Zig Zag Education

Economics AS and A Level | Edexcel B | 8EB0/9EB0

Quantitative Skills for A Level Edexcel Economics B

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Contents

Teacher's Introduction

Edexcel has published a list of the quantitative skills in Economics required for the new course. 15% of the overall marks awarded at AS and 20% of the marks at A Level will require 'at least Level 2 [GCSE] mathematical skills'.

Economics students sometimes find the numerical skills required for success a challenge. This resource has been produced with the intention of providing them with the opportunity to review the specific topics and concepts mandated by the exam board that require numerical understanding. Where possible, data from real-world sources is used to expand contextual understanding. This will help with the data-response questions found in the exams as well as aiding the student to 'think like an economist' more generally.

Each section within the resource allows students to examine both theoretical notes and worked examples. Theory is discussed when needed but the focus is predominantly on quantitative methods.

Students have the opportunity to complete practice questions, some of which are in exam style, which will help develop the necessary numerical skills and consolidate understanding. These questions should build students' confidence in having the required ability to demonstrate their full potential in AS and A Level Economics, in both class and examination conditions.

This resource covers all of the topics mentioned in the quantitative skills annex of the Edexcel specification. Each skill is structured as follows:

- **Part A: Specification Overview** – this provides an overview of the term or concept specified by the exam board and the understanding required. This includes details of where skills are applied to A Level only material.
- **Part B: Theoretical Overview** – a brief summary of the key points associated with the numerical term/concept. Content is linked to the relevant part of the specification with the symbol shown on the right.

  » Topic 1.1.1
- **Part C: Example** – detailed numerical and written responses to exam-style questions.
- **Part D: Practice Activities** – skills 1–11 are concluded with practice activities that allow students to demonstrate their understanding of the relevant terms and concepts.

Included in this workbook are two additional quantitative skills that are not required in the DfE Subject Content for Economics list. These are the **Level of a Variable and the Rate of Change** and **Composite Indicators**. These are covered after the first 11 skills and because of their nature do not include practice activities. *Note that these have been adopted from the Economics A specification but are nevertheless relevant to the Economics B specification – especially **Composite Indicators**, which covers the Human Development Index (HDI).*

At the end of the resource can be found:

- a **Quantitative Skills Assessment Activity**, which provides students with the opportunity to complete an assessment which is presented in a format similar to that which they will encounter in their exams (this is also provided as an A5 booklet master)
- **suggested Answers to Practice Activities**, which provide a mark scheme for the practice activities that appear in Skills 1 to 14
- the **Mark Scheme for the Quantitative Skills Targeted Test**, which provides a mark scheme for exam-style assessment
- a short **appendix** with some key economic indicators for the UK provided as reference

April 2018

Students' Introduction

Economics is the science of choice. In order to analyse and inform the choices of governments, the subject has to be a quantitative discipline. At AS and A Level th GCSE Maths but the key is that maths is not used for the sake of it: there is alwa questions are an opportunity to apply your economic knowledge to real data.

Those taking A Level Maths should find most of the quantitative content straight worry. If stuck with a question, then don't panic: all of the information you need think 'what can I do with these numbers?'

This resource will guide you through the quantitative skills required for the cours have covered a lot of it already at GCSE – means, medians, ratios and fractions, f for you to work through the questions and examples to expose yourself to the ic practising the techniques, you will ensure some relatively easy marks in the exar the longer-answer questions. Good luck!

SKILL 1: CALCULATE, USE AND UNDERSTAND RATIOS AN

Part A: Specification Overview

The idea of ratio and proportion is important and relevant throughout the specif feature when analysing a firm's financial information through ratio analysis, whe and capacity utilisation, and also when considering the degree of oligopoly in a r examined at A Level *only*).

Part B: Theoretical Overview

A ratio is a comparison between two quantities. Usually these are expressed as ' of 6 : 8 boys to girls in a class tells us that there are 6 boys for every 8 girls. There example – 12 boys and 16 girls.

The ratio in the example above can be reduced from 6 : 8 to 3 : 4. It still tells us e relative quantities of boys and girls remain unchanged. We could reduce it even girls, indicates the same thing – but of course pupils can't be divided so it's best numbers) when talking about people.

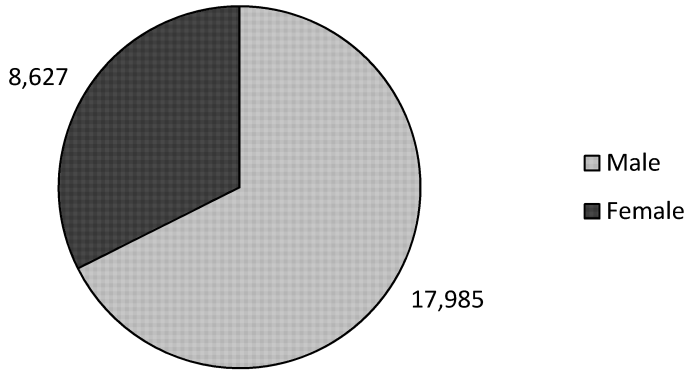
Note, further, that ratios can be reduced such that they represent decimal propo of 6 : 8 can be presented as 0.43 : 0.58 by dividing both sides by the *total* (which sum to 1, so these numbers can be quickly converted to percentage terms by mu ratio in Economics is much more likely to be expressed as just one number and r because the other option is often *implicit*.

If we talk about the *capacity utilisation* ratio, for instance, then we are consideri as a proportion of the firm's maximum possible output (that is, their 'capacity'). resources and factor inputs fully and efficiently, it is said to be operating at full c what is actually being used is what *isn't* being used, but this need not be stated e utilisation ratio (which serves as the basis for a percentage calculation (QS2)) car number. This is because the ratio has been reduced, as we did with the pupils, to percentage. This allows us to think of the ratio more clearly as a *proportion* of a

Firms' individual capacity utilisation is likely to differ from business to business a there's no 'typical' value to analyse. However, let's assume that some firm has d degree of spare capacity (perhaps because it wants to build in some 'slack') and utilisation ratio is 0.80. Traditionally, this ratio would be expressed in the format number denotes the proportion of the firm's capacity that is *not* being utilised (i the proportion of the firm's capacity that is not being used implicitly from the ca because the ratio has been reduced so both sides sum to *one* and we can work c necessary). Note that it is very easy to convert this form into a percentage: just r will often be expressed in percentage terms. For further discussion of percentag **QS 2 (Calculate, use and understand percentages, percentage changes and per**

Note, finally, that proportions (and percentages) of a whole may be shown visua *never* used to show changes over time. There is an example on the next page – t taking A Level Economics in 2014.

A Level Economics Students 2014
(Total: 26,612)



Source: JCQ

Financial Ratio Analysis

Ratios are important in the AS and A Level Economics B course when using ratio
profitability, and also in conducting break-even analysis. Specifically, you are req
firm's *gross*, *operating* and *net profit margins*, as well as the *margin of safety*. To
ratios can measure a business's success as well as identifying potential risks.

Gross Profit Margin (Ratio):

First, a firm's gross profit refers to its revenue less its cost of sales – that is, the c
such as the cost of raw materials, or the cost of operating capital equipment. Th
expresses this measurement of profit as a proportion of the firm's total revenue

$$Gross\ Profit\ Margin = \frac{Gross\ Profit}{Revenue} = \frac{Revenue - Co}{Rever}$$

Note that the gross profit margin is usually multiplied by 100 in order to present
gross profit margin was, say, 0.30 (or 30%) we would know that the firm was ma
sales – that is, for every £1 in sales, £0.30 is gross profit. Finally, this financial rat
business's performance in previous periods or to that of another *similar* busines
profitability and ability to control cost of sales. Importantly, this ratio must *only*
same industry, otherwise it tells us very, very little about the firm's success.

Operating Profit Margin (Ratio):

Following on from gross profit, a firm's operating profit takes gross profit and th
expenses (sometimes referred to as 'overheads') – that is, costs that are not dire
but are nevertheless incurred by the firm through the business's operation (e.g.
utility bills, marketing costs etc.). The operating profit margin then takes this figu
proportion of the firm's revenue.

$$Operating\ Profit\ Margin = \frac{Operating\ Profit}{Revenue} = \frac{Gross\ Profit -}{R}$$

Again, it's worth noting that this ratio is usually multiplied through by 100 in ord
percentage terms. Note that this financial ratio is analysed in much the same wa
except that changes in the figure represent changes in the firm's ability to mana
direct cost of sales.

Net Profit Margin (Ratio):

'Net' profit builds on the two preceding measurements of profits but includes re
activities (e.g. income received from investments) as well as making deductions
charges (e.g. interest payments) and taxation. The net profit margin then takes t
expresses it as a proportion of the firm's revenue.

$$Net\ Profit\ Margin = \frac{Net\ Profit}{Revenue}$$

Again, this financial ratio is usually expressed as a percentage by multiplying by 1
the same way as *gross* profit and *operating* profit except that changes reflect ch
of non-trading activity, or financing costs. If a firm's net profit margin increases,
shareholders in dividends at the end of the year.

Margin of Safety:

Finally, we have the *margin of safety* ratio, which is relevant to Topic 1.6.3 of the
preceding ratios because it is concerned not with pure profitability but with the
business exceeds its break-even quantity. It therefore indicates by how much sal
starts to make a loss. It is the difference between the firm's actual output and th
as a proportion of total output.

$$Margin\ of\ Safety = \frac{Actual\ Sales\ Volume - Break\text{-}e}{Actual\ Sales\ Volume}$$

Essentially, it is a measure of the business's 'buffer' in terms of units of output. I
is said to have a large margin of safety, and the closer the ratio is to one the larg
If there was a *negative* demand shock for a business with a small margin of safet
unprofitable.

Part C: Example

The table below shows selected information from Pizzas with Pizzazz Limited's st
income.

Statement of Comprehensive Income for Pizzas with Pizzazz for Year En	
	£
Revenue	24
Cost of Sales	(16
Gross Profit	
Rent	(
Wages	(
Utilities	(
Internet	(
Marketing Expenses	(
Operating Profit	
Note that parentheses indicate expenses.	

1. Calculate Pizzas with Pizzazz Limited's *gross* profit.

$$Gross\ Profit = Revenue - Cost\ of\ Sales$$
$$Gross\ Profit = 24{,}800 - 16{,}200 = 8{,}600$$

2. Calculate Pizzas with Pizzazz Limited's *gross* profit ratio to *two* decimal pla

$$Gross\ Profit\ Margin = \frac{Gross\ Profit}{Revenue}$$
$$Gross\ Profit\ Margin = \frac{8{,}600}{24{,}800}$$
$$Gross\ Profit\ Margin = 0.34677 \ldots = 0.35$$

Note that profit margins are usually expressed as percentages by multiplyin
Pizzazz's case, this would mean that their gross profit margin is 35%, implyi
constitutes gross profit**.**

3. Calculate Pizzas with Pizzazz Limited's *operating* profit.

$$Operating\ Profit = Gross\ Profit - Operating\ Ex$$
$$Operating\ Profit = 8{,}600 - (400 - 780 - 260 - 40 - 4$$

4. If Pizzas with Pizzazz's *net* profit margin was equal to 0.20, calculate the va

$$Net\ Profit\ Margin = \frac{Net\ Profit}{Revenue}$$
$$0.2 = \frac{Net\ Profit}{24{,}800}$$
$$Net\ Profit = 0.2(24{,}800)$$
$$Net\ Profit = 4{,}960$$

5. Calculate the value of the additional deductions from *operating* profit to a

$$Net\ Profit = Operating\ Profit - Deduction$$
$$4{,}960 = 6{,}680 - Deductions$$
$$Deductions = 6{,}680 - 4{,}960$$
$$Deductions = 1{,}720$$

Part D: Practice Activities

1. If a dentistry firm has the productive ability to produce 6,800,000 units of tc
has had a particularly unproductive year and has only produced 5,100,000 u
utilisation?

2. **a)** Suppose that David can pick 400 blackberries in four hours. Calculate D
ratio.
b) If Jess can pick 900 blackberries in the same amount of time, what is he
c) Calculate the ratio of David's labour productivity to Jess's. Express you

3. 'In 2016 a British petroleum company's revenue had fallen from £300,000 t
spillage in the Gulf Coast led members of the public to boycott the business
direct cost of sales remained constant at a total of £100,000 million during t
unable to respond to the sudden demand shock by cutting back its operatio

a) Calculate the company's operating profit margin for 2015.
b) Calculate the company's operating profit margin for 2016.
c) Calculate the percentage change in the operating profit margin betwee

SKILL 2: CALCULATE, USE AND UNDERSTAND PERCENT
CHANGES AND PERCENTAGE POINT CHANG

Part A: Specification Overview

Understanding percentages and percentage changes is necessary throughout the
Growth in GDP figures, unemployment and inflation rates, and so on, will often b
bodies of the examination's extracts as well as assessed via quantitative questio
comfortable interpreting *and* calculating them. Understanding percentage chang
calculations (such as the price and income elasticities of Topics 2.2.1 and 2.2.4, c

Part B: Theoretical Overview

The term 'percent' comes from Latin and means 'for each hundred'. We have alr
when talking about ratios because the idea is similar.

A percentage expresses the proportion of one value with respect to another. By
it makes it much easier to compare values. We could say that 4 out of 20 people
while 5 out of 30 people are unemployed in Town B. Stated like this, it is tricky to
it's not immediately obvious which town has a higher unemployment rate. It's m
the numbers into percentage terms.

To convert, divide one side of the ratio by the other and then multiply it by 100.

Town A: $\left(\frac{4}{20}\right) \times 100 = 20\%$

Town B: $\left(\frac{5}{30}\right) \times 100 = 16.7\%$

Now it becomes clear that the unemployment rate is higher in Town A.

In Economics we are often concerned with how variables are affected by other f
increases its expenditure, does the employment rate rise? If the pound depreciat
increase as other countries find it more cost-effective to buy our goods?

To consider these sorts of things, it's often useful to look at percentage *change* i
To work out the percentage change, use the following formula:

$$\text{Percentage Change} = \frac{(\text{New Value} - \text{Old Value})}{\text{Old Value}} \times$$

For example, if a firm expands, it might see its costs of production increase beca
needed to produce a greater quantity of output. It could be the case that firm's c
£180,000. Therefore, the percentage increase would be calculated as follows:

$$\text{Percentage Increase} = \frac{(£18{,}000 - £150{,}000\ )}{£150{,}000} \times 100$$

Note that an increase of 100% means that the initial value has doubled (and is n

You should be aware of percentages of percentages; if the central bank raises in
this is an increase of *one percentage point*, but interest rates have **not** increased
percentage change above:

$$\%\ \text{Increase in Interest Rates} = \frac{(6\% - 5\%)}{5\%} \times 100 =$$

The rate has risen by one percentage point, *but this means interest rates have in*

Part C: Example

1. **Suppose the GDP of Germany is £4.5 trillion. Agriculture contributes £0.13 this figure. What percentage of the total is this?**

$$\frac{0.135}{4.5} \times 100 = 3\%$$

2. **Germany's total GDP figure rose by 4% over the course of a year. What wa the year?**

$$4.5 + \left(\left(\frac{4.0}{100} \right) \times 4.5 \right) = £4.68 \text{ trillion}$$

3. **The following year, the GDP rose even higher, going from 4% to 5%. What *rates* does this represent?**

$$\% \text{ change} = \frac{(5 - 4)}{4} \times 100 = 25\%$$

Part D: Practice Activities

1. Suppose that a firm has 890 workers, of whom 340 have a degree. What pe go to university? Give your answer to two decimal places.

2. In the UK, one in seven 16–24-year-olds are considered unemployed. What *unemployment*? Give your answer to two decimal places.

3. The total number of unemployed 16–24-year-olds rises from 498,000 to 52(is this? Show your working.

4. Below is a table showing unemployment rates in the UK and in Spain in 200

Country	Unemployment Rate %	
	2008	2012
UK	5.1	8.2
Spain	9	23.2

Source: Eurosta

   a) How many percentage points higher was unemployment in Spain in 20 UK in the same year?
   b) Unemployment rates in the UK decreased from 8.2% in 2012 to 6.9% ir **decrease** in unemployment rates does this represent?

5. Suppose that a business prices its products with at 40% mark-up in order to guarantee that its costs will be covered if its products are sold. If it sells its p calculate the cost of manufacture.

> **Exam tip:** Make sure you include the percentage sign (%) ir given to two decimal places to ensure you get all the availc

SKILL 3: UNDERSTAND AND USE THE TERMS 'MEAN' ANI

Part A: Specification Overview

An understanding of statistical measures such as mean and median are required
necessary to understand both the different calculation methods and the reason
should be interpreted differently. Specifically, the concept of means (averages) i
average costs, revenues and profits (Topic 1.6.1 – covered in **QS6 (Calculate cost
average and totals**)), while medians are needed when assessing the distribution

Part B: Theoretical Overview

Means are commonly defined as the sum of a set of numbers divided by the nun
Often, the 'arithmetic mean' or simply the 'mean' of a set of values is referred tc
to the same thing. Familiarise yourself with all these terms just to be on the safe

$$Mean\ (or\ Average) = \frac{Total\ Sum\ of\ Values}{Number\ of\ Values}$$

Averages are essentially a measurement of the 'central tendency' of a set of valu
average is a measure of the most 'typical' number from a set of figures. Often, m
clustered around this central value (this is referred to as a 'normal' distribution i
help us to draw conclusions from data.

In Economics it is sometimes more appropriate to use the median rather than th
the mean can be affected by outliers in the data – that is, values that don't really
Formally, the median is the 'middle number' in a data set. It can be calculated us

$$Median = \left\{\frac{N+1}{2}\right\}^{th}\ value\ where\ N\ is\ number\ of\ values$$

Note, however, that the data set must be ordered before calculating the median
simple and you would have covered them in GCSE Maths – and perhaps before t
example calculations.

Part C: Example

When we think of averages, most of the time we're thinking about the 'arithmet
types of average, such as the 'geometric mean' and the 'harmonic mean', but we
and concentrate on what's important to us.

Means are remarkably easy to calculate. All you to do is find the total 'sum' of a
then you divide this number by the 'number of numbers'.

Let's consider the unemployment rate of 10 countries in an unspecified year.

Country	*Unemployment Rate (ILO Estimate) (%)*
Qatar	0.2
Vietnam	2.2
Japan	3.1
Korea	3.7
Switzerland	4.6
China	4.6
United Kingdom	4.8
Norway	4.8
Canada	7.1
France	10.0
Total	45.1

Now, although the unemployment rate varies quite substantially between the co
there's a 9.8 percentage point difference between Qatar and France) we are still
number that is typical for the group – that is, a measure of 'central tendency.' If
country's unemployment rate, the total is 45.1%. Obviously, this figure is nonser
divide by the total number of countries in the study (10), we find the average, or

$$\text{Average} = \frac{(0.2 + 2.2 + 3.1 + 3.7 + 4.6 + 4.6 + 4.8 + 4.8 + 7.1 + 1}{10}$$

So, what we now know is that the 'average' or 'typical' country in this group has
That's pretty much what we'd expect since this value falls roughly *halfway* throu
it is close to the 'centre.'

However, as economists we have to be *very* careful of using averages. Although
turned out to be a fairly good measurement of the unemployment rate for a typ
work out this way.

Imagine that another economy was added to the study of 10 countries. Zimbabv
with an unemployment rate that is reported to be as high as 95% . What we wou
countries' unemployment rates would increase to 140.2% and the average unem
about 12.8% – this, clearly, would be a less representative figure than the one w

It's clear that the median would serve as a more representative measurement of
Zimbabwe's unemployment rate had been added to the data set. Note that the r
and would be China, with an unemployment rate of 4.6% – this is a much better
unemployment rate than 12.8%!

Remember that if the data wasn't ordered before calculating the median, you'd

Part D: Practice Activities

7 7 8 8 9 10 12 12 13 15 18

1. The numbers above are hourly wages for the employees in a small firm.

a) What is the mean wage? Show your working.

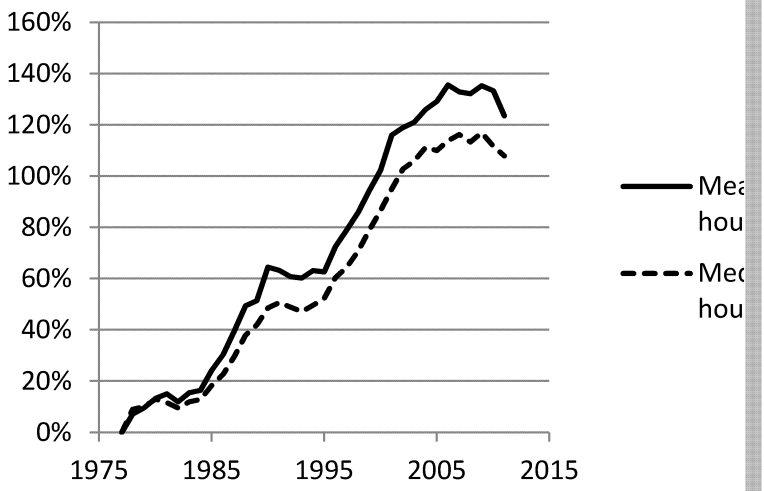
b) What is the median wage? Show how you arrive at your answer.

2. Suppose that the government is considering introducing legislation to limit t receive. The boss of this company (whose wage is not in the list above) will the typical wage.

a) Would he prefer the average used to be the mean wage or the median salary would be in each case.

b) If the aim of the government was to reduce inequality, which option w

Mean vs Median UK Household Income



Sou

3. Above is a chart showing the change in mean disposable income and media since 1977. What can you interpret from the graph?

4. **Table below** shows data relating to monthly costs and output of a small cor UK.

Fixed Costs	
Variable Costs	
Monthly Output	

Using the information in the table, calculate the *average cost* of a computer

5. Rwanda's GDP was about $8,095 million in 2015. Its population is approxim

a) What was Rwanda's GDP per capita in 2015?

b) If Rwanda's GDP grew by 20% between 2015 and 2016, what would GD assuming population remained constant?

SKILL 4: UNDERSTAND AND USE RELEVANT QUANTILES (Q

Part A: Specification Overview

The understanding and use of quantiles is required by Edexcel at A Level *only*. Da
quantiles – usually quartile or quintile form – in questions, and students should k
accordingly.

Part B: Theoretical Overview

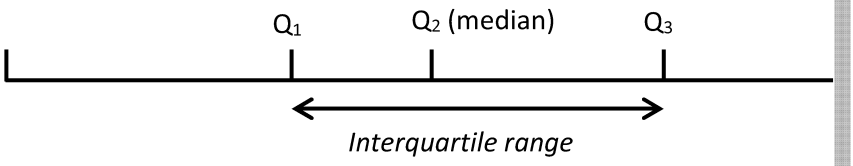
The use of quantiles is a common way of presenting data in Economics. Quantile
groups which allows us to make comparisons between different sections of a po

The most common type of *quan*tile is a *quar*tile. Think 'quarter' – a quartile split
can link the information we have just learnt in **Skill 3** about median values. Just a
values, we place the data in order from lowest to highest. The median value lies
bottom two quartiles from the top two quartiles.

Similarly, the median of the lowest half of the data set only will separate the bot
median of the top half of the data will separate the top two quartiles. Note that
numbers, then we take the middle value between the two (their mean).

By splitting data into quartiles, we can see how groups of data are distributed, a
different groups. A common application in Economics is household income data;
four groups allows us to make comparisons between the top and bottom earner

The *interquartile range* is another idea that you need to understand. The interqu
difference in data between quartile (Q_1) and quartile 3 (Q_3). This ignores any extr
considering income, there will be those who earn a very small wage (perhaps livi
those who earn sky-high salaries at the top. By just looking at the interquartile ra
can get a more representative picture of the population.



While quartiles are probably the most common type of quantile, you may also se
the data into five different groups. *Percent*iles split it into 100 (e.g. 'the top perc
who have 99% of the population earning less than them). For each different type
splits in the data, where n represents the number of subgroups, so quartiles hav
data split into percentiles will have 99 splits.

Part C: Example

15	5	17	11	12	11	15
1	16	18	16	3	10	3

Here is a random series of 20 values. To separate them into quartiles, we first ha

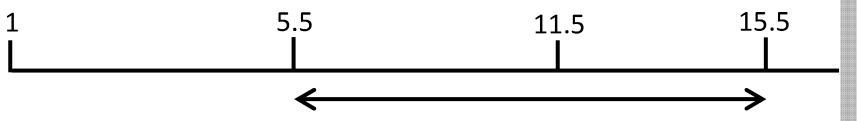
1	2	3	3	5	6	7
12	13	14	15	15	16	16

It's now straightforward to divide the group into quartiles. In this case, the data
half and top half, so the median is between 11 and 12 – it's 11.5.

If you draw a line down the middle of the entries, then you will split Q_1 from Q_2 (
from Q_4 on the bottom row. Hence:

Q_1	1	2	3	3
Q2	6	7	10	1
Q_3	12	13	14	1
Q_4	16	16	17	1

This is how we can present the data visually:



Interquartile range (= 10)

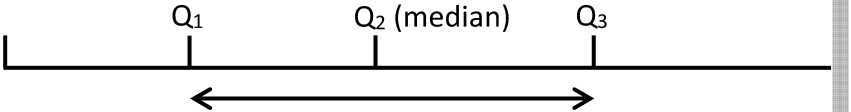
Part D: Practice Activities

40	22	41	37	37	35	20
47	23	37	24	45	25	39

1. Sort the numbers above into four quartiles.

2. What is the median value?

3. What is the interquartile range?



Interquartile range

4. What can you interpret from this diagram of quartiles? Think about the dist
been separated into quartiles.

SKILL 5: CONSTRUCT AND INTERPRET A RANGE OF STANDARD

Part A: Specification Overview

The need to construct and interpret graphical forms applies across the syllabus. straight line graph. Most students will understand the theory from GCSE Maths, discussing gradients, shifts and rotations. This knowledge will help students und as AS/AD schedules which will feature in exams at AS Level.

Part B: Theoretical Overview

Graphs are important in Economics because we are often interested in the relati Graphs allow economists to understand whether variables are related to one an relationship, they tell us quickly and clearly how one variable affects the other. N these ideas in GCSE Maths, but it's worth reviewing them.

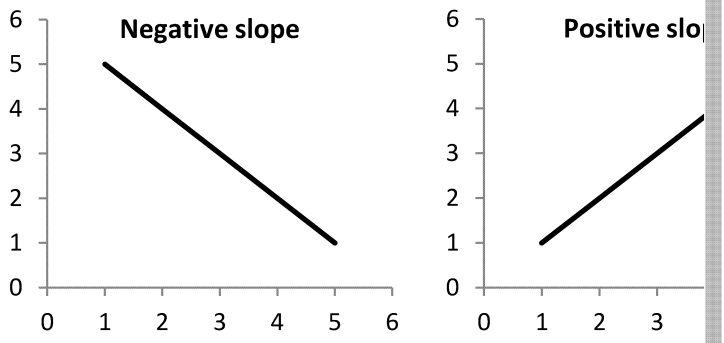
Graphs are usually plotted on a **two-dimensional** space. This means that we hav variable 'x' as the **independent** variable – and also a 'y-axis' – we call variable 'y'

Primarily, the most important aspect of a basic line graph is the gradient (or slop that tells us the most important information about the relationship between tw positive or negative correlation?

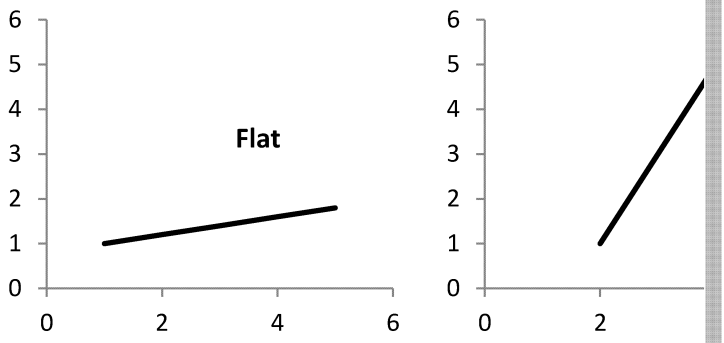
Mathematically, a curve's gradient is defined as follows:

$$\text{Gradient} = \frac{\text{Change in Y}}{\text{Change in X}}$$

Now, it is possible to tell whether the relationship between our variables is *posit* whether the coefficient is greater than (>) or less than (<) zero. If the gradient is to be *upward-sloping* – e.g. the supply curve – and this means that there is a pos and *y* variable. Conversely, if the gradient is *less* than zero, then the line is said t demand curve – and this means that as one variable increases the other decreas to interpret the slope of a curve if we are to understand the relationship betwee AS and A Level.



However, while it's important to know the direction of the relationship between the gradient is also important and tells us how *much* one variable changes with t price of petrol by a £1 per litre decreased demand by 99%, this curve would look demand falls by only 1%, despite the direction of the relationship being exactly t *negative* gradient). So, the larger the numerical figure of the gradient, the larger flatter line – whether positive or negative – tells us that a marginal change in the will trigger a proportionally smaller change in the *y* variable (the *vertical* axis). Co the opposite, with a marginal change in the *x* variable triggering a disproportiona variable. Curves are considered to be 'flat' if the absolute value of the gradient f gradient is equal to 1 – whether positive or negative – then a change in *x* produc is referred to as 'unity'). Finally, if the gradient is greater than one, then the curv

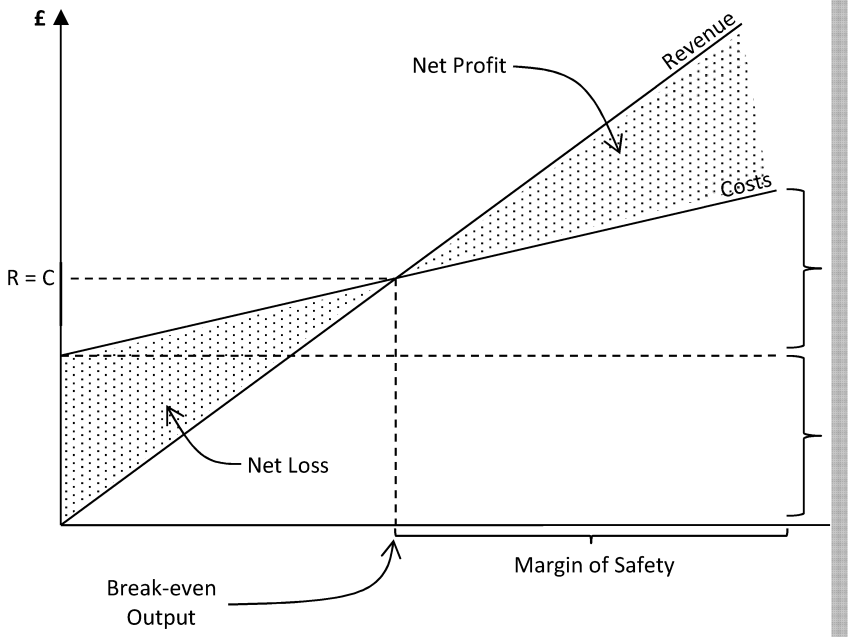


Finally, it's also important to note that the curves can 'shift'. You will see shifts ir
of specific markets and entire economies throughout your study of Economics. S
amount is added to either the *x* or the *y* variable. If we add a constant 'c' to the y
either up or down depending on whether *c* is positive or negative. If we add 'c' t
shift to the left if *c* is greater than 0, and to the right if *c* is less than 0.

It's important that you understand the basic principles of interpreting linear rela
able to apply this to a lot of different topics of economic analysis during the exar
looking at specific markets and their *demand* and *supply* curves!

Break-even Analysis

In the Economics B course, one application of where it is particularly important t
conducting break-even analysis for a firm. It is used to determine when a busine
revenue exactly equals the business's costs – at which point the business will ha
begin to earn a profit.



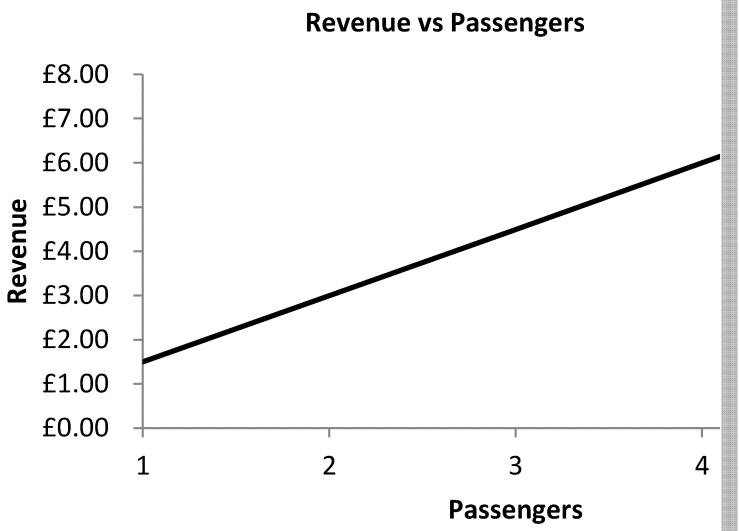
Businesses are said to 'break even' when their total costs equal their total reven
at the intersection of a firm's cost and revenue curves. It should be easy to ident
you're given a diagram like the one above. However, remember that if a firm's c
break-even output will change too.

Part C: Example

Let's start with a very basic example. Below is a chart showing the number of pa
amount of revenue the bus company receives. In this case, tickets are £1.50 eacl

Passengers	Revenue
1	£1.50
2	£3.00
3	£4.50
4	£6.00
5	£7.50

Graphically, we can present this information as follows:

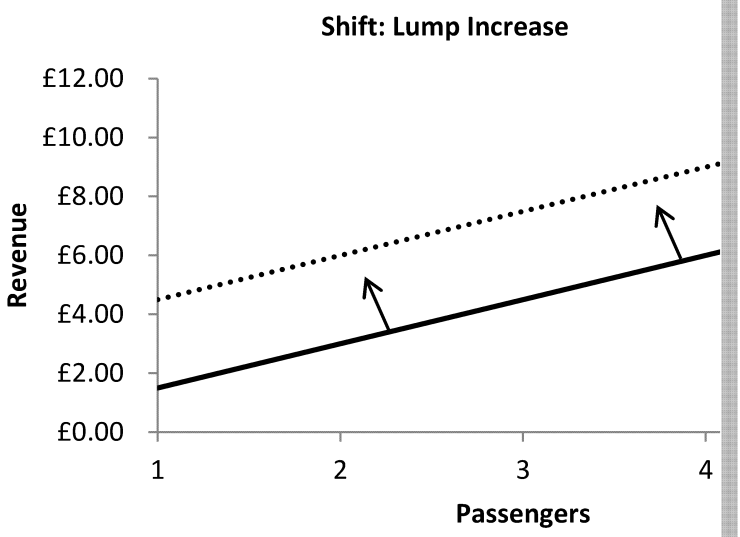


The line is upward-sloping: there is a positive relationship between the number
that the bus company receives. Indeed, we can calculate the gradient of the line
that goes from £3 and two passengers to £6 and four passengers.

$$\text{Gradient} = \frac{\text{Change in Y}}{\text{Change in X}} = \frac{6-3}{4-2} = \frac{3}{2}$$

Hence, the gradient here is 3/2, or 1.5. This means the relationship between rev

The gradient tells us how the different values change as we move *along* the line. what happens when events, or 'shocks', alter the position of the line itself. The r encounter is a **shift**. This is when the line moves up or down but *the gradient rer* example. Here, the price of each bus ticket has increased by £3.

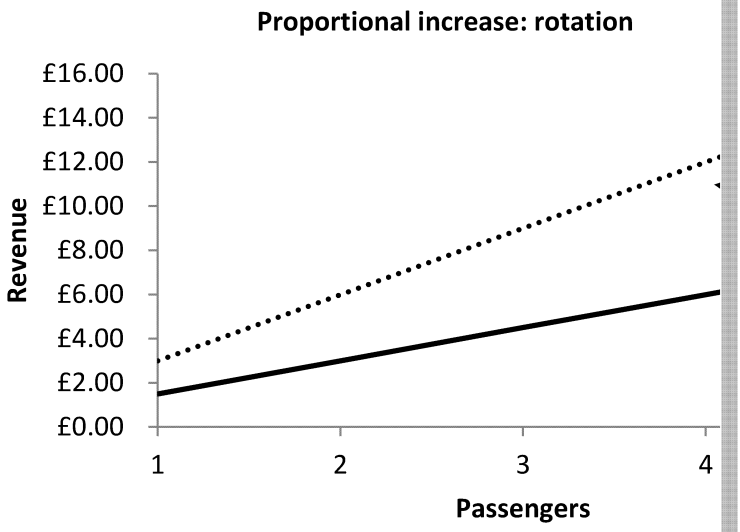


Let's look at the gradient again between two and four passengers:

$$\text{Gradient} = \frac{\text{Change in Y}}{\text{Change in X}} = \frac{9-6}{4-2} = \frac{3}{2}$$

So the line has moved – but the gradient is still 3/2.

Now let's consider a different change: a rotation. This occurs if each value chang the price of a bus ticket doubles.



$$\text{Gradient} = \frac{\text{Change in Y}}{\text{Change in X}} = \frac{12-6}{4-2} = \frac{6}{2} = \frac{3}{1}$$

So now the gradient is 3/1, or 3. A steeper gradient has a larger value (3 > 1.5).

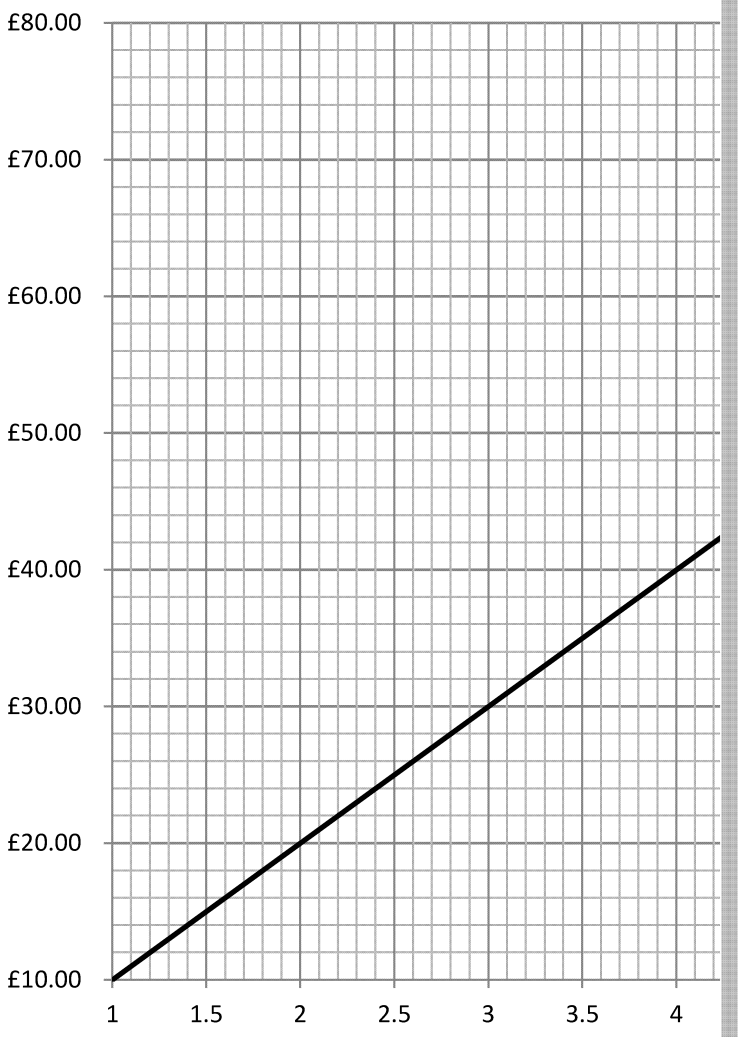
Often you will see combinations of the two changes: a shock might cause both a

Part D: Practice Activities

1. **a)** Fill in the table below by **first** increasing revenue by 50% **then** adding £
'Revenue$_2$' column.

Passengers	Revenue	Revenue$_1$ (50% increase)	Re (Pl
1	10	**15**	
2	20		
3	30		
4	40		
5	50		

b) Now use your new values to draw a new line showing Revenue$_2$ on the



c) What is the gradient of the new line? Is this a shift or a rotation?

SKILL 6: CALCULATE AND INTERPRET INDEX NUI

Part A: Specification Overview

Index numbers are most often used in Economics B specification to examine cha
level. However, index numbers can be applied to a number of different areas of
production and productivity. Importantly, students must be able to understand a
in index form at both AS and A Level. Moreover, students will also need to be ab
using Consumer Price Index (CPI) and Retail Price Index (RPI) data at AS Level an
2.5.3). This includes the idea of a 'base year' and how weights are used when co
Note, however, that an in-depth technical knowledge of the RPI and CPI indices
for example) is not required.

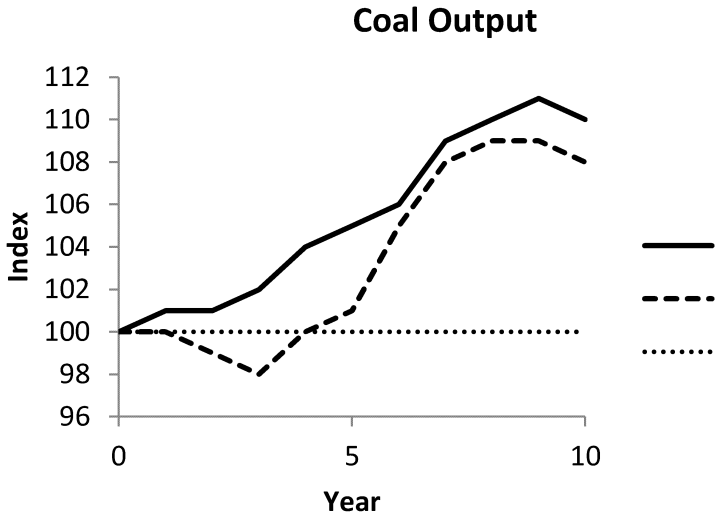
Part B: Theoretical Overview

In this section we will use a lot of the skills covered in **Skill 2** so refer back if you
percentages and percentage change.

Economists tend to use index numbers to make comparisons over time. The key
points can be compared back to an initial 'base'. The base is always shown with a
value – then following data points are adjusted to this value.

Imagine we have yearly data on the output of a coal mine. An index of 105 in yea
was extracted in that year than in the base year. Index numbers can be below 10
output falls by 2% compared to the base year, then the index will be 98. Index nu
don't mention tonnes when referring to output in this example, and don't use a

Before we talk about how to calculate index numbers, it is useful to think about
see a line graph showing the output of two imaginary coal mines in index form.



First, note how the output of each mine starts at 100 at year 0, the base year. Th
had the same output in year 0. Rather, it just shows 100% of their respective sta
with the subsequent changes for each output over time, relative to this starting

We can see that the output for Mine 1 generally increases over time. In year 4 it
means that its output has increased 4% relative to the base year.

The output for Mine 2, however, decreases relative to the base year between ye
year 3 tells us that output has decreased by 2% compared to the base year.

You may not have come across index numbers of less than 100. The most comm
numbers in A Level Economics is to show changes in price levels, and generally p
(inflation).

Calculating index numbers may be daunting at first, but each step is relatively sir
number of calculations needed – you might end up punching a lot of numbers in
there is higher potential for an error to creep in. Try to record each step as clear
mistake and need to retrace your steps.

Part C: Example

Let's start by looking at an example of the type of index number you are most lik
across: the Consumer Price Index (CPI). The idea of the CPI is to track price chan
selection, or 'basket', of goods and services which best represents the spending
whole. The items included are updated each year to reflect the introduction of n
popularity of others (this year e-cigarettes and music streaming services were in
yoghurt drinks have become less popular and were discarded).

There are over 700 goods and services included in the basket, which includes ite
insurance and dry cleaning. Each item is assigned a weight which best represent
example, is assigned a much higher weight than light bulbs. Each weight can be
percentage of total spending: the total sum of weights equals 1 (or 100%).

Below is a table showing a simplified example of a price level index. Only four go

Year	Goods in the Basket			Price
	Good	Price	Weight	
2010	Good A	£10	0.25	£
	Good B	£5.50	0.15	
	Good C	£2	0.2	
	Good D	£4.50	0.4	
2011	Good A	£10.40	0.25	£
	Good B	£5.50	0.15	
	Good C	£2.20	0.2	
	Good D	£5.10	0.4	
2012	Good A	£10.60	0.25	£
	Good B	£5.70	0.15	
	Good C	£2.30	0.2	
	Good D	£6.00	0.4	
2013	Good A	£11.10	0.25	£
	Good B	£6.00	0.15	
	Good C	£2.50	0.2	
	Good D	£6.00	0.4	

This is a large table with lots of values but it needn't be daunting. Each step is sir
price value for each year. Multiply the price of each good by its weighting, and a
2010, the base year, we get:

$$\text{Price Value}_{2010} = (10.0 \times 0.25) + (5.5 \times 0.15) + (2.0 \times 0.2) + ($$

This is an easy calculation but quite lengthy. Make sure you get all the brackets r
calculator (it may be easier to write down the answer for each step and then adc
If your answer is higher than the highest price, or lower than the lowest, then yo
need to retrace your steps.

The price values for the other years are calculated in the same way:

$$\text{Price Value}_{2011} = (10.4 \times 0.25) + (5.5 \times 0.15) + (2.2 \times 0.2) + (5.1 \times 0.4$$

$$\text{Price Value}_{2012} = (10.6 \times 0.25) + (5.7 \times 0.15) + (2.3 \times 0.2) + (6.0 \times 0.4$$

$$\text{Price Value}_{2013} = (11.1 \times 0.25) + (6.0 \times 0.15) + (2.5 \times 0.2) + (6.0 \times 0.4$$

We can now calculate our index values. Remember, the first year is always assigı
need to calculate it for 2010; just write in '100'.

The indices for other years are calculated as follows:

$$\text{Index for Year X} = \left(\frac{\text{Price Value of Year X}}{\text{Price Value of Base Year}}\right) \times$$

Hence:

$$\text{Index}_{2011} = \frac{5.91}{5.53} \times 100 = 107$$

$$\text{Index}_{2012} = \frac{6.37}{5.53} \times 100 = 115$$

$$\text{Index}_{2013} = \frac{6.58}{5.53} \times 100 = 119$$

Note that each price value is divided by the price value for the base year rather t
preceding year.

Finally, to work out the economy's inflation rate using CPI (or RPI) data, we woul
change between index values. So, between 2010 and 2011 the percentage chang
starting value is 100, hence the inflation rate is 7%. However, between 2011 and
have to use the formula for percentage change that we learned in **QS2 (Calculat
percentages, percentage changes and percentage point changes)**.

Therefore, for the period 2011 to 2012, inflation would be calculated as follows:

$$Inflation = \frac{115 - 107}{107} \times 100 = \frac{8}{107} \times 100 = 7.4$$

Part D: Practice Activities

1. Fill in the table below. Show as much of your working as possible.

Year	Goods in the Basket			Price V
	Good	Price	Weight	
2013	Good X	£5.50	0.5	**£3.2**
	Good Y	£0.50	0.1	
	Good Z	£1.20	0.4	
2014	Good X	£5.40	0.5	
	Good Y	£0.50	0.1	
	Good Z	£2.20	0.4	
2015	Good X	£5.60	0.5	
	Good Y	£0.80	0.1	
	Good Z	£5.50	0.4	

2. Suppose that the Office for National Statistics (ONS) decides to adjust the w
the basket. Why would they do this?

3. In 2014 Good X had its weight increased to 0.7 and Good Z had its weight de
would the price level and index now be for that year, 2014? The price value
same. Show your working.

4. In question 3, the price of Good X decreases in 2014 – but the index goes *up*

SKILL 7: CALCULATE COST, REVENUE AND PROFIT: AVERAGI

Part A: Specification Overview

In the Economics B course students are expected to be able to perform a numbe
firm's costs and revenue. Specifically, students must be able to calculate both sa
(Topic 1.6.1), fixed, variable, average and total costs (Topic 1.6.1); contribution (
point. It's also expected that students can calculate gross, operating and net pro

Part B: Theoretical Overview

Many of the cost, revenue, and profit calculations required for the Economics B
(or Year 1) Topic 1.6 (Revenue, Costs, Profits and Cash). However, these calcula
4.1.4 (Business Objectives and Pricing Decisions) so it's important to have a gooc
studying Year 2 Economics B. Luckily, the maths is not particularly complicated –
mathematical operations such as addition, subtraction, multiplication and divisic
that are required, and *subtle* differences in terms, so it's worth devoting a short
required knowledge.

Revenue
The firm's sales revenue is simply the number of goods it sold – that is, its *sales*
of each good. If, for instance, the firm sells 10 goods at £5 each, then its total sal

Mathematically, sales revenue is calculated using the following formula:

$$\text{Total Revenue (TR)} = \text{Quantity (Q)} \times \text{Price (P}$$

Costs
Firms' costs can be broken down into *fixed* and *variable* portions. 'Fixed' costs re
business expenses that don't vary according to the quantity of output produced
they are constant irrespective of output. Fixed costs might include overheads, su
and salaries. 'Variable' costs, conversely, are costs that vary with the level of out
direct cost of production, otherwise known as the 'cost of sales', e.g. the cost of
wages.

Mathematically, a firm's total costs are calculated as follows:

$$Total\ Costs\ (TC) = Fixed\ Costs\ (FC) + Variable\ Co$$

It is also important to be able to calculate a firm's *average* cost of production. Us
the terms 'mean' and 'median', and relevant quantiles) we are able to work ou
the total cost of production divided by the firm's output.

Mathematically:

$$Average\ Cost\ (AC) = \frac{Total\ Cost\ (TC)}{Quantity\ (Q)} = Average\ Fixed\ Cost\ (AFC) + A$$

Note that the concept of average cost in Economics is important because a firm
more cost-effectively on average because of economies of scale. Firms tend to g
increases, while the firm's fixed costs are also spread out across more output, he
decrease as production increases.

Contribution
'Contribution' is the difference between a firm's sales price and the variable cost
production. It measures the income that a business receives after subtracting th
of production from the firm's revenue.

Mathematically,

$$Contribution = Selling\ Price\ (P) - Variable\ Cost\ (VC$$

Note that the contribution can be used to work out the break-even level of outp
fixed costs by the contribution per unit, we find out how many units must be sol
be the break-even point.

Break-even Point
Businesses break even when their total costs equal their total revenue – that is,
their revenue covers all of their expenses.

Mathematically, the break-even point is given by,

$$Break\text{–}even\ Point: Total\ Fixed\ Costs\ (TFC) + Total\ Variable\ Costs\ (T$$

Profit
Profit is the difference between the amount that a business earns (its *revenue*) a
costs.

Typically, profit is calculated using the following formula:

$$Profit\ (\prod) = Total\ Revenue\ (TR) - Total\ Costs$$

However, in the Economics B course you need to know how to calculate *gross, o*
profit is simply a firm's revenue minus the direct costs of production. 'Operating
less any overheads (e.g. rent, wages, insurance). 'Net' profit, however, adjusts fc
costs such as the cost of financing. Note that it can also include revenues receive

Part C: Example

Output (Units)	Total Cost (£)
1	5.50
2	10.00
3	14.00
4	16.00
5	17.00

1. The firm produces three units of output. What is the average cost?

Recall that:

$$\mathrm{AC} = \frac{\mathrm{TC}}{\mathrm{Q}}$$

Hence:

$$\mathrm{AC} = \frac{14}{3} = £4.67$$

2. If the firm increases its output to five units, does the average cost change?

$$\text{AC} = \frac{17}{5} = £3.40$$

So the average cost of producing a unit falls considerably when more units a
firm benefits from economies of scale.

3. The average fixed cost when producing five units is £2.00. What is the ave

$$\text{AC} = \text{AFC} + \text{AVC}$$

So:

$$\text{AVC} = \text{AC} - \text{AFC}$$

$$\text{AVC} = £3.40 - £2.00 = £1.40$$

Part D: Practice Activities

1. A firm records a total revenue of £2,000 from selling 40 units. What price w

Output (Units)	Total Cost (£)
1	5.50
2	10.00
3	14.00
4	16.00
5	17.00

2. a) Look at the table above. What is the average cost of five units of outpu
b) When the firm is producing five units of output, the average fixed cost
variable cost?
c) The firm sells five units for a total of £20. What is its total revenue? Wh
d) What is the average revenue when five units are sold for £20?

3. a) A firm produces 100 units at an average cost of £10. Average fixed cost
variable costs?
b) Following an increase in raw material prices, the average variable cost
new total average cost?

SKILL 8: CALCULATE COST, REVENUE AND PROFIT: MA
(A LEVEL ONLY)

Part A: Specification Overview

In Economics B, marginal cost and revenue are concepts that are only relevant to
4.1.4 (Business Objectives and Pricing Decisions). Accordingly, this section has be
section to explore the concepts in more depth. Note that it is important to unde
because these calculations are used to establish the profit-maximising output of

Part B: Theoretical Overview

The introduction of 'the margin' was a big deal when it was first presented by ec
century, and the so-called 'Marginal Revolution' shocked the Economics disciplir
you don't like maths, that is – it also made the subject much more mathematical
concept of the margin is not that difficult, and there is no complicated calculus n

In Economics, the 'margin' refers to the idea of an *additional* unit. Economists ar
impact on total cost and total revenue if a firm produces another unit.

Marginal Cost
Let's start with marginal cost, otherwise referred to as MC. Essentially, this is the
cost that results from the production of one extra unit.

Mathematically, marginal cost is calculated as follows:

$$\text{Marginal Cost (MC)} = \frac{\text{Change in Total Cost}}{\text{Change in Output}} = \frac{\Delta}{}$$

If $\Delta Q = 1$, this indicates that one additional unit has been produced and we can l
total cost. Note that the marginal cost of production is not affected by changes i
because these costs do not vary with the level of output; this marginal cost picks
cost that arises because of changes in output.

If, for instance, it costs £10 to produce five units but £12 to produce six units, th
that extra unit is £2.

Marginal Revenue
Marginal revenue uses the exact same idea but applies it to the firm's revenue ir
does total revenue change if the firm sells one more unit of output?

Mathematically, the answer to this question is found by applying the following f

$$\text{Marginal Revenue} = \text{MR} = \frac{\text{Change in Total Revenue}}{\text{Change in Output Sold}}$$

Imagine a firm sells 50 units and total revenue is £100. The firm sells 51 units, to
marginal revenue, therefore, is £2.

Application – Profit Maximisation
Importantly, marginal cost and marginal revenue are essential for the calculation
profit-maximising position.

Suppose that a firm's MR is greater than its MC. If MR > MC, the firm can add to
additional unit of output because the additional revenue received from that extr
expense in producing it. Conversely, if the firm's MR is less than its MC (MR < MC
increases the firm's costs more than it increases its revenue. It would, therefore,
produce that additional unit and scale back production until MR = MC.

And, just like that, we've stumbled across the profit-maximising condition. If the
does not increase profit, but does not decrease profit either, then profit must ne
in either direction from the MR = MC level of output will *decrease* profits.

$$Profit\ Maximisation: MR = MC$$

Part C: Example

Units of Output	Total Cost
0	15
1	25
2	34
3	42
4	48
5	59

Let's look at this table of a firm's output and total cost. First, notice that there is a
of output being produced. This is the fixed cost which does not depend on output.

Imagine now that we want to know the marginal cost of producing the third unit c
cost of producing just that one extra unit. In this case, the cost increases from 34 t

For this to be the profit-maximising level of output, the marginal revenue from s

Part D: Practice Activity

1. Fill in the table below by calculating the marginal cost of producing each ext

Units of Output	Total Cost	Marginal Cost
0	11	
1	21	
2	30	
3	38	
4	44	
5	55	

2. **a)** Fill in the blanks in the table below. Show your working where possible

Total Output	Total Revenue	MR	Total Cost	
1	100		70	
2	200		140	
3	300		200	
4	400		300	
5	500		510	

b) How many units would the firm need to produce to maximise profits?

SKILL 9: MAKE CALCULATIONS TO CONVERT FROM MONE

Part A: Specification Overview

Students should understand the difference between real and nominal values fro
includes the need to calculate both real and nominal rates of economic growth.

Part B: Theoretical Overview

Money in the present is worth more than money in the future – this is referred t
Economics. First, this is because a pound today is worth more than a pound next
earn *interest*. Second, the effect of inflation means that the purchasing power of
and so a pound in the present is necessarily worth more than a pound in the futu
more important in economics when converting values from 'nominal' (money) to

Therefore, in order to make meaningful comparisons between monetary values
must convert to real terms by taking inflation into account.

One of the most important examples of this is real versus nominal GDP figures. N
been adjusted at all. Essentially, nominal GDP measures the monetary value of t
that have been produced within an economy during a period of time, where the
terms at the time of production. Real GDP, on the other hand, has been adjusted
of inflation by using a measure such as CPI (see **Skill 6**). When economists discus
referring to **real** GDP because this allows them to make meaningful comparisons

Note that if the prices of *every* good in an economy doubled over a specific time
double. However, if the amount of goods and services produced in the economy
real GDP would not change because the figure would be corrected for the doubl
'volume' and 'value' measurement of GDP, and the preceding example highlight
rather than nominal figures. In *real* terms the economy hasn't grown at all, but i
we' would erroneously come to the specious conclusion that the economic grow

To 'deflate' a value to real terms in order to make a better comparison with a pa
index of the previous period. The formula you need to use to convert nominal va

$$\frac{\text{Nominal Value}_{\text{Year X}}}{\text{CPI}_{\text{Year X}}} \times 100 = \text{Real Value}_{\text{Year X}}$$

This is best illustrated by working through an example.

Part C: Example

Let's suppose that nominal GDP of a fictional economy was £34 million in 2015.
nominal GDP had risen to £37.4 million; however, inflationary pressure caused p
rise generally by about 5% over the course of the year.

Nominally, this economy experienced a rate of economic growth of 10%. Howev
capture the increase in *volume* as well as the increase in *value*, but as economist
the former rather than the latter.

Therefore, in order to account for the changes in this economy's prices and to es
volume of production, it's necessary to convert the nominal GDP figure in 2016 t
2015 is the 'base' year for the price index, the CPI index value for 2016 would be

Hence:

$$Real\ GDP_{2016} = \frac{Nominal\ GDP_{2016}}{CPI_{2016}} \times 100 = \frac{£37.4\ million}{105} \times 1$$

There, in real terms, GDP has only increased to £35.62 million between 2015 and in nominal terms. In effect, this economy's GDP growth is actually 4.77%, not 10 useful approximation that you can use to work out an economy's real growth rat growth rate tends to be approximately equal to the economy's nominal growth r prices (inflation).

Note that here $\frac{100}{105}$ is known as the 'GDP deflator'. It is used to deflate – or remov the latest value.

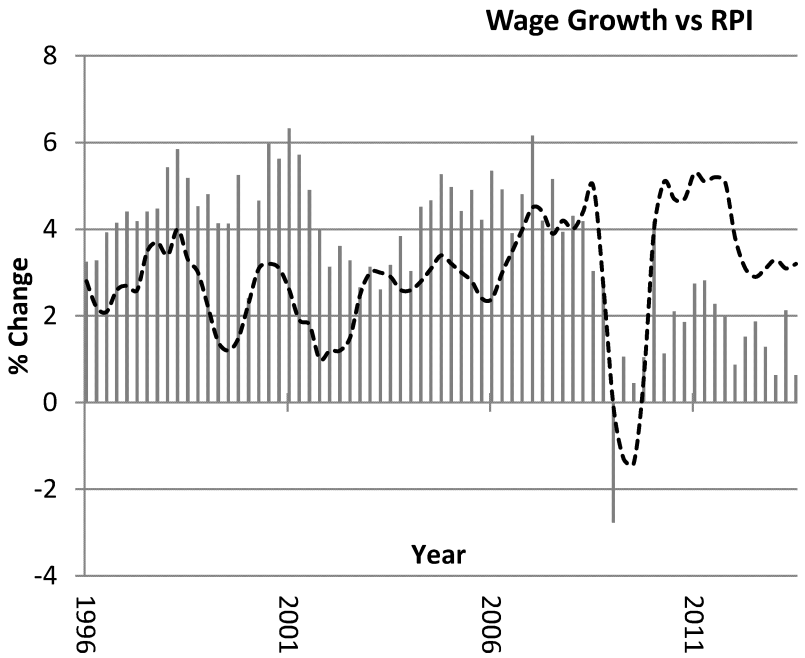
Part D: Practice Activities

1. **a)** The nominal GDP of Spain rose from $1,010bn in 2013 to $1,110bn in 2 increase is this in nominal terms?

b) The price index for 2014 with respect to 2013 is 103. What was the nev

c) What was the percentage increase in *real* GDP?

2. What can you interpret from the graph below?



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SKILL 10: MAKE CALCULATIONS OF ELASTICITY AND INTER

Part A: Specification Overview

Calculating and interpreting elasticities is important at both AS and A Level. In Ec
required to be able to calculate price elasticity of demand and income elasticity
to interpret the numerical values.

Part B: Theoretical Overview

'Elasticity' is a term that refers to the responsiveness of one variable to a change
does demand for beer react if the price increases? What if people earn more?

The calculations for elasticity are perhaps the trickiest you will encounter while s
But, don't be daunted! It's actually simpler than it initially seems; it's just calcula
and then simple division. However, the key to mastering elasticities is to underst
and practise doing the sums.

Price Elasticity of Demand

Price Elasticity of Demand (PED) measures the responsiveness of the demand fo
to a change in its price. Typically, we'd expect that demand should increase whe
of a product falls. But, elasticities help us decipher by exactly how much demanc
It might be the case that a price cut leads to a huge increase in demand, or it mig
barely changes at all. Therefore, understanding the magnitude of demand's resp
economists and business people alike.

Mathematically, PED is calculated as follows:

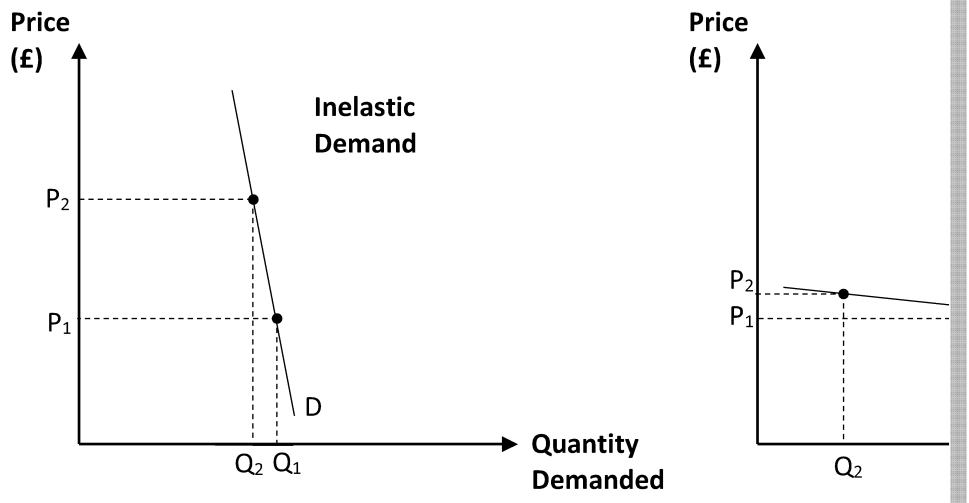
$$\text{Price Elasticity of Demand (PED)} = \frac{\%\ \text{Change in Quantity}}{\%\ \text{Change in P}}$$

That is, PED is the *percentage change* in the quantity demand divided by the *per*
that the demand for a product is said to be *elastic* if a marginal change in price b
higher change in demand. If a good is price *inelastic* then the opposite holds.

Perfectly Inelastic	
Inelastic	
Unit Elastic	
Elastic	
Perfectly Elastic	

Note that PED values will naturally be negative because of the law of demand, b
absolute value. If demand is *perfectly inelastic,* the quantity demand is unrelatec
demand is *perfectly elastic* a small change in price will completely wipe out the c

It can be useful to show these ideas graphically. Below are two diagrams showin
demand. Note how in the case of inelastic demand a large change in price (*y*-axis
change in the quantity demanded (*x*-axis). The opposite is true with elastic dema
amount, then the quantity demanded falls dramatically.



Income Elasticity of Demand

Income Elasticity of Demand (YED) is a very similar concept. Instead of looking at
demand responds to changes in price, though, it looks at the effect of changes ir
Suppose that Tom earns £16,000 and purchases five football tickets a season. Hc
more games would he go to if he earned £20,000?

The formula for income elasticity of demand (YED) is below. Note that the abbre
is 'Y' because 'I' denotes investment.

$$\text{Income Elasticity of Demand (YED)} = \frac{\%\ \text{Change in Quant}}{\%\ \text{Change in}}$$

Luxury Good	
Normal Good	
Inferior Good	

Naturally, there are some goods for which demand responds negatively to increa
called 'inferior' goods and include things such as tinned meats and own-brand pı
exactly that – normal! Generally, consumption tends to increase as our income r
purchase a larger amount. Finally, 'luxury' goods are a special sort of a normal gc
disproportionately to income increases, e.g. 3D TVs.

Part C: Example

In the previous example we mentioned Tom, who earns £16,000 and attends fiv
gets promoted at work and earns £4,000 more each year. He still has plenty of s
extra money by going to seven games a season.

1. What is Tom's YED for games?

$$\text{YED} = \frac{\Delta \text{ Quantity Demanded \%}}{\Delta \text{ Price \%}}$$

Change in quantity demanded = 40%
Change in income = 25%

$$\text{YED} = \frac{40}{25} = 1.6$$

1.6 is positive and greater than 1, suggesting that football tickets are a luxu

Now let's think about price elasticity of demand. Demand for football ticket
support their team no matter what. Over the last decade, Premier League ti
risen at rates above inflation but attendance figures have not decreased (th
people don't change the team that they support). Recall that the formula fc

$$\text{PED} = \frac{\Delta \text{ Quantity Demanded \%}}{\Delta \text{ Price \%}}$$

We can now apply this formula in the next question.

**2. Tom's friend Sarah is a hardy football fan and goes to 16 games a season,
her favourite team, 'Melchester FC'. Ticket prices increase from £20 to £2
accordingly and attends 15 games a season. What is her PED for football n**

$$\Delta \text{ Quantity Demanded \%} = \frac{(15 - 16)}{16} \times 100 = (-)$$

$$\Delta \text{ Price \%} = \frac{(25 - 20)}{20} \times 100 = 25\%$$

Hence, Sarah's PED for football matches is:

$$\text{PED} = \frac{6.25\%}{25\ \%} = 0.25$$

Recall that PED values of less than 1 indicate **inelastic demand**. Sarah's dem
inelastic: her demand to see games will only decrease slightly following a la

Part D: Practice Activities

1. **a)** The amount by which railway operators can increase fares is linked to t
of a rail season ticket from Woking to London rose from £3,704 to £3,8
that the number of season ticket holders fell from 15,000 to 14,750. Ca
demand, showing your working.

b) Is demand for commuter rail tickets elastic or inelastic? Can you think v

c) Draw a diagram to show the PED for these season tickets graphically.

2. This question is about income elasticity of demand (YED). Jasper goes to the
income increases by 7.5% and he goes to the cinema 14 times a year. What
Show your working.

SKILL 11: INTERPRET, APPLY AND ANALYSE INFORMA
GRAPHICAL AND NUMERICAL FORMS (

Part A: Specification Overview

Students must possess the skills required to analyse and interpret data presente
AS and A Level. Students need to critically evaluate both qualitative and quantita
arguments. Exam questions will present data in a variety of forms and ask stude
information and use it as a prompt to apply knowledge from elsewhere in the cc

Part B: Theoretical Overview

You don't need to memorise facts and figures to get marks in your Economics exams but it will help you to be up to date with the current trends facing our economy.

You will, however, need to know how to interpret data presented in a variety of forms. This may be any combination of tables, graphs and text extracts. Often questions will require you to develop your answer from multiple sources.

So that you are confident with handling and interpreting this sort of information, we recommend that you spend time reading articles with an economic content – *The Financial Times* and *The Economist* are highly recommended. These are subscription-based, but you can access a certain number of articles online for free each month.

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Another idea is to look at the monthly economic reviews published by the Office
These are free and easy to find online. They contain all the latest economic figur
You can even download the data yourself if you want to probe a little deeper int
own graphs.

Finally, note the difference between quantitative data and qualitative data. Qua
values that can be measured and recorded. Most of the data you will come acro
e.g. the number of workers in the labour force, inflation figures and the money s
other hand, is subjective. It looks at *qualities* that can't easily be measured. Exan
interviews or focus groups used to gauge consumer confidence, for which there

Graphical and Chart Representations of Economic Data
In the Economics B examination you are likely to presented with economic data
charts, pie charts – so you'll need to familiarise yourself with these before the ex
presented with a 'time-series' graph, which is a type of graph which tracks chang
time (e.g. GDP growth for the last decade), or you might be given a pie chart sho
market shares in a particular industry (e.g. the concentration ratio for oligopolist

Here's a brief recap of some common forms of graphical and tabular information
exam.

Bar Charts:
Usually, this type of chart tends to have *categorical* variables on the *x*-axis and *n*
Then, there are columns, or bars, on the graph positioned above the categorical
columns correlates to whichever numerical value is on the *y*-axis.

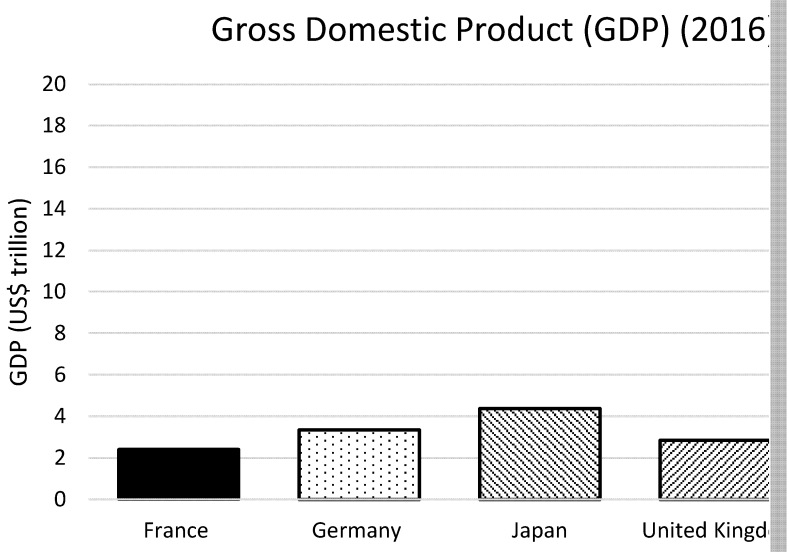


Figure 1

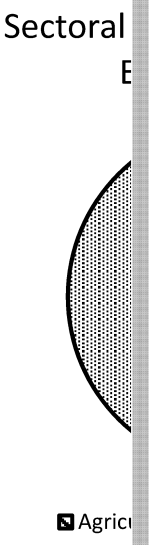
In **Figure 1** you can see that on the *x*-axis there are the names of four different e
Japan, the United Kingdom and the United States – in this case, then, the catego
location. On the *y*-axis there is numerical data – in this case we have chosen Gro
it is possible to observe from the bar chart that Japan's GDP is about $4.5 trillion
trillion.

What is useful about economic data being presented in bar chart form is that yo
categories are the smallest or largest by simply looking at the height of the colur
States' GDP is the greatest because it is the tallest bar in the bar chart (and by sc
Conversely, we know that is France or the UK whose GDP is the lowest because t
actuality, it is France's GDP that is the smallest at $2.42 trillion, compared to the
difficult to fully establish on this bar chart because of its scale. Therefore, bar ch
values between categories.

Note that **histograms** are a specific type of bar chart where the *x*-axis has categc
data, as opposed to *qualitative* data – e.g. you could replace the countries in the
(18–24, 24–30, 30–24, etc.), or simply a single age per column. Interpreting histc
exactly the same way – the only difference is that the columns will be touching e
continuity of the numbers on the *x*-axis

Pie Charts:

Pie charts are circular, just like the pies from which they get their name! This circle is then cut up into segments in order to represent how the 'whole' breaks down into parts. Therefore, the 'whole' should be the *full* amount of the data and each 'part' should represent a certain portion of this whole.



In **Figure 2**, we have got an example which looks at the sectoral make-up of the Chinese economy. We can immediately see that of the *whole* economy (the full circle, or pie) the majority of production occurs in the 'services' (or tertiary) industry. Note that this pie chart could be representing the data either in percentages or in levels, i.e. it could be saying that the service industry makes up 51.6% of the Chinese economy, or it could be saying that services represent $5.6 trillion of China's $10.87 trillion economy; it doesn't matter because these amount to exactly the same thing.

What is important to note is that a pie chart shows a percentage of a whole – wh
stated as percentages or given to you as levels. The total is 100% and the segme
to represent percentages of the total – the larger the percentage, the larger the

Pie charts are useful because they help us to compare the size of categories rela
relative to the 'whole.'

Line Graphs:

Line graphs are normally used to display information that changes over time. Us
– this could be measured in minutes, hours, days, weeks, month, years or any ot
y-axis would then have the numerical data value that we're interested in – e.g. G
inflation rate. A series of points are plotted that relate the value of the *y*-axis to
axis, and then a line is drawn connecting these points.

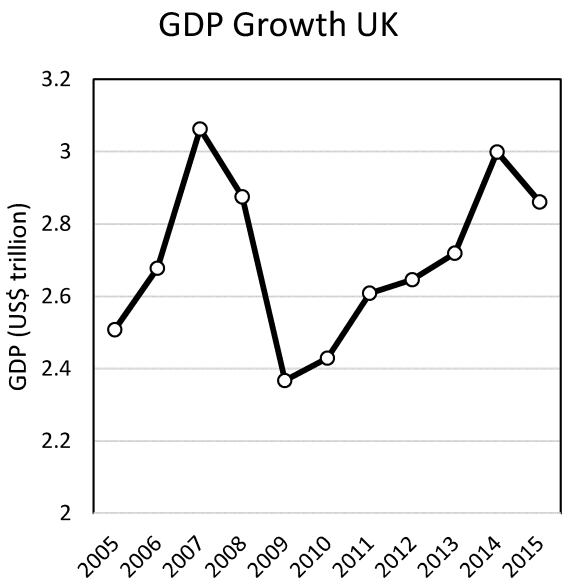


Figure 3

In **Figure 3**, we can see an example of how a line graph looks. It shows the UK's G
graphs are really useful in working out trends in economic data. We can tell, for
fluctuates considerably over time by simply looking at the shape of the curve – a
rises then falls, and rises and falls again. Note that this is what is referred to as th
economics. Between 2007 and 2009 the UK (like much of the Western world) ex
deep recession, which explains why GDP falls so rapidly. Note that from a line gr
know the magnitude of any increases or decreases by looking at the *slope* of the
has been more change over a given period.

Finally, we are able to tell at which points in time a certain GDP was reached. If y
from a GDP of 2.8 trillion on the *y*-axis, you are immediately able to tell that this
initially sometime between 2006 and 2007 and then again between 2013 and 20
recovery.

Finally, line graphs allow us to identify peaks (highest points) or troughs (lowest
We know, for example, that in 2007, just before the financial crisis, the UK's eco
just above $3 trillion, and that by 2009 GDP had fallen to its lowest point.

Part C: Example

In *Part C* we'll be working through some economic data represented in graph f macroeconomic indicators – the *exchange rate* and the *current account* rate.

Figure 1 shows the UK's unemployment rate for 1989–1994.

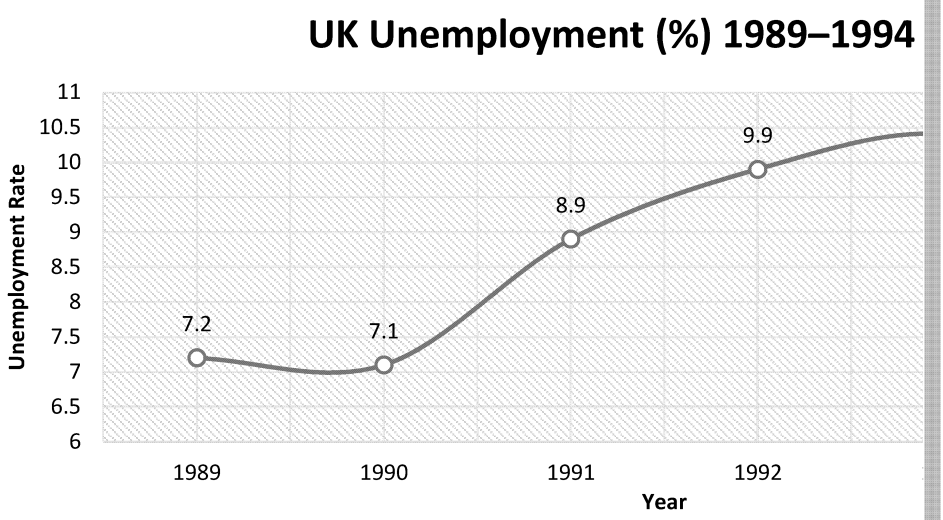


Figure 1

Figure 2 shows the UK's rate of inflation (as measured by changes in the consu

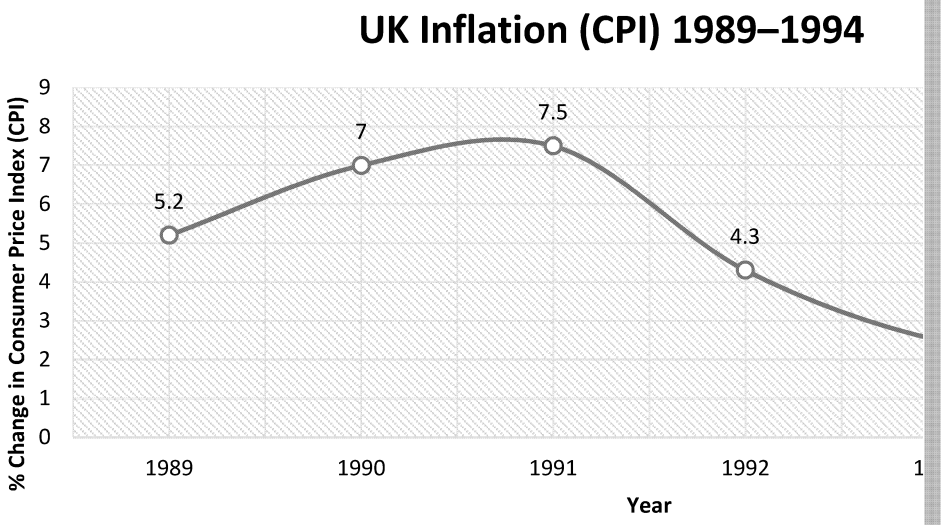


Figure 2

1. **Using Figure 1, calculate the percentage change in unemployment betwee**
   In 1993 the UK's unemployment rate was 7.1%. By 1993 it had risen to 10.4 tempting to say that the unemployment rate had increased by 3.3% (10.4% would be incorrect. 3.3 is the 'percentage point' increase in the unemploym calculate the percentage change, which you should remember from QS1.

$$\%\ Change\ in\ Unemployment\ Rate = \frac{10.4 - 7.1}{7.1} \times 1$$

2. **Using Figure 2, calculate how much higher inflation was at its highest than 1989 and 1994.**
   CPI inflation reached a high of 7.5% in 1991. At its lowest, CPI growth was o between these figures is a simple subtraction calculation: 7.5% – 2% = 5.5%

3. Using Figure 2, between which years did the rate of CPI inflation change th
Initially, you might be tempted to solve this question by working out the *pe* between the data for each year in Figure 2.

Your findings would look something like this:

Time Period	
1989–1990	
1990–1991	
1991–1992	
1992–1993	
1993–1994	

Clearly, then, the change between 1991 and 1992 is the largest in percentag was a 42.67% decrease in the CPI rate of inflation and the next largest is the with a 41.86% decrease in CPI growth.

However, even if you're confident calculating percentage change, this meth you're asked to solve a question like this you might be better off *estimating* the greatest percentage change. It's possible to do this by looking at the *slo steeper* the curve for something is the more responsive it is to changes in th is 'time'. So, the steeper the curve is, the more something has changed betv case its years. It's clear from the graph that the *steepest* part of the curve is therefore, we could estimate that it is between these years that the rate of You could then calculate the actual figure and compare it to some other cor certain that you've picked the correct time period.

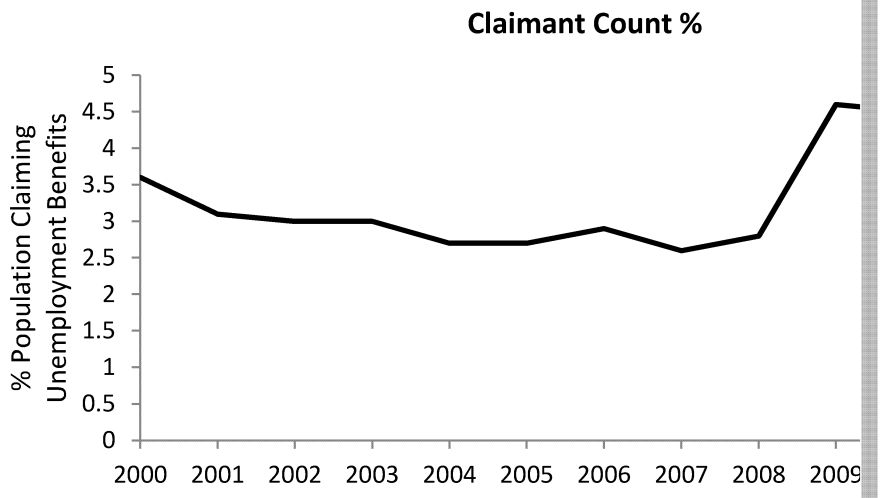
4. Using Figures 1 and 2, explain the relationship between the unemploymer the UK.
Comparing **Figure 1** and **Figure 2** should roughly highlight that inflation is in falling. Conversely, when unemployment is rising, inflation tends to be fallir the shape of the curves in **Figure 1** and **Figure 2**. When the curve is downwa the inflation rate curve is upward-sloping – this implies that these two macr 'inversely' related. When unemployment is *lower* there is going to be *highe* more people have money to spend on consumption. If you remember that i 'demand-pull' factors, then it should be clear that inflation is growing when *When aggregate demand is growing faster than aggregate supply there wil*

Part D: Practice Activities

Questions in this section will be based on the following information:

Graph 1

Graph 2



Extract 1

'In the six years since the global economic crisis, standard jobs were destroye continued to increase...

Non-standard workers are worse off in terms of many aspects of job receive less training and, in addition, those on temporary contracts ha have less job security than workers in standard jobs. Earnings leve

Source: The Guardian *2015 http://www.theguardian.com/busi may/21/temporary-and-part-time-jobs-surge-promotes-inequal*

Questions:

1. **a)** Describe the main trends shown in **Graph 1**. Pay attention to the separ
   b) One measure of unemployment is the *claimant count*, which considers population is claiming Jobseeker's Allowance. The claimant count betw **Graph 2**. What can you interpret from this graph?
   c) With reference to the second paragraph of **Extract 1**, explain how a shi might have an impact on aggregate demand. Illustrate your answer by

EXTENSION SKILL 12: DISTINGUISH BETWEEN CHANGI VARIABLE AND THE RATE OF CHANGE (C

Part A: Specification Overview

Students will come across data describing both levels and rates of changes throu the exams. Students will not be assessed on the specific details of the difference change, but knowledge of each will enhance understanding.

Part B: Theoretical Overview

The **rate of change** is how one variable changes with another.

Often we are concerned with how one amount has varied over time, so the rate variable changes at a given point.

Think back to **Skill 5**: graphically, the rate of change is the gradient of the line.

$$\text{Gradient} = \frac{\text{Change in Y}}{\text{Change in X}}$$

If the line is not straight, then the rate of change is not constant. In this case we might look at the average rate of change by just taking the beginning and end values and looking at the mean change over the period.

For Ma the stu dor diff Lev will Eco

On a graph, change in GDP would not be a straight line – it's very volatile, and cc rise or fall. We therefore usually look at the average rate of change of GDP over or years). For example, the rate of change of UK GDP was 0.3% in the first quarte

Note that average rate of change is usually expressed in percentage terms. Look refresh the idea of percentage changes. An example is inflation; this is the perce levels over time.

The **level**, on the other hand, is the total amount of that variable at a given mom million 16–64-year-olds were not in the labour force in the first quarter of 2015 people not available for work or not looking to work. If it went up to 9 million in that would be a *change* in the level (of 0.02 million).

Note that levels can be expressed in percentage terms *if they are proportions of* previous statistic represents 22.1% of the population aged 16–64. GDP, however because there is no proportional aspect – there is no total level of GDP to compa

It might help you to think of the difference by thinking about how fast a car is tra rate of change, while the speed at any point is a level.

Part C: Example

The table below shows the estimates for young people (aged 16–24) who were N
Employment or Training).

	UK (thousands) Seasonally Adjusted	
Levels	**Total NEET 16–24-year-olds**	**NEETs as %**
Oct–Dec 2013	1,041	
Jan–Mar 2014	987	
Apr–Jun 2014	966	
Jul–Sep 2014	954	
Oct–Dec 2014	963	
Jan–Mar 2015	943	
Change		
Change on qtr.	-20	
Change %	-2.1	
Change on year	-44	
Change %	-4.7	

This is a table from the Office for National Statistics (ONS). There are quite a few
quite confusing at first, but let's work through it. It highlights well the difference
of change.

The table concerns the number of young people (16–24-year-olds) who were NE
Employment or Training) at certain points in time. The figures have been season
next section).

In the top half of the table we have the **levels** of NEETs. That is, the total numbe
figures are presented in thousands in the table, so in January–March there was a
the UK.

In the lower half of the table we have the change – in numbers and in percentag
previous quarter, and previous year. So, in the quarter ending March 2015 there
UK compared to the previous quarter. That is a reduction of 2.1%, which is the ra

EXTENSION SKILL 13: UNDERSTAND COMPOSITE INI

Part A: Specification Overview

Students should understand how composite indicators can be compiled using va
most important is the Human Development Index (HDI), and students should ap
of the index and how they are measured and combined (Topic 2.4.2).

Part B: Theoretical Overview

In Economics we use a lot of indicators, from GDP, unemployment and CPI to the
built and how many homes have broadband. These are numbers which tell us hc
how well it might fare in the future.

Sometimes, economists and statisticians will group several of these indicators to
measure in order to illustrate something that normal indicators cannot show.

This is a **composite indicator**: a new number based on a combination of sub-indi

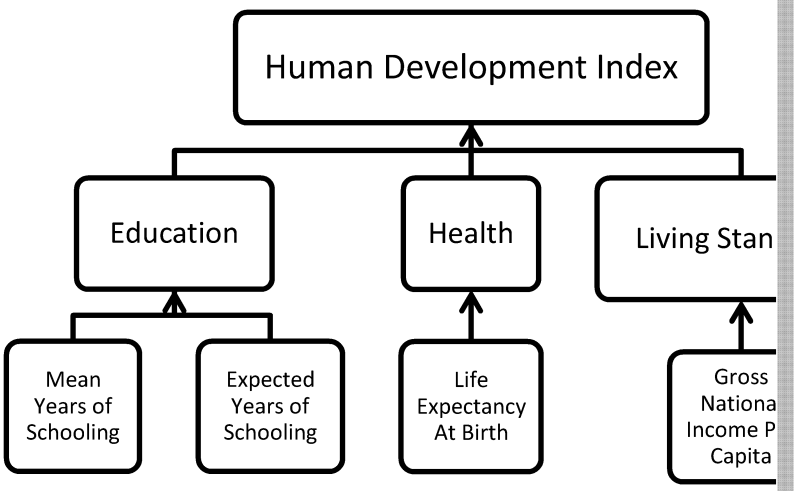
Think about the method for calculating inflation indices such as CPI (see Skill 6).
basket are assigned a weighting depending on their importance. The price for ea
relevant weight and then they are all added together.

The idea of composite indicators is similar: each sub-indicator must be assigned
in the new index that is being created. Often the new index will have no unit of r
element of judgment needed when creating a composite indicator. Each sub-ind
'normalised' so its scale is comparable to the scale of other sub-indicators used.

Part C: Example

When ranking countries on their development, there is an argument that GDP p
Generally, more money means better living standards.

However, economists such as Amartya Sen have reasoned that GDP per capita m
about health and education, and that a single, simple number would be more us
discussion. Their arguments led to the creation of the Human Development Inde
indicators detailing education, health and living standards into a new, unitless in



The sub-indicators considered in the HDI are detailed in the diagram above (edu

An index for each of the three aspects is created, and they are normalised so tha comparable. The two individual educational indices are given equal weighting.

The HDI is the geometric mean of these three indices:

$$\text{HDI} = \sqrt[3]{\text{Life Expectancy Index} \times \text{Education Index} \times \text{In}}$$

The mathematics of calculating the index is quite complicated and you don't nee you should have some idea of how the HDI is devised.

Below is a comparison of the top 10 countries ranked by HDI and by GDP per cap are on both lists (in bold) which shows how HDI ranks countries differently from

Top 10 Countries in 2015	
Ranked by HDI	**Ranked by GDP per c (US$)**
1. Norway	1. Luxembourg
2. Australia	2. Switzerland
3. Switzerland	3. Macao SAR, Chin
4. Germany	4. Norway
5. Denmark	5. Qatar
6. Singapore	6. Ireland
7. Netherlands	7. Australia
8. Ireland	8. United States
9. Canada	9. Denmark
10. United States	10. Singapore

Source: United Nations / Wor

Finally, there are a few shortcomings of the HDI which are worth pointing out:

- It doesn't take into account any environmental factors.
- It considers gross national income (GNI) per capita – but not how this incom have high GNI per capita, but also high inequality.
- Human development may vary hugely across the same country if certain reg average, but the HDI just gives one figure for the nation as a whole.

QUANTITATIVE SKILLS ASSESSMENT ACT

Guidance

The assessment that follows is presented in a similar format to the AS and A Lev to much of the A Level exam content too. It has been adapted so there is a great of the numerical requirements of the course. The format used is not an exact re only numerical content and no long written answers.

The questions in Section A are presented in multiple-choice format, each with fo not exam style questions, this is a good way for students to warm up with some

Section B has slightly longer-answer questions with a little bit more working requ specific problems that students may have when performing calculations more cl

Section C presents data in a variety of forms, similar to the format found in the r requires students to both interpret the information and apply their own econom

We suggest that students complete the exam after studying the booklet and atte The exam is worth 80 marks and we recommend that students have one and a h provides the same amount of time as they would get in an exam for this number

On completion, the assessment could be marked by the class teacher, peer asse themselves. Once the assessment has been marked, students can look at their re identify areas which may benefit from further review.

Surname	
Other Names	

Supporting AS and A Level Edexcel

Economics — Quantitative

Targeted Ski

For this paper you must have:

- a calculator

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ballpoint pen.
- Fill in the boxes at the top of this paper.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in
  be marked.
- Do all rough work in this book. Cross through any work you do not want to

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80 marks.

SECTION A

Questions in this section are **multiple-choice**.
Answer all questions. Only **one** answer per question is allowed.
For each answer **circle** the letter alongside the appropriate answer.
If you wish to change an answer, then cross out the original answer with an X.

1. Firm A's capacity utilisation ratio is 0.78 and the firm produces 312 units o of output could Firm A produce if it operated at full capacity?

a) 22
b) 78
c) 88
d) 400

2. The number of unemployed people in Sandbourne rises from 34,120 to 35 is this?

a) 4.60%
b) 4.40%
c) 15.71%
d) 7.03%

3. Interest rates rise from 4% to 5.5%. What *percentage change* in interest ra

a) 37.5%
b) 1.50%
c) 27.27%
d) 15.00%

4. The table below displays information on the inflation rate of the G7 econc mean and median rates of inflation for this group of seven countries?

Country	*Inflation Rate (CPI) (%)*
Canada	1.4
France	0.2
Germany	0.5
Italy	-0.1
Japan	-0.1
United Kingdom	0.6
United States	1.3

a) Mean = 0.453%, Median = 0.6%
b) Mean = 0.543%, Median = 0.6%
c) Mean = 0.453%, Median = 0.5%
d) Mean = 0.543%, Median = 0.5%

5. The price value of a basket of goods in 2010, the base year, is £5.30. In 20 and in 2012 it costs £5.85. What is the index for 2012?

a) 104
b) 110
c) 111
d) 100

6. **When do firms maximise profits?**

   a) When average costs equal average revenue.
   b) When marginal revenue equals the average variable costs.
   c) When marginal costs are slightly below marginal revenue.
   d) When marginal costs equal marginal revenue.

7. **Incomes in an economy have risen by 5% and annual sales of musical thea 14.7 million. What is the income elasticity of demand for musical theatre t affected demand)?**

   a) +1
   b) -1
   c) 5
   d) 0.5

8. **The price of 750 g of salt in a supermarket rises from £0.28 to £0.35. The s 2%. What is the price elasticity of demand for salt?**

   a) 0.08
   b) 0.8
   c) 12.5
   d) 0.28

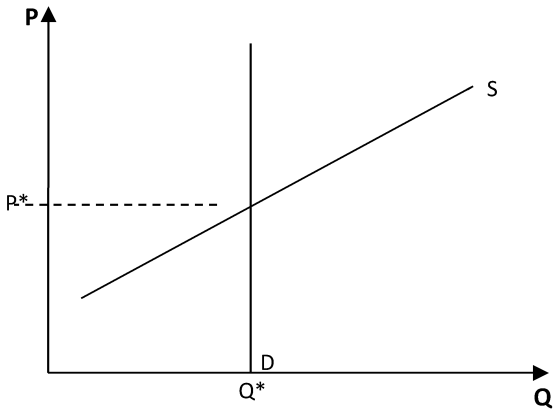
9. **A firm's selling price for one of its products is £224. It sells all of its produc the following is the firm's per unit cost of sales?**

   a) £134.40
   b) £160.00
   c) £89.60
   d) £140.00

10. **Real GDP in an economy in 2016 was £120 billion. Between 2015 and 2016 increased from its base of 100 to 106. What was this economy's GDP in no**

    a) £113.2 billion
    b) £124.8 billion
    c) £127.2 billion
    d) £129.6 billion

11. **Look at the following diagram, which shows the demand and supply curve**



If supply increased, which of the following would be true?

a) Consumers will consume more *and* the equilibrium price will fall.
b) Consumers will consume less *and* the equilibrium price will rise.
c) Consumers will not change their demand and the equilibrium price will
d) Consumers will decrease their demand and the equilibrium price will n

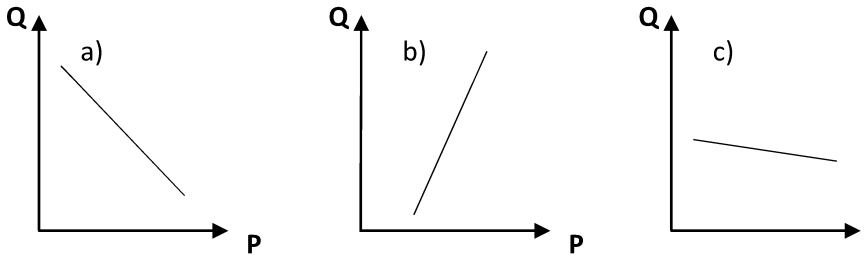
12. Suppose 80 Polish zloty is equal to £14.29. What is the pound-to-zloty exc

a) 1,143
b) 11.43
c) 17.86
d) 5.6

13. Stephanie pays 40% of her income in tax. She saves 10%, gives 5% to chari Supposing she has an annual salary of £60,000, how much does she spend

a) £2,250
b) £27,000
c) £2,000
d) £4,250

14. Look at the following diagrams. Which shows the most elastic demand?

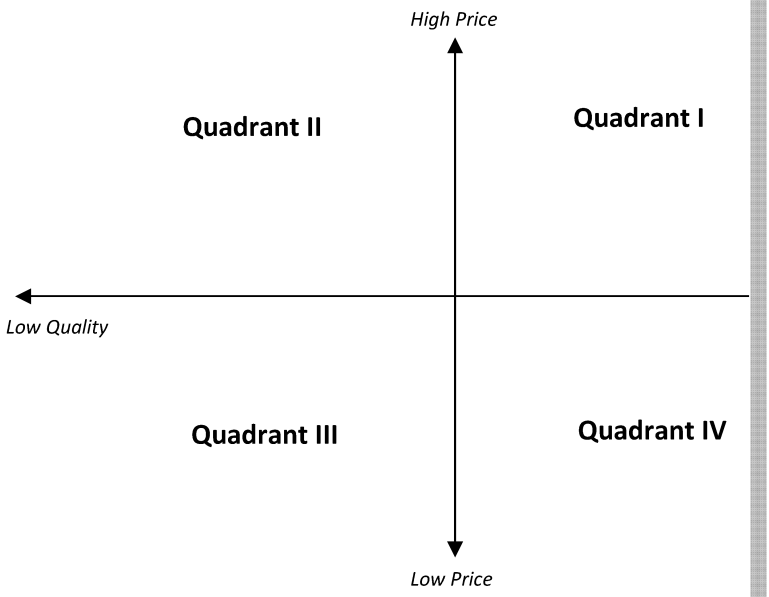


15. Consider the following table. What is the average cost of producing three

Output	Total Cost (£)
1	12
2	20
3	27
4	33

a) £8.25
b) £9.00
c) £7.00
d) £27.00

16. The figure below displays a typical set of 'market map' axes, which plots q



Ludl is a high-street supermarket brand that sells top quality products at h
In which quadrant of the market map above would you place the Ludl bra

a) Quadrant I
b) Quadrant II
c) Quadrant III
d) Quadrant IV

SECTION B

Family	Household Income (£)
1	16,000
2	19,000
3	23,000
4	24,000
5	25,000
6	33,000
7	35,000
8	47,000
9	55,000
10	78,000

1. The table above displays information on the household income for 10 fam

a) What is the ratio of Family 1's household income to Family 10's?

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b) What is the median household income?

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c) The mean household income is £35,500. Suppose that this figure rises year. What is the new value?

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d) If the rise was two *percentage points* higher, what would the new val

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2. The table below displays information on the price of items and their weigl goods for an economy.

a) Fill in the missing figures in the table.

Year	Goods		
	Good	Price	Weight
2010	Good A	£1.00	0.25
	Good B	£2.00	0.15
	Good C	£3.00	0.2
	Good D	£4.00	0.4
2011	Good A	£1.10	0.25
	Good B	£2.00	0.15
	Good C	£3.20	0.2
	Good D	£4.50	0.4
2012	Good A	£1.10	0.25
	Good B	£2.05	0.15
	Good C	£3.25	0.2
	Good D	£4.45	0.4
2013	Good A	£1.10	0.25
	Good B	£2.00	0.15
	Good C	£3.40	0.2
	Good D	£4.40	0.4

b) Which year was the most expensive to live in?

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c) In 2014, Good D was reweighted such that it constituted 50% of the b weight was reduced to 0.15. What was the price value of the basket c

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d) What would be the rate of inflation between 2013 and 2014?

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3. **The table below displays information on a firm's revenue and costs over a**

   a) **Fill in the marginal cost (MC) column.**

Total Output	Total Revenue	MR	Total Cost
1	8	8	6
2	16	8	13
3	24	8	20
4	32	8	28
5	40	8	42

   b) **What would be this firm's profit-maximising level of output?**

4. **Mario's Specialist Cakes produces cupcakes for special occasions, includin target audience is across the West Midlands. The selling price per cupcake for each one. The business has fixed costs of £3,000 per month. The busin 3,000 cupcakes a month.**

   a) **Complete the break-even table below for Mario's Specialist Cakes.**

Output	Revenue	Total variable costs	Fixed costs
0	£0	£0	
500	£1,000	£250	£3,000
1000	£2,000	£500	£3,000
1500		£750	£3,000
2000	£4,000	£1,000	£3,000
2500	£5,000	£1,250	£3,000
3000	£6,000		£3,000

   b) **How many cupcakes must the business sell a month to break even?**

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   .....

   c) **Explain why Mario's Specialist Cakes has total costs of £3,000, if no cu at a zero level of output.**

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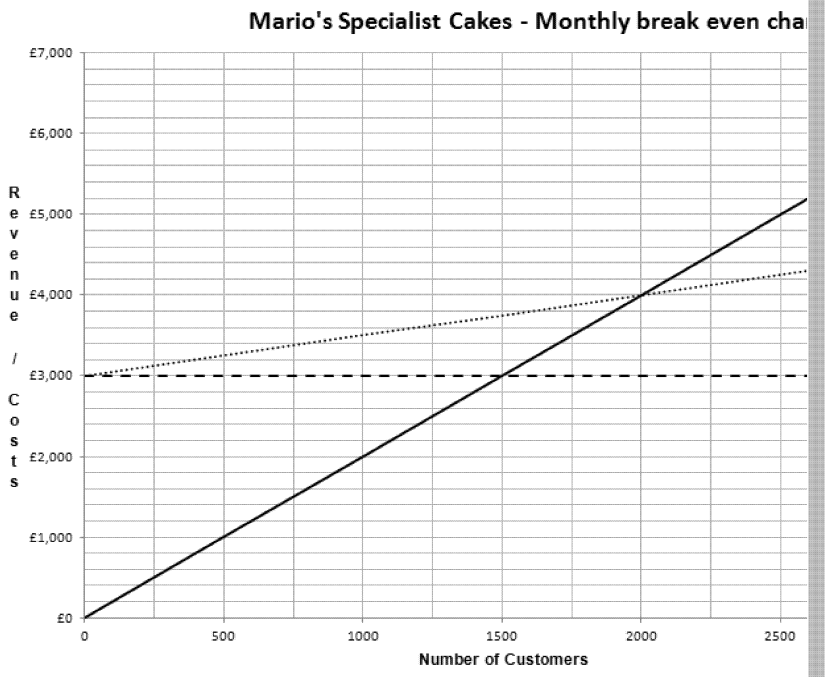
d) Mario's Specialist Cakes is planning to increase the selling price of eac
expected not to continue selling 3,000 cupcakes a month, as demand



Using the graph above to complete the following:

i) Label the original break-even output BE1.

ii) Label and state the margin of safety on the chart before the price

iii) Plot the new revenue line and label it REV2.

iv) Label the new break-even output BE2.

v) What is the new break-even output level for Mario's Specialist C

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vi) Use the chart to work out how much of a profit or loss will be ma
month at the new price.

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5. Cineworld, a cinema group with theatre operations in the UK, Ireland and market leader for a number of years. In 2013 it had a 25.5% share of the U

The business has embarked on a period of expansion over the last few yea the arthouse cinema chain, Picturehouse, in 2012 for £47.3 million, which mature and cultured target market. During the early part of 2015 it opene both Cineworld and Picturehouse. Six more new cinemas were planned fo existing cinemas have been refurbished to include the latest technology o new seats, IMAX, 4DX and 'Superscreens'.

Between 2013 and 2014 UK cinema attendance fell by 4.9% to 157.5 millic For the financial year ending December 2013 the Cineworld group's gross operating profit margin 9.2% and profit for the year margin 5.2%. In the fc revenue achieved by the group was £619.4 million, gross profit £180.5 mil million and profit for the year £54.5 million.

a) Calculate the 2014 gross profit margin.

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b) Calculate the 2014 operating profit margin.

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c) Calculate the 2014 profit for the year margin.

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6. Historically, Japan has struggled with very low inflation – and sometimes

a) Imagine a Japanese firm sees its total revenue rise from 350 million y to 2015. What percentage increase is this in nominal terms?

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b) **The price index for 2015 with respect to 2014 is 98.5. What was the n real terms?**

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c) **What was the percentage increase in real revenue?**

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7. a) **A fish and chip shop has to increase the price of its chips after blight a The price of a cone of chips rises from £1.20 to £1.40. The shop sees s price elasticity of demand?**

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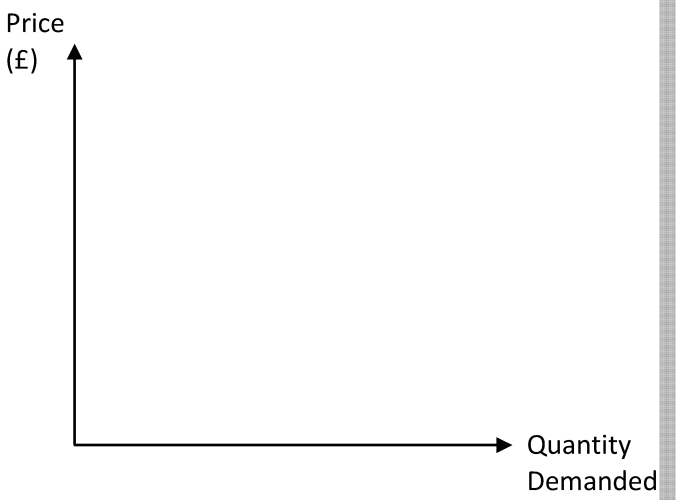
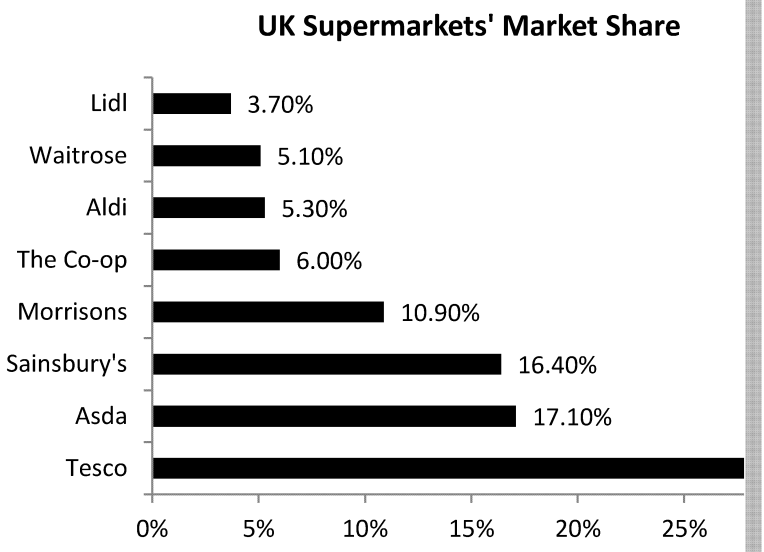
b) **Sketch the demand for chips with respect to price on the graph below**



SECTION C

This section is based on the following information:

Graph 1

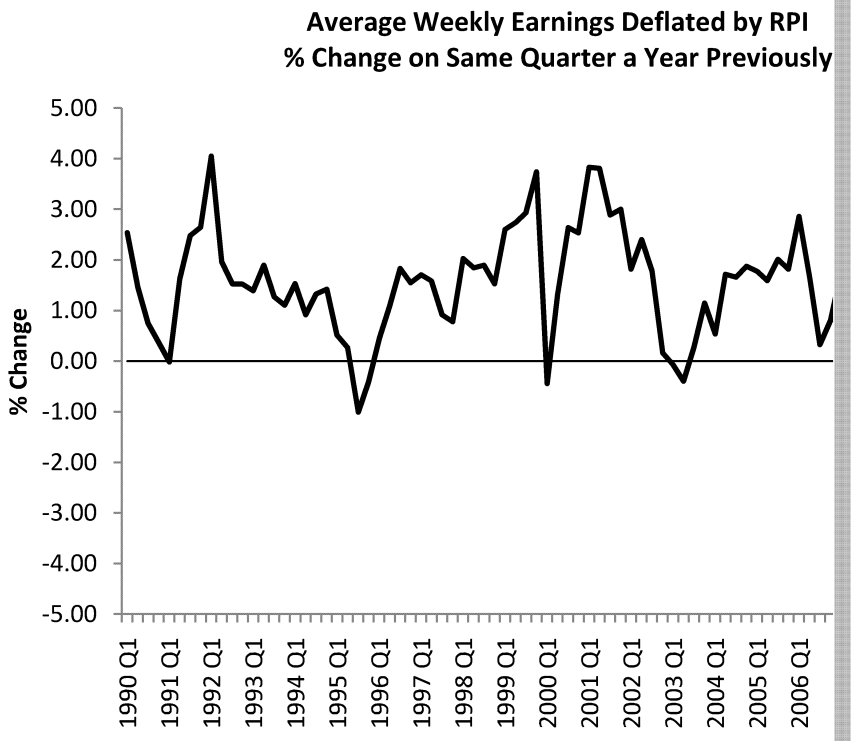


Extract 1

Despite challenging economic conditions, the two main discount supermarkets in share increase this year. Aldi experienced growth of over 30%, which resulted in the UK to date. It currently stands at 4.6%. Lidl also expanded successfully and no

Premium supermarkets also managed to expand, with Waitrose slightly increasin main losers were the 'big four' of Tesco, Asda, Sainsbury's and Morrisons, which

Graph 2



1. **Identify key features of the data in Graph 2.**

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2. **Extract 1 suggests that discount supermarkets have increased their marke Graph 2, discuss why this might be the case.**

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3. **Calculate the three-firm concentration ratio (the proportion of the market firms) for supermarkets in the UK.**

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SUGGESTED ANSWERS TO PRACTICE ACT

Skill 1: Ratios

1. Capacity Utilisation$=\frac{\text{Current Output}}{\text{Maximum Possible Output}}=\frac{5{,}100{,}000}{6{,}800{,}000}=0.75$

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

2. a) Productivity Ratio$=\frac{\text{Output}}{\text{Input}}=\frac{400}{4}=100$ berries per labour hour

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

b) Productivity Ratio$=\frac{900}{4}=225$ berries per labour hour

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

c) David : Jess = 100 : 225 = 1 : 2.25

3. a) Operating Profit (2015)$=\frac{\text{Operating Profit}}{\text{Revenue}}=\frac{£200{,}000 \text{ mn.}}{£300{,}000 \text{ mn.}}=0.67$

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

b) Operating Profit (2016)$=\frac{\text{Operating Profit}}{\text{Revenue}}=\frac{£20{,}000 \text{ mn.}}{£120{,}000 \text{ mn.}}=0.17$

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

c) Percentage Change$=\frac{0.17-0.67}{0.67}\times100=-\frac{0.5}{0.67}\times100=-0.746\times100=-75\ \%$

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

Skill 2: Percentages, percentage changes and percentage point changes

1. 550/890 × 100 = **61.80%**
***2 marks**. **1 mark** for the answer, **1 mark** for two decimal places and % sign.*

2. 1/7 × 100 = **14.29%**
***2 marks**. **1 mark** for the answer, **1 mark** for two decimal places and % sign.*

3. [(520 000 – 498 000) / 498 000] × 100 = **4.42%**
***3 marks**. **1 mark** for correct approach in working, **1 mark** for answer, **1 mark** for tw*

4. a) 9 – 5.1 = **3.9**
1 mark** for correct answer. Note that adding % sign is **incorrect.

b) (6.9 – 8.2)/8.2 × 100 = **(-)15.85%**
***2 marks**. **1 mark** for correct answer, **1 mark** for % and two decimal places.*

5. Price = Cost + 40% Mark–up = £7

1.40 (Cost) = £7

Cost $=\frac{£7}{1.40}=£5$

***2 marks. 1 mark** for correct answer, **1 mark** for showing working.*

Skill 3: Mean and median

1. a) Mean = **12** (144/12)
***2 marks**. **1 mark** for correct answer, **1 mark** for working.*

b) Median = **11** (The numbers are already ordered. The median lies between 10 a
***2 marks**. **1 mark** for the correct answer, **1 mark** for an indication the student h*

2. a) Mean = £36, median = £33. Hence, the boss would prefer the mean as it's high
***3 marks**. **1 mark** for each correct answer, **1 mark** for the correct interpretation*

b) Tying pay to **median** income would be better for reducing inequality. The mea
higher earners. If a boss was concerned about raising his own pay then he wo
wages of all workers.
***2 marks**. **1 mark** for the correct answer (median), **1 mark** for interpreting that*

3. Mean income has risen at a consistently higher rate than the median income. This i
the highest earners have risen at a higher rate and, thus, the means are skewed up
***3 marks**. **1 mark** for pointing out that mean income has risen at a higher rate than
interpreting the effect this has on inequality, etc.*

4. Total Fixed Cost = £8,000

Total Variable Cost = £6.00 × 500 = £3,000

Total Cost = £11,000

Output = 500

Average Cost = $\frac{£11,000}{500}$ = £22

5. **a)** Rwanda's GDP per capita= $\frac{8,095}{11.61}$ =\$697.24

b) Increase in GDP=8,095+(0.2)8,095=9,714

GDP per capita (2016)= $\frac{9,714}{11.61}$ =\$836.69

Skill 4: Quantiles

1.

***Q*₁**	12	17	20	21	22
***Q*₂**	23	24	25	32	35
***Q*₃**	36	37	37	37	39
***Q*₄**	40	41	45	47	48

***3 marks**. Award **3 marks** if all numbers are correct.*

2. The median value is **35.5**.
***1 mark**. Incorrect if the student has rounded this to 36.*

3. The interquartile range is 22.5 to 39.5 (which can also be stated as 39.5 – 22.5 = 17
***2 marks** for the correct answer. Award **1 mark** if the student is 0.5 either side of the*

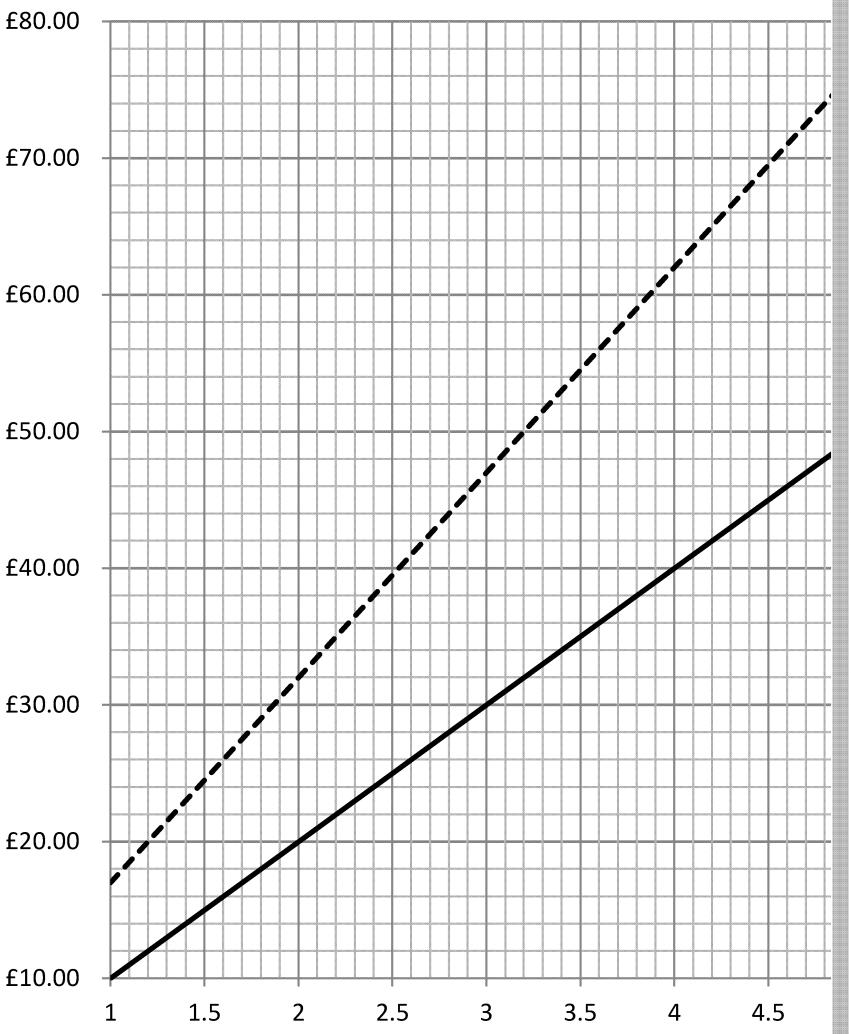
4. We are looking for the student to talk about the distribution of values: there is a lo
The median value is not in the middle, suggesting that high values skew everything
an example of data that may be distributed like this (e.g. income).
***3 marks**. **1 mark** for just pointing out facts about the relevant positions of Q1, Q2, e
sensible points and observations about the distribution of values.*

Skill 5: Standard graphical forms

1. **a)** The table should be filled in as below.
***2 marks**. **1 mark** for each correct column.*

Passengers	Revenue	Revenue₁ (50% increase)	Revenue₂ (Plus £2)
1	10	**15**	**17**
2	20	**30**	**32**
3	30	**45**	**47**
4	40	**60**	**62**
5	50	**75**	**77**

b) The graph should be drawn below.
2 marks. ***1 mark*** *for the correct shape,* ***1 mark*** *if it passes through the correct*



c) The gradient is 30/2 = 15. It is a shift **and** a rotation.
2 marks. ***1 mark*** *for the gradient,* ***1 mark*** *for a correct interpretation.*

Skill 6: Index numbers

1. Correct answers are shown below.

Year	Goods in the basket		
	Good	Price	Weight
2013	Good X	£5.50	0.5
	Good Y	£0.50	0.1
	Good Z	£1.20	0.4
2014	Good X	£5.40	0.5
	Good Y	£0.50	0.1
	Good Z	£2.20	0.4
2015	Good X	£5.60	0.5
	Good Y	£0.80	0.1
	Good Z	£5.50	0.4

Award ***6 marks*** *for all correct answers and working. Deduct* ***1 mark*** *for each of the*
2 marks *if the attempted working is appropriate and the units are correct (deduct* ***1***
the index column).

2. The ONS would adjust the weights if they feel that consumer spending habits have
consumers are purchasing more of Good X and less of Good Y. Thus, X should have
***2 marks**. **1 mark** for the idea that weights may change to reflect changing spending*
indicated that this specific change means that consumers are buying more of Good

3. Price value = £4.27; Index = 130
***3 marks**. **1 mark** for each correct answer, **1 mark** for the working.*

4. The idea that although the higher-priced item has decreased in price, it has become
Thus, there is inflation.
*Award **2 marks**. **1 mark** for the idea that Good X has become more important / wei*
***1 mark** for correct interpretation of the effect.*

Skill 7: Cost, revenue and profit (average and totals)

1. TR = Q × P so P= TR / Q = 2000 / 40 = **£50**
*Award **2 marks**. **1 mark** for rearranging the formula, **1 mark** for correct answer.*

2. **a)** 17/5 = **£3.40**
***1 mark** for the correct answer.*

b) £3.40–£1.40 = **£2**
***1 mark** for the correct answer.*

c) TR = **£20** (slight trick question – the answer is given). Profit = TR – TC = 20 – 17
***2 marks**. **1 mark** for each correct answer.*

d) AR = P = 20/5 = **£4**
***1 mark** for the correct answer.*

3. **a)** AVC = £10 – £2 = **£8**
***1 mark** for the correct answer.*

b) AVC increase by 25% – £8 to £10. AFC remains constant. So new AC (total) = £
***2 marks**. **1 mark** for working, **1 mark** for correct answer.*

Skill 8: Cost, revenue and profit (marginal)

1.

Units of Output	Total Cost	Marginal Cost
0	11	
1	21	**10**
2	30	**9**
3	38	**8**
4	44	**6**
5	55	**11**

***1 mark** for filling in all six values correctly.*

2. **a)**

Total Output	Total Revenue	MR	Total Cost	
1	100	**100**	70	
2	200	**100**	140	
3	300	**100**	200	
4	400	**100**	300	
5	500	**100**	510	

***4 marks**. **1 mark** for each column, **1 mark** if working is correct.*

b) Profit is maximised when MR = MC. In this case, that is producing four units of
***2 marks**. **1 mark** for the profit maximisation rule, **1 mark** for the correct answ*

Skill 9: Converting money to real terms

1. **a)** [((1110 – 1010) / 1010) × 100] = 9.9%
***2 marks**. **1 mark** for correct answer, **1 mark** for suitable working and % sign.*

b) [(1110 / 103) × 100] = $1077.7
***2 marks**. **1 mark** for correct answer and **1 mark** for suitable working and $ sig*

c) [((1077.7 - 1010) / 1010) × 100] = 6.7%
***2 marks**. **1 mark** for correct answer, **1 mark** for suitable working and % sign.*

2. This question is deliberately vague and is designed to give students practice in inter
*Award **4 marks** for suitable answers. Points include:*

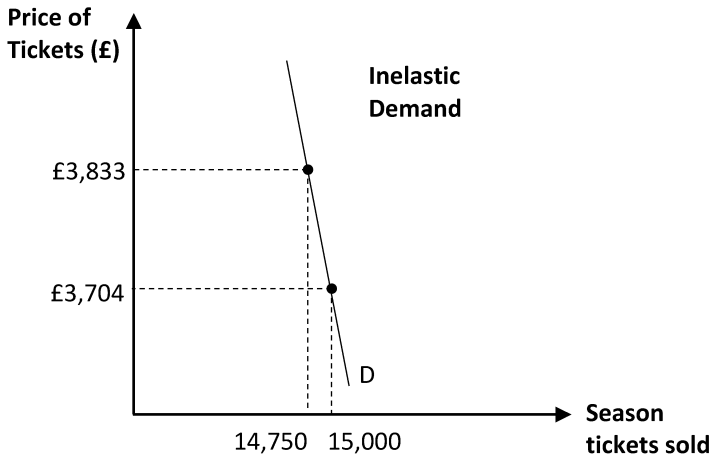
- *In general, wages have grown at a higher rate than inflation.*
- *This changed since the 2008 financial crisis and subsequent recession.*
- *Now, wages are not rising as fast as inflation.*
- *Links to purchasing power (it is now decreasing – people can afford fewer goo*

Skill 10: Elasticity

1. **a)** PED = change in Q% / change in P% = [(14 750 – 15 000) / 15 000] / [(3833 – 3
= (-1.6/3.48) = **(–)0.46**
***3 marks**. **1 mark** for correct PED formula, **1 mark** for good working, **1 mark** fo*

b) **Inelastic** (less than 1). This is because commuters may have no other way of g
tickets despite price rises.
***2 marks**. **1 mark** for the correct answer (inelastic), **1 mark** for a suitable expla*

c) We are looking for something like this:



***3 marks**. **1 mark** for the steep slope showing inelastic demand, **1 mark** for labe
adding the values on the axes and connecting them to the slope.*

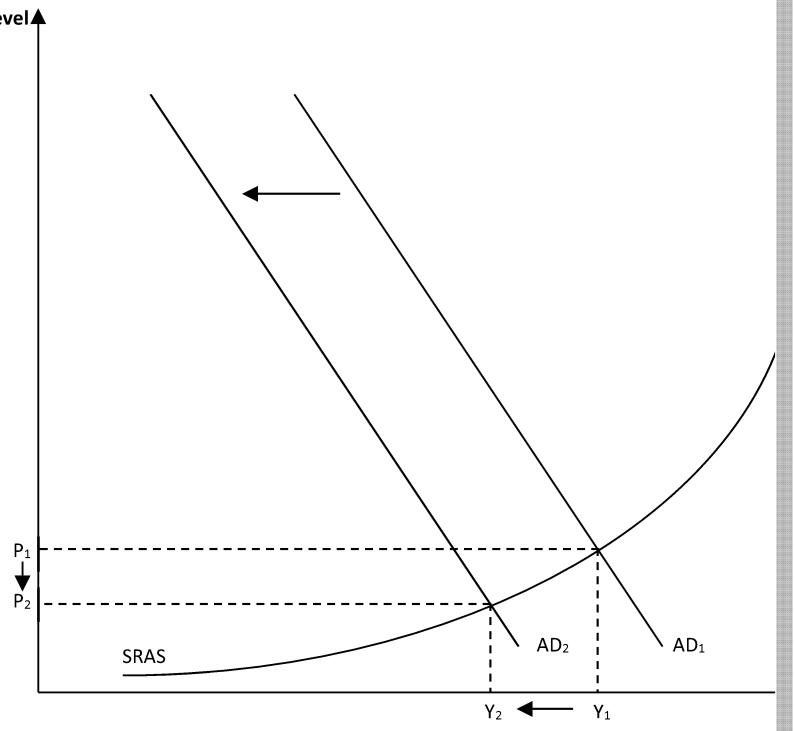
2. YED = change in Q % / change in income % = ([(14 – 12) / 12) / 7.5] = **2.2**
***3 marks**. **1 mark** for the correct answer, **1 mark** for correct formula, **1 mark** for wor*

Skill 11: Information in written, graphical and numerical forms

1. **a)** *Total **4 marks**. There is a lot going on in this graph. **1 mark** for correctly interp
decreased since 2008 and **1 mark** for interpreting that part-time employment
for discussing some numbers from the graph – check that students have interp
1 further mark for any other correct observation, e.g. the two lines mirror eac
financial crisis, etc.*

b) *Total **3 marks**. **1 mark** for pointing out that the claimant count has risen since
is higher, **1 mark** for correctly using an example figure from the graph, **1 furth**
e.g. the claimant count may be higher if fewer workers had shifted to part-tim
in 2008 and has then remained steady, not yet decreasing to pre-crisis levels.*

c) *Total **5 marks**. The key line here is '…*those on temporary contracts have more
than workers in standard jobs. Earnings levels are also lower.*' With lower earr
likely reaction is to reduce expenditure. Therefore, the AD curve would shift inv
it declines (recall that AD = C + I + G + (X – M)). Award **2 marks** for this observa
Award **a further 3 marks** for drawing a suitable AD/AS diagram – showing left
to AD_2 because of a reduction in consumption owing to falling incomes and a l
insecurity. We are looking for something like this:*



MARK SCHEME FOR QUANTITATIVE SKILLS TAF

Section A: Multiple-choice Questions (16 marks)

1. C	5. B	9. B
2. A	6. D	10. C
3. A	7. A	11. C
4. D	8. A	12. D

Detailed answers:

1. Firm A's capacity utilisation ratio is 0.78 and the firm produces 312 units of outpu output per week could Firm A produce if it operated at full capacity? [1]

Capacity Utilisation Rate = 0.78
Utilised Capacity: Unutilised Capacity → 0.78 : 0.22 → $312 : X$

$$\frac{312}{312 + X} = 0.78$$

$\therefore X = 88$

2. The number of unemployed people in Sandbourne rises from 34,120 to 35,690. W

$$\frac{(35\,690 - 34\,120)}{34\,120} \times 100 = 4.601\%$$

3. Interest rates rise from 4% to 5.5%. What *percentage change* in interest rates is t

$$\left(\frac{(5.5 - 4)}{4}\right) \times 100 = 37.5\%$$

4. What are the mean and median rates of inflation for this group of seven countrie

$$\text{Mean} = \frac{\text{Total Sum of Values}}{\text{Number of Values}} = \frac{3.8}{7} = 0.543$$

$$\text{Median} = \left\{\frac{N+1}{2}\right\}^{th} \text{value} \therefore = \left\{\frac{7+1}{2}\right\}^{th} \text{value} = 4^{th} \text{value} = 0.5$$

5. The price value of a basket of goods in 2010, the base year, is £5.30. In 2011 the s it costs £5.85. What is the index for 2012?

$$\left(\frac{5.85}{5.30}\right) \times 100 = 110.38$$

6. When do firms maximise profits?

Firms maximise profits when MC = MR. The golden rule.

7. Incomes in an economy have risen by 5% and annual sales of musical theatre tick million. What is the income elasticity of demand for musical tickets (if nothing els affected demand)?

$$\text{YED} = \frac{\Delta \text{ demand \%}}{\Delta \text{ income \%}}$$

$$\Delta \text{ demand \%} = \left(\frac{(14.7 - 14)}{14} \times 100\right) = 5$$

$$\text{YED} = \frac{5}{5} = 1$$

8. The price of 750 g of salt in a supermarket rises from £0.28 to £0.35. The superma is the price elasticity of demand for salt?

$$\text{PED} = \frac{\Delta \text{ quantity demanded \%}}{\Delta \text{ price \%}}$$

$$\Delta \text{ price \%} = \left(\frac{(35-28)}{28} \times 100\right) = 25$$

$$\text{PED} = \frac{2}{25} = 0.08$$

9. A firm's selling price for one of its products is £224. It sells all of its products at a 4 following is the firm's per unit cost of sales?

Price = £224

Price = Cost of Sales + 40% Cost of Sales

£224 = 1.40 (Cost of Sales)

$$\text{Cost of Sales} = \frac{£224}{1.40} = £160$$

10. Real GDP in an economy in 2016 was £120 billion. Between 2015 and 2016 the co its base of 100 to 106. What was this economy's GDP in nominal terms in 2016?

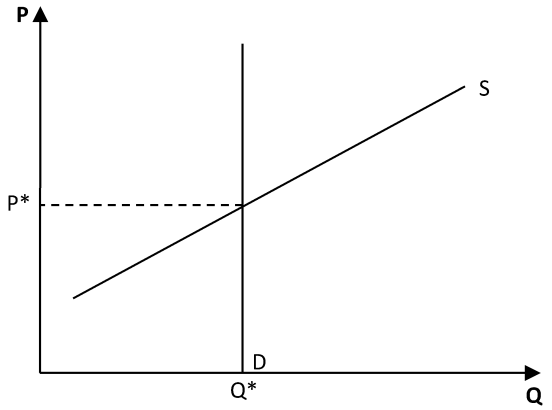
$$\text{Nominal GDP}_{2016} \times \text{GDP Deflator}_{2016} = \text{Real GDP}_{2016}$$

$$\text{Nominal GDP}_{2016} \times \frac{\text{CPI}_{\text{Base (2015)}}}{\text{CPI}_{2016}} = \text{Real GDP}_{2016}$$

$$\text{Nominal GDP}_{2016} \times \frac{100}{106} = £120 \text{ billion}$$

$$\text{Nominal GDP}_{2016} = \frac{£120 \text{ billion} \times 106}{100} = \frac{£12720 \text{ bn}}{100} = £127.20 \text{ billion}$$

11. Look at the following diagram, which shows the demand and supply curve for a c



If supply increased, which of the following would be true?

If supply increased, the supply curve would shift outward (to the *right*) and the equ unchanged. However, because the demand curve is *perfectly inelastic* the change ir through a change in price – in this case it is a *decrease*. Consumers demand the pro range of different prices..

12. Suppose 80 Polish zloty is equal to £14.29. What is the pound-to-zloty exchange r

Note that the pound-to-zloty exchange rate can be expressed as a *ratio*:
80zł : £14.29

$$\frac{80zł}{14.29} : \frac{£14.29}{14.29}$$

∴ £1 = 5.6 zł

13. Stephanie pays 40% of her income in tax. She saves 10%, gives 5% to charity and s an annual salary of £60,000, how much does she spend per month?

$100 - (40 + 5 + 10) = 45$

$0.45 \times 60\,000 = 27\,000$

$\frac{27\,000}{12} = £2{,}250$

14. Look at the following diagrams. Which shows the most elastic demand?

Diagram c is the most elastic – the flatter line means that a small change in price tri in quantity demanded.

15. Consider the following table. What is the average cost of producing three units of

$\frac{27}{3} = £9$

16. In which quadrant of the market map above would you place the Ludl brand?

The Ludl brand sells top-quality products (*High Quality*) at discounted prices (*Low P* sensible to place the brand in Quadrant IV (the bottom right quadrant).

Section B: Longer-answer Questions (28 marks)

1. a) Income of Family 1 = £16,000
Income of Family 10 = £78,000
Family 1 : Family 10 → £16,000 : £78,000 → 1 :4.875
***2 marks**. **1 mark** for the correct answer, **1 mark** for working.*

b) The median is **£29,000**. [(25 000 + 33 000) / 2]
***2 marks**. **1 mark** for the correct answer, **1 mark** for good attempt at working c*

c) 35 500 + [(3 / 100) × 35 500] = **£36,565**
***1 mark** for the correct answer.*

d) 35 500 + [(5 / 100) × 35 500] = **£37,275**
***2 marks** for the correct answer and working.*

2. a)

Year	Goods		
	Good	Price	Weight
2010	Good A	£1.00	0.25
	Good B	£2.00	0.15
	Good C	£3.00	0.2
	Good D	£4.00	0.4
2011	Good A	£1.10	0.25
	Good B	£2.00	0.15
	Good C	£3.20	0.2
	Good D	£4.50	0.4
2012	Good A	£1.10	0.25
	Good B	£2.05	0.15
	Good C	£3.25	0.2
	Good D	£4.45	0.4
2013	Good A	£1.10	0.25
	Good B	£2.00	0.15
	Good C	£3.40	0.2
	Good D	£4.40	0.4

*The table should be filled in as above. Award **3 marks**, subtracting **1 mark** for e*

b) A basket of goods cost the same in **2011 and 2013**; 2012 was very similar.
1 mark *for the correct answer.*

c)

Good A	£1
Good B	£2
Good C	£
Good D	£
Total	

2 marks *for the correct answer and working.*

d) $\text{Inflation}_{2013–2014} = \frac{\text{Price Level}_{2014} - \text{Price Level}_{2013}}{\text{Price Level}_{2013}} \times 100 = \frac{3.35 - 3.02}{3.02} \times 100 = 0.1$

2 marks *for the correct answer and working.*

3. a)

Total Output	Total Revenue	MR	Total Cost	
1	8	8	6	
2	16	8	13	
3	24	8	20	
4	32	8	28	
5	40	8	42	

The MC column should be filled in as above. Award ***3 marks****, subtracting* ***1 mark***

b) The profit-maximising output is at MC = MR, which is **four units**.
1 mark *for identifying that profit-maximising output = 4.*

4. a)

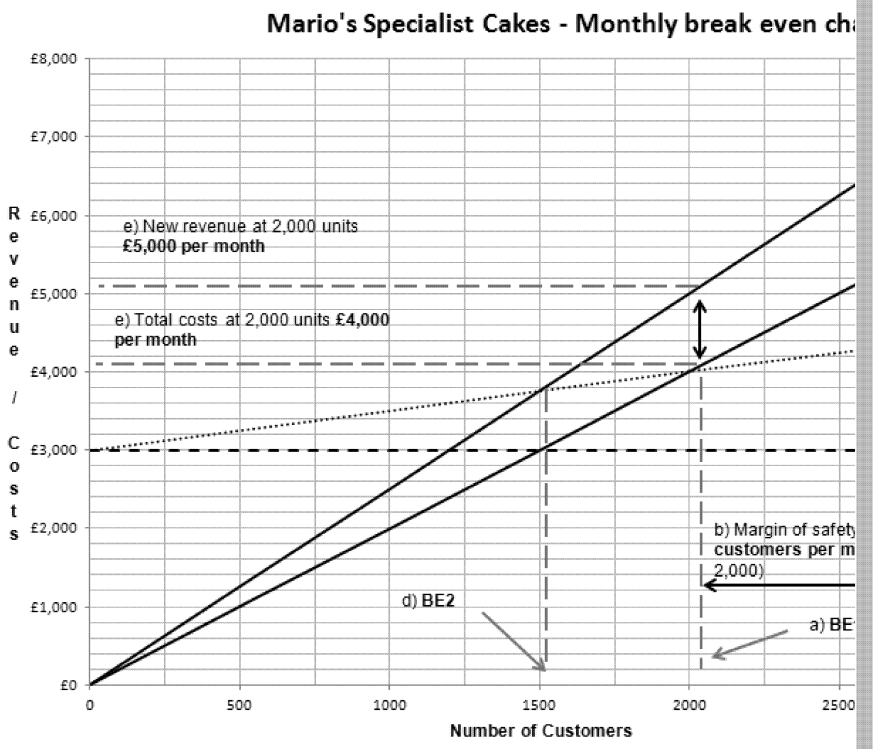
Output	Revenue	Total variable costs	Fixed costs	
0	£0	£0	**£3,000**	
500	£1,000	£250	£3,000	
1000	£2,000	£500	£3,000	
1500	**£3,000**	£750	£3,000	
2000	£4,000	£1,000	£3,000	
2500	£5,000	£1,250	£3,000	
3000	£6,000	**£1,500**	£3,000	

1 mark for each correct answer up to a maximum of 4 ***marks***

b) 2,000 cupcakes a month are required to break even – ***1 mark*** *for correct answ*

c) The total costs include fixed costs which have to be paid regardless of whethe
sells anything or not (*1 mark).*
Total of ***1 mark*** *available*

d)



i) *1 mark* *labelling break-even at 2,000 customers (total of **1 mark***

ii) *1 mark* *labelling the margin of safety between 2,000 and 3,000 c*
1 mark *identifying the margin of safety as 1,000 customers*
*Total of **2 marks** available*

iii) *1 mark* *new revenue line has a minor error **or***
2 marks *new revenue line accurate*
1 mark *labelling the new revenue line REV2*
*Total of **3 marks** available*

iv) *1 mark* *new break-even labelled at 1,500 (total of **1 mark** availab*

v) *1 mark* *correct answer, 1,500 cupcakes per month (total of **1 ma***

vi) Revenue at 2,000 customers per month is £5,000 at the new price level,
business is expected to make a £1,000 profit per month (£5,000 – £4,00
1 mark each *correct revenue and total costs data (maximum 2 marks)*
1 mark *correct formula*
1 mark *correct profit answer: £1,000 p/month*
*Total of **4 marks** available*

5. a) $\frac{£180.4m}{£619.4m} \times 100 =$ **29.1% GPM**

*See **Activity 6 Q1** answer for guidance on allocating marks*
*Total of **3 marks** available*

b) $\frac{£76.0m}{£619.4m} \times 100 =$ **12.3% NPM**

*See **Activity 6 Q1** answer for guidance on allocating marks*
*Total of **3 marks** available*

c) $\frac{£54.5m}{£619.4m} \times 100 =$ **8.8% PYM**

See Activity 6 Q1 answer for guidance on allocating marks
*Total of **3 marks** available*

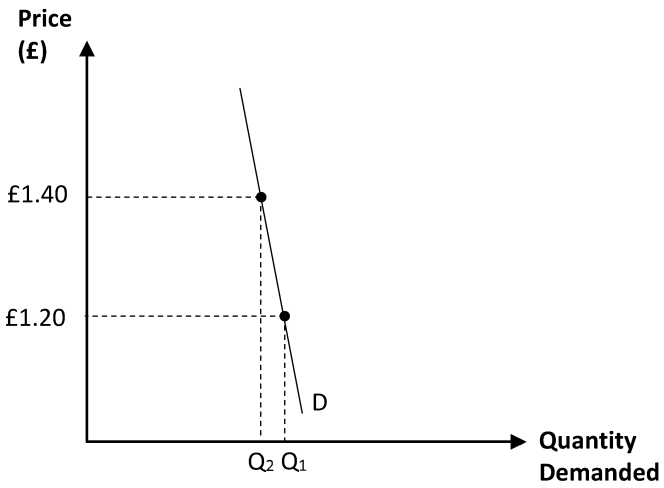
6. **a)** [(385 – 350) / 350] × 100 = **10%**
***2 marks**. **1 mark** for the correct answer, **1 mark** for working and the % sign.*

b) (385 / 98.5) × 100 = **390,860,000 yen**
***2 marks**. **1 mark** for the correct answer, **1 mark** for working and writing 'yen'.*

c) [(390 860 000 – 350 000 000) / 350 000 000] × 100 = **11.68%**
***2 marks**. **1 mark** for the correct answer; **1 mark** for working, two decimal plac*

7. **a)** PED = 12/16.6 = **0.72**
***2 marks. 1 mark** for the correct answer, **1 mark** for working.*

b)



We are looking for a steep downwards-sloping line.
***2 marks**. **1 mark** for the correct line shape; **1 mark** for labelling axes, etc.*

Section C: Data Response

1. This is quite a tricky graph to interpret. They key is that when the line is below 0 the
the previous year, even if the line is moving upwards.
*up to **3 marks:** up to **2 marks** for describing the main trend of the line (recent decre
term trend of a rise), **1 mark** for linking a trend to economic knowledge, **1 mark** for
mark for any other observation (e.g. quite volatile data).*

2. The main point here is that real earnings have decreased, and so much of the popu
real terms. Hence, the discount or budget supermarkets have become more popula
***3 marks** for correct interpretation and relevant discussion.*

3. Concentration ratio = (29.4 + 17.1 + 16.4) = 62.9%
***2 marks**. **1 mark** for correct answer; **1 mark** for working, the decimal place and the*

APPENDIX 1: KEY UK ECONOMIC INDIC

All figures for are 2016 unless otherwise stated

Growth	GDP	$
	Real GDP growth	1
	GDP per capita	$
	Gross national saving rate	1
GDP by sector	Agriculture	0
	Industry	1
	Services	8
Labour	Labour force	3
	Unemployment rate	4
	Population below poverty line	1
Household income by percentage share	Bottom 10%	1
	Top 10%	3
Public debt	92.2% of G	
Inflation	Consumer prices	0
Trade	Exports	$
	Imports	$