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Specimen Papers

Mathematics in Context

Pearson Edexcel Level 3 Certificate in Mathematics in Context (7MC0)

Issue 1

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Introduction

These specimen papers have been produced to complement the sample assessment materials for Pearson Edexcel Level 3 Certificate in Mathematics in Context and are designed to provide extra practice for your students. The specimen papers are part of a suite of support materials offered by Pearson.

The specimen papers do not form part of the accredited materials for this qualification.

General marking guidance

- All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the mark scheme – not according to their perception of where the grade boundaries may lie.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification/indicative content will not be exhaustive.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, a senior examiner must be consulted before a mark is given.
- Crossed-out work should be marked **unless** the candidate has replaced it with an alternative response.

Guidance on the use of codes within the mark scheme:

- **B mark** is a standalone mark for accuracy (not linked to a method mark).
- **A mark** is a mark awarded for accuracy.
- **M mark** is a method mark.
- **C mark** is a mark that involves descriptive comment which may or may not contain a numerical solution to the problem.
- **oe** – or equivalent.
- **cao** – correct answer only.
- **ft** – follow through.
- **sc** – special case.
- **awrt** – answers which round to.

Pearson Edexcel Level 3 Certificate

Mathematics in Context

Paper 1: Comprehension

Specimen Paper
Source booklet

Paper Reference
7MC0/01

Do not return this source booklet with the question paper.

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Formulae sheet

There will be no credit for anything you write on this formulae sheet.

Mean of a frequency distribution $= \dfrac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \dfrac{\sum fx}{\sum f}$, where x is the mid-interval value

Variance $= \dfrac{\sum (x - \bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum (x - \bar{x})^2}{n}\right]}$

where $\bar{x}$ is the mean of the set of values

Standard deviation
(discrete frequency distribution) $\sqrt{\left[\dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum f(x - \bar{x})^2}{\sum f}\right]}$

Spearman's rank correlation coefficient $1 - \dfrac{6\sum d^2}{n(n^2 - 1)}$

The product moment correlation coefficient is

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}} = \frac{\sum x_i y_i - \frac{\left(\sum x_i\right)\left(\sum y_i\right)}{n}}{\sqrt{\left(\sum x_i^2 - \frac{\left(\sum x_i\right)^2}{n}\right)\left(\sum y_i^2 - \frac{\left(\sum y_i\right)^2}{n}\right)}}$$

The regression coefficient of y on x is $b = \frac{S_{xy}}{S_{xx}}$

Least squares regression line of y on x is $y = a + bx$ where $a = \bar{y} - b\bar{x}$

Arithmetic series

$$u_n = a + (n - 1)d$$

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_\infty = \frac{a}{1 - r} \text{ for } |r| < 1$$

There will be no credit for anything you write in this source booklet.

SECTION A: MUSIC

Data source A

The value of music streaming in the UK surpassed £100 million (£100m) for the first time in history in 2013 – but both single and album sales volumes were down on 2012.

According to the new BPI/Official Charts Company statistics, the overall value of the UK recorded music market was down just 0.5% year-on-year to £1.04 billion (£1.04bn).

However, unit sales of albums across both digital (downloaded) and physical formats showed a 6.3% decline to 94.1m, whilst single sales dropped for the first time in recent history by 3.4% – with a 182.2m total over the year.

The overall value of singles sales was down 1.6% to £167.8m, while the overall value of the albums market dropped 3.6% to £772.1m.

Sales of CD albums were down sharply yet again, but claimed more than 60% of all album sales across the year. Vinyl album sales continued to grow, up 101% on 2012.

The reason the market was able to remain flat despite these declines is clear: the booming growth in streaming services, which claimed around 10% of the total value of the UK recorded music market.

Until now streaming data has not been included in the published UK market figures, but the BPI has calculated that in 2013 the value of premium-account subscriptions to audio streaming services such as Spotify and Deezer stood at £103m.

The figure excludes revenues from advertising that funds free streams, and revenue from audio-visual streaming services such as YouTube, but represents a 34% rise on the 2012 figure of £77m.

Interestingly, statistics from retail trade body ERA show that the overall value of digital (downloaded) music in 2013 grew, up 3.5% to £397.2m. Physical music value declined 7.6% to £542.7 m.

UK fans are estimated to have streamed 7.4 billion songs from audio streaming services during 2013 – double the levels of 2012 – with Arctic Monkeys the most streamed artist.

Table 1: Albums – UK market volumes (in millions) by format

Format	2009	2010	2011	2012	2013	Market share 2013
CD	112.5	98.5	86.2	69.4	60.6	64.4%
LP	0.219	0.234	0.337	0.389	0.781	0.8%
Digital (downloaded)	16.1	21.0	26.6	30.5	32.6	34.7%
Other*	0.146	0.104	0.052	0.147	0.073	0.1%
TOTAL	**129.0**	**119.8**	**113.2**	**100.4**	**94.1**	**100.0%**

** 'Other' includes Cassette, MiniDisc, DVD Audio, DVD Video, DMD and 7" box set albums.*

Data source B

Our band, Pomplamoose, just finished a 28-day tour in November 2014. We played 24 shows in 23 cities around the United States.

The tour consisted of Pomplamoose who are Jack Conte and Nataly Dawn, four hired musicians and two road crew.

In order to plan and execute our tour, we had to prepare for months, slowly gathering risk and debt before selling a single ticket. We had to rent lights. And book hotel rooms. And rent a van. And assemble a crew. And buy road cases for our instruments. And rent a trailer. And….

Where did all those expenses come from? I'm glad you asked:

Expenses

$26,450 – Production expenses: equipment rental, lights, lighting board, van rental, trailer rental, road cases, backline.

$17,589 – Hotels. Two people per room, 4 rooms per night. Best Western level hotels, nothing fancy. 28 nights for the tour, plus a week of rehearsals.

$11,816 – Gas, airfares, parking tolls. Parking a 42-foot van is expensive.

$5,445 – Insurance. In case we break someone's face while crowdsurfing.

$48,094 – Salaries and per diems**.** We also knew that once we hit the road, we would be paying our band and crew on a weekly basis. Each of the four hired musicians and the two road crew were paid $1463 per week.

Per diems are twenty dollar payments to each of the hired musicians and road crew members each day for food while we're out. Think mechanized petty cash.

$21,945 – Manufacturing merchandise, publicity (a radio ad in San Francisco, Facebook ads, venue specific advertising), supplies, shipping.

$16,463 – Commissions. Our awesome booking agency, High Road Touring, takes a commission for booking the tour. They deserve every penny and more: booking a four week tour is a huge job.

Fortunately, Pomplamoose made some money to offset some of these expenses. Let's look at our income from the tour:

Income

$97,520 – Our cut of ticket sales. Dear fans, you are awesome. You're the reason we can tour. Literally, 72% of our tour income came from the tickets you bought. THANK YOU.

$29,714 – Merchandise sales. Hats, T-shirts, CDs, posters. 22% of our tour income.

$8,750 – Sponsorship.

SECTION B: LIFE EXPECTANCY

Data source C

For children born in 2013 the life ahead of them should be filled with promise but for some it could be up to 41 years shorter than others.

Those that will live the longest are likely to be born in Monaco, where life expectancy at birth is 90 according to a new visualisation that plots the life expectancy for each continent.
The worst country to be born in last year was Chad, which has a life expectancy of 49.

Europe, Asia and the Americas are the regions in the world where life expectancy is, on average, the highest. The United Kingdom has a life expectancy of 80, putting it in 15th place within Europe. Europe has 22 countries with a life expectancy of more than 80 years, with Monaco, San Marino, Andorra, Switzerland and Italy ranking the highest.

In Asia, the countries Taiwan, Jordan, Israel, Hong Kong, Singapore, Japan and Macau all have life expectancies over 80 years. However there are also 13 countries where the life expectancy is in the 60s, and Afghanistan has a life expectancy of only 50. In North Korea people born in 2013 can expect to live to 69 which is six years higher than in Cambodia or Laos.

The majority of countries in the Americas have a life expectancy in the 70s, with the United States falling behind six other countries including Bermuda and Canada both with a life expectancy of 79 years.

Africa has an average life expectancy of only 60 with many countries having life expectancies in the 50s, including Uganda (54) and Nigeria (52).

Some of this data is given in Table 2.

Table 2:

Country	Female life expectancy in years	Male life expectancy in years	Total population life expectancy in years	Healthcare expenditure 2014 (% of GDP)
Andorra	84.92	80.51	82.65	7.2
Austria	83.24	77.25	80.17	10.6
Belgium	83.22	76.76	79.92	10.6
Bulgaria	78.13	70.76	74.33	7.6
Croatia	80.20	72.81	76.41	7.8
Czech Republic	81.45	75.34	78.31	7.4
Denmark	81.64	76.68	79.09	11.2
Finland	83.29	76.24	79.69	8.9
France	84.91	78.55	81.66	11.6
Germany	82.86	78.15	80.44	11.1
Greece	83.06	77.71	80.30	9.0
Italy	84.82	79.40	82.03	9.5
Monaco	93.64	85.66	89.57	4.3
Netherlands	83.34	79.02	81.12	12.0
Norway	83.69	79.63	81.60	9.1

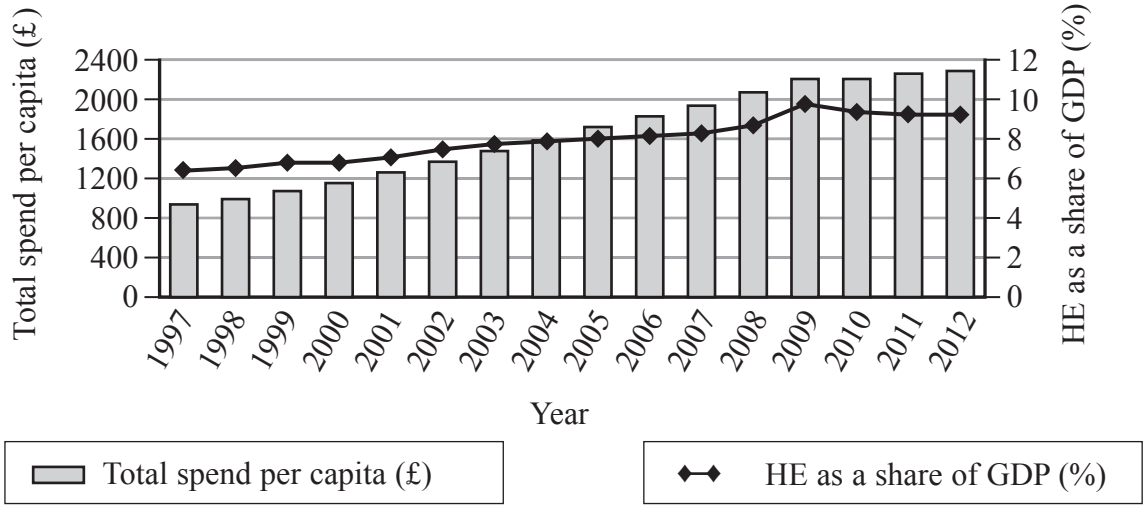
The GDP (Gross Domestic Product) for each country is the total value, in billions of dollars, of all the transactions (goods and services) in one year. This is shown for selected countries in Table 3.

Table 3:

Country	**GDP (billions of dollars) 2014**
Austria	415.84
Belgium	508.12
Germany	3634.82
Greece	241.72
Monaco	104.37
Netherlands	800.17

Data source D

Total healthcare expenditure (HE) per capita and total healthcare expenditure (HE) as a share of GDP in the UK.



	1997	1998	1999	2000	2001	2002	2003	2004
Total spend per capita (£)	936.6	996.6	1086.3	1158.0	1257.2	1370.4	1497.1	1600.7
HE as a share of GDP (%)	6.5	6.5	6.8	6.9	7.2	7.5	7.8	7.9

	2005	2006	2007	2008	2009	2010	2011	2012
Total spend per capita (£)	1717.9	1838.7	1949.4	2077.0	2215.0	2219.0	2241.6	2268.1
HE as a share of GDP (%)	8.1	8.3	8.4	8.8	9.7	9.4	9.2	9.2

Data source E

Table 4: Total healthcare expenditure in the UK, 1997–2012

Year	£ billion
1997	54.8
1998	58.5
1999	64.0
2000	68.4
2001	74.6
2002	81.6
2003	89.0
2004	96.3
2005	104.4
2006	112.4
2007	120.1
2008	129.0
2009	138.9
2010	140.1
2011	142.8
2012	144.5

Data source A adapted from:
http://www.musicweek.com/news/read/streaming-value-shoots-up-in-2013-but-album-and-singles-sales-dip-bpi-stats/057146

Data source B adapted from:
https://medium.com/@jackconte/pomplamoose-2014-tour-profits-67435851ba37

Data source C adapted from:
The Telegraph with data from The CIA World Factbook, the Encyclopedia Britannica and tradingeconomics.com.

Data sources D and E adapted from:
Office for National Statistics, Expenditure on healthcare in the UK: 2012

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Surname	Other names

Pearson Edexcel Level 3 Certificate

Centre Number	Candidate Number

Mathematics in Context

Paper 1: Comprehension

Specimen Paper **Time: 1 hour 40 minutes**	Paper Reference **7MC0/01**

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

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.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 60
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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SECTION A

Answer ALL questions. Write your answers in the spaces provided.

MUSIC

Refer to **data source A** in the source booklet for Questions 1 and 2.

1 Compare the percentage changes for the volume sales of CD albums and digital (downloaded) albums from 2012 to 2013.

(Total for Question 1 is 3 marks)

2 The manager of a company that makes CD albums is concerned about future sales of CDs. He wants a model to predict the future sales of CD albums and digital (downloaded) albums.

Let the volume of sales of CD albums be y million.

Let the year of sales be x.

For the sales of CD albums

$$S_{xy} = -132.9,\ S_{xx} = 10,\ S_{yy} = 1777.692,\ \sum x = 10055 \text{ and } \sum y = 427.2$$

The equation of the regression line of y on x is given by

$$y = a + bx$$

(a) (i) Show that $a = 26812$ (5 significant figures) and $b = -13.29$

(3)

(ii) Use the equation of the regression line to model future sales of CD albums.

Comment on your answer.

(3)

Let the volume of sales of digital (downloaded) albums be d million.

The equation of the line of regression of d on x is

$$d = 4.25x - 8521$$

(b) Find the year in which these models predict that the volume of sales of CD albums will be the same as the volume of sales of digital (downloaded) albums.

(3)

An alternative model is proposed for the sales of digital (downloaded) albums

$$d = ck^t$$

where c and k are constants and t is the number of years after 2009 (for example $t = 2$ when the year is 2011).

(c) Find a value of c and a value of k.

(5)

(Total for Question 2 is 14 marks)

Refer to **data source B** in the source booklet for Questions 3 and 4.

3 How much profit or loss did Pomplamoose make from this tour?

(Total for Question 3 is 2 marks)

4 The typical split for ticket sales is 80% to the band and 20% to the venue.

(a) Calculate the **total** ticket sales for the tour.

(2)

The band had the option to employ a full-time merchandise seller for the 28-day tour.
Assuming that

- the merchandise seller is paid the same as a hired musician
- one extra hotel room will be needed each night

(b) Calculate the cost of employing a full-time merchandise seller for the 28-day tour.

(4)

Had they hired a full-time merchandise seller the band estimate that there was a

- 10% chance that merchandise sales would have been unaffected
- 50% chance that merchandise sales would have increased by $\frac{1}{5}$
- 40% chance that merchandise sales would have increased by $\frac{1}{3}$

(c) Determine whether or not the band should employ a full-time merchandise seller for their next tour.

(5)

(Total for Question 4 is 11 marks)

(Total for MUSIC is 30 marks)

TOTAL FOR SECTION A IS 30 MARKS

SECTION B

Answer ALL questions. Write your answers in the spaces provided.

LIFE EXPECTANCY

Refer to **data source C** in the source booklet for Questions 5 to 8.

5 Work out how many billions of dollars the Netherlands spent on healthcare in 2014.

(Total for Question 5 is 2 marks)

6 (a) In Bulgaria life expectancy for women is 10.4% more than life expectancy for men.
In Monaco life expectancy for women is 4.5% more than life expectancy for men.

Janet says,

"This information shows that to live a long life, it is better to be a woman in Bulgaria than a woman in Monaco."

Is Janet correct?
Justify your answer.

(2)

(b) John says,

"The life expectancy for the total population is the mean of the life expectancy for females and the life expectancy for males."

Is John correct?
Justify your answer.

(1)

(Total for Question 6 is 3 marks)

7 The data for female life expectancy, from Table 2, is shown in the box plot below.

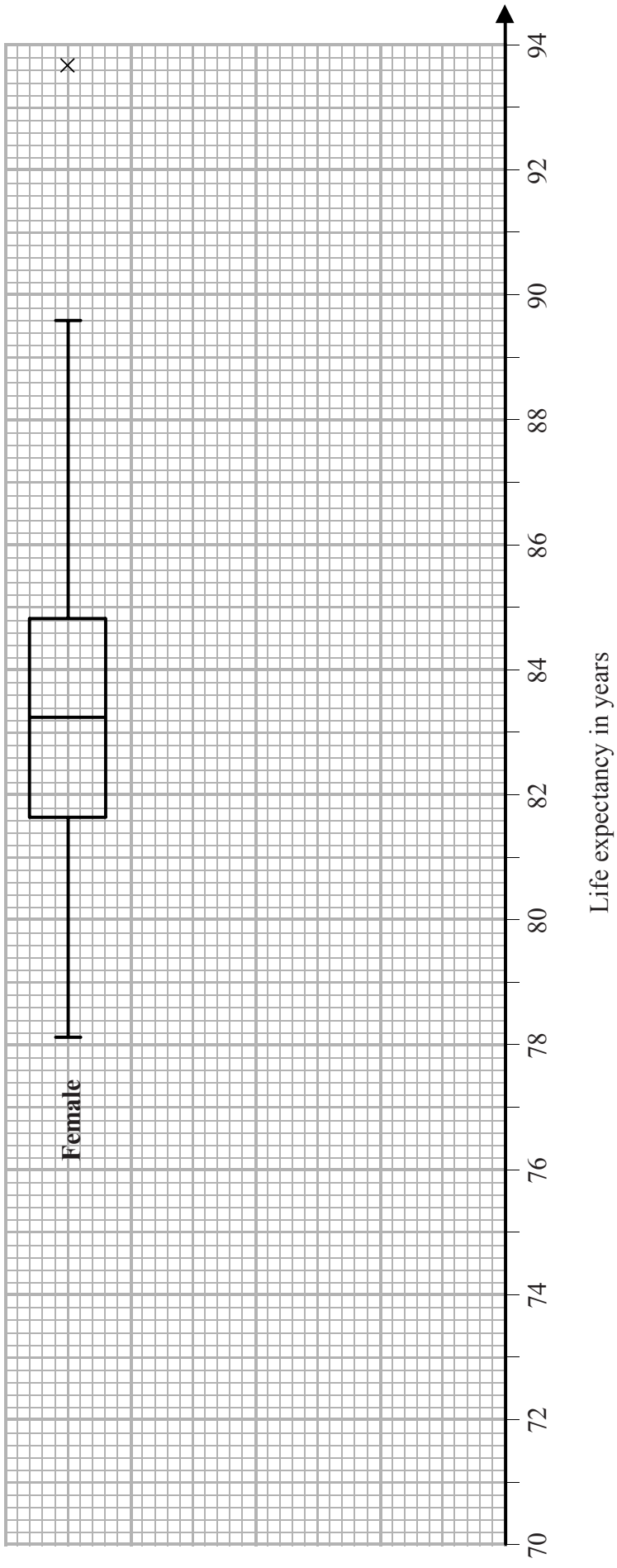

Table 5:

Country	Male life expectancy in years
Bulgaria	70.76
Croatia	72.81
Czech Republic	75.34
Finland	76.24
Denmark	76.68
Belgium	76.76
Austria	77.25
Greece	77.71
Germany	78.15
France	78.55
Netherlands	79.02
Italy	79.40
Norway	79.63
Andorra	80.51
Monaco	85.66

An outlier is defined as any value that is

either greater than the upper quartile + (1.5 × interquartile range)

or less than the lower quartile – (1.5 × interquartile range)

(a) On the graph paper opposite, draw a box plot to show the information for male life expectancy given in Table 5.

You must show any outliers on your box plot, along with calculations to identify these outliers.

(6)

(b) For the given sample, compare the life expectancy of the female population and the life expectancy of the male population.

(2)

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(Total for Question 7 is 8 marks)

8 (a) Calculate a suitable correlation coefficient for the total population life expectancy and healthcare expenditure (% of GDP) in Table 6.

(5)

Table 6:

Country	Total population life expectancy in years	Healthcare expenditure (% of GDP)		
Andorra	82.65	7.2		
Austria	80.17	10.6		
Belgium	79.92	10.6		
Bulgaria	74.33	7.6		
Croatia	76.41	7.8		
Czech Republic	78.31	7.4		
Denmark	79.09	11.2		
Finland	79.69	8.9		
France	81.66	11.6		
Germany	80.44	11.1		
Greece	80.30	9.0		
Italy	82.03	9.5		
Monaco	89.57	4.3		
Netherlands	81.12	12.0		
Norway	81.60	9.1		

A recent article states:

"**Money Alone Does Not Extend Lives**"

(b) Does your answer to (a) support this statement? You must justify your answer.

(1)

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(c) Explain why it might not be appropriate to use just the data in table (a) to evaluate the statement, "**Money Alone Does Not Extend Lives**".
Suggest which data could be collected to give a more reliable answer.

(2)

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(Total for Question 8 is 8 marks)

Refer to **data source D** in the source booklet.

9 Describe the changes in UK healthcare spending for the period 1997–2012.
Support your description with suitable calculations.

(Total for Question 9 is 4 marks)

Refer to **data source E** in the source booklet.

10 Table 7 shows some of the 5-point moving averages for the total healthcare expenditure in the UK, 1997–2012.

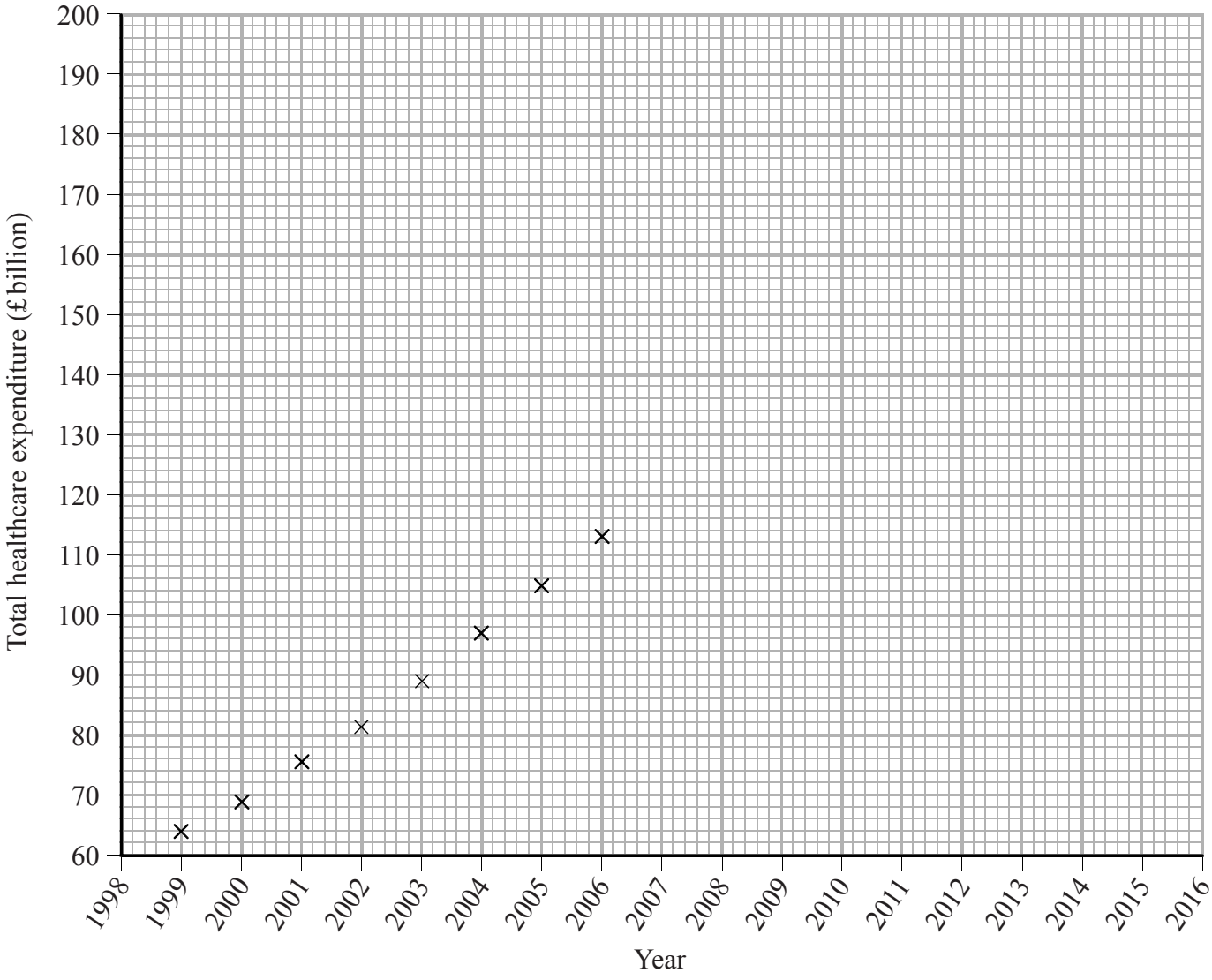
Table 7:

Year	Total healthcare expenditure (£ billion)	5-point moving average (£ billion)
1997	54.8	
1998	58.5	
1999	64.0	64.1
2000	68.4	69.4
2001	74.6	75.5
2002	81.6	82.0
2003	89.0	89.2
2004	96.3	96.7
2005	104.4	104.4
2006	112.4	112.4
2007	120.1	121.0
2008	129.0	128.1
2009	138.9	134.2
2010	140.1	
2011	142.8	
2012	144.5	

(a) Calculate the 5-point moving average for 2010.

(2)

The 5-point moving averages for 1999 to 2006 have been plotted on the graph below:



(b) Plot the moving averages for the years 2007 to 2010.

(1)

(c) Use your graph to predict total healthcare spending for 2015.
Comment on the reliability of your prediction.

(2)

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(Total for Question 10 is 5 marks)

(Total for LIFE EXPECTANCY is 30 marks)

TOTAL FOR SECTION B IS 30 MARKS

TOTAL FOR PAPER IS 60 MARKS

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Paper 1: Comprehension – Mark Scheme

SECTION A – TASK 1: MUSIC

Question	Working	Answer	Mark	Notes
1. (a)	CD: $\frac{60.6-69.4}{69.4\times100}$ Digital: $\frac{32.6-30.5}{30.5\times100}$		M1	$\frac{60.6-69.4}{69.4\times100}$ or $\frac{32.6-30.5}{30.5\times100}$
		−12.7%, 6.9%	A1	awrt −12.7(%) and awrt 6.9(%)
		appropriate comment	C1	e.g. sales of CDs fell by 12.7% and sales of digital (downloaded) rose by 6.9%
2. (a) (i)	$b = -\frac{132.9}{10}$	−13.29	B1	cao
	$a = \frac{427.2}{5} - b \times \frac{10055}{55}$		M1	$\frac{427.2}{5}$ – "b"× $\frac{10055}{55}$
		26811.63	A1	26811.63 or 26811.6 or 26812 (cao)
(a) (ii)	$y = 0 \Rightarrow x = \frac{26812}{13.29}$		M1	Use of $y = 0 \Rightarrow x = \frac{26812}{13.29}$
	= 2017.429		A1	2017.429

Question	Working	Answer	Mark	Notes
OR	e.g. $y = 26812 - 13.29 \times 2018 = -7.22$		M1	use of $x \geq 2018$ to show sales of CDs is predicted to be negative
			A1	correct negative value for sales
		Model is unrealistic + reason + calculation	C1	e.g. model is unrealistic since it predicts that sales of CDs will be zero by 2017, or model predicts negative sales by 2018 onwards
(b)	$4.25x - 8521 = 26812 - 13.29x$		M1	$4.25x - 8521 = 26812 - 13.29x$
	$17.54x = 35333$		A1	$17.54x = 35333$ (or $x =$ awrt 2014.4)
	$x = 2014.424$ so year is 2014	2014	A1	2014 cao
(c)	e.g. $t = 0$ when the year is 2009		M1	substituting $t = 0$ in given equation
	$16.1 = c \times k^0 \Rightarrow c = 16.1$	e.g. $c = 16.1$	A1	correct value for c
	e.g. $t = 4 \Rightarrow k^4 = \frac{32.6}{16.1}$		M1	Use of $t = 1$, 2, 3, or 4 to find d
	$k = \left(\frac{32.6}{16.1}\right)^{0.25}$		M1	Complete method to find k
	$k = 1.2$	e.g. $k = 1.2$	A1	correct value for k NB: values of c and k will depend on choice of t

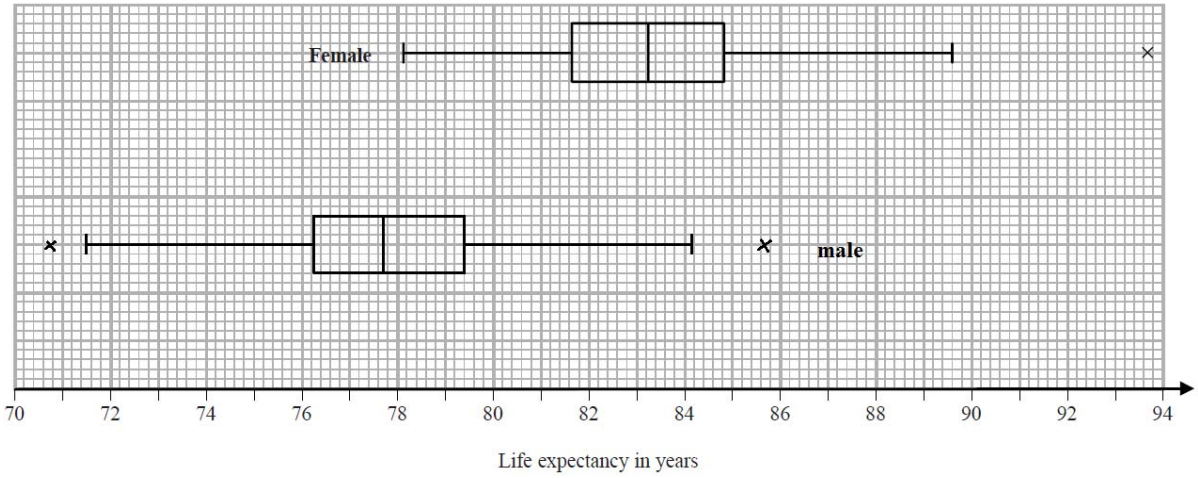
Question	Working	Answer	Mark	Notes
3.	Income: \$135 984 − Costs: \$147 802		M1	Correct method to calculate: Total income – Total costs or Total costs – Total income
		Loss of \$11 818	A1	Loss of \$11 818 (or profit of −\$11 818)
4. (a)	Total ticket receipts: $\$97520 \times \frac{100}{80} = 121\,900$		M1	$\$97520 \times \frac{100}{80}$
		\$121 900	A1	(\$)1219 00
(b)	Cost of employing a merchandise seller	$\frac{1}{3}$	M1	Correct method to calculate cost of additional hotel room
	Hotel: e.g. $\$\frac{17589}{8 \times 35} = \$62.82$ per day		A1	Correct calculation
	Salary: \$1463×4 + 28 × 20		M1	\$1463×4 + 28 × 20 + \$"62.82" × 28
	Total: \$8170.96	e.g. \$8171	A1	Correct cost
(c)	$\frac{1}{5}$ increase $= \frac{29714 \times 6}{5} = 35656.80$		M1	$\frac{29714 \times 6}{5}$ and $\frac{29714 \times 4}{3}$ o.e.
	$\frac{1}{3}$ increase $= \frac{29714 \times 4}{3} = 39618.67$			

Question	Working	Answer	Mark	Notes
	Expected income: 0.1 × 29714 + 0.5 × ”35656.80” + 0.4 × ”39618.67”		M1	0.1 × 29714 + 0.5 × ”35656.80” + 0.4 × ”39618.67”
	= 36647		A1	36647 (seen or implied)
	“36647” – “8170” = 28477		dM1	“36647”−“8171”
		No + reason stated	C1	e.g. No, since the expected income after employing a full-time merchandise seller is less than the current income from merchandise sales

SECTION B – TASK 2: LIFE EXPECTANCY

Question	Working	Answer	Mark	Notes
5.		96.0204	M1 A1	$12 \div 100 \times 800.17$ cao
6. (a)		Explanation	C1 C1	Cannot be sure / don't know Need to know life expectancy of men in each country
(b)	A counterexample showing the life expectancy for the total population is not the mean of the life expectancy for females and the life expectancy for males. e.g. for Andorra, $\frac{84.92 + 80.51}{2} \neq 82.65$	No + justification	C1	A general statement, e.g. No - only correct if equal number of males and females OR correct conclusion with a counterexample.

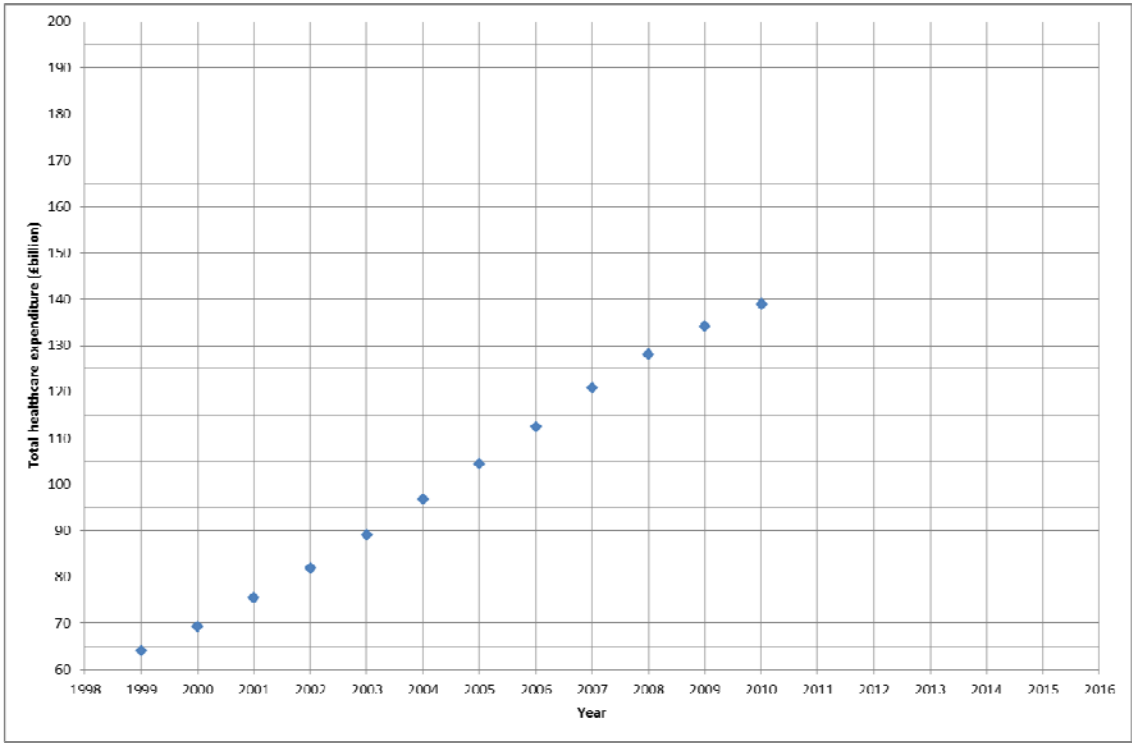
Question	Working	Answer	Mark	Notes
7. (a)	Median = 77.71		B1	Median identified
	Lower quartile = 76.24 Upper Quartile = 79.40	$\frac{84.92+80.51}{2}$	B1	Upper and lower quartiles identified
	outliers: $76.24 - 1.5 \times (79.40 - 76.24) = 71.5$ AND $79.40 + 1.5 \times (79.40 - 76.24) = 84.14$		M1	Complete method to find one outlier
			A1	Identification of outliers as Bulgaria and Monaco (can be figures)
		Box plot drawn	B2 ft	A fully correct box plot drawn and labelled



Question	Working	Answer	Mark	Notes
				(B1 for a partially correct box plot, allow up to 2 plotting errors)
(b)		Comparisons made	C2	TWO valid comparisons stated, e.g. females live longer than males by comparison of medians, the male distribution is below the female median, the interquartile ranges are very similar (C1 for one valid comment)
8. (a)	(See table page 11 below)	(awrt) 0.042	M1	method to rank life expectancy and GDP % either way round but consistent
			M1	ft finds d for their rankings
			M1	ft for finding Σd^2 for their ranking
			M1	Using the Spearman rank formula correctly for their figures
	$\frac{6 \times 536.5}{1-15(15^2-1)}$		A1	Spearman's Rank = 0.0419(6428..)
(b)		Yes + Spearman's coefficient is 'small'	C1	
(c)		Explanations	C1	Comment that the answer is generated with percentages

Question	Working	Answer	Mark	Notes
9.		Appropriate comments and quantifiers	C1	for a statement about improvement eg better to use actual figures on health expenditure (per capita)
			C1	Appropriate statement re HE per capita with attempt at quantifying.
			C1	Appropriate statement re HE as a percentage of GDP with attempt at quantifying.
			B1	Attempt at a quantifier.
			B1	Two correct quantifiers.
				Example statements: HE per capita rose steadily from 1997 to 2009 then the rate of increase slowed from 2009 to 2012. HE as a percentage of GDP rose steadily between 1997 and 2009 and then fell between 2009 and 2012. Example quantifiers: HE per capita rose by 136% or more than doubled between 1997 and 2009. Rose by only 2.4% between 2009 and 2012. HE as a percentage of GDP rose by 50% between 1997 and 2009 and then fell by 5% between 2009 and 2012.

Question	Working	Answer	Mark	Notes
10. (a)	$\frac{129+138.9+140.1+142.8+144.5}{5}$	139.1	M1	$\frac{129+138.9+140.1+142.8+144.5}{5}$
			A1	139.1 (awrt)
(b)		Points correctly plotted	B1	



Question	Working	Answer	Mark	Notes
(c)	Line of best drawn and extrapolated to 2015 OR attempt to find equation of line of best fit and 2015 substituted		M1 C1	Evidence of use of graph £170−185 billion. Answer is not reliable as the data has been extrapolated

Working for Question 8

Country	Total population life expectancy	Health Expenditure	d	d^2
Monaco	1	15	14	196
Andorra	2	14	12	144
Czech Republic	13	13	0	0
Bulgaria	15	12	3	9
Croatia	14	11	3	9
Finland	11	10	1	1
Greece	8	9	1	1
Norway	5	8	3	9
Italy	3	7	4	16
Belgium	10	5.5	4.5	20.25
Austria	9	5.5	3.5	12.25
Germany	7	4	3	9
Denmark	12	3	9	81
France	4	2	2	4
Netherlands	6	1	5	25
				536.5

Pearson Edexcel Level 3 Certificate

Mathematics in Context

Paper 2: Applications

Specimen Paper
Source booklet

Paper Reference
7MC0/02

Do not return this source booklet with the question paper.

Turn over ▶

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PEARSON

Formulae sheet

There will be no credit for anything you write on this formulae sheet.

Mean of a frequency distribution $= \dfrac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \dfrac{\sum fx}{\sum f}$, where x is the mid-interval value

Variance $= \dfrac{\sum (x - \bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum (x - \bar{x})^2}{n}\right]}$

where $\bar{x}$ is the mean of the set of values

Standard deviation
(discrete frequency distribution) $\sqrt{\left[\dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum f(x - \bar{x})^2}{\sum f}\right]}$

Spearman's rank correlation coefficient $1 - \dfrac{6\sum d^2}{n(n^2 - 1)}$

The product moment correlation coefficient is

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}} = \frac{\sum x_i y_i - \frac{\left(\sum x_i\right)\left(\sum y_i\right)}{n}}{\sqrt{\left(\sum x_i^2 - \frac{\left(\sum x_i\right)^2}{n}\right)\left(\sum y_i^2 - \frac{\left(\sum y_i\right)^2}{n}\right)}}$$

The regression coefficient of y on x is $b = \frac{S_{xy}}{S_{xx}}$

Least squares regression line of y on x is $y = a + bx$ where $a = \bar{y} - b\bar{x}$

Arithmetic series

$$u_n = a + (n - 1)d$$

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_\infty = \frac{a}{1 - r} \text{ for } |r| < 1$$

There will be no credit for anything you write in this source booklet.

SECTION A: LIFE EXPECTANCY

Data source A
The population of the UK is ageing. The proportion of people aged 65 and over is increasing every year.

Table 1: UK population 2011

	Northern Ireland	Wales	Scotland	England
Total population	1 811 000	3 036 000	5 296 000	53 012 000
Percentage aged over 65	14.8	18.7	16.9	16.7

Source: Office for National Statistics, Northern Ireland Statistics and Research Agency, National Records of Scotland.

Table 2:

Year	Percentage of population of the UK aged 65 and over
1971	13.2
1981	15.0
1991	15.7
2001	15.9
2009	16.3
2011	16.8

Source: Office for National Statistics, Northern Ireland Statistics and Research Agency, National Records of Scotland

Table 3:
The government predictions for the percentage of the population age 65 and over are given in the table below:

Year	Percentage of population aged 65 and over
2021	19.3
2031	22.3

Source: Office for National Statistics, Northern Ireland Statistics and Research Agency, National Records of Scotland

Within the UK, information is available for the population by age group and also for mortality rates per age group.

Some of this information is shown in the tables below.

Table 4:

Population by age in 2011

Age	Number of people
0–14	11 101 000
15–24	8 294 000
25–34	8 433 000
35–44	8 820 000
45–54	8 738 000
55–64	7 421 000
65–74	5 480 000
75–84	3 502 000
85 and over	1 394 000
Total	63 183 000

Table 5:

Mortality rates

Age	Number of deaths per 1000 per year
Under 1	5
1–4	0.2
5–10	0.1
11–14	0.2
15–24	0.3
25–34	0.5
35–44	1.1
45–54	2.9
55–64	6.9
65–74	18.5
75–84	55.6
85 and over	142.9

Source: Office for National Statistics, Northern Ireland Statistics and Research Agency, National Records of Scotland

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Write your name here

Surname	Other names

Pearson Edexcel Level 3 Certificate

Centre Number	Candidate Number

Mathematics in Context

Paper 2: Applications

Specimen Paper **Time: 1 hour 40 minutes**	Paper Reference **7MC0/02**

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

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.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 80
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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PEARSON

SECTION A

Answer ALL questions. Write your answers in the spaces provided.

LIFE EXPECTANCY

Refer to **data source A** in the source booklet for Question 1.

1 The UK consists of Northern Ireland, Wales, Scotland and England.

(a) Show that the percentage of people aged 65 and over for the whole of the UK in 2011 is 16.8 correct to one decimal place.

(3)

Three different models are proposed for the data in Table 2.

Model 1: $P_n = 0.075n + 13.675$
Model 2: $P_n = 0.156n - 0.002n^2 + 13.7$
Model 3: $P_n = 0.00017n^3 - 0.013n^2 + 0.29n + 15$

P_n is the percentage of population of the UK aged 65 and over.
n is the number of years after 1970 (e.g. for 1991, $n = 21$)

The table below shows some of the values the models give for 1971–2011.

Year	Model 1	Model 2	Model 3
1971	13.8	13.8	15.3
1981		15.2	16.8
1991	15.3	16.1	16.9
2001	16.0		16.6
2009	16.6	16.8	16.6
2011	16.8	16.8	

There are three values missing from the table.

(b) Work out the missing values.

Give your answers correct to 3 significant figures.

(3)

(c) By using the data in Table 3, evaluate the long-term validity of each of the proposed models.

(7)

A student sets up the following spreadsheet in order to calculate the surviving population, in 2012, of the 55–64 age group in 2011.

	A	B	C	D
1	**Age**	**Population in 2011**	**Mortality rate Deaths per 1000 per year**	**Surviving population of this group in 2012**
2	55 – 64	7421000	6.9	

The student is considering four formulas to go in cell D2.

- =B2*C2/1000
- =B2-C2*1000
- =B2*(1000–C2)/1000
- =B2*(1000–C2)*1000

(d) (i) Write down the correct formula.

Find the surviving population in 2012 of this group.

(ii) Using some of the information in Table 4 and Table 5, work out an estimate for the number of people who will be aged 66 in 2013.

Assume that the number of people at each age (55, 56, 57...) within the 55–64 age group is the same.

(iii) State and comment on any assumptions made in your calculation.

(7)

(Total for Question 1 is 20 marks)

TOTAL FOR SECTION A IS 20 MARKS

SECTION B

Answer ALL questions. Write your answers in the spaces provided.

TASK 1: TOURIST ATTRACTIONS

2 A geography student carries out a survey to find out which local tourist attraction is the most visited.

The student decides to take a sample to find out this information.

Write down a limitation of taking a sample.

.....

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(Total for Question 2 is 1 mark)

3 A tourist board carried out a survey of the local attractions visited by tourists.

The survey shows that

- the probability that a tourist visits the stately home is 0.6
- if the tourist visits the stately home, the probability that the tourist visits the farm shop is 0.7
- if a tourist does not visit the stately home, the probability that the tourist visits the farm shop is 0.25

(a) Draw a probability tree diagram to represent this information.

(3)

(b) Find the probability that a tourist chosen at random visits just one of the stately home or the farm shop.

(3)

Next month the tourist board expects 30 000 tourists to visit local attractions.

(c) Work out an estimate for the number of tourists who will visit the farm shop.

(3)

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(Total for Question 3 is 9 marks)

4

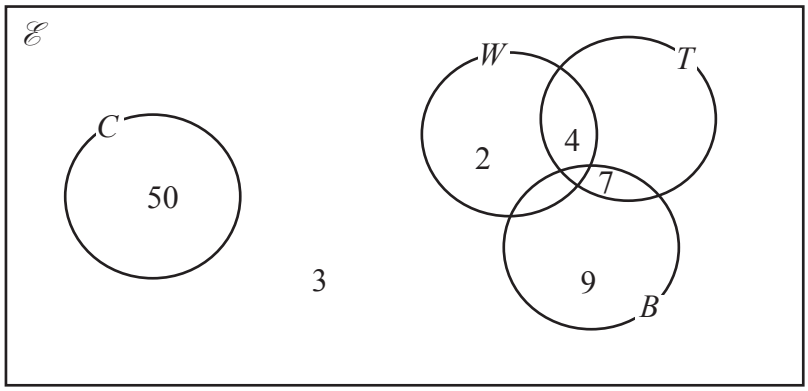


Figure 1

The Venn diagram shows how 75 people travel to a museum.

B = {people who travel to the museum by bus}
C = {people who travel to the museum by car}
T = {people who travel to the museum by train}
W = {people who travel to the museum by walking}

One of the 75 people is chosen at random.

(a) (i) Find the probability that this person travels to the museum by car.

.....

(ii) Find P(C')

.....

(iii) Find P($T \cap W$)

.....

(3)

(b) From the Venn diagram, write down any two events that are mutually exclusive. Give a reason for your answer.

(2)

(c) Determine whether or not B and T are independent events.

(3)

Given that a person travels to the museum by bus,

(d) find the probability that this person also travels by train.

(2)

(Total for Question 4 is 10 marks)

TASK 2: FOOTBALL

Lydia is an Arsenal football fan.
She finds this data about the time, t minutes, from the start of each match when goals were scored by Arsenal.

Table 1:

Time (t minutes)	Number of goals scored by Arsenal
$0 < t \leqslant 10$	3
$10 < t \leqslant 20$	4
$20 < t \leqslant 30$	3
$30 < t \leqslant 40$	5
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	4
$60 < t \leqslant 70$	9
$70 < t \leqslant 80$	4
$80 < t \leqslant 90$	10

Data from: www.soccerstats.com

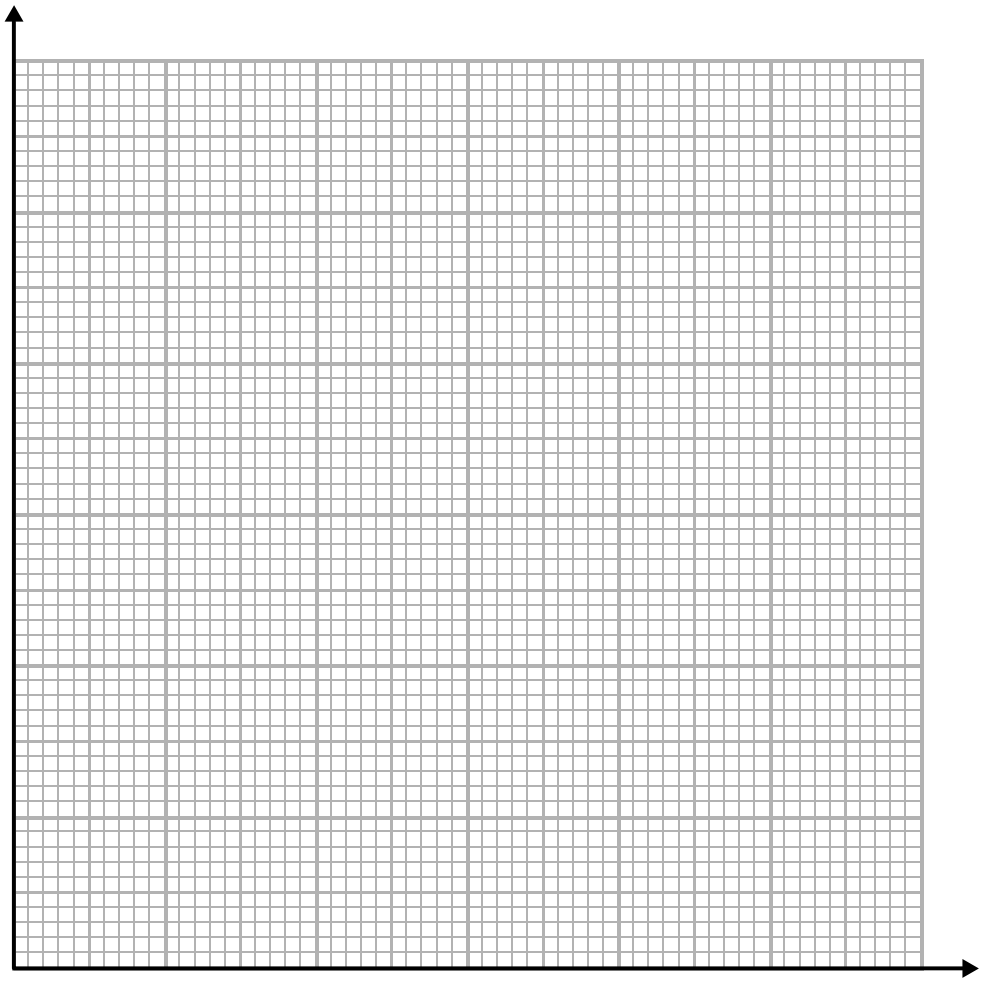
5 Lydia is writing a blog called

"When goals are scored by Arsenal."

She wants to include a diagram and some statistics.

(a) Draw a suitable diagram Lydia could use to estimate the median time.

(4)



(b) (i) Use your graph to estimate the median time.

A football match has two halves.
Each half lasts 45 minutes.

(ii) What does the median time tell you about the number of goals scored by Arsenal in the two halves of the football matches?

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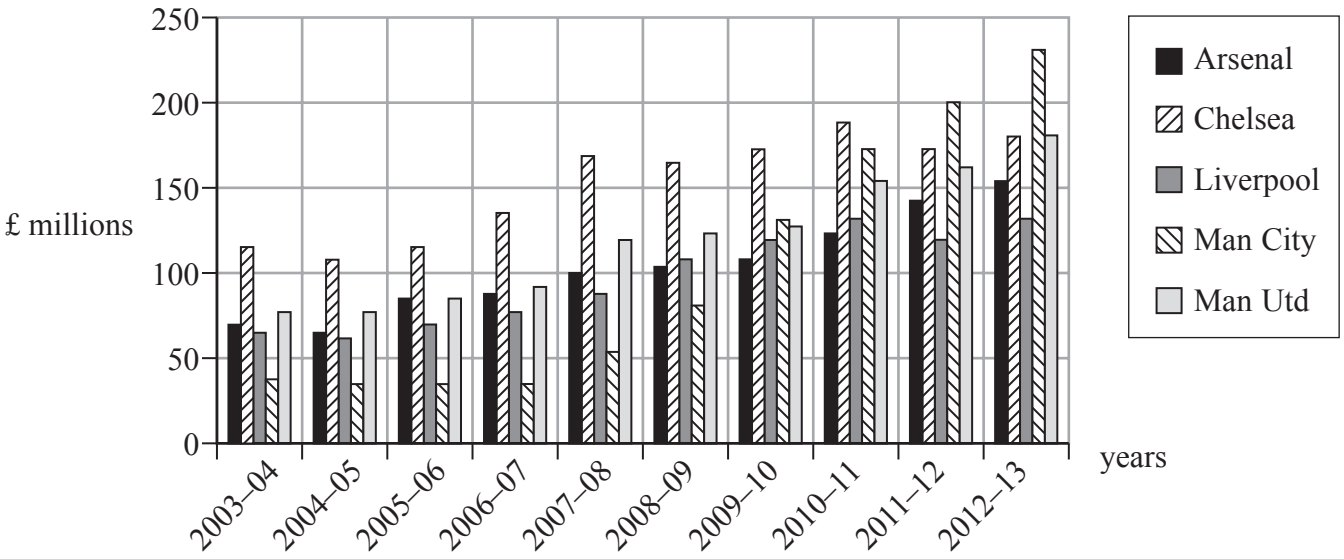
(3)

(Total for Question 5 is 7 marks)

6 Lydia is also interested in how the wage bills of some football teams have changed in recent years. She finds this diagram.



Ref: Evening Standard Friday 12th December 2014

Lydia uses this diagram in her blog.
She writes,

"Arsenal's wage bill is not keeping up with that of other teams."

Comment on this statement.

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.....

(Total for Question 6 is 2 marks)

7 Here is a table for the wage bills and league positions for the 20 teams in the Premier League in the 2012–2013 season.

Team	**Wage Bill (£ million) Season 2012–2013 (x)**	**Premier League position Season 2012–2013 (y)**
Manchester City	233	2
Manchester United	181	1
Chelsea	179	3
Arsenal	154	4
Liverpool	132	7
Tottenham Hotspur	96	5
Queens Park Rangers	78	20
Aston Villa	72	15
Fulham	67	12
Everton	63	6
Newcastle	62	16
Stoke City	60	13
Sunderland	58	17
West Ham United	56	10
West Bromwich Albion	54	8
Norwich City	51	11
Swansea City	49	9
Southampton	47	14
Reading	46	19
Wigan Athletic	44	18
Total	**1782**	

Lydia sees two headlines about wage bills in the Premier League.

Headline 1 "Average wage bill is over £80 million".

Headline 2 "Average wage bill is under £70 million".

(i) Explain how both headlines could be correct.

.....

.....

.....

(ii) State, with a reason, which headline you think is the more valid.

(Total for Question 7 is 4 marks)

8 Given that $\sum x = 1782, \sum y = 210, \sum xy = 14102, \sum x^2 = 217296, \sum y^2 = 2870$

(a) Show that $S_{xy} = -4609$

(2)

(b) Calculate the product moment correlation coefficient between the wage bill for the season 2012–2013 and the Premier League position for the season 2012–2013.

Give your answer correct to 3 decimal places.

(3)

(c) Interpret your answer.

(2)

(Total for Question 8 is 7 marks)

TASK 3: SEATING

9 Chairs can be bought in two sizes, medium and large.

The head teacher of school A buys 150 medium chairs and 50 large chairs.
The total cost of these chairs is £2460.

The head teacher of school B buys 30 medium chairs and 165 large chairs.
The total cost of these chairs is £2538.

The head teacher of school C needs to buy 25 medium chairs and 10 large chairs.

Work out the total cost of buying the 25 medium chairs and the 10 large chairs.

(Total for Question 9 is 6 marks)

10 A college decided to invest in new furniture.
There are two types of table available.
The Octo seats 8 people and occupies 7 m^2 of floor space.
The Quattro seats 4 people and occupies 3 m^2 of floor space.

The college needs seating for at least 480 people.
There is 600 m^2 of floor space available.
There needs to be at least as many Quattros as Octos.
There must be at least 30 Octos.

Let x be the number of Octos.

Let y be the number of Quattros.

(a) Show that $2x + y \geqslant 120$

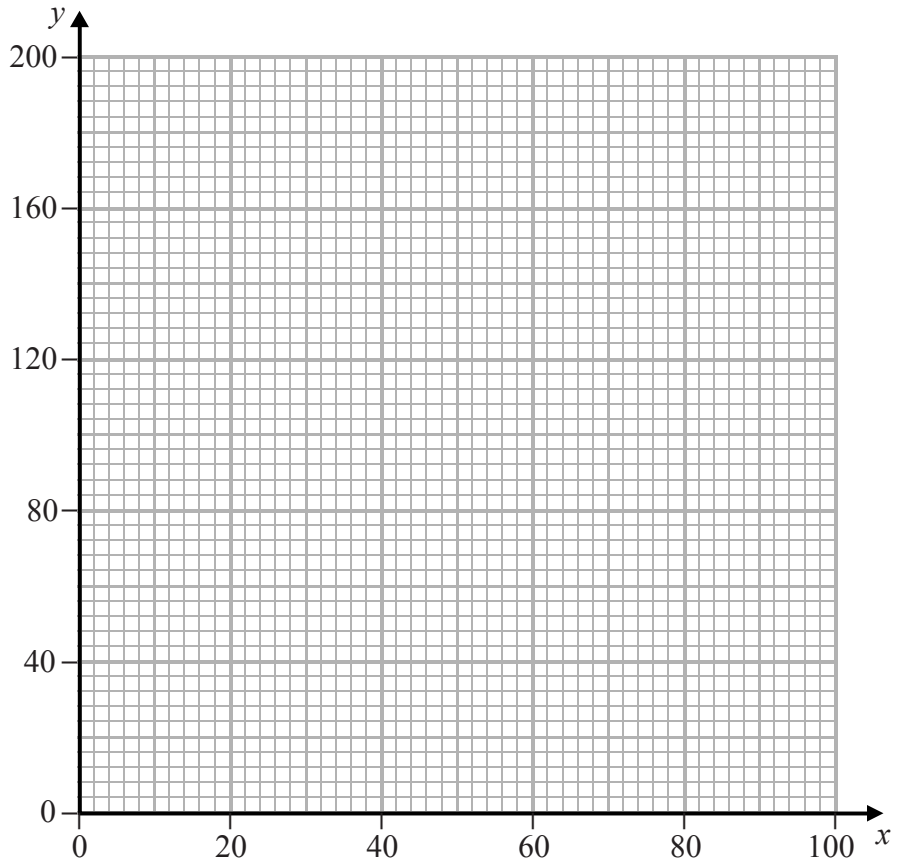
(1)

(b) Write down three further constraints in addition to $x \geqslant 0$ and $y \geqslant 0$

(3)

(c) On the grid, show all the constraints.
Label the feasible region **R**.

(5)



An Octo costs £140
A Quattro cost £70

The college wants to spend as little as possible on tables.

(d) (i) Write down the objective function, in terms of x and y, for the total cost of the tables.

(ii) Find the minimum total cost of the tables.
You should state the number of Octos and the number of Quatros the college should buy.

(5)

(Total for Question 10 is 14 marks)

TOTAL FOR SECTION B IS 60 MARKS

TOTAL FOR PAPER IS 80 MARKS

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Paper 2: Applications – Mark Scheme

SECTION A – Life Expectancy

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>1. (a)</td><td>(1 811,000 × 14.8 + 3 036,000 × 18.7 + 5 296 000 × 16.9 + 53 012 000 × 16.7) / (1 811 000 + 3 036 000 + 5 296 000 + 53 012 000)</td><td></td><td>M1

M1</td><td>(1 811 000 × 14.8 + 3 036 000 × 18.7 + 5 296 000 × 16.9 + 53 012 000 × 16.7)

(1 811 000 + 3 036 000 + 5 296 000 + 53 012 000)</td></tr>
<tr><td></td><td></td><td>16.8</td><td>A1</td><td>16.8 (awrt, supported by correct working)</td></tr>
<tr><td>(b)</td><td></td><td>Model 1: 14.5

Model 2: 16.6

Model 3: 16.8</td><td>B1

B1

B1</td><td>14.5 (cao)

16.6 (cao)

16.8 (cao)

(If all three answers are given more accurately only penalise once; however incorrect rounding without sight of a more accurate answer scores B0 each time)</td></tr>
<tr><td>(c)</td><td><table><tr><th>Year</th><th>Govt figures</th><th>Model 1</th><th>Model 2</th><th>Model 3</th></tr><tr><td>2021</td><td>19.3</td><td>17.5</td><td>16.5</td><td>18.5</td></tr><tr><td>2031</td><td>22.3</td><td>18.3</td><td>15.8</td><td>22.9</td></tr></table>
Model 1: Underestimates the government figures
Model 2: Decreases from 2016, so is inappropriate.
Model 3: is the most reliable of the three</td><td></td><td>M1

A1

A1

A1

C1</td><td>Any attempt to evaluate all three models with the same value of n.

Correct evaluation of Model 1 for both years

Correct evaluation of Model 2 for both years

Correct evaluation of Model 3 for both years

Model 1: Underestimates the government figures</td></tr>
</table>

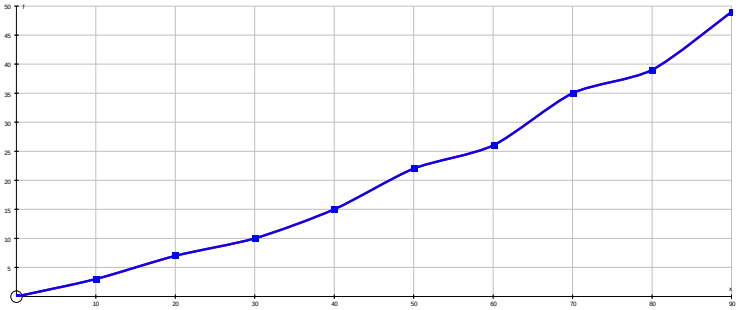
Question	Working	Answer	Mark	Notes
				Model 2: Decreases from 2016 so is inappropriate. Model 3: is the most reliable of the three.
(d) (i)		B2*(1000–C2) / 1000	B1	(cao)
		737 000	B1	736979.5(...); accept (awrt) 737 000
(ii)	742 1000 ÷ 10 × 6.9 ÷ 1000 = 5 120.49 742 100 – 5 120.49 = 736 979.51		M1	Method to find the number of 65 year olds in 2012 who die or survive
		736 980	A1	736 980
	No of 65 year olds in 2012 Repeat with rate of 18.5 and 736 980		M1	Complete method to calculate the surviving number from 2012 to 2013
		723 345	A1	(awrt) 723 345
(iii)		Assumption	C1	C1 for an assumption, e.g. No increase in population due to immigration; no decrease due to emigration; equal distribution of the mortality rates within an age group

SECTION B – TASK 1: TOURIST ATTRACTIONS

Question	Working	Answer	Mark	Notes
2.		Reason	B1	Reason, e.g. sample size could be too small; sample could be carried out in a bias manner; sample results could be skewed
3. (a)	Tree diagram		B1	First branch stately home P(Y) = 0.6 and P(N) = 0.4
			B1	Second branch from Y with P(Y) = 0.7 and P(N) = 0.3
			B1	Second branch from N with P(Y) = 0.25 and P(N) = 0.75
(b)	0.6 × 0.3 or 0.4× 0.25		M1	0.6 × "0.3" or "0.4"× 0.25
	0.6 × 0.3 + 0.4× 0.25		M1	0.6 × "0.3" + "0.4"× 0.25
		0.28	A1	(cao)
(c)	0.6 × 0.7 + 0.4 × 0.25 = 0.52		M1	Method to find the probability of visiting the farm shop
	0.52 × 30000		M1	Complete method to estimate the number
		15 600	A1	(cao)
4. (a) (i)		$\frac{50}{75}$	B1	(oe)
(ii)		$\frac{25}{75}$	B1	(oe)
(iii)		$\frac{4}{75}$	B1	(cao)

Question	Working	Answer	Mark	Notes
(b)		Car and one other	B1	Car and one other
		Reason	C1	From the diagram, car does not overlap with any other event (oe)
(c)			M1	At least 2 of P(B and T) = $\frac{7}{75}$, P(B) = $\frac{16}{75}$ and P(T) = $\frac{11}{75}$
			M1	Full method to show the events are not independent due to probability rules
		Not independent	C1	Clear statement that the events are not independent, supported by calculations
(d)	9 + 7 = 16	$\frac{7}{16}$	M1	Complete method shown
			A1	cao

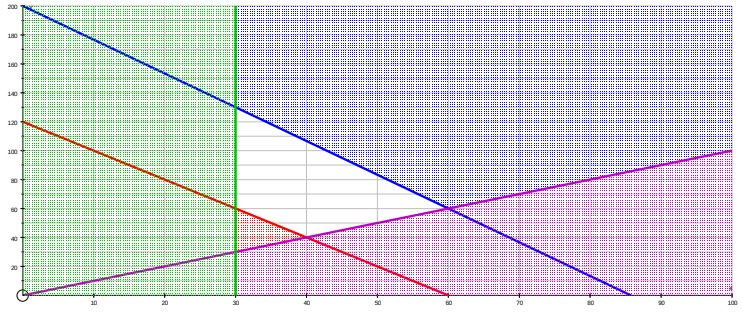
SECTION B – TASK 2: FOOTBALL

Question	Working	Answer	Mark	Notes
5. (a)			B4	
(b) (i)		54 – 57	B1	A value in the range 54 to 57 (or ft from their graph)
(ii)			C2	Two comments with one in context, e.g. it tells you the median time is in the second half which means that less goals are scored by Arsenal in the first half than in the second half) (C1 for a simple statement, e.g. it tells you the median time is in the second half)
6.		Comments about the graph	C2	Two comments about the graph on wage bills, e.g. Arsenal stayed steady then rose, or Arsenal is behind now, or other clubs now pay more, or Man City now pay much more (C1 one relevant comment)

Question	Working	Answer	Mark	Notes
7. (i)	Mean: £89.1 million	£89.1m	B1	Mean value
	Median: £62.5 million	£62.5m	B1	Median value
		Statement	C1	Relevant statement about both papers could be correct dependent upon average used
(ii)		Reason and supporting statement	C1	Statement supported by a reason, e.g. second headline because the median less affected by extreme values, or first headline because use the mean shows the higher value implying a growing bill
8. (a)	$14102 - (1782 \times 210 \div 20)$		M1	Complete method to find S_{xy}
		–4609	A1	cao (dependent on M1 being awarded)
(b)	$S_{xx} = 58519.8$, $S_{yy} = 665$		M1	Method to find S_{xx} and S_{yy}
			M1	Complete method to find r
		–0.739	A1	–0.739 (awrt)
(c)		Statement	C1	Statement about type or strength of correlation
		Statement	C1	Relevant statement in context, e.g. negative because as you spend less your position is a higher number; low numbers are good positions or as you spend less you finish lower in the league; as you spend more you come higher in the league

SECTION B – TASK 3: SEATING

Question	Working	Answer	Mark	Notes
9.	$150x + 50y = 2460$ $30x + 165y = 2538$		B1	Setting up the correct equations
			M1	Correct method to eliminate one variable
			M1	Correct method to find the other variable, e.g. by substitution or by elimination
		$x = 12$ and $y = 13$	A1	$x = 12$ and $y = 13$
			M1	Complete method to find the total cost of the required chairs using their values for x and y
		£432	A1	
10. (a)		Simplification shown	B1	Sight of BOTH $8x + 4y \geq 480$ and $2x + y \geq 120$
(b)		$7x + 3y \leq 600$	B1	
		$y \geq x$	B1	
		$x \geq 30$	B1	(use of strict inequalities – lose last B mark awarded)

Question	Working	Answer	Mark	Notes
(c)			B1	$2x + y = 120$
			B1	$7x + 3y = 600$
			B1	$y = x$
			B1	$x = 30$
			B1	cao (feasible region labelled)
(d) (i)		$140x + 65y$	B1	(cao)
(ii)	(40,40) 8200		M1	Testing one point from within the region
	(30,130) 12650 (60,60) 12300		M1	Testing the two potential minimum points
	(30,60) 8100	£8100	A1	
		$x = 30$ and $y = 60$	A1	
				Or
			M1	Finding the gradient of the objective line
			M1	Drawing the correct objective line
		£8100	A1	
		$x = 30$ and $y = 60$	A1	

Enlarged diagram for Question 10(c)