NR1

Mathematics
Support Centre

Title: Numerical Reasoning Test

Target: On completion of this worksheet you should be familiar with numerical reasoning test questions and know how to approach them.

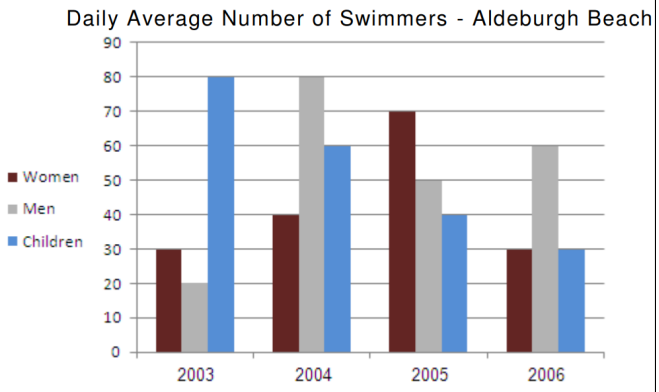
Introduction

Psychometric tests are often used as part of the recruitment process and are a way for employers to assess your intelligence, skills and personality. Recruiters use the results from these tests to determine whether you would be a suitable match for the company to which you are applying. Psychometric tests are divided into three main categories: aptitude, skills and personality tests. The numerical reasoning tests fall under the category of aptitude tests and are used to identify how you analyse numerical data, often via a combination of written and statistical information presented in reports, graphs or charts.

Note: There is not a fixed way of approaching these types of tests considering every one is different with multiple levels of difficulty. You have to practice until you feel confident in solving them.

This worksheet covers a wide variety of example questions with detailed solutions.

Example 1



In which year was the average number of daily swimmers the highest?

a. 2003

b. 2004

c. 2005

d. 2006

Solution

In case you can't see the answer straight away, try to eliminate what seems to not be the answer. In this example, looking at the graph, 2003 and 2004 seem to be smaller than 2004 and 2005 therefore, they can be eliminated. Then you can simply do the calculations to find the highest average between 2004 and 2005.

Complete calculation for the number of swimmers:

2003: $30 + 20 + 80 = 130$

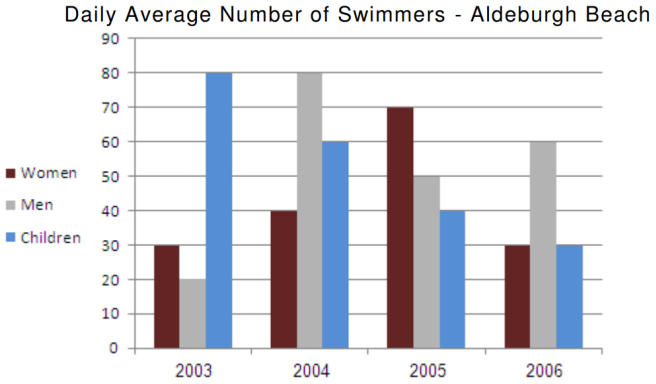
2004: $40 + 80 + 60 = 180$

2005: $70 + 50 + 40 = 160$

2006: $30 + 60 + 30 = 120$

The answer is **b- 2004**.

Example 2



Assuming the children group is 50% boys and 50% girls, how many more males swam at Aldeburgh beach in 2006 than in 2005?

a. 35 b. 45 c. 10 d. 5

Solution

Firstly, identify which data you need from the graph and focus only on the data from 2005 and 2006 for children and men. If the children group is equally distributed between boys and girls, then we can simply divide the amount of children by two and add it to the number of male swimmers in each year.

For 2005:

Number of men=50

Number of boys: 50% out of 40 is 20.

Total male swimmers= 50+20 =70

For 2006:

Number of men=60

Number of boys: 50% out of 30 is 15.

Total male swimmers= 60+15=75

The answer is **d- 5**.

P.T.O.

Example 3

Nutritional Values, Product X

Serving size 1/2 cup (114g). Servings per container: 4		
Calories	90	
Calories from fat	30	
		% Daily Value
Total Fat	3g	5
Saturated fat	0g	0
Cholesterol	0mg	0
Sodium	300mg	13
Total Carbohydrate	13g	4
Dietary fiber	3g	12
Sugars	3g	
Protein	3g	
Vitamin C		60%
Iron		4%

**% Daily values are based on a 2000 calorie diet*

How many calories originated in fat will be consumed when eating 1.5 cups of product X?

a. 120 b. 135 c. 45 d. 90

Solution

The table indicates nutritional values per one serving size of product X which is equivalent to half a cup. Each cup of product X contains 30 calories from fat. Eating 3 cups of product X will result in the consumption of: $30 \times 3 = 90$ calories.
The answer is **d- 90**.

Example 4

Nutritional Values, Product X

Serving size 1/2 cup (114g). Servings per container: 4		
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Total Fat	3g	5
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Sodium	300mg	13
Total Carbohydrate	13g	4
Dietary fiber	3g	12
Sugars	3g	
Protein	3g	
Vitamin C		60%
Iron		4%

**% Daily values are based on a 2000 calorie diet*

How many grams of dietary fibre should a person who follows a 2000 calorie diet consume if he already ate an entire container of product x today?

a. 22 b. 13 c. 19 d. 8

Solution

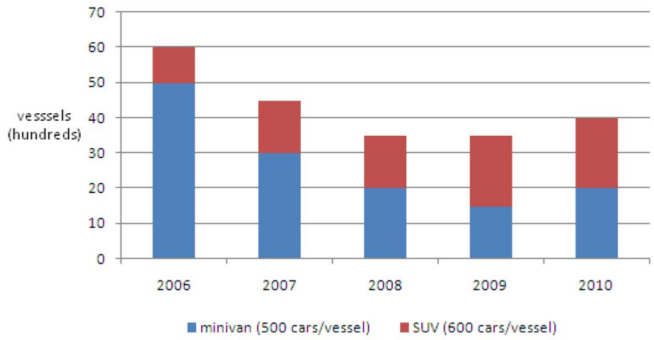
The table indicates nutritional values per one serving of product and not per the whole container which has four servings. One serving contains 3 grams which constitute 12% of the daily amount. A person who eats a whole container consumes $3 \times 4 = 12$ gr. Since 3 gr represents 12% we can calculate what 100% is:

$$\text{full amount} = \frac{3}{12} \times 100 = 25 \text{ gr}$$

He needs to consume $25 - 12 = 13$ gr of dietary fibre.
The answer is **b- 13** grams.

Example 5

European Large Family Car Sales (Delivered by Sea Vessels)



Sea delivery per car (either SUV or minivan) costs $ 25. What were the sea delivery costs for large family cars in 2008?

a. 19 million
b. 42.5 million
c. 45.5 million
d. 47.5 million

Solution:

In 2008, there were $20 \times 100 = 2000$ vessels of minivans. If each vessel had 500 minivans, then $2000 \times 500 = 1,000,000$ is the total number of minivans. There were also $15 \times 100 = 1500$ vessels of SUVs. If each vessel had 600 SUVs, then $1500 \times 600 = 900,000$ is the total number of SUVs.
Adding the two results: $1,000,000 + 900,000 = 1,900,000$ cars sold in total. Calculate the delivery: $1,900,000 \times 25 = 47,500,000$ total delivery costs in 2008.
The answer is **d- 47.5 million**.

Example 6

Natural Resources Market Annum Statistics

Products	No. of employees (thousands)	Value of extracted produce (millions)	Market value (millions)	
			Asia	U.S.A
oil	2,572	$7,568	$487	$1,574
copper	1,235	$3,587	$831	$928
coal	957	$3,456	$728	$1,375
uranium	1,542	$6,875	$427	$3,208
silver	1,012	$3,500	$700	$1,789

On average, how much market value in Asia would a Uranium employee create per week (52 weeks a year)?

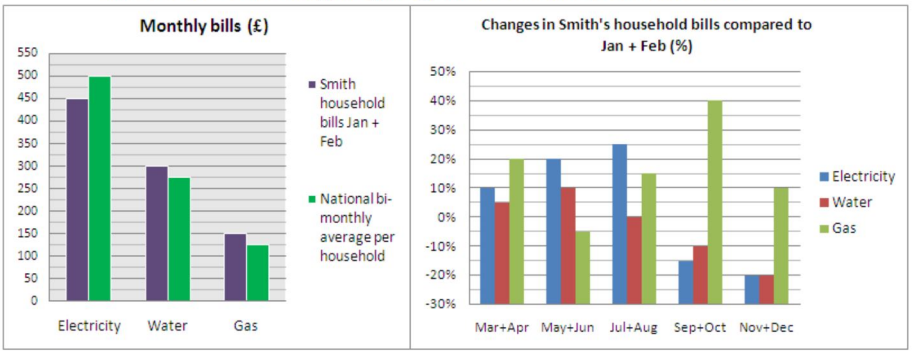
a. $5.3 b. $5.5 c. $5.7 d. $5.9

Solution

The market value of Uranium in Asia is $427,000,000. This sum is divided by the number of employees to find the market value per employee per annum: $\frac{427,000,000}{1,542,000} = 276.91$.
The question refers to a week therefore, we divide the calculated sum (representing a year) by 52: $\frac{276.91}{52} = 5.3$.
The answer is **a- $5.3**.

Example 7

The Smiths are investigating irregularities in their household bills:



How many bi-monthly electricity bills of Smith household are higher than the national average?

a. 1 b. 2 c. 3 d. 4

Solution

The national average of a bi-monthly electricity bill is 500 and The Smiths' bi-monthly electricity bill of Jan+Feb was 450 (LHS chart).

The chart on the RHS informs us about changes of the bi-monthly electricity bill relative to the Smiths' Jan+Feb bill. Therefore, not every increase necessarily represents a higher payment than the national average.

Note that the bills of Sep+Oct and Nov+Dec were lower than that of Jan+Feb. Therefore, cannot be higher than the national average, given that Jan+Feb's were already lower than the national average. Therefore, they can be eliminated from the start.

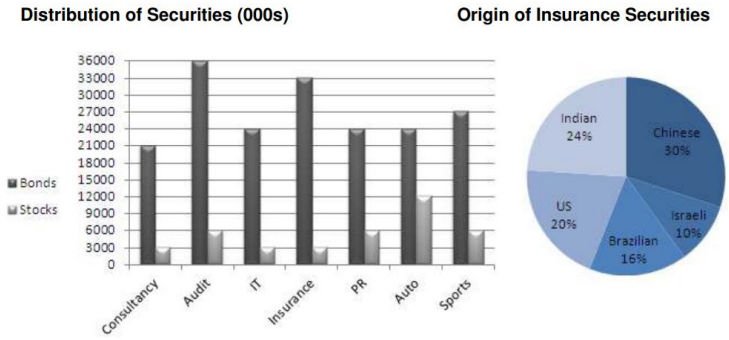
The electricity bill of Mar+Apr was 10% higher than that of Jan+Feb: 110% of 450 is 495 which is less than 500 and this is not higher than the national average.

The electricity bill of May+Jun was 20% higher than that of Jan+Feb: 120% of 450 is 540 which is more than 500 and this is higher than the national average.

The electricity bill of Jul+Aug was 25% higher than that of Jan+Feb. It is a higher figure than the previous bi-monthly bill therefore, we already know it is higher than the national average without calculating the sum.

The answer is **c- 2**.

Example 8



If the number of Chinese Insurance stocks represented 3.5% of all Insurance securities, approximately how many Insurance bonds were Chinese?

a. 9,200,000 b. 9,500,000 c. 10,800,000 d. 1,080,000 e. 910,000

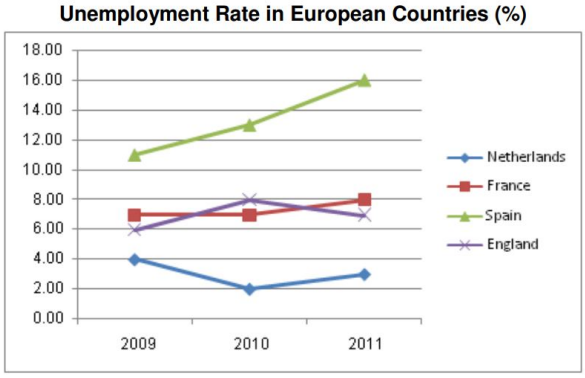
Solution

Chinese Insurance Stocks comprise 3.5% of all Insurance securities, which leaves 26.5% of Chinese bonds.

The total number of Insurance securities is: 33,000,000+3,000,000= 36,000,000. Now we only need to calculate 26.5% of 36,000,000: $36,000,000 \times 0.265 = 9,540,000$ which is approximately 9,500,000.

The answer is **b- 9,500,000**.

Example 9



In 2009, there were 667,284 unemployed in Netherlands, whose population was 27.53% of the UK for that year. With a fixed annual population increase of 0.639%, approximately how many unemployed are in the UK in 2011?

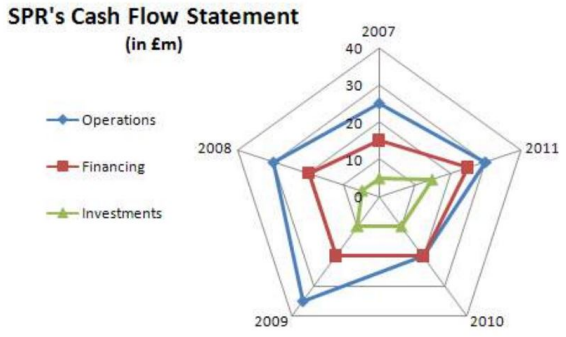
a. 6,987,322 b. 4,801,138 c. 8,511,287 d. 4,296,108 e. 6,895,245

Solution

While unemployment rates are measured in proportion to the labour force and not the entire population, you must answer according to the data you are given. Calculating the total population of Netherland in 2009: $\frac{667,284}{0.04} = 16,682,100$. Therefore, we can calculate the UK population 2009: $\frac{16,682,100}{0.2753} = 60,596,077$. Calculating the UK population in 2011 knowing there is a 2 year gap between 2009 and 2011: $60,596,077 \times (1+0.00639)^2 = 61,372,968$. Calculating the number of UK unemployed people in 2011 by analysing the graph: $61,372,968 \times 0.07 = 4,296,108$.

The answer is **e- 4,296,108**.

Example 10



*Cash Flow from investments = Proceeds from sales + Dividends earned

If the value of the companys cash flow from operations decreased by 2.7% in 2012, and 63% of their total cash flow was from operations, what would be the total balance of the company, in millions?

a. 30.89 b. 41.37 c. 45.2 d. 47 e. 66.33

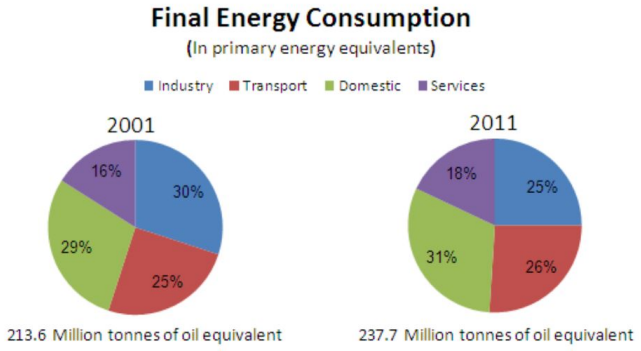
Solution

In order to solve this question we must first find the value of cash flow from operations in 2011 where it was 30 million. We then calculate a 2.7% decrease: $30 \times (1 - 0.027) = 29.19$ which represents 29.19 millions.

We can now find the total balance using the percentage given in the second part of the question: $\frac{29.19}{0.63} = 46.33$.

The answer is **e- 46.33**.

Example 11



*Figures taken from the UK national archives.

Approximately, what is the percentage growth in final energy consumption for the domestic sector in million tonnes of oil equivalent?

a. 2 b. 18.96 c. 20.88 d. 23.81 e. 2.08

Solution

We must first find the amount of oil equivalent used by the domestic sector in each year.

In 2001: $213.6 \times 0.29 = 61.94$ million tons

In 2011: $237.7 \times 0.31 = 73.69$ million tons

The percentage growth rate would be: $\frac{73.69}{61.94} - 1 = 0.18957$. Multiply by 100 to get the percentage which is 18.96%.

The answer is **b- 18.96**.