Name: _____

GCSE Statistics

Index Numbers

Total marks available: 78

Total marks achieved: _____

Instructions
• Use black ink or ball-point pen.
• Fill in the boxes at the top of this page with your name, centre number and candidate number.
• Answer all questions.
• Answer the questions in the spaces provided – there may be more space than you need.
• Scientific calculators may be used.
• You must show all your working out with your answer clearly identified at the end of your solution.

Information
• The marks for each question are shown in brackets – use this as a guide as to how much time to spend on each question.

Advice
• Read each question carefully before you start to answer it.
• Try to answer every question.
• Check your answers if you have time at the end.

Q1.

The table gives the simple index numbers, with 2013 as base year, for the average prices of houses in Scotland and in Wales for the years 2014 to 2017

The table also gives the chain base index numbers for the same information.

	Year	2014	2015	2016	2017
Scotland	Simple index number	103.6	110.1	111.7	113.5
	Chain base index number	103.6	106.3	101.5	101.6
Wales	Simple index number	103.0	106.7	109.7	115.0
	Chain base index number	103.0	103.6	102.8	104.8

(Source: *HM Land Registry*)

(a) Give an interpretation of the simple index number 103.6 for Scotland.

.....

.....

(2)

David bought his house in Wales for £165 000 in 2013

(b) (i) Use an appropriate index number to calculate an estimate for the price of his house in 2017

£ .....

(ii) Comment on the reliability of this estimate.

.....

.....

.....

(3)

(c) By finding appropriate geometric means, compare and interpret the yearly average change in house prices from 2013 to 2017 in Scotland and in Wales.

(5)

(Total for question = 10 marks)

Q2.

The table gives information about the change in the cost of a second class stamp from 2011 to 2017

Year	2011	2013	2015	2017
Cost of second class stamp (pence)	36	50	54	56
Chain base index number		138.9	108	

(Source: *www.2ndclassstamp.co.uk*)

By working out the geometric mean of 3 appropriate chain base index numbers, what can be deduced about the average two-yearly change in the cost of a second class stamp from 2011 to 2017?

.....

.....

.....

.....

(Total for question = 6 marks)

Q3.

The table gives information about the monthly average price per litre, in pence, of diesel over a period of five months.

The table also gives some of the chain base index numbers, correct to one decimal place, for this information.

	May	June	July	August	September
Monthly average price (p)	109.1	111.8	112.7	111.2	113.1
Chain base index number		102.5	100.8		

(Source: *theaa.com*)

(a) Calculate the chain base index numbers for August and September and write them in the table.

Give each value correct to one decimal place.

(2)

(b) (i) Calculate the geometric mean of the four chain base index numbers.

You must show your working.
Give your answer correct to one decimal place.

.....

(2)

(ii) Interpret your answer.

.....

.....

.....

(2)

(Total for question = 6 marks)

Q4.

The table gives the average UK annual car insurance price for male drivers for each of the years 2016 and 2017

Year	2016	2017
Average car insurance price (£)	781	890

(Source: *www.confused.com*)

(a) Using 2016 as the base year, calculate the index number for the average car insurance price for male drivers in 2017

Give your answer correct to the nearest whole number.

.....

(2)

The index number for the average UK annual car insurance price for female drivers for 2017 using 2016 as the base year is 113

(b) Compare how the average UK annual car insurance prices changed from 2016 to 2017 for male drivers and for female drivers.

.....

.....

.....

.....

.....

(2)

(Total for question = 4 marks)

Q5.

The table gives the average UK annual car insurance price for male drivers for each of the years 2016 and 2017

Year	2016	2017
Average car insurance price (£)	781	890

(Source: *www.confused.com*)

(a) Using 2016 as the base year, calculate the index number for the average car insurance price for male drivers in 2017

Give your answer correct to the nearest whole number.

.....

(2)

The index number for the average UK annual car insurance price for female drivers for 2017 using 2016 as the base year is 113

(b) Compare how the average UK annual car insurance prices changed from 2016 to 2017 for male drivers and for female drivers.

.....

.....

.....

.....

.....

(2)

(Total for question = 4 marks)

Q6.

The table shows the average monthly rental price for a two-bedroom property in the UK in 2010 and in 2012

Year	2010	2012
Average monthly rental price	£1042	£1187

(Data source: www.rentright.co.uk)

(a) Using 2010 as the base year, calculate the index number for the average monthly rental price in 2012

.....

(2)

The index number for the average monthly rental price for a three-bedroom property in the UK for the same period is 120

(b) Compare how the monthly rental prices changed from 2010 to 2012 for two-bedroom and three-bedroom properties in the UK.

.....

.....

.....

.....

.....

.....

(2)

(Total for Question = 4 marks)

Q7.

The table shows the chain base index numbers for the price of an annual season rail ticket from Gloucester to Birmingham for each of the years 2011 to 2015

Year	2010	2011	2012	2013	2014	2015
Chain base index number		109	106	104	103	102

Source: Transport Focus

(a) Describe what the chain base index numbers show about the price of an annual season rail ticket for the years 2010 to 2015

.....

.....

.....

.....

(2)

The cost of an annual season rail ticket in 2010 was £3032

(b) Work out the cost of the ticket in 2011

.....

(2)

(c) Show that the cost of an annual season rail ticket has increased by more than 25% over the period from 2010 to 2015

(2)

(Total for question = 6 marks)

Q8.

The table shows information about the average price of milk per year, in pence per litre, for the years 2008 to 2012

Year	2008	2009	2010	2011	2012
Price (pence per litre)	26	24	25	27	28

Source: Office for National Statistics

The incomplete table shows some of the chain base index numbers for these prices.

Year	2009	2010	2011	2012
Chain base index number	92	104		

(a) Interpret the value 92 in this table.

.....

.....

.....

(2)

(b) Work out the chain base index numbers for the years 2011 and 2012 You must show your working.

2011 .....

2012 .....

(3)

(Total for question = 5 marks)

Q9.

In 2010, a factory had the following monthly running costs.

Category	Staff wages	Premises	Raw material
Monthly running cost (£)	52 000	8000	20 000

(a) Show why appropriate weightings for the running cost categories are

Category	Staff wages	Premises	Raw material
Weighting	65	10	25

(2)

Using 2010 as the base year, the index numbers for the running cost categories in 2015 were

Category	Staff wages	Premises	Raw material
Index number	107.2	114.6	112.0

(b) Find the monthly cost of staff wages in 2015

£ .....

(2)

The factory manager says that the total monthly running costs have risen by less than 10% since 2010

(c) By finding the weighted index number for the total running costs of the factory in 2015, show that she is correct.

(3)

(Total for question = 7 marks)

Q10.

The table shows the average cost of comprehensive motor insurance bought online each January from 2010 to 2013

January 2010	January 2011	January 2012	January 2013
£ 501.75	£ 618.59	£ 651.32	£ 595.66

(Data source: AA British Insurance Premium Index)

(a) Using 2010 as the base year, find the price index (price relative) for motor insurance in January 2011

.....

(2)

(b) (i) Calculate the value of the **chain base** index number for motor insurance in January 2013

.....

(ii) Interpret your answer.

.....

.....

.....

.....

(4)

(Total for question = 6 marks)

Q11.

The table gives the price index number for the average rail fare in Great Britain for each of six years, with 2012 as base year.

The table also gives some of the chain base index numbers for the same information.

Year	Price index number	Chain base index number
2012	100	
2013	104.3	104.30
2014	107.0	102.59
2015	109.4	102.24
2016	110.1	100.64
2017	111.4	

(Source: *Office of Rail and Road*)

(a) Find, correct to 2 decimal places, the chain base index number for 2017

.....

(2)

Chris wanted to know the percentage increase in the cost of the average rail fare in Great Britain between 2016 and 2017

Here is his working.

> 111.4 – 110.1 = 1.3
>
> Hence, the cost of the average rail fare in Great Britain has risen by 1.3% between 2016 and 2017

(b) Explain whether or not Chris is correct.

.....

.....

.....

.....

(2)

The geometric mean of the chain base index numbers for 2013 to 2017 is 102.18

(c) Interpret this geometric mean in the context of the average rail fare in Great Britain.

.....

.....

.....

.....

(2)

(Total for question = 6 marks)

Q12.

Matthew is investigating how the cost of computer data storage has changed over time.

(a) Suggest a hypothesis Matthew could use.

.....

.....

(1)

Matthew finds the cost per terabyte of computer data storage in each first quarter of five successive years.

The table gives cost per terabyte, in US$, for computer data storage.
It also gives two of the chain base index numbers, correct to one decimal place, for this information.

Year	2015	2016	2017	2018	2019
Cost per terabyte (US$)	33.33	31.25	29.00	24.87	24.43
Chain base index number		93.8	92.8	.....	.....

(Source: *jcmit.net*)

(b) Find the chain base index numbers for 2018 and 2019 and write them in the table.
Give each value correct to one decimal place.

(2)

(c) (i) Find the geometric mean of the four chain base index numbers.

You must show your working.
Give your answer correct to one decimal place.

.....

(2)

(ii) Interpret your answer.

.....

.....

.....

.....

(2)

(Total for question = 7 marks)

Q13.

The table shows the value of the gross domestic product (£ million) of the UK for each quarter from 2007 to 2009

Year	Quarter	Gross domestic product (£ million)
2007	1	444 292
	2	447 498
	3	451 288
	4	455 043
2008	1	456 663
	2	453 283
	3	445 818
	4	436 137
2009	1	428 886
	2	428 073
	3	428 682
	4	430 166

(Source: *https://www.ons.gov.uk/economy/grossdomesticproductgdp*)

A country is in recession when its gross domestic product falls in two or more consecutive quarters.

The UK went into recession in 2008 Quarter 3

A country comes out of recession in the quarter in which its gross domestic product rises.

(a) According to the table, in which year and quarter did the UK come out of this recession?

.....

(1)

(b) Using 2007 Quarter 1 as the base, work out the simple index number for the gross domestic product of the UK in 2008 Quarter 1

Give your answer correct to the nearest whole number.

.....

(2)

The table below shows the simple index number for the gross domestic product of the UK for each quarter in 2010 using 2007 Quarter 1 as the base.

Year	Quarter	Gross domestic product simple index number
2010	1	97.3
	2	98.1
	3	98.7
	4	98.8

(c) Calculate the value of the gross domestic product of the UK in 2010 Quarter 1

£ ..... million

(2)

Marc says that the UK was in recession throughout 2010 because all of the simple index numbers are less than 100

(d) Explain whether or not Marc is correct.

.....

.....

.....

(2)

(Total for question = 7 marks)