



# Numerical Reasoning Practice Test 2

## Solution Booklet

Company	Company Annual Profit (£)	Cost to Buy Company (£)	Number of Employees
A	20,000	18,000	5
B	26,000	25,000	8
C	21,000	20,000	8
D	30,000	30,000	12

**Q1 Which company has the highest annual profit per employee?**

A B C D

*Simply divide the annual profit by the number of employees for each company:*

*Company A = £4,000/employee.*

*Company B = £3,250/employee.*

*Company C = £2,625/employee.*

*Company D = £2,500/employee.*

*This is a relatively easy question; don't waste time by looking for anything more complicated.*

**Q2 If the profits per employee remain the same, how many extra employees would Company B have to recruit to achieve annual profits of £39,000?**

6 3 12 4

*For company B, profit per employee is originally (£26,000 ÷ 8) = £3,250/employee.*

*So £39,000 ÷ £3,250 = 12 employees, which is 4 more than they currently have.*

*Whilst each question can be done in isolation, it will help here if you can quickly locate the workings from the previous question.*

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**Q3** If every employee of Company D contributes equally, how much would each employee have to contribute in order to collectively buy Company A?

**£1,500**

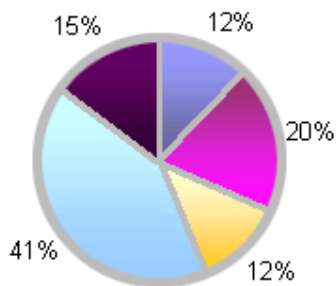
£1,700

£2,700

£2,100

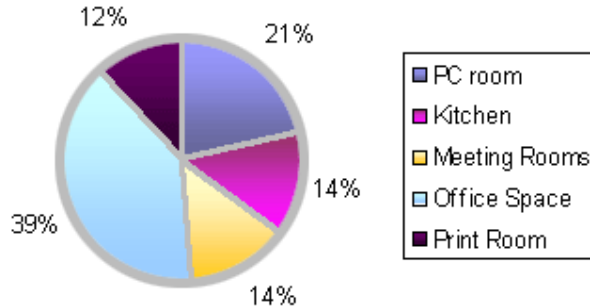
*We are told that the cost to buy Company A is £18,000. We are also told there are 12 employees in Company A. So  $£18,000 \div 12 \text{ employees} = £1,500 \text{ per person}$ .*

**Building Energy Use 1990**



Total = 17,000kWh

**Building Energy Use 2000**



Total = 15,000kWh

**Q4** Between 1990 and 2000, what was the increase in energy use for the PC Room, Meeting Rooms and Office Space combined?

50kWh    184kWh    188kWh    Cannot say

The graphs give percentages, with the total shown at the bottom. Don't waste time by working out the kWh value for each of the PC Room, the Meeting Rooms and the Office Space. Use the percentages and add up at the end:

In 1990: (12% + 12% + 41%) of 17,000kWh = 11,050kWh

In 2000: (21% + 14% + 39%) of 15,000kWh = 11,100kWh.

Which is an increase of 50kWh.

**Q5** If the Building Energy Use today is 6% less than it was in 2000, by what percentage is today's Building Energy Use lower than that of 1990?

82.9%    17.1%    17.8%    Cannot say

Total energy usage in 2000 = 15,000kWh, so today's at 6% less is  $15,000 \times 0.94 = 14,100\text{kWh}$ . This compares with 1990 levels of 17,000kWh.

To work out the reduction from 17,000 to 14,100, calculate  $(14,100 \div 17,000) = 0.8294$ , which is a reduction of  $(1 - 0.8294 = 0.17059)$  17.1%.

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**Q6** Which space experienced the smallest reduction in kWh used between 1990 and 2000?

Office Space      **Print Room**      Meeting Rooms      PC Room

*We can rule out the PC Room from the possible answers by inspection since it is apparent its energy use actually increased between 1990 and 2000. So the other three possible answers:*

*Print Room:  $2,550 - 1,800 = 750\text{kWh}$ .*

*Office Space:  $6,970 - 5,850 = 1,120\text{kWh}$ .*

*Meeting Rooms:  $2,040 - 2,100 = \text{Increase of } 60\text{kWh}$  (note question asked for smallest reduction).*

Sector	Male	Female
Voluntary Work	41,000	68,000
IT	121,000	107,000
Engineering	398,000	105,000
Legal Services	273,000	251,000
Healthcare	227,000	271,000
Business Services	186,000	124,000
Self Employed	45,000	62,000
Unemployed	52,000	43,000
Total	1,343,000	1,031,000

**Q7** Approximately what percentage of the people sampled are unemployed?

7%      5%      6%      **4%**

Make sure you add together the male and female figures to arrive at a figure for 'people'.

Total number unemployed = 52,000 + 43,000 = 97,000.

Total number people sampled = 1,343,000 + 1,031,000 = 2,374,000.

So now  $97,000 \div 2,374,000 = 4.086\%$ .

**Q8** If it is predicted that the number of females employed in IT will rise by 10% every year, but the number of males stays the same, what percent of IT employees would be female after a three year period?

**54.1%**      53.5%      85.0%      45.5%

Number of female IT employees to start with is 107,000 from the table. If the number of female employees rises by 10%, that gives 142,417 employees after three years ( $107,000 \times 1.10 \times 1.10 \times 1.10 = 142,417$ ). The number of male IT employees is still 121,000, so the total in IT is now  $142,417 + 121,000 = 263,417$ . So 142,417 out of 263,417 IT employees is 54.07%.

With this question, where we are dealing with number of people, you should end up with integers in the working since it is not possible to have part of a person. If you start to get decimals, consider whether you have made a mistake.

Town		Aug	Sep	Oct	Nov	Average cost per accident (£)
Ribley	Number of Accidents	8	6	12	10	1,900
	Vehicles on Road*	85	76	79	81	
Wartop	Number of Accidents	14	18	4	20	3,200
	Vehicles on Road*	112	101	89	117	
Surren	Number of Accidents	6	20	9	21	1,050
	Vehicles on Road*	96	104	119	125	

\*In Thousands

**Q9 What was the average accident cost per vehicle on the road in Ribley in November?**

**£0.23**      £0.47      £15.40      £2.30

Hopefully you have noticed that the 'Vehicles on Road' figures are in thousands. Total average cost of accidents in Ribley in November =  $10 \times £1,900 = £19,000$ . Number of vehicles on road = 81,000. So  $£19,000 \div 81,000 = £0.2346$ .

Don't be fooled into thinking the answer is simply the 'Average cost per accident' figure given on the right hand side; per vehicle on the road is what the question is after. If it looks as though all you have to do for a question is read a number from the figure, you have probably misunderstood.

**Q10 Comparing Wartop with Surren, what was the difference in average accident cost per vehicle on the road in October?**

3.4p      **6.4p**      £64.60      £0.70

The working is similar to the previous question, but there is a bit more work to this question as you have to work it out for two towns. Again, don't forget that the 'Vehicles on Road' figure is in thousands. The fact that the question asks for 'average accident cost' means we can answer the question because we are given the 'Average cost per accident' figure to apply to all accidents. Otherwise we'd have to know the cost of every single accident.

Wartop:  $(£3,200 \text{ per accident} \times 4 \text{ accidents}) \div 89,000 \text{ vehicles on road} = (12,800) \div 89,000 = £0.1438$ .

Surren:  $(£1,050 \text{ per accident} \times 9 \text{ accidents}) \div 119,000 \text{ vehicles on road} = (9,450) \div 119,000 = £0.0794$ .

Difference = £0.064.

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**Q11** The only towns in the County are Ridley, Wartop and Surren. What was the average accident cost per vehicle on the road in September for the County?

£0.17

**£0.32**

£0.94

£20.50

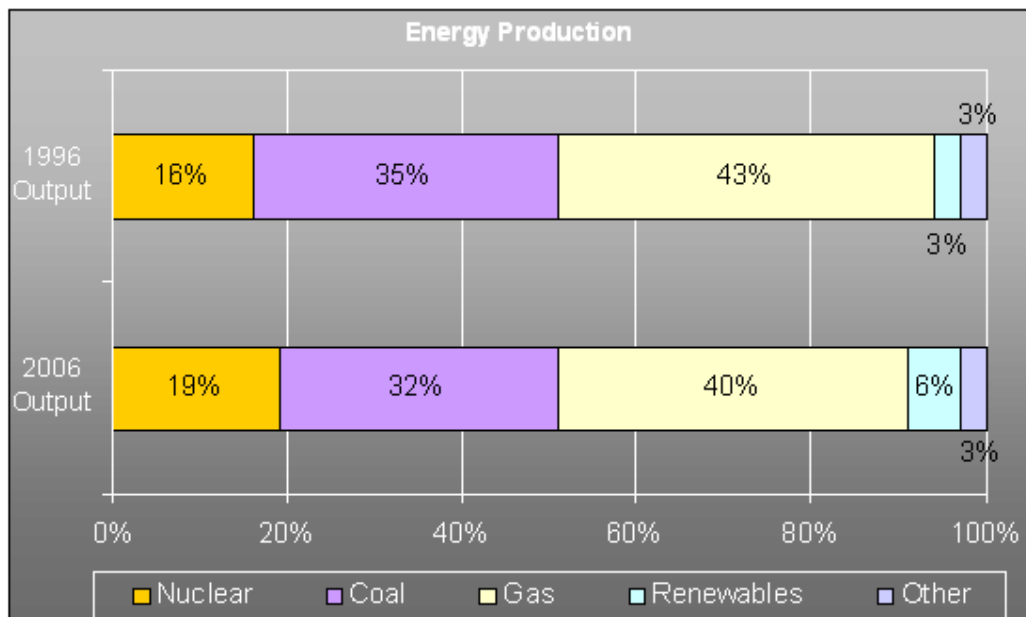
*Don't be fooled into working out the average accident cost per vehicle on road for all three towns, and then finding the average of these by summing and dividing by three. This is not the overall average, this would give a distorted average toward the town with the lowest number of accidents.*

*We need to first find the total costs of all accidents for all towns:  $(£1,900 \times 6) + (£3,200 \times 18) + (£1,050 \times 20) = £90,000$ .*

*Now divide this by the total number of vehicles on the road for all three towns  $(76,000 + 101,000 + 104,000) = 281,000$ .*

*So  $£90,000 \div 281,000 = £0.320$ .*





**Q12** In 1996, total output of from all fuels was 200TWh. If output for Nuclear in 2006 was twice that for Coal in 1996, what was the output for Nuclear in 2006?

140TWh      400TWh      64TWh      96TWh

*If you read this quickly, it might be daunting. It needn't be if you take each step at a time. We are told that the total output from all fuels in 1996 is 200TWh, so we can work out what is was for coal in 1996.*

*Coal in 1996 was 35% of 200TWh: 70TWh. So Nuclear in 2006 is twice this: 140TWh.*

**Q13** If between 1996 and 2006, Renewables output doubled to 18TWh, approximately what was the Gas output in 1996?

129TWh      86TWh      120TWh      110TWh

*Again, work through each step using what we have been told. Bear in mind you never need information that was given in the previous question; each question should stand alone.*

*So in 2006 we are told Renewables was 18TWh, which was double what it was in 1996: 9TWh. Therefore, if 9TWh is 3% of the total (according to chart), the total in 1996 was 300TWh ( $9TWh \div 0.03 = 300TWh$ ). Gas we are told made up 43% in 1996, i.e.  $0.43 \times 300TWh = 129TWh$ .*

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**Q14** If total output was 200TWh in 1996 and 320TWh in 2006, what was Gas output in 2001?

107TWh

133TWh

120TWh

**Cannot say**

*This is a fairly obvious 'cannot say' question. Don't try to extrapolate between 1996 and 2000 since we are not told what the trend was. No data is given, or can be implied, for 2001 in the question. Often, it is less obvious that the answer cannot be determined from the available information.*

### Refund Data Report

Refund Cause	This Year (% of total refunds)	Last Year (% of total refunds)
	<i>Total number of refunds not given</i>	<i>Total number of refunds 912</i>
Faulty Software	27	32
Faulty Hardware	48	41
Delivery Damage	9.5	8
False Advertisement	1.5	1
Customer Service	12	15
Other	2	3

**Q15** This year saw a 20% increase in the total number of refunds over last year. Approximately how many refunds were issued this year due to Delivery Damage?

102      104      124      1040

Total refunds last year: 912, so for this year add 20% by multiplying 912 by 1.2 which comes to 1094.4.

Of these 1094.4 refunds, we are told from the table 9.5% were refunded due to delivery damage. So  $0.095 \times 1094.4 = 103.97$ . The fact that the questions asks for an 'approximate' number of refunds means our decimal place answer for what can be only an integer is OK (in fact it should encourage us because an integer answer would not ask for an 'approximate' number in the question.)

**Q16** The number of refunds last year due to Faulty Hardware was an increase of 15% above the year before last. Approximately how many complaints were received from Faulty Hardware in the year before last?

186      215      325      343

Start with the total for last year: 912. From the table we see that 41% of these were due to Faulty Hardware, so we know that last year there were  $(0.41 \times 912 =)$  373.92 refunds due to Faulty Hardware. Now, we are told in the passage that this figure is a 15% increase above the year before last. So  $373.92 \div 1.15 = 325.15$  will be the number of refunds for the year before last.

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**Q17** If the total number of refunds this year was 840, by what percentage did Faulty Hardware refunds increase between last year and this year?

**7.8%**

2.8%

79.1%

11.0%

*This one is a fairly straight forward application of percentages.*

*Last year =  $912 \times 41\% = 373.9$*

*This year =  $840 \times 48\% = 403.2$*

*Therefore increase =  $403.2 \div 373.9 = 1.0784$ , which is an increase of 7.84%.*

01 May 1995		
	UK Pounds Sterling (£)	US Dollars (\$)
UK Pounds Sterling	1.00	1.74
US Dollar	0.57	1.00
Canadian Dollar	0.50	0.87
JP Yen	0.005	0.008
Euro	0.69	1.21
Russian Rubles	0.020	0.035

**Q18** What was the approximate value in Pounds Sterling of 150 Canadian Dollars in 1995?

£55      **£75**      £130      £300

The table shows us that 1 Canadian Dollar is worth 0.5 Pounds Sterling. So 150 CAD  $\times 0.5 = £75$ .

**Q19** Approximately How many Euros was 85 Russian Rubles worth in May 1995?

**€2.46**      €2,933      €1,900      Cannot say

You have to convert both Euros and Rubles to a common reference (we'll use Pounds). So for 85 Rubles;  $85 \times 0.020 = £1.7$ . We are told one Euro is worth £0.69, so £1.7 must be worth €2.464.

**Q20** How many more Canadian Dollars would 100 UK Pounds Sterling buy than would 120 US Dollars in May 1995?

CAD\$35      CAD\$54      CAD\$60      **CAD\$62**

100 Pounds = 200 CAD ( $100 \div 0.5$ ).  
120 US Dollars = 137.93 CAD ( $120 \div 0.87$ ).  
So the difference is  $200 - 137.93 = 24.56$  CAD.

Mass Range (kg)	UK Number of cars (000)		France Number of cars (000)	
	1995	2000	1995	2000
0-499	4	9	6	11
500-999	21	32	56	89
1000-1499	292	341	346	491
1500-1999	420	495	510	586
2000-Unlimited	71	65	64	26

**Q21** How many cars under 2,000kg were there in France in 1995?

918,000      918      408,000      737,000

Simply add up the number of cars in each bracket up to 1,999kg. There's also a little thing to look out for which is that these figures are all in thousands. So  $510 + 346 + 56 + 6$  (thousand) = 918,000.

**Q22** What was the combined mass of all the cars in the UK in 2000?

211,000kg      858,500kg      1,426,500kg      **Cannot Say**

You might be tempted to do something like multiply the number of cars in each range by their average weight, or something similar. Don't; read the question carefully. Because the data is grouped, we don't know how many cars are at the bottom end of the group, and how many are towards the top. It is impossible to say from the data given.

**Q23** In the UK, what was the percentage increase in the total number of cars between 1995 and 2000?

15.0%      **16.6%**      32.1%      58.0%

You have to find the sum of the number of cars in 1995, do the same for 2000, and work out the percentage difference between the two.

In 1995:  $4 + 21 + 292 + 420 + 71 = 808$  (thousand)

In 2000:  $9 + 32 + 341 + 495 + 65 = 942$  (thousand)

So the percentage increase was  $942 \div 808 = 1.166 = 16.6\%$ .

### Population Structure 1985

	Population at start of year (millions)	Live Births per 1000 population (Jan-Dec)	Deaths per 1000 population (Jan-Dec)	Percentage of population at start of year aged	
				under 15	60 or over
UK	56.6	13.3	11.8	19	21
France	55.2	13.9	10.0	21	19
Australia	46.5	8.0	6.5	19	17
Germany	61.0	9.6	11.5	15	20
Greece	28.5	13.2	7.8	21	18

#### Q24 How many live births occurred in 1985 in Greece and Australia combined?

21,200      **748,200**      1,051,000      Cannot say

*Note live births are given per 1,000 population. So considering each country we have:  
Greece: 28.5 (million) x 13.2 (per 1000). The best way to rationalise the units is to say this is equivalent to 28,500 x 13.2. Which = 376,200.  
And the same with Australia: 46.5 (million) x 8.0 (per 1000) = 372,000.  
Add these together and the total is 748,200.*

#### Q25 Which country had the highest number of people aged under 15 at the start of 1985?

UK      **France**      Australia      Germany

*Immediately from the possible answers we can neglect Greece in our working. But we have to work out the number of people under 15 for the other countries, although we don't need to bother with the units since the question asks only for the largest in magnitude.  
UK:  $56.6 \times 19\% = 10.754$   
France:  $55.2 \times 21\% = 11.592$   
Australia:  $46.5 \times 17\% = 7.905$   
Germany:  $61.0 \times 15\% = 9.15$*

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**Q26** What was the net effect on the UK population in 1985?

**Increase of 84,900**  
Increase of 542,810

Increase of 85,170  
Decrease of 61,400

*We have to consider the births and deaths and find the net effect.*

*Births: 13.3 (per 1000) x 56.6 (million) = 752,780.*

*Deaths: 11.8 (per 1000) x 56.6 (million) = 667,880.*

*So the net increase is 84,900.*

**Q27** Approximately what percentage of the German population were aged 60 or over at the end of 1985?

20%

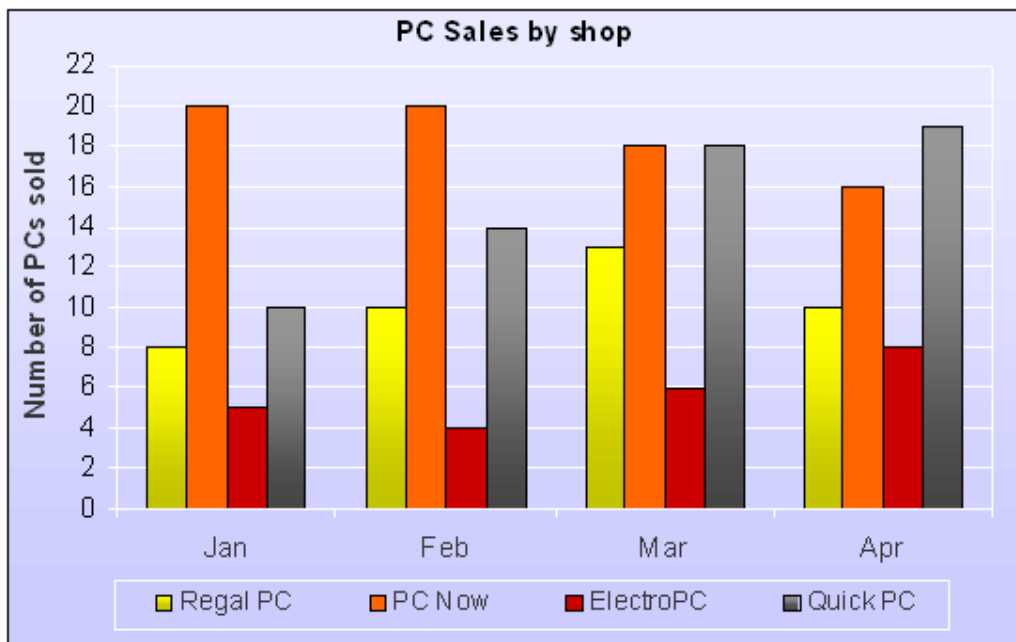
21%

16%

**Cannot say**

*The end column giving percent over 60 is for the start of the year only. By the end of the year, this will certainly have changed but we are not told what the figure is.*





**Q28** For all the shops combined, which month showed the largest decrease in number of PC sales over the previous month?

Feb      Mar      **Apr**      Cannot say

*Sometimes it is possible to rule out some of the possible answers just by looking at the figure, but for this question that is quite difficult. We have to sum for every month.*

Jan:  $8 + 20 + 5 + 10 = 43$

Feb:  $10 + 20 + 4 + 14 = 48$

Mar:  $13 + 18 + 6 + 18 = 55$

Apr:  $10 + 16 + 8 + 19 = 53$

April was the only month where sales dropped from levels of the previous month.

**Q29** Approximately what percentage of Regal PC's sales were made in April?

21%      22%      **24%**      28%

*This is a fairly straightforward percentage question. Total PC sales for Regal in the data given =  $8 + 10 + 13 + 10 = 41$ . Sales in April = 10. So  $10 \div 41 = 24.4\%$ .*

**Q30** If the average profit made on each PC sold by Quick PC was £62, what was the total profit over the four months for Quick PC?

£3,144      **£3,782**      £3,857      Cannot say

*Total sales by Quick PC over the four months =  $10 + 14 + 18 + 19 = 61$ . So  $61 \times £62 = £3,782$ .*

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