

Time Series – GCSE Statistics**1. No.10**

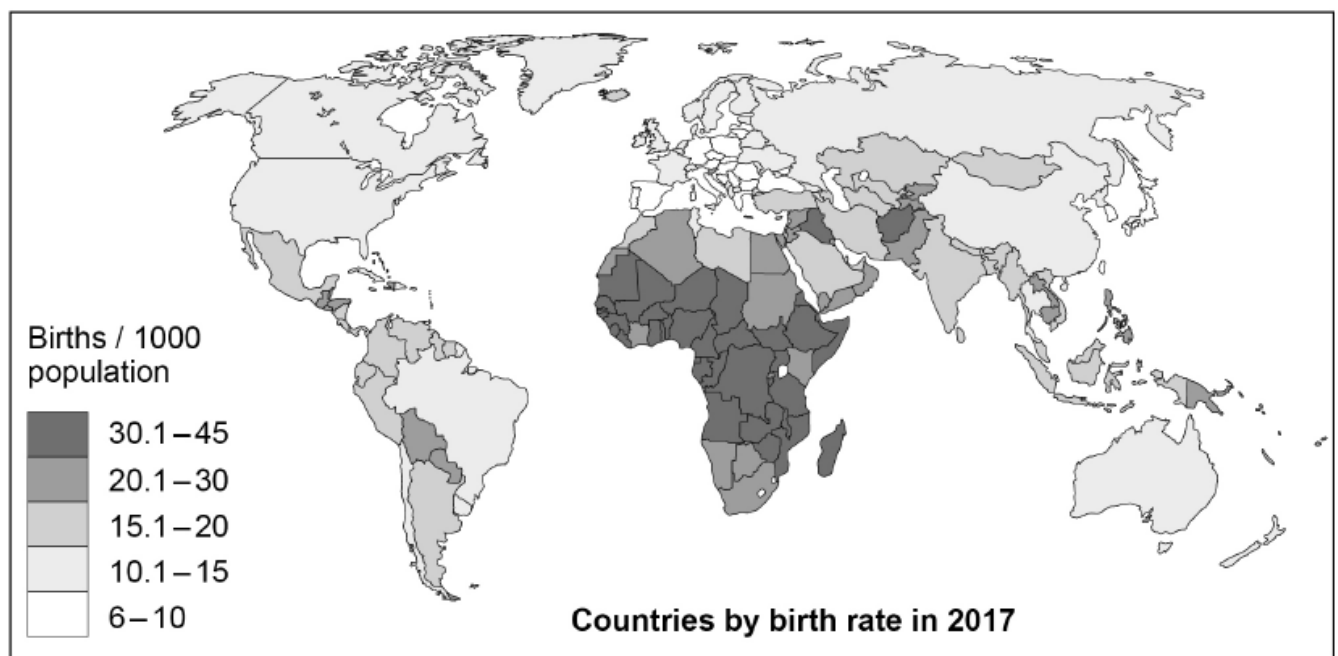
Sol is investigating birth rates in different countries.

He thinks that European countries have the lowest birth rates.

- (a) Write a possible hypothesis for Sol to use in his investigation.

[1 mark]

- (b) Sol sees this map on Wikipedia.



- (b) (i) What is the name of this type of map?

[1 mark]

Answer _____

- (b) (ii) Nearly all of the countries on the map with a birth rate of 6 – 10 are in Europe.

Given this, comment on whether the hypothesis you wrote in **part (a)** may be correct.

[1 mark]

- (c) Sol decides to find the actual birth rates for a selection of European and non-European countries.
- (c) (i) He says, "This is primary data as it is me who is going on the Internet to find it."

Is Sol correct?

Tick (✓) a box.

Yes

☐

No

☐

Give a reason for your answer.

[1 mark]

- (c) (ii) Here is the list of countries and their birth rates found by Sol.

Country	In Europe?	Birth Rate (per 1000) (to 1 dp)
Argentina	N	17.0
Belgium	Y	11.4
Cameroon	N	34.5
Denmark	Y	10.4
Egypt	N	30.3
France	Y	12.3
Germany	Y	8.5
Honduras	N	55.8
Italy	Y	8.7
Japan	N	7.9

Source: CIA World Factbook 2017

He decides to check the value for Honduras as he thinks it must be wrong.

By referring to the map, how does he know this value is almost certainly wrong?

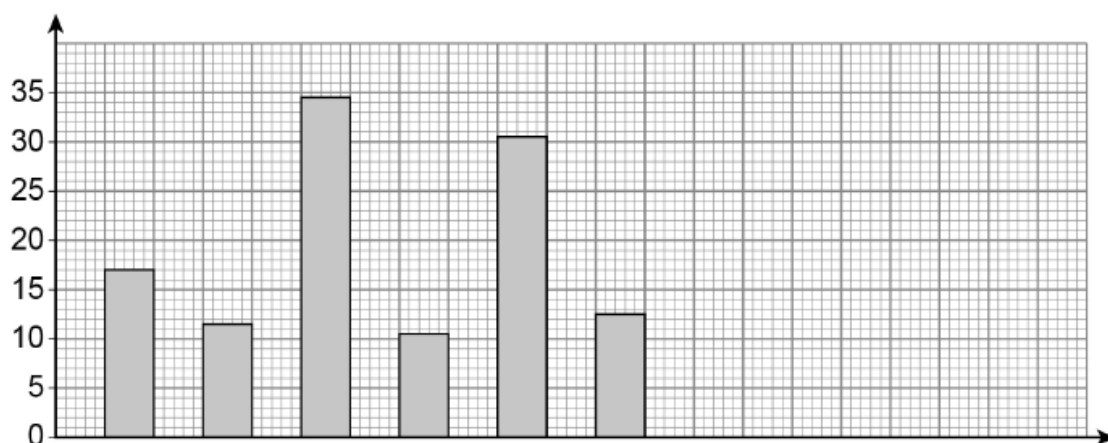
[1 mark]

- (d) In fact, Sol had misread the Honduras value and it should have been 22.8

Use this value and the table to complete the bar chart for the data.

You will need to complete the labels for the axes.

[4 marks]



- (e) Give **one** possible reason for the apparent huge differences between the birth rates for different countries.

[1 mark]

- (f) The formula used to calculate a birth rate is

$$\text{Birth rate} = \frac{\text{number of live births recorded}}{\text{total population}} \times 1000$$

The population of Germany in 2017 was approximately 80 000 000

- (f) (i) Use the table on page 11 and this information to estimate the approximate number of live births recorded in Germany in 2017.

[3 marks]

Answer _____

- (f) (ii) Give **one** reason why the answer to part (f)(i) is an estimate.

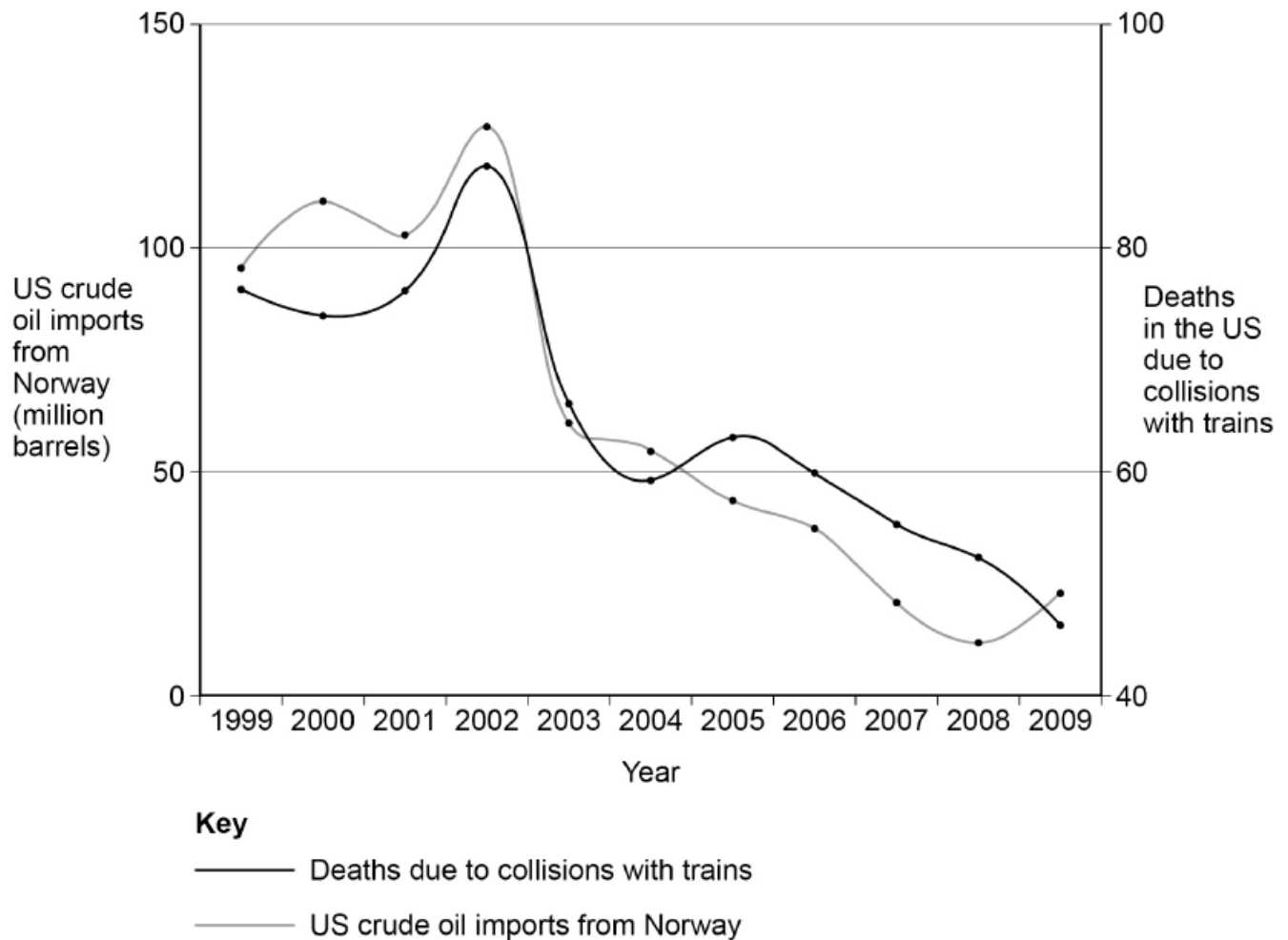
[1 mark]

- (g) Sol does more research and reads a few different articles.
He writes a conclusion about the data he has used and the articles he has read.
In his summary, he uses data from the articles.

What **must** his summary include?

[1 mark]

2. No.12



Jon sees the above graph on the Internet.

He correctly calculates that there is a strong positive correlation between the amount of oil imported to the US from Norway and the number of deaths in the US due to collisions with trains.

Circle the letter of the correct statement below.

- A** Increased oil imports cause more deaths by collision with trains.
- B** There is no causal link between the two variables despite the correlation.
- C** Increased deaths by collision with trains cause more oil to be imported.
- D** Increased oil imports cause more deaths by collision with trains **and** more deaths by collision with trains cause increased oil imports.

[1 mark]

3. No.13

You will need the **Data Sheet** to answer this question.

In the UK, films shown in cinemas are given a certificate to reflect the age of the person they might be suitable for.

The certificates are shown in the Data Sheet.

(a) Look at **Table 1** in the Data Sheet.

Discuss the trends in the number of films given each **certificate** from 2008 to 2018.

Make **two** distinct comments on the trends.

[2 marks]

1 _____

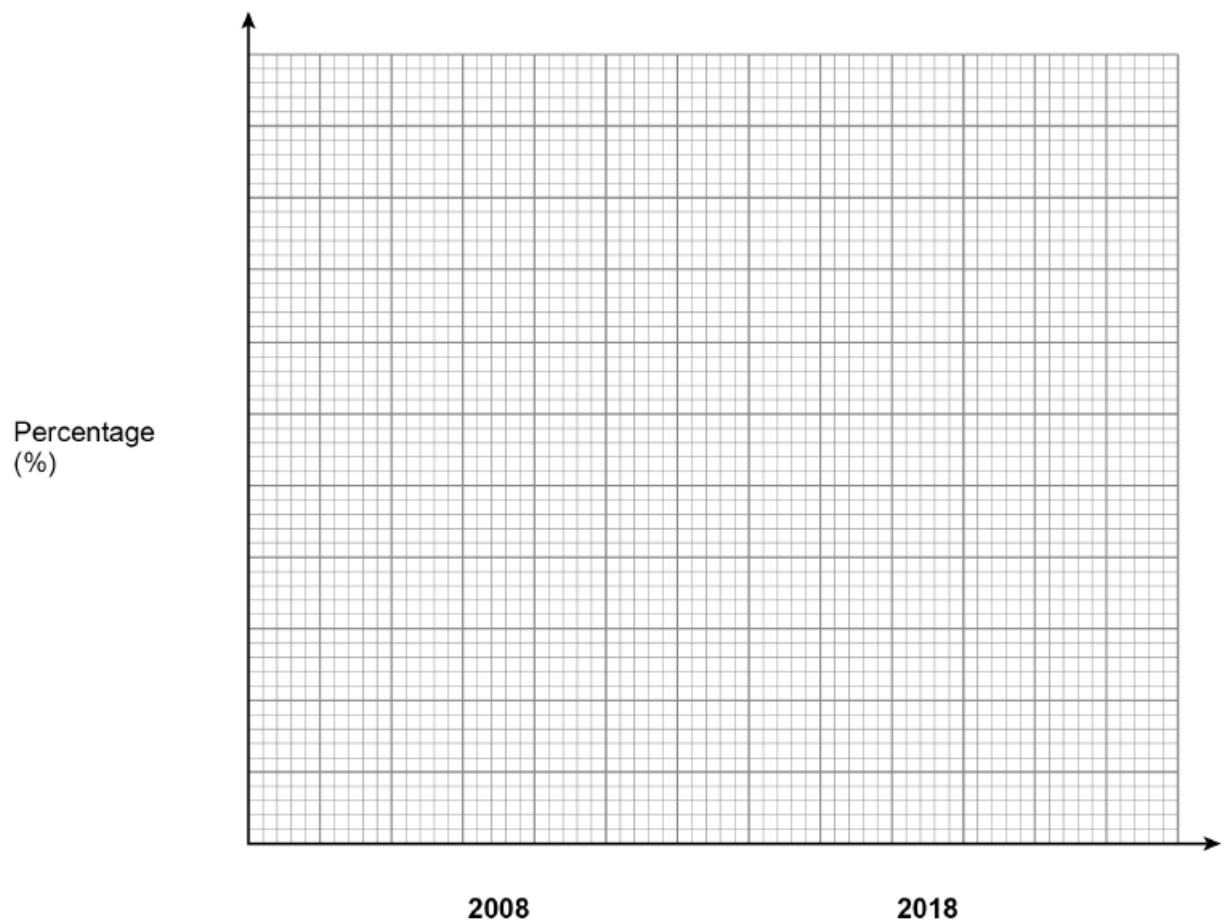
2 _____

(b) Look at **Table 1** in the Data Sheet.

Use the grid on the next page to draw a **percentage composite bar chart** for the two years 2008 and 2018.

Show any calculations you make in the space below.

[7 marks]



- (c) In Northtown, there is a multiscreen cinema, mainly showing popular films. Lopez is the manager of a new cinema about to open in the town. He wants to know the popularity of films with different certificates.

Should Lopez use primary or secondary data to gather this information?

Tick (✓) a box.

Primary

☐

Secondary

☐

Give a reason for your answer.

[1 mark]

- (d) Look at **Table 2** on the Data Sheet.

How do you know that the percentages are not exact?

[1 mark]

- (e) Lopez concludes that no 18-certificate films were shown by the multiscreen cinema.

- (e) (i) Give one reason why Lopez might be correct.

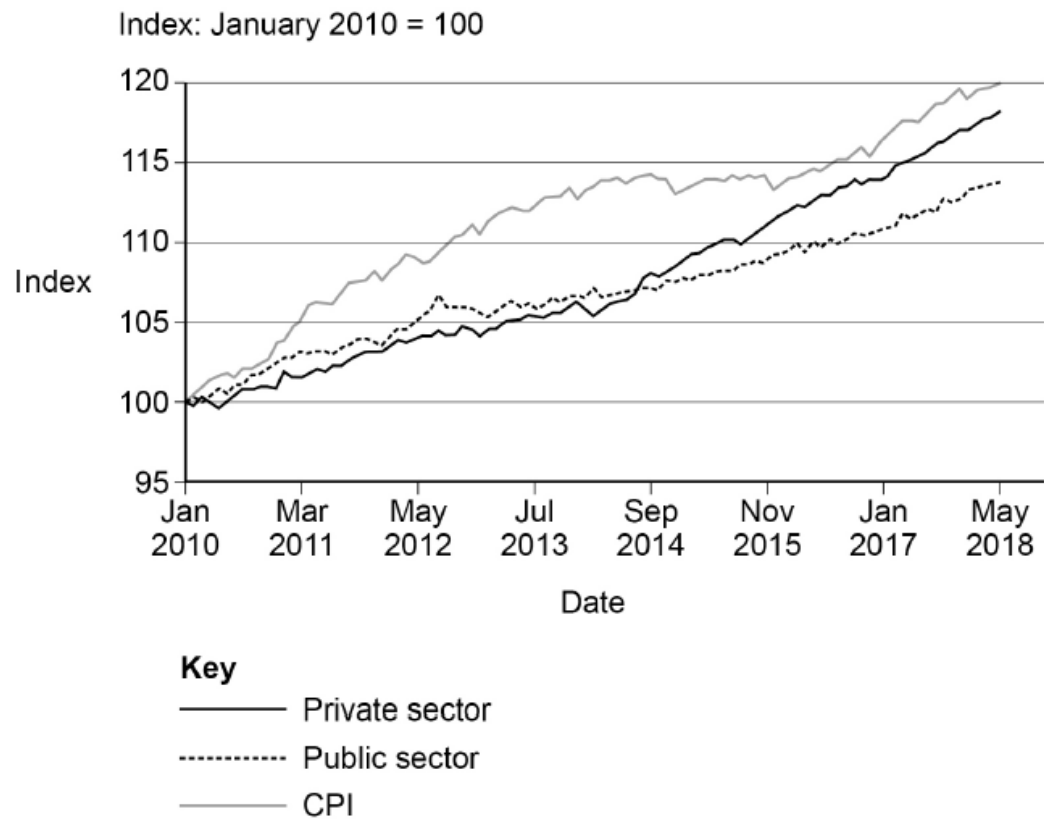
[1 mark]

- (e) (ii) Give one reason why Lopez might not be correct.

[1 mark]

4. No.17

The graph shows changes in private and public sector pay and the Consumer Price Index (CPI).



Source: ONS

(a) What does CPI measure?

[1 mark]

(b) By what percentage, approximately, did public sector pay increase between Jan 2010 and May 2012?

Circle your answer.

[1 mark]

4

5

104

105

- (c) Compare the changes in public sector and private sector pay between Jan 2010 and May 2018. [2 marks]

- (d) Jim says,

“The index number for CPI is 120 to the nearest whole number for May 2018 with Jan 2010 as base.

So the index number for CPI for Jan 2010 with May 2018 as base will be 80 to the nearest whole number.”

Evaluate all of Jim’s statement.

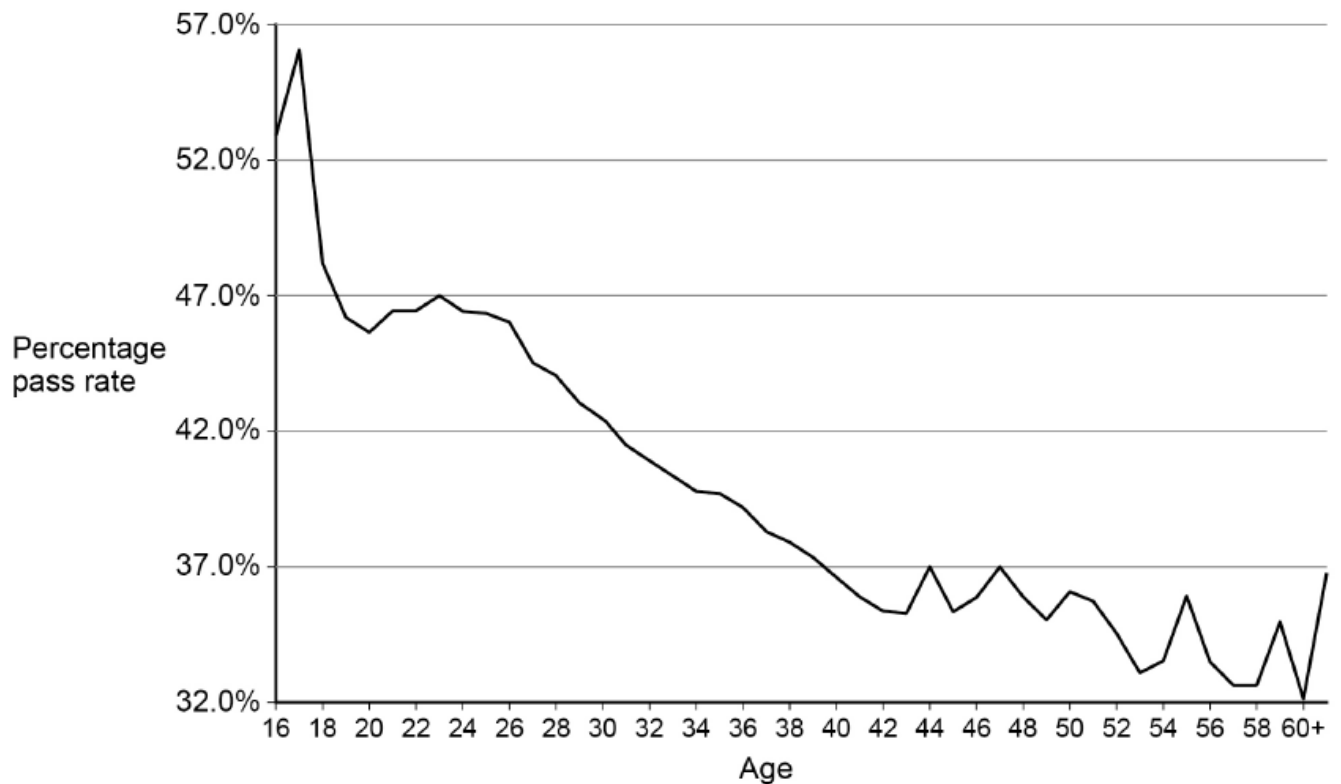
Use calculations, where necessary, to show if he is correct.

[3 marks]

5. No.5

The graph shows the percentage pass rate for UK driving tests at different ages.

Driving test pass rates by age



Source: PassMeFast

- 5 (a) Estimate the percentage chance that a 34-year-old will pass their test.

[1 mark]

Answer _____ %

- 5 (b) Betty says that the older you are the less likely you are to pass your test.

Evaluate Betty's statement, giving evidence both for and against.

[2 marks]

For _____

Against _____

6. No.7

Natalie is selling her house.

At a selling price of £135 000, she is advised that the house would definitely sell within one month.

For each additional £1000 on the asking price, the risk of **not** selling within any one month increases by 0.05

(a) Natalie wants £150 000 for her house.

(a) (i) At £150 000, what is the risk that she will **not** sell her house within one month?

[2 marks]

Answer _____

(a) (ii) At £150 000, what is the risk that she will **not** sell her house within two months?

[2 marks]

Answer _____

(a) (iii) What assumption did you have to make in answering part (a)(ii)?

[1 mark]

- (b) (i) Using the information given, what is the minimum price for which the house will apparently **never** sell?

[2 marks]

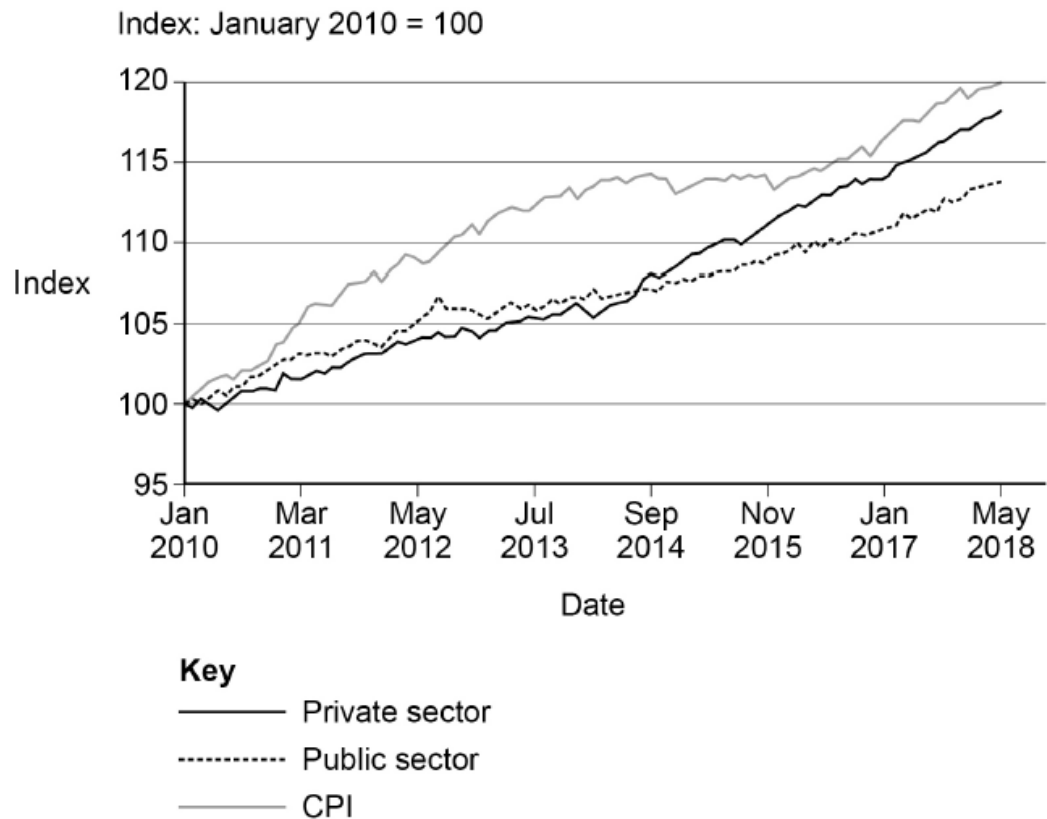
Answer £ _____

- (b) (ii) Give a reason why the house may actually sell at this minimum price.

[1 mark]

7. No.8

The graph shows changes in private and public sector pay and the Consumer Price Index (CPI).



Source: ONS

(a) What does CPI measure?

[1 mark]

(b) By what percentage, approximately, did public sector pay increase between Jan 2010 and May 2012?

Circle your answer.

[1 mark]

4

5

104

105

- (c) Compare the changes in public sector and private sector pay between Jan 2010 and May 2018. **[2 marks]**

- (d) Jim says,

“The index number for CPI is 120 to the nearest whole number for May 2018 with Jan 2010 as base.

So the index number for CPI for Jan 2010 with May 2018 as base will be 80 to the nearest whole number.”

Evaluate **all** of Jim’s statement.

Use calculations, where necessary, to show if he is correct.

[3 marks]

8. No.5

The table shows the annual sales value (£ million) in the UK of different ways to buy music.

		Annual sales value (£ million)		
		Physical (eg CD)	Downloads	Streaming
Year	2013	544	397	106
	2014	517	338	168
	2015	513	293	254
	2016	475	215	407
	2017	459	165	602
	2018	383	123	829

- (a) Write down the value of Downloads in 2015.

[1 mark]

£ _____ million

- (b) In which year was the largest difference in the sales of Physical and Downloads?

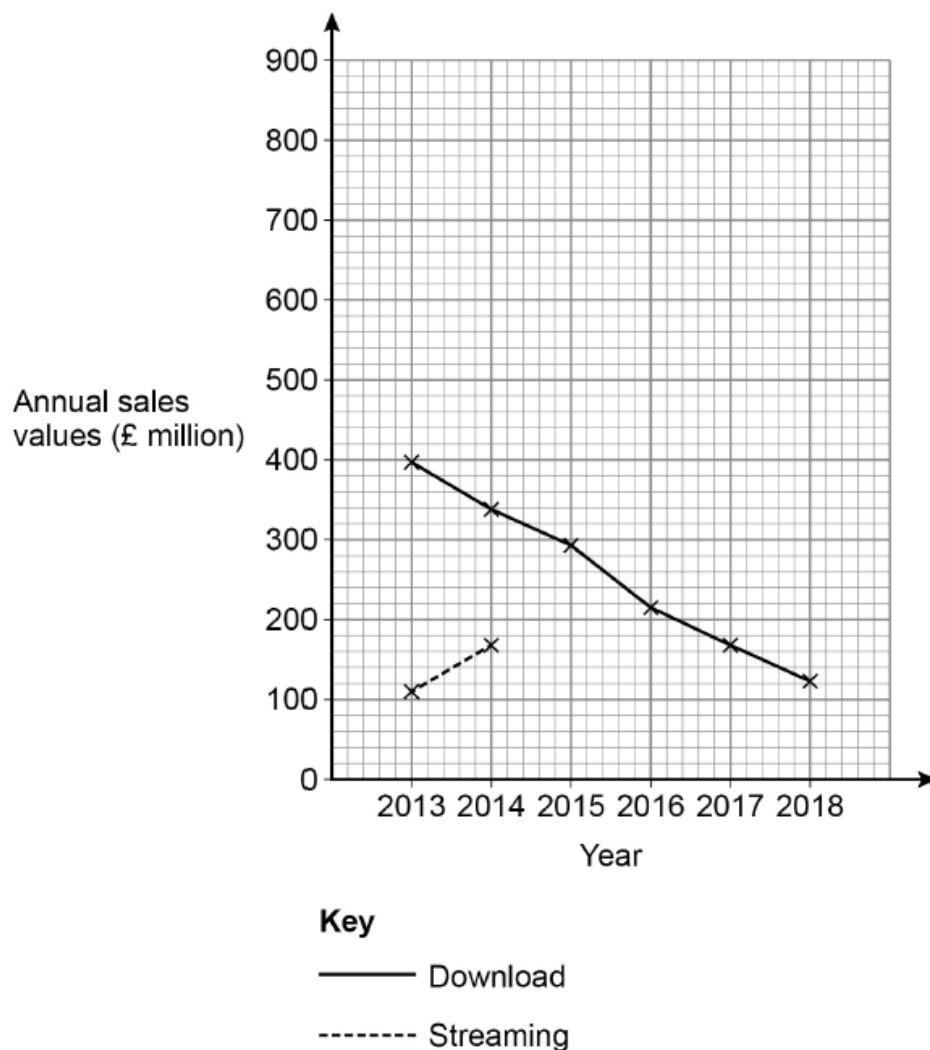
[2 marks]

Answer _____

- (c) The graph shows the values for Downloads and some of the values for Streaming.

Use the values for **Streaming** from the table to complete the graph.

[2 marks]



- (d) Make **two** comments about the trends shown on the graph.

[2 marks]

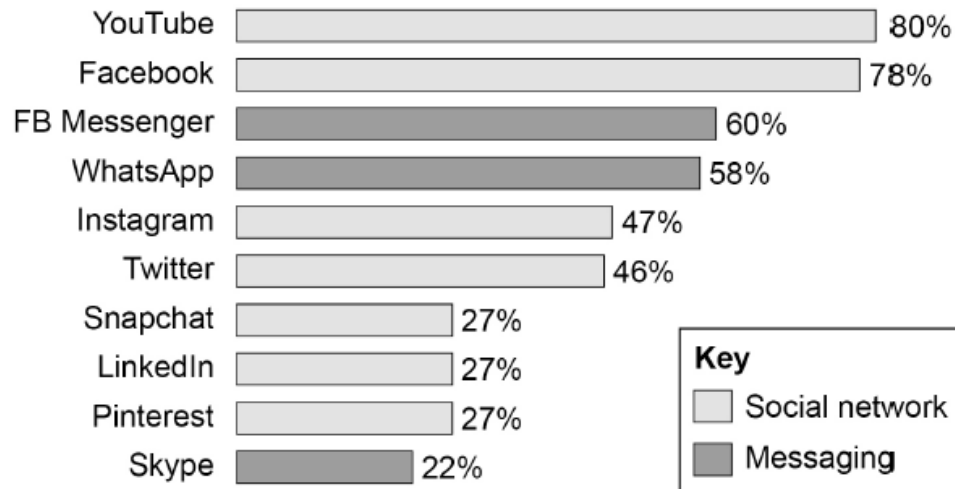
Comment 1 _____

Comment 2 _____

9. No.7

The graph shows information about the UK's most popular social media in 2019.

Percentage of the UK population who report using each platform



Source: Adapted from Hootsuite

- (a) Which was the **second** most popular **messaging** platform in the UK in 2019?

[1 mark]

Answer _____

- (b) The population of the UK in 2019 was approximately 68 million.
 Simran said,

“Nearly 55 million people used YouTube in the UK in 2019 and were on it every day.”

- (b) (i) Comment on this part of Simran's statement.

“Nearly 55 million people used YouTube in the UK in 2019...”

[3 marks]

(b) (ii) Comment on this part of Simran's statement,

"...and were on it every day."

[1 mark]

10. No.15

Look at the data below.

Confirmed cases of measles, mumps and rubella in England and Wales: 1996 to 2018.

The values in the brackets are for **England only**.

Year	Measles	Mumps	Rubella
1996	112 (112)	94 (93)	3922 (3567)
1997	177 (177)	182 (172)	117 (113)
1998	56 (55)	121 (118)	119 (117)
1999	92 (92)	373 (371)	162 (159)
2000	100 (99)	730 (721)	62 (61)
2001	70 (67)	784 (731)	45 (41)
2002	320 (316)	500 (394)	64 (64)
2003	440 (396)	1541 (1086)	16 (14)
2004	193 (183)	8129 (7321)	14 (14)
2005	76 (76)	43 378 (39 621)	29 (27)
2006	711 (707)	4420 (4128)	34 (34)
2007	934 (921)	1476 (1462)	35 (35)
2008	1315 (1280)	2405 (2348)	27 (27)
2009	1141 (982)	7662 (7301)	9 (9)
2010	377 (369)	3965 (3880)	12 (12)
2011	1085 (1063)	2372 (2299)	4 (4)
2012	2032 (1920)	2680 (2592)	65 (65)
2013	1836 (1414)	4265 (3752)	13 (13)
2014	121 (102)	3094 (2680)	3 (3)
2015	91 (91)	830 (761)	5 (5)
2016	541 (526)	573 (537)	2 (2)
2017	283 (265)	1840 (1796)	3 (3)
2018	989 (968)	1088 (1061)	3 (3)

Source: GOV.UK

- (a) Write down the last year in which there was a confirmed case of rubella in **Wales**. [1 mark]

Answer _____

- (b)
$$\text{Mumps rate} = \frac{\text{Number of confirmed cases}}{\text{Total population}} \times 1000$$

The population of **England** in 2011 was estimated by the census to be 53 012 456

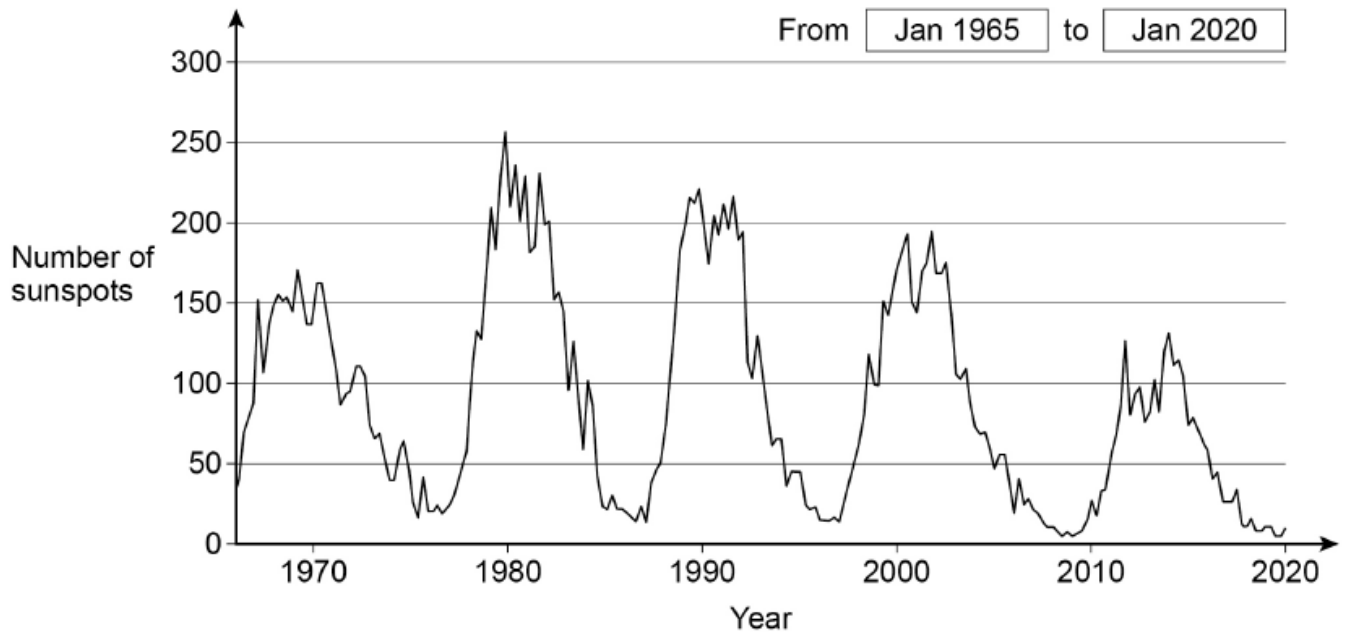
Show that the mumps rate for England in 2011 was 0.043 to 3 decimal places.

[3 marks]

11. No.7

Sunspots are dark marks on the sun's surface which can affect things on Earth such as radio signals.

The number of sunspots recorded **monthly** from 1965 – 2020 is shown in the time series graph below.



Source: SpaceWeatherLive

- (a) Estimate the year when the most sunspots were recorded for 1965 – 2020 and work out an estimate for the number of sunspots in that year.

[2 marks]

Year _____ Number of sunspots _____

- (b) Describe **one** feature of the data.

[1 mark]

- (c) There are variations in the number of sunspots seen per month throughout the year.

How could you smooth out these variations?

[2 marks]
