3.25 million Ftl.

- (f) Foreign producers' export revenues generated by dairy exports to Flatland with the quota = world price for dairy products \times Flatland's quantity of dairy imports with the quota = 15 Ftl \times 150 000 kg = 2 250 000 Ftl, or 2.25 million Ftl

Foreign producers' export revenues generated by dairy exports to Flatland without the quota = world price for dairy products \times Flatland's quantity of dairy imports without the quota = 15 Ftl \times 400 000 kg = 6 000 000 Ftl, or 6 million Ftl

Therefore foreign producers export revenues increased by 6 million – 2.25 million = 3.75 million Ftl.

- (g) Quota revenue = amount of quota \times the difference between the domestic price with the quota and the domestic price without the quota = 150 000 kg \times 5 Ftl = 750 000 Ftl

- (h) Foreign producers gained 3.75 million Ftl from the removal of the quota (part (f) above) and lost 750 000 Ftl from the loss of quota revenues. Therefore their total gain was $3\,750\,000 \text{ Ftl} - 750\,000 \text{ Ftl} = 3\,000\,000 \text{ Ftl}$, or 3 million Ftl.
- (i) Consumers gained because they are buying more of the product while at the same time paying less for it due to the fall in price (expenditures decreased). Foreign producers gained because they have increased their exports and therefore have a gain in export revenues, experiencing a net gain after taking into account their loss of quota revenues.
- (j) Domestic producers lost because they are selling less of the product and receiving a lower price for it, resulting in a loss of revenues.
- (k) The effects of quotas are the same as the effects of tariffs with the exception of tariff revenues and quota revenues. In the case of tariffs, the domestic government gains from tariff revenue. In the case of quotas, it is usually the foreign producers who gain the quota revenue, as the domestic government usually distributes quota licences to foreign governments who then distribute them to their producers or exporters.
- (l) Refer to Figure 13.9(b) (textbook, page 369), which shows areas d, e and f as the welfare loss arising from the imposition of a quota. When the quota is removed, d, e and f represent welfare that is regained.
- (m) Any two of the following:
- improvement in domestic income distribution
 - increased efficiency in production
 - improvement in the global allocation of resources.
- (For more information see textbook, pages 369–70.)

Question 26

- (a) The price received by producers with the subsidy = $P_w + \text{subsidy per unit} = 25 \text{ Gsl} + 5 \text{ Gsl} = 30 \text{ Gsl}$.

The price received by producers without the subsidy = $P_w = 25 \text{ Gsl}$.

- (b) The total amount of cereals consumed with and without the subsidy is the same.

Domestic consumption with the subsidy = domestic production with subsidy + quantity of imports = $150\,000 \text{ kg} + 75\,000 \text{ kg} = 225\,000 \text{ kg}$ per week

Domestic consumption after the subsidy is again equal to domestic production plus the quantity of imports; as domestic production falls with the removal of the subsidy, the quantity of imports increases to make up for the loss of domestic production.

- (c) Domestic consumption with the subsidy of 225 000 kg (from part (b) above) remains the same after the removal of the subsidy. Therefore, with domestic production falling to 80 000 kg after the removal of the subsidy, imports increase by $225\,000 - 80\,000 = 145\,000 \text{ kg}$.

- (d) Draw a diagram as in Figure 13.11(a) (textbook, page 372), and label $P_w = 25$; $P_s = 30$; $Q_1 = 80\,000$ kg (domestic production without the subsidy); $Q_3 = 150\,000$ kg (domestic production with the subsidy); $Q_2 = 225\,000$ kg (domestic consumption with and without the subsidy); $Q_2 - Q_3 = 75\,000$ kg (quantity of imports with the subsidy); $Q_2 - Q_1 = 145\,000$ kg (quantity of imports without the subsidy).

- (e) There is no change in consumer expenditure after the removal of the subsidy, since both the price paid and the quantity purchased remain the same.

(Consumer expenditure is given by $P_w \times$ quantity purchased = $25 \text{ Gsl} \times 225\,000 \text{ kg} = 5\,625\,000 \text{ Gsl}$, or 5.625 million Gsl)

- (f) Producer revenue with the subsidy = $P_s \times$ domestic production with the subsidy = $30 \text{ Gsl} \times 150\,000 \text{ kg} = 4\,500\,000 \text{ Gsl}$, or 4.5 million Gsl

Producer revenue without the subsidy = $P_w \times$ domestic production without the subsidy = $25 \text{ Gsl} \times 80\,000 \text{ kg} = 2\,000\,000 \text{ Gsl}$, or 2 million Gs

Therefore producer revenue decreased by $4.5 \text{ million Gsl} - 2 \text{ million Gsl} = 2.5 \text{ million Gsl}$.

- (g) The amount of spending by the government to provide the subsidy = subsidy per unit (or $P_s - P_w$) \times quantity produced domestically with the subsidy = $5 \text{ Gsl} \times 150\,000 \text{ kg} = 750\,000 \text{ Gsl}$. Therefore the government budget gains this amount.

- (h) Foreign producers export revenues generated by cereal exports to Grassland with the subsidy = $P_w \times$ Grassland's cereal imports with the subsidy = $25 \text{ Gsl} \times 75\,000 \text{ kg} = 1\,875\,000 \text{ Gsl}$, or 1.875 million Gsl

Foreign producers export revenues generated by cereal exports to Grassland without the subsidy = $P_w \times$ Grassland's cereal imports without the subsidy = $25 \text{ Gsl} \times 145\,000 = 3\,625\,000 \text{ Gsl}$, or 3.625 million Gsl

Therefore foreign producers gain by the amount $3.625 \text{ million Gsl} - 1.875 \text{ million Gsl} = 1.75 \text{ million Gsl}$.

- (i) The government has gained by not having to pay the subsidy. Foreign producers have gained through the increase in their export revenues.
- (j) Domestic producers have lost as their revenues decreased due to the fall in the price and fall in quantity produced.
- (k) Consumers remained unaffected, as both the price they pay and the quantity they buy remain the same.
- (l) Unlike in the case of tariffs and quotas:
- subsidies do not affect the price paid by consumers and the quantity they purchase
 - as a result, subsidies have a smaller distorting effect on resource allocation, because they do not lead to any welfare loss associated with changes in consumption.

Chapter 14 Exchange rates and the balance of payments

Question 27

- (a) $1 \text{ Rv} = \frac{1}{2.5} \text{ Mnl} = 0.4 \text{ Mnl}$
- (b) $1500 \text{ Rv} = 1500 \times 0.4 \text{ Mnl} = 600 \text{ Mnl}$
- (c) Since $1 \text{ Mnl} = 2.5 \text{ Rv}$, $175 \text{ Mnl} = 2.5 \times 175 = 437.5 \text{ Rv}$.
- (d) Since $1 \text{ Mnl} = 2.7 \text{ Rv}$, $175 \text{ Mnl} = 2.7 \times 175 = 472.5 \text{ Rv}$.
- (e) Currency appreciation refers to an increase in the value of the currency expressed in terms of other currencies.

Currency depreciation refers to a decrease in the value of the currency expressed in terms of other currencies.

In this case, when the value of 1 Mnl changed from 2.5 Rv to 2.7 Rv, the Mnl appreciated (increased in value relative to the Rv) and the Rv depreciated (fell in value relative to the Mnl).

(f) $\% \text{ appreciation of the Mnl} = \frac{2.7 - 2.5}{2.5} \times 100 = \frac{0.2}{2.5} \times 100 = 8\%$

To find the % depreciation of the Rv, you must first calculate the value of the Rv in terms of the Mnl before and after the exchange rate change:

Before depreciation: $1 \text{ Rv} = \frac{1}{2.5} \text{ Mnl} = 0.4 \text{ Mnl}$

After depreciation: $1 \text{ Rv} = \frac{1}{2.7} \text{ Mnl} = 0.37 \text{ Mnl}$

$\% \text{ depreciation of the Rv} = \frac{0.37 - 0.4}{0.4} \times 100 = -7.5\%$

- (g) See textbook, pages 385–6, for a discussion of causes of changes in exchange rates. Be sure to refer specifically to how each factor you choose impacts upon the Mnl, which appreciates, and the Rv, which depreciates.
- (h) Refer to Figure 14.2, textbook, page 384.

Question 28

Important note: There is an error in the demand and supply functions. These should be:

$$Q_d = 16 - 4P \qquad Q_s = -2 + 5P$$

- (a) $16 - 4P = -2 + 5P \Rightarrow 9P = 18 \Rightarrow P = 2$; i.e. the equilibrium exchange rate is 1 Mnl = 2 Rvl

- (b) $Q = 16 - 4(2) = 8$; alternatively, $Q = -2 + 5(2) = 8$. Therefore the equilibrium quantity of Mnl bought and sold each day is 8 million Mnl per day.

- (c) It is a freely floating exchange rate system.

- (d) If the Mnl is pegged at 1 Mnl = 2.3 Rvl, then

$$Q_d = 16 - 4(2.3) = 16 - 9.2 = 6.8; \text{ i.e. 6.8 million Mnl will be demanded per day.}$$

$$Q_s = -2 + 5(2.3) = -2 + 11.5 = 9.5; \text{ i.e. 9.5 million Mnl will be supplied per day.}$$

Therefore there will be a surplus (excess supply) of 9.5 million – 6.8 million = 2.7 million Mnl per day.

- (e) The Mnl will be overvalued at the exchange rate of 1 Mnl = 2.3 Rvl, meaning that its value is too high relative to its equilibrium free market value.

- (f) Any two of the following:

- use of official reserves; the Bank of Mountainland (the central bank) can buy the surplus of Mnl by selling foreign exchange reserves
- the Bank of Mountainland can raise interest rates in order to attract financial investments from abroad, which would increase the demand for the Mnl (shift the demand for Mnl curve to the right to eliminate the surplus)
- the government of Mountainland can borrow from abroad, thus increasing the demand for the Mnl
- the government can attempt to limit imports through contractionary policies or trade protection policies (this would reduce the supply of Mnl in the foreign exchange market, i.e. shift the Mnl supply curve to the left, to reduce the excess supply of Mnl)
- the government can impose exchange controls, limiting the outflow of Mnl (this would also shift the supply of the Mnl to the left).

(For more information on these points see textbook, pages 388–9.)

- (g) Draw an exchange rate diagram showing 1 Mnl = 2 Rvl as the equilibrium exchange rate, and show the excess supply of Rvl that would result at the exchange rate of 1 Mnl = 2.3 Rvl.

- (h) If the Mnl is pegged at 1 Mnl = 1.7 Rvl, then

$$Q_d = 16 - 4(1.7) = 16 - 6.8 = 9.2; \text{ i.e. 9.2 million Mnl will be demanded per day.}$$

$$Q_s = -2 + 5(1.7) = -2 + 8.5 = 6.5; \text{ i.e. 6.5 million Mnl will be supplied per day.}$$

Therefore there will be a shortage (excess demand) of 9.2 million – 6.5 million = 2.7 million Mnl per day.

- (i) The Mnl will be undervalued at the exchange rate of 1 Mnl = 1.7 Rvl, meaning that its value is too low relative to its equilibrium free market value.
- (j) Possible policies:
- use of official reserves; the Bank of Mountainland (the central bank) can sell Mnl by buying foreign exchange
 - any policy that encourages outflows of Mnl from Mountainland, putting a downward pressure on the value of the currency.

Question 29

- (a) See textbook, page 395.

- (b)

	Billion Ocl
Current account	
Exports of goods	+25
Imports of goods	-36
Balance of trade in goods	-11
Exports of services	+3
Imports of services	-2
Balance of trade in services	+1
Balance of trade in goods and services	-10
Income	+3
Current transfers	+2
<i>Balance on current account</i>	-5
Capital account	
Capital transfers	-3
Transactions in non-produced, non-financial assets	+1
<i>Balance on capital account</i>	-2
Financial account	
Direct investment	+6
Portfolio investment	-2
Reserve assets	+4
<i>Balance on financial account</i>	+8
<i>Net errors and omissions</i>	-1
<i>Balance</i>	0

- (c) Accounts in deficit: the current account and the capital account (debits are larger than credits, therefore the balance has a negative sign).

Account in surplus: the financial account (credits are larger than debits, therefore the balance has a positive sign).

- (d) This means that the central bank of Oceanland has bought 4 billion Ocl in 2010 by selling reserve currencies (official reserves). The + sign indicates that the 4 billion Ocl are a credit in the financial account, meaning that there has been an inflow of Ocl. If the central bank had not purchased the Ocl, there would be an overall deficit in the balance of payments, with an excess of debits over credits, and the overall balance of the balance of payments would not be zero.
- (e) The balance of payments statistics for Oceanland show that the current account is in deficit, and that this deficit is due to a deficit in the balance of trade in goods (i.e. imports of goods greater than exports of goods). The depreciation of the Ocl is undertaken with a view to correcting this trade deficit, by encouraging exports to increase and imports to decrease. Whether or not the depreciation will have the desired effect depends on the Marshall–Lerner condition, which is that a currency depreciation will work to reduce the trade deficit if the sum of the price elasticities of demand (PED_s) for imports and exports is greater than 1; if this sum is less than 1 then the depreciation will have the effect of making the trade deficit larger. In Oceanland's case, over the short-term (less than six months, $PED_x + PED_m = 0.49 + 0.39 = 0.86$, which is less than 1. Therefore during this period the trade deficit is likely to become larger and the balance on current account will worsen.
- (f) Over the longer term (more than six months) $PED_x + PED_m = 0.75 + 0.83 = 1.66$, which is greater than 1. Therefore during this period it is likely that Oceanland's trade deficit will start to shrink and its current account balance will begin to improve.
- (g) The condition is the Marshall–Lerner condition, explained in part (e) above.
- (h) Draw a diagram as in Figure 14.7 (a) or (b) (textbook, page 411). The J-curve effect is an illustration of a country's worsening trade balance during the early months of a depreciation (the downward-sloping part of the curve), and improving trade balance over longer periods of time (the upward-sloping part of the curve). The deterioration in the trade balance is likely to occur over the short term because the PED_s for exports and imports tend to be low over short periods of time, adding up to less than 1, as in Oceanland's case. Over longer periods, the PED_s of exports and imports are likely to increase; if their sum becomes greater than 1, as in Oceanland's case, then the depreciation will lead to an improvement in the trade balance. The J-curve effect can be explained by the Marshall–Lerner condition (explained in part (e) above).

Chapter 15 Economic integration and the terms of trade

Question 30

- (a) Terms of trade = $\frac{\text{index of average export prices}}{\text{index of average import prices}} \times 100$

- (b) 1990 has been taken as the base year. This means that the numerator in the equation above, or the index of average export prices, has been computed as a weighted price index where 1990 was used as the base year and set equal to 100. In addition, the denominator, or the index of average import prices, was also computed as a weighted price index with 1990 as the base year and therefore equal to 100.

$$\text{Therefore the terms of trade for the base year} = \frac{100}{100} \times 100 = 100.$$

(c) (i) Oil-exporting countries: $\frac{119 - 21}{21} \times 100 = 466.7\%$

(ii) Non-oil exporting developing countries: $\frac{109 - 126}{126} \times 100 = -13.5\%$

(iii) Developed countries: $\frac{87 - 110}{110} \times 100 = -20.9\%$

- (d) The oil-exporting countries experienced an improvement in their terms of trade (a very large one). The other two groups of countries experienced a deterioration, which is apparent from the decline in their terms of trade index in the period 1970–81.
- (e) The deterioration in the terms of trade of the non-oil exporting countries and the developed countries is likely due to the oil price increases that led to the improvement in the terms of trade of the oil-exporting countries. The oil-exporting countries experienced a huge improvement in their terms of trade because they are highly specialised in the production and export of oil; therefore their terms of trade index of average export prices is very much a reflection of the large increases in the price of oil over the period shown. In the other two groups of countries, exports and imports tend to be much more diversified, with oil taking a far smaller weight in their indices of export and import prices; therefore resulting in far smaller deterioration in their terms of trade.
- (f) Long-term changes in the terms of trade are likely to give rise to a global redistribution of income and global output, with the countries experiencing improvements in their terms of trade gaining and those experiencing a deterioration losing. The reason can be found in the principle that countries experiencing an improvement can buy a larger quantity of imports with the same amount of exports, or alternatively the same quantity of imports with a smaller amount of exports. In other words, the opportunity cost of their imports falls, and they gain from a transfer of income and output from other countries. Countries experiencing deterioration must increase the quantity of their exports in order to maintain a given quantity of imports, thus facing an increasing opportunity cost of imports, and a transfer of income and output toward other countries.
- (g) Draw a diagram as in Figure 2.11(b) (textbook, page 32) showing a leftward shift of the supply curve resulting in an increase in the equilibrium price and decrease in the equilibrium quantity of oil.

- (h) When the terms of trade of a country change due to changes in global supply (in this case due to the restriction of oil supplies by the oil exporting countries), it is not possible to predict the effects on the balance of trade without knowledge of the price elasticity of demand for exports and imports. In this case what is important is the PED of exports as we are examining the oil-exporting countries. Since $PED_x < 1$ in the case of oil (inelastic demand), as the price of oil increased, it gave rise to a proportionately smaller decrease in the quantity of oil exports demanded. Therefore it follows that the improvement in the terms of trade following the oil price increases gave rise to increasing oil export revenues, which eventually led to very large trade and current account surpluses for the oil exporting countries. (Note that this would not have been possible in the case of a good with a $PED_x > 1$, as in this case the price increase resulting from a restriction in supply would lead to a proportionately larger decrease in exports demanded, and hence falling export revenues and a worsening trade and current account balance.)

Development economics

No topics covered by HL paper 3.