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Support Pack | Grade 12

CAPS

Mathematical Literacy

Basic skills: revision

This revision pack for **Mathematical Literacy Grade 12** provides valuable support for the Basic Skills section of the CAPS Curriculum to help learners with exam preparation. These basic skills are required to work out problems in other sections of the Curriculum, and should therefore be revised before studying other topics. A set of 50 revision questions and their answers is also provided.

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Basic skills: revision

This revision deals with ratio, rate, percentages, scientific notation, estimations and rounding off. This material was covered in Grade 10 and revised in Grade 11. You will often need this material when working on other Mathematics problems.

Ratio and rate

- We use ratios to compare the sizes of two or more quantities in the same units.
- Ratios can also be written as common fractions. Example: you can write 4 : 6 as $\frac{4}{6}$. When you write a ratio with a colon (:), you do not include units of measure and the units for the quantities must be the same. So, we write a ratio of 5 ml to 250 ml as 5 : 250.
- When using rates, we compare two quantities of different units. The word *per* is often used when describing rate. It means for every or for each. We often use a slash in the place of the word *per*. Examples: rand per hour (R/h), metres per second (m/s) and kilometres per hour (km/h).
- Rate is often calculated as a percentage. Example: $12\% = \frac{12}{100}$

Percentages

- A percentage is a way of expressing a value out of 100.

Example: $\frac{68}{100}$ or $0,68 = 68\%$.

To calculate the percentage 11,5 out of 35 represents:

$$\frac{11,5}{35} \times 100 = 32,9\%$$

- You will find examples of percentage increase or decrease regularly in everyday life. For example, items for sale are usually marked down by a certain percentage. You can use the percentage key on a calculator to calculate percentage increase or percentage decrease. Or, if you do not have a calculator handy, use the following formulae:
 - Discount of a regular priced item = $\frac{\text{discount amount}}{\text{regular price}} \times 100$
 - Discounted price = retail price $\times (1 - \text{discount percentage})$
 - Retail price = cost price $\times (1 + \text{mark-up percentage})$

Rounding off

- Always keep common sense and logic in mind when rounding off values.
- To round off to:
 - one decimal place: Look at the digit in the second decimal place. If this digit is greater than 5, increase the first decimal value by 1. If the second decimal digit is less than 5, the first digit remains the same.
 - two decimal places: Look at the third decimal place and apply the principle that you apply for rounding off to one decimal place.

Examples:

$$3,348 \approx 3,3 \text{ (rounded off to one decimal place)}$$

$$3,348 \approx 3,35 \text{ (rounded off to two decimal places)}$$

$$3,358 \approx 3,4 \text{ (rounded off to one decimal place)}$$

$$3,358 \approx 3,36 \text{ (rounded off to two decimal places)}$$

Scientific notation

- A number in scientific notation has only *one digit* (not zero) *before* the decimal comma.
- You can use your calculator for calculations in scientific notation.
- Use the **EXP** key or, on the latest calculators, the **×10^x** key for calculations in scientific notation.
- To convert numbers in scientific notation to standard notation (examples):
 $1,874 \times 10^6$: key in: 1,874 **EXP** 6 {=} 1 874 000
 $8,492 \times 10^{-3}$: key in: 8,492 **EXP** -3 {=} 0,008492
- To multiply, divide, subtract or add numbers in scientific notation (examples):
 $1,02 \times 10^4 + 2,6 \times 10^3$: key in: 1,02 **EXP** 4 {+} 2,6 **EXP** 3 {=} $1,28 \times 10^4$
 $1,5 \times 10^{-2} \div 2,0 \times 10^3$: key in: 1,5 **EXP** -2 {+} 2,0 **EXP** 3 {=} $7,5 \times 10^{-6}$

Exponents (indices)

- An exponent (or index) is a positive number that indicates how many times the first number must be multiplied by itself.
Example: $4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1\,024$
- Exponential growth indicates that the rate of change is always increasing.
- An exponential graph shows the relationship between variables that involves an expression in which one of the variables is written as an exponent (index).
Exponents can be used to calculate growth in a population:
$$P_{\text{new}} = P_i \times \left(\frac{100 + \text{population growth } r}{100} \right)^n$$
where,
 P_{new} = the new population
 P_i = the start population
population growth r = the population growth rate as a percentage increases in a period
 n = the number of years
- To calculate increase in growth as a percentage:
percentage increase = $\frac{\text{difference between two values}}{\text{original value}} \times 100$.

Changing the subject of a formula

It is often necessary to change the subject of a formula.

- To calculate the area of a triangle use the formula:
Area of triangle = $\frac{1}{2}$ base \times perpendicular (\perp) height

But if the area of the triangle is given and the perpendicular height is unknown, change the subject of the formula:

$$\text{Area of triangle} = \frac{1}{2} \text{ base} \times \perp \text{ height}$$

$$A = \frac{\text{base} \times \perp \text{ height}}{2} \quad (\text{Multiply both sides by 2.})$$

$$2A = \text{base} \times \perp \text{ height} \quad (\text{Divide both sides by the base.})$$

$$\frac{2A}{\text{base}} = \perp \text{ height} \quad (\text{The height is the subject of the formula.})$$

- To calculate the volume of a cube, use the formula $V = \text{length}^3$, but if the volume of a cube is given and you need to calculate the length of the side, you need to make length the subject of the formula:

$$V_{\text{cube}} = l^3 \quad (\text{Find the cube root of both sides.})$$

$$\sqrt[3]{V} = \sqrt[3]{l^3}$$

$$\sqrt[3]{V} = \text{length of side}$$

Remember!

- Use brackets when you substitute values into any formula.
- Use the correct order of procedures when you use your calculator.

- To calculate the area of a square, use the formula $A = \text{length}^2$, but if the area of a square is given and you need to calculate the length of the side, you must make length the subject of the formula.

$$A_{\text{square}} = l^2 \quad (\text{Find the square root of both sides.})$$

$$\sqrt{A} = \sqrt{l^2}$$

$$\sqrt{A} = \text{length of side}$$

Worked examples

1. Carlos finds the information below on a 125-g packet of potato chips.

Nutrition information		
Nutrients	Per 100 g	Per 30 g
Energy	2 178 kJ	653 kJ
Proteins	7,4 g	2,2 g
Carbohydrates	45,0 g	13,5 g
Sugars	0,7 g	0,2 g
Fats	35,0 g	10,5 g
Dietary fibre	4,0 g	1,2 g
Sodium	0,7 g	0,2 g

- a) What ratio of fats to carbohydrates will Carlos consume when he eats the potato chips? Give your answer in its simplest form.
- b) Calculate his nutrient intake if Carlos eats the whole 125-g packet of potato chips.
- c) The recommended daily nutrient intake for an 18-year-old girl with height 161 cm and mass of 54 kg is given as 2 100 calories. If an 18-year-old girl eats the whole 125-g packet of potato chips, what percentage of her recommended daily energy allowance has she consumed?

2. The price of an umbrella that sells for R198,79 is reduced by 14% at a sale. Calculate the sale price of the umbrella.
3. Altogether 45 000 candidates are writing the final Grade 12 examinations. If each learner uses a minimum of seven pieces of paper for each of his or her seven subjects, how many pieces of paper will all the candidates use in total for the final Grade 12 examinations? Give your answer in scientific notation, rounded off to two decimal places.
4. During a gymnastics competition, the judges use the formula $S = 0,6DT$ to calculate the score of a particular event, where S = score, D = degree of difficulty and T = total score of judges.
 - a) Calculate the score of a competitor who executed an event with a degree of difficulty of 2,5 and for which the total score of the judges was 36,9.
 - b) What was the degree of difficulty if the score was 85,5 and the total score of the judges was 38,5? Give your answer correct to one decimal place.
 - c) What was the total score of the judges if the degree of difficulty was 2,5 and the score obtained was 29,5? Give your answer correct to one decimal place.
5. A remote rural settlement receives a drum containing 600 litres of water to share amongst 36 people living in the settlement. If the water is shared equally, how many litres of water will each person receive?

Note

1 calorie = 4,186 kJ

Answers

1. a) Fat : carbohydrate
 $= 35 : 45$
 $= 7 : 9$
- b) The nutrients on the packet are given per 100 g of potato chips. So you need to calculate the nutrients for 25 g potato chips and then add the two quantities.
 $100 \div 4 = 25$
 Calculate $\frac{1}{4}$ of each nutrient.

Nutrients	Per 100 g	Per 25 g	Per 125 g
Energy	2 178 kJ	544,5 kJ	2 722,5 kJ
Proteins	7,4 g	1,85 g	9,25 g
Carbohydrates	45,0 g	11,25 g	56,25 g
Sugars	0,7 g	0,175 g	0,875 g
Fats	35,0 g	8,75 g	43,75 g
Dietary fibre	4,0 g	1,0 g	5,0 g
Sodium	0,7 g	0,175 g	0,875 g

- c) First convert 2 100 calories to kilojoules.
 $2\ 100\ \text{calories} = 4,186 \times 2\ 100 = 8\ 790,6\ \text{kJ}$

$$\frac{x}{100} \text{ of } 8\ 790,6 = 2\ 722,5$$

$$x = \frac{2\ 722,5 \times 100}{8\ 790,6}$$

$$x = 30,97$$

By eating the 125-g packet of potato chips, she has consumed 31% of her recommended daily energy intake.

2. Two methods you can use for the calculation are shown below.

Method 1

Calculate 14% of the price:

$$198,79 \times \frac{14}{100} = 27,83$$

Subtract R27,83 from the original price:

$$R198,79 - R27,83 = R170,96$$

Method 2

Let the original price represent 100%.

$100\% - 14\% = 86\%$ of the original price:

$$198,79 \times \frac{86}{100} = R170,96$$

3. $7\ \text{pages} \times 7\ \text{subjects} = 49$
 $45\ 000 \times 49 = 2\ 205\ 000$
 $= 2,21 \times 10^6\ \text{pages}$

4. a) $S = 0,6DT$
 $= 0,6(2,5)(36,9)$
 $= 55,35$
- b) $S = 0,6DT$
 $85,5 = 0,6(D)(38,5)$
 $85,5 = 23,1D$
 $\frac{85,5}{23,1} = D$
 $3,7 = D$
- c) $S = 0,6DT$
 $29,5 = 0,6(2,5)T$
 $29,5 = 1,5T$
 $\frac{29,5}{1,5} = T$
 $19,7 = T$

5. $\frac{600}{36} = 16,666666\dots$

The logical way to round off 16,666666... is to 16 litres per person. There will probably be some spillage when the water is distributed.

$$16 \times 36 = 576\ \ell$$

An amount of approximately 24 litres has been allowed for spillage.