

## SESSION 10: PERCENTAGE IN CONTEXT

### Key Concepts

In this session we will focus on:

- Calculating percentages in the context of taxation
- How to calculate VAT
- Calculating personal income tax from a salary slip
- Working with tables and graphs to calculate and interpret percentages

### X-planation

### PERCENTAGES

#### Definition

A percentage is a portion of a whole where the whole is one hundred. Every percentage is then a fraction out of 100 (the whole). It is for this reason that we write a percentage as a fraction with a denominator of 100.

Example: 40% is shorthand for  $\frac{40}{100}$  or 0,40

Percentage has been adopted quite comfortably into day to day language because:

- People find it easier to visualise / comprehend percentage than actual amounts. For example one would have a better sense of how popular a candidate was if you heard “Karen got 70% of the votes” compared with “Karen got 4 389 of the 6 270 votes cast”.
- It makes comparisons easier. For example, people find it easier to make sense of the statement: “37,5% of the population got ill this year in comparison with 44,4% last year” than they would the statement: “ $\frac{3}{8}$  of the population got ill this year in comparison with  $\frac{4}{9}$  last year”

Below are five different types of questions you may be asked when dealing with percentage.

- a) If given an amount, to find out how much of the total the amount is in %:
- i) Thandi gets 20 out of 25 for her test. How much is the percentage of the total?  
$$\frac{20}{25} \times \frac{100}{1} = 80\%$$
- ii) Work out the percentage of  $\frac{2}{5}$

This will be  $2 \div 5 = 0.4 \times 100 = 40\%$

b) If given the percentage, to find out the new total:

i) An article cost R15 and VAT is 5%.

We would work out the amount due as follows:

$$R15 \times 5\% = 0,75$$

$$R15 + 0,75 = R15,75$$

or

$$R15 \times 105\% = R15,75$$

$$(100\% + 5\%)$$

ii) I exchange R1 250 in foreign exchange and then pay a 12% commission fee. How much in total do I pay to the cashier?

$$R1\ 250 \times 12\% = R150$$

$$R1\ 250 + R150 = R1\ 400$$

or

$$R1\ 250 \times 112\% = R1\ 400$$

$$(100\% + 12\%)$$

iii) The butcher increased all his prices by 8%. If mince was R21,99 per kg, what would you pay now for 1 kg?

$$R21,99 \times 8\% = R1,76$$

$$R21,99 + R1,76 = R23,75$$

or

$$R21,99 \times 108\% = R23,75$$

$$(100\% + 8\%)$$

c) If given the new amount, to find out the original amount:

i) If the price of an article after 5% VAT is added is R15,75, what is the cost excluding VAT?

$$R15,75 \div 105\% = R15$$

ii) If I had R1 400 and went to exchange money but had to pay 12% commission, how much money could I exchange?

$$R1400 \div 112\% = R1\ 250$$

iii) After a drastic price increase of 8%, I pay R23,75 for 1kg mince. How much did the mince cost before?

$$R23,75 \div 108\% = R21,99$$

d) If given two amounts, to find the % increase or decrease:

$$\frac{\text{New amount} - \text{initial amount}}{\text{Initial Amount}} \times \frac{100}{1}$$

- e) If given the percentage, to convert into a common fraction:

Convert 25% to a common fraction.  
Key 25 into calculator and  $\div 100 = \frac{1}{4}$

### X-ample Questions

#### Question 1

Since the government requires revenue on an ongoing basis, employers must subtract PAYE (Pay-as-you-earn) from their employees' salaries and pay it over to SARS (the South African Revenue Service) every month.

Patsy Smith works in the sales department of United Industries and received a gross salary of R10 560,00 per month during the 2006/7 tax year. Every month PAYE, and contributions to the pension fund, medical aid and Unemployment Insurance Fund are deducted from her salary. TABLE 1 shows one of her monthly payslips for the tax year 2006/7.

Patsy needed to calculate her tax liability and to check whether the PAYE tax that was subtracted from her salary, was sufficient for the 2006/7 tax year.

**TABLE 1: Patsy Smith's Payslip for December 2007**

|                                     |                                     |                                   |                               |                      |
|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|----------------------|
| UNITED INDUSTRIES                   | PAY DATE:<br>24-DEC-07              | NAME:<br>Patsy Smith              | STAFF NUMBER:<br>099-0045     | DEPARTMENT:<br>Sales |
| IDENTITY NUMBER:<br>691112-xxxx-xxx | BIRTH DATE:<br>12-11-1969           | JOB TITLE:<br>Sales Person        | TAX REFERENCE NUMBER:<br>xxxx |                      |
| MARITAL STATUS:<br>Single           | BANK ACCOUNT NUMBER:<br>963 246 987 |                                   | BANK:<br>BCTB                 |                      |
| <b>SALARY</b>                       | <b>AMOUNT</b>                       | <b>DEDUCTIONS</b>                 | <b>AMOUNT</b>                 |                      |
| Basic salary                        | R10 560,00                          | Pay-as-you-earn (PAYE)            | R1 918,77                     |                      |
| Bonus                               | R10 560,00                          | Pay-as-you-earn (PAYE)            | R1 918,77                     |                      |
|                                     |                                     | Pension (7,5% of monthly salary)  | R792,00                       |                      |
|                                     |                                     | Medical aid contribution          | R495,00                       |                      |
|                                     |                                     | Unemployment Insurance Fund (UIF) | R21,12                        |                      |
| <b>GROSS SALARY</b>                 | <b>R21 120,00</b>                   | <b>TOTAL DEDUCTIONS</b>           | <b>R5 145,66</b>              |                      |
| <b>NETT PAY DUE:</b>                |                                     |                                   | <b>R15 974,34</b>             |                      |

- a) In December each year Patsy receives a bonus of a non-pensionable 13<sup>th</sup> cheque. Only tax is subtracted from the 13<sup>th</sup> cheque. Calculate her gross ANNUAL salary (including her bonus). (4)

b) During the 2006/7 tax year Patsy had an amount of R150 000 invested in a South African money-market account at an interest rate of 7,2% compounded half-yearly.

i) Calculate the interest she received during the 2006/7 tax year using the formula:

$$A = P (1 + i)^n ; \text{ Interest} = A - P \quad (6)$$

ii) A tax exemption is allowed on interest earned on investments in a South African bank. This means that the tax payer is allowed to subtract a given amount from their interest earned, and only pays tax on the remaining portion.

Tax exemption:

- For individuals younger than 65 years of age: R16 500
- For individuals 65 years of age and older: R24 500

Write down the amount on which Patsy must pay tax. (1)

c) Write down the total income received on which she must pay tax. (1)

d) Before the final tax payable is calculated, all pension fund contributions and all medical aid contributions that are less than R500 per month, are subtracted from the income received. As Patsy pays R495,00 per month for medical aid, she is able to subtract her full contribution before her final tax is calculated. Calculate the following:

- i) Patsy's annual medical aid contributions. (2)
- ii) Patsy's annual pension fund contributions. (2)
- iii) Her total medical aid and pension fund contributions. (1)
- iv) Patsy's taxable income. (2)

e) South Africa has a Progressive Income Tax System. This means that the more one earns, the more tax one pays. TABLE 2 shows the tax rates for the 2006/7 tax year.

TABLE 2: Tax rates for the year of assessment ending 28 February 2007  
(2006/7 year of assessment)

| TAXABLE INCOME      | RATES OF TAX                                |
|---------------------|---|
| R0 – R100 000       | 18% of each R1                              |
| R100 001 – R160 000 | R18 000 + 25% of the amount above R100 000  |
| R160 001 – R220 000 | R33 000 + 30% of the amount above R160 000  |
| R220 001 – R300 000 | R51 000 + 35% of the amount above R220 000  |
| R300 001 – R400 000 | R79 000 + 38% of the amount above R300 000  |
| R400 001 and above  | R117 000 + 40% of the amount above R400 000 |

Calculate the following:

- i) The total tax payable on Patsy's taxable income. (4)
  - ii) Her annual PAYE deductions. (2)
- f) Was sufficient PAYE tax deducted from Patsy's gross salary during the 2006/7 tax year to cover the total tax payable? Give a reason for your answer. (2)

### Question 2

In February 2007, a large scale community survey was conducted in all nine provinces in South Africa. The table below shows the results of the survey, showing the number of people using electricity for lighting and having access to tap water in each province and in South Africa.

**Access to electricity and tap water in South Africa**

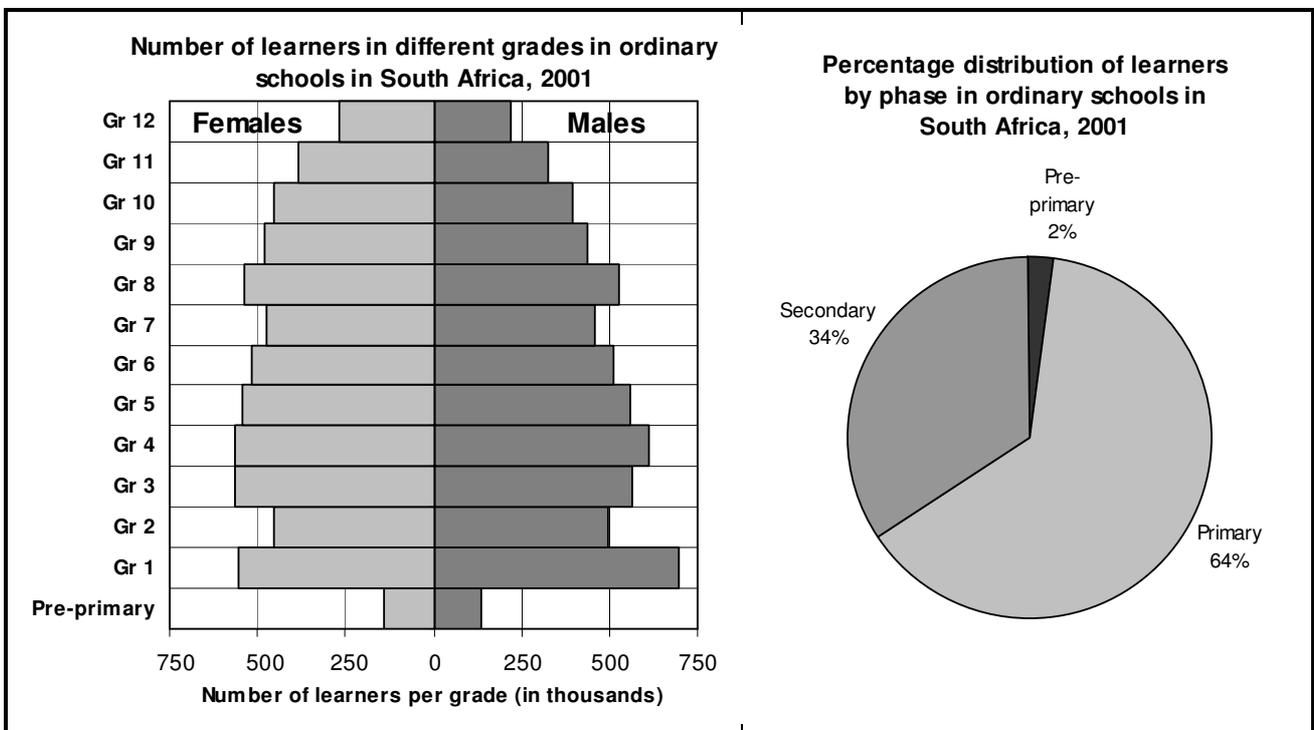
| PROVINCE            | Total population  | Number of people using electricity for lighting | % using electricity for lighting | Number of people having access to piped water | % having access to piped water |
|---------------------|-------------------|---|----------------------------------|---|--------------------------------|
| Free State          | 2 773 059         | 2 401 469                                       | 86,6                             | 2 703 733                                     | 97,5                           |
| Gauteng             | 10 451 713        | C   | 83,5                             | 10 232 227                                    | 97,9                           |
| Northern Cape       | 1 058 060         | 923 686   | 87,3                             | 1 003 041                                     | 94,8                           |
| Eastern Cape        | 6 527 747         | 4 275 674                                       | 65,5                             | 4 595 534                                     | 70,4                           |
| North West          | 3 271 948         | 2 692 813                                       | 82,3                             | 2 941 481                                     | 89,9                           |
| KwaZulu-Natal       | 10 259 230        | 7 335 349                                       | 71,5                             | 8 145 829                                     | D                              |
| Limpopo             | 5 238 286         | 4 243 012                                       | 81,0                             | 4 379 207                                     | 83,6                           |
| Mpumalanga          | 3 643 435         | 2 976 686                                       | 81,7                             | 3 345 526                                     | 91,3                           |
| Western Cape        | 5 278 585         | 4 993 541                                       | 94,6                             | 5 215 242                                     | 98,8                           |
| <b>SOUTH AFRICA</b> | <b>48 502 063</b> | <b>38 569 410</b>                               | <b>B</b>                         | <b>A</b>                                      | <b>87,8</b>                    |

- a) What does the missing value of C in the table represent? (2)
- b) Calculate the following missing values. (Give each answer rounded off to the nearest unit.)

- i) A (2)
  - ii) B (3)
  - iii) C (3)
  - iv) D (3)
- c) In which province is both the percentage use of electricity for lighting as well as the percentage access to tap water the smallest? (2)

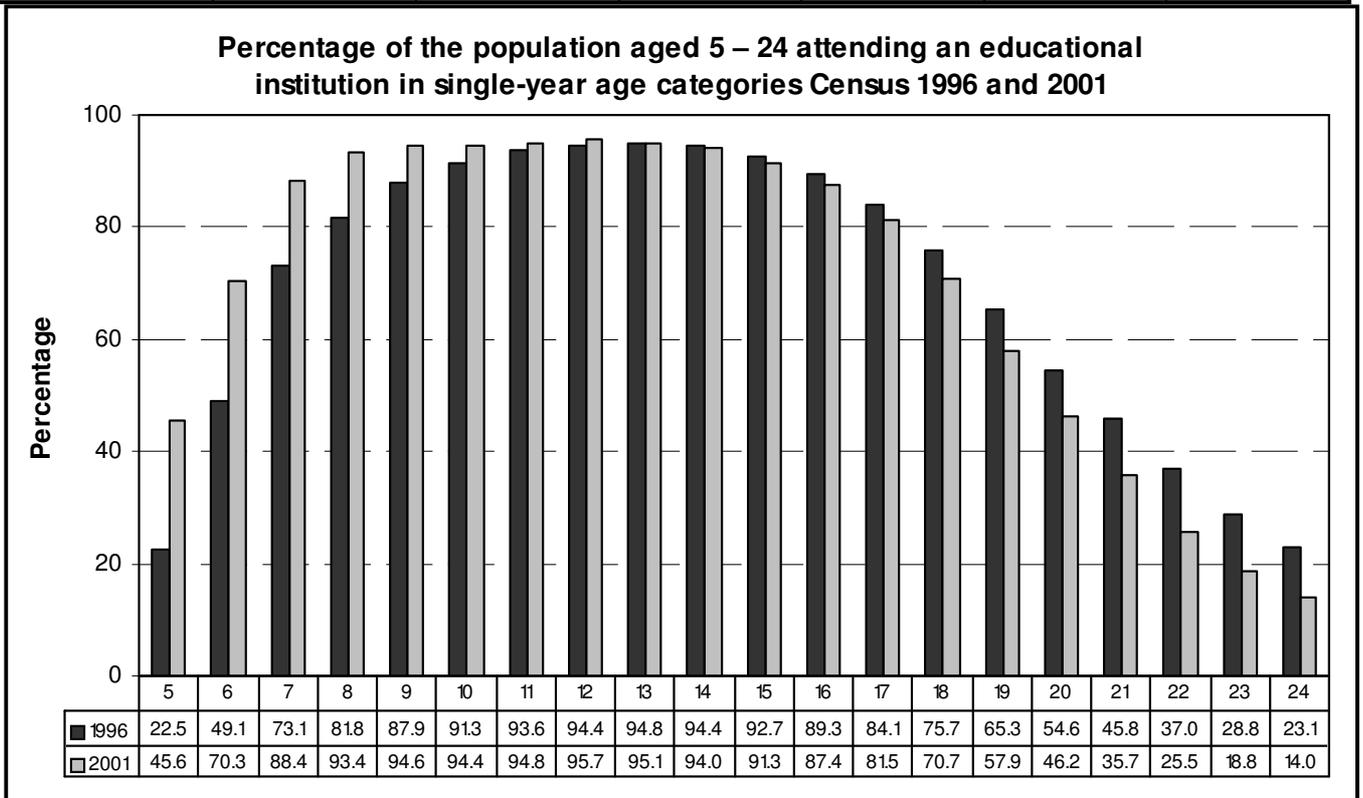
**X-ercises**

The charts and table below show some information that was collected in 2001 about the numbers of learners and non-learners in South Africa in 2001. Study these carefully and then answer the questions that follow.



| Learners and non-learners in the age group 14–18 years old in the provinces of South Africa, 2001 |   |   |   |                            |                                 |                                     |
|---|---|---|---|----------------------------|---------------------------------|-------------------------------------|
| Province  | Total number of 14–18 year olds in South Africa | Number attending an educational institution | Number not attending an educational institution | Unknown educational status | % at an educational institution | % not at an educational institution |
| Eastern Cape  | 752 496   | 657 156                                     | 90 944  | 4 396                      | 87,3                            | 12,1                                |
| Free State  | 273 722   | 247 195                                     | 25 487  | 1 040                      | 90,3                            | 9,3                                 |

|                    |           |           |         |        |      |      |
|--------------------|-----------|-----------|---------|--------|------|------|
| Gauteng            | 560 493   | 495 055   | 59 022  | 6 416  | 88,3 | 10,5 |
| KwaZulu-Natal      | 919 156   | 778 631   | 132 790 | 7 735  | 84,7 | 14,4 |
| Limpopo            |           | 555 223   | 54 556  | 5 179  | 90,3 | 8,9  |
| Mpumalanga         | 303 390   | 268 083   | 33 268  | 2 039  | 88,4 | 11,0 |
| Northern Cape      | 82 879    | 65 060    | 17 320  | 499    | 78,5 | 20,9 |
| North West         | 353 593   | 302 348   | 49 343  | 1 902  | 85,5 | 14,0 |
| Western Cape       | 332 105   | 274 127   | 54 845  | 3 133  | 82,5 | 16,5 |
| Total South Africa | 4 192 792 | 3 642 878 | 517 575 | 32 339 | (a)  | (b)  |



- (a) What percentage of learners in South Africa in 2001 was in primary schools? (1)
- (b) Were there more males than females in primary schools (Grades 1 to 7) in South Africa in 2001? Explain how you can see this from the chart. (2)
- (c) Write a sentence that explains the meaning of the number 87,3 at the top of the 6th column in the table. (2)
- (d) The first column for Limpopo has not been filled in. Provide the correct value that should be in the column. (2)
- (e) Now calculate the numbers that should be in the spaces labelled (a) and (b) at the bottom of the ‘% at an educational institution’ and ‘% not at an educational institution’ columns. (4)
- (f) Which province has the greatest number of children who should be at

- secondary school but who are not attending school? (2)
- (g) Which province has to cater for the greatest number of learners in the secondary phase? (2)
- (h) With regard to every child being entitled to an education, in which way has the situation:
- i) improved from 1996 to 2001 (2)
  - ii) deteriorated from 1996 to 2001 (2)