



Mathematics 2 – Grade 9

Welcome to your Conquesta Olympiad. When you have decided which of the answers is correct, scratch out the letter in the matching square on your answer sheet. Example:- If the answer to question 4 is c, then scratch out the letter c in the square containing c next to the number 4 (see example 1 below). If you've made a mistake and b should have been the answer, neatly cross out the mistake and then scratch out b (see example 2 below).

Example 1:- 4. a b ~~c~~ d

Example 2:- 4. a ~~b~~ ~~c~~ d

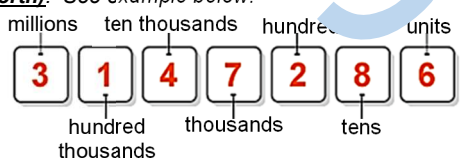
Useful tip:- When you have number sentences using different operations, apply the rule of **BODMAS**, which is the order of operations:- Firstly, calculate whatever is in **Brackets**, then **Other** (of, square roots, power of, etc), then **Division** and **Multiplication** (from left to right as they rank equally), and lastly, **Addition** and **Subtraction** (also from left to right).

Did you know?

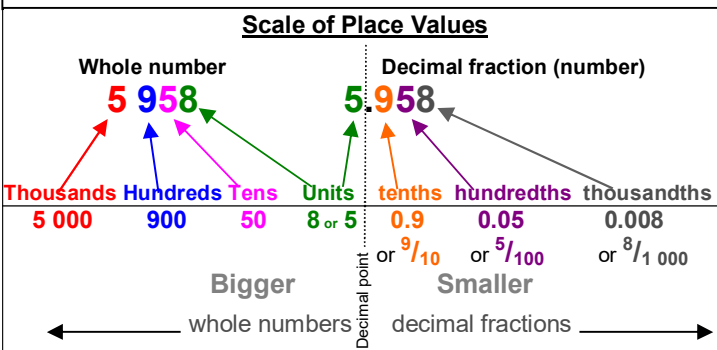
- Factors** are the numbers we can multiply together to get another number. A factor is a number that divides exactly into another whole number, e.g., the factors of 12 are 1, 12, 2, 6, 3, 4 because they all divide exactly into 12.
- A **multiple** is the result of multiplying a number by an integer (not a fraction). $6 \times 2 = 12$, so 12 is a multiple of 6 and a multiple of 2.
- Squared numbers** are numbers multiplied by themselves, e.g., $4 \times 4 = 16$, also be written as '4 to the power of 2', '4 to the second power' or simply '4 squared'. E.g., $4^2 = 16$, so 4 squared is 16; and the square root of 16 = 4. The little 2 is called an exponent. The square root symbol is $\sqrt{\quad}$.
- The **exponent** (also called **powers** or **indices**) of a number says how many times to use the number in a multiplication. If the exponent is 1, then the number remains the same, e.g., $9^1 = 9$. If the exponent is 3, then the number is written as, e.g., $9^3 = 9 \times 9 \times 9 = 729$. If the exponent is 0, then you get 1, e.g., $9^0 = 1$. Remember fractions are negative powers. E.g., $(\frac{1}{2})^x = 2^{-x}$.
- Scientific Notation** is a special way of writing numbers. The number is written in two parts, the **digits** (with the decimal point placed after the first digit), followed by **$\times 10$ to a power** that puts the decimal point where it should be. E.g., 700 written as 7×10^2 , because $700 = 7 \times 100$ and $100 = 10 \times 10 = 10^2$. When the number is 10 or greater, the decimal point has to move to the left, and the power of 10 is **positive**. When the number is smaller than 1, the decimal point has to move to the right, the power of 10 is **negative**. E.g., 0,0055 is written $5,5 \times 10^{-3}$.

Number values

- By splitting each number into clusters of 3, you are able to read a number easily. For example, 65432 can be easier to read when written this way: 65 432.
- Remember that each **digit** in a number is important and has its own **value (worth)**. See example below.



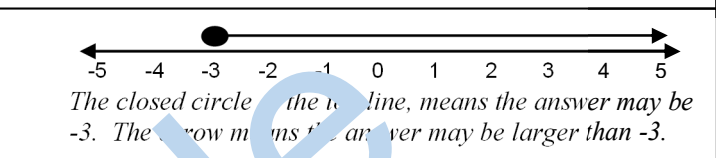
In the above number, the digit 1 is bigger than the digit 8. This is because the **digit 1** is actually **worth 100 000** and the **digit 8** is worth just **80**. You need to learn the place value of numbers so that you can put the digits in their correct places. Look at the chart below, which includes decimal fractions. When adding or subtracting with decimal numbers, **always have the decimal points above one another**.



1. 0,24 written as a fraction in its simplest form is:
(a) $\frac{1}{24}$ (b) $\frac{24}{100}$ (c) $\frac{12}{50}$ (d) $\frac{6}{25}$

1,5; $\sqrt[3]{64}$; $-\frac{0}{4}$; $\frac{22}{11}$

2. Which number in the above set is **not** an integer?
(a) 1,5 (b) $\sqrt[3]{64}$ (c) $-\frac{0}{4}$ (d) $\frac{22}{11}$



3. The inequality (meaning two values are not equal) described above is:
(a) $x > -3$ (b) $x < -3$ (c) $x \geq -3$ (d) $x \leq -3$

4. Apply the calculator that the cost of servicing his car will be R50 per hour for labour, plus R850 for oil and spare parts. He estimates that the job will take $2\frac{1}{2}$ hours to complete.

4. What will the cost of servicing the car be?
(a) R1 300 (b) R2 575 (c) R1 975 (d) R1 030

5. Simplify using the laws of exponents:
 $(2a^2b)^3 \times ab \times 3a^2$
(a) $18a^9b^4$ (b) $24a^9b^4$ (c) $24a^8b^4$ (d) $6a^8b^4$

Russia has a landmass of about 1 637 742 km².

6. What is the landmass if it's written in scientific notation?
(a) $1,6 \times 10^6$ km² (b) 1,6 km²
(c) $1,6 \times 10^{-6}$ km² (d) $1\ 600 \times 10^3$ km²

A farmer must provide her chickens with 200 grams of protein per kilogram of chicken feed.

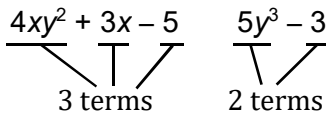


7. What is this as a percentage?
(a) 10% protein per kg. (b) 0,2% protein per kg.
(c) 20% protein per kg. (d) 2% protein per kg.

8. Calculate:
 $9,6 \times 10^{-4} + 1,2 \times 10^{-2}$
(a) 0,01296 (b) 0,1296 (c) 0,0216 (d) 0,0108

Did you know?

- An **equation** says that two things are equal. It will have an equal sign "=", so an equation is like a **statement**, "this equals that". E.g., $x + 2 = 6$. This example says: **what is on the left, $(x + 2)$ is equal to what is on the right (6).**
- A **formula** is a fact or rule that uses mathematical symbols. It will usually have an equal sign (=), and two or more **variables** ($x, y,$ etc) that stand in for values we don't know yet. It shows us how things are related to each other. E.g., $x = 2y - 7$ (relating x and y), and $a^2 + b^2 = c^2$ (relating a, b and c).
- **Directly Proportional:** as one amount **increases**, another amount **increases at the same rate**. \propto is the symbol for **directly proportional**. (Don't confuse it with the symbol for infinity ∞).
- **Inversely Proportional:** when one value **decreases** at the same rate that the other **increases**.
- **Polynomial** comes from poly- (meaning 'many') and -nomial (in this case meaning 'term') ... so it says many terms.
- A **binomial** is a polynomial with two terms.



9. Multiply the binomials below:

$$(3x^3 + 4xy)(5x^3 - 6xy)$$

- (a) $15x^9 - 24x^2y^2$ (b) $15x^6 - 2x^4y - 24x^2y^2$
 (c) $15x^6 - 24x^2y^2$ (d) $15x^6 + 2x^4y - 24x^2y^2$

A bride and groom agree to share the cost of their wedding in proportion to the number of guests each one invites to the wedding. The bride has 32 guests and the groom has 54. The total cost of the wedding was R129 000.



10. How much did the bride contribute?

- (a) R81 000 (b) R52 500 (c) R52 000 (d) R76 444

A square has the same area as a rectangle which has a length of 12 cm, and a breadth of 3 cm.

11. Calculate the sides of the square.

- (a) 12 cm (b) 6,5 cm (c) 6 cm (d) 36 cm

$$y = 3(x + 1)$$

12. If $x = 3$, what is the value of y ?

- (a) 13 (b) 48 (c) 30 (d) 144

$$\sqrt[3]{125}; \frac{35}{5}; 6\frac{1}{2}; (2,5)^2$$

13. Arrange the above numbers in ascending order. (Convert all to decimals first.)

- (a) $\sqrt[3]{125}; 6\frac{1}{2}; (2,5)^2; \frac{35}{5}$
 (b) $\frac{35}{5}; (2,5)^2; 6\frac{1}{2}; \sqrt[3]{125}$
 (c) $\sqrt[3]{125}; (2,5)^2; 6\frac{1}{2}; \frac{35}{5}$
 (d) $\frac{35}{5}; 6\frac{1}{2}; (2,5)^2; \sqrt[3]{125}$



Mandy has R85 more than Annette. They have R245 altogether.

14. How much money does Mandy have?

- (a) R34,50 (b) R207,50 (c) R165,00 (d) R80,00

15. Give the following with positive exponents:

$$\sqrt{4x^{-16}y^2}$$

- (a) $\frac{2y}{x^4}$ (b) $\frac{1}{2x^8y}$ (c) $\frac{2y}{x^8}$ (d) $\frac{2}{x^8y}$

Thuli buys a fruit combo at the vegetable shop for R50. She also buys 0,75 kg of cheese at R80 per kilogram. The fruit is Vat free, and the cheese has 15% Vat added to it.



16. What did Thuli pay in total?

- (a) R126,50 (b) R117,50 (c) R125,00 (d) R119,00

Dave purchased a house for R650 000. After renting it out for a year, he decided to sell it. The property market experienced a growth of 6% during the year so he sold it for 6% more than he paid for it.

17. How much did Dave sell the property for?

- (a) R689 000 (b) R390 000
 (c) R1 040 000 (d) R650 006

18. Simplify:

$$\frac{(3ab^2)^2(2a^4b)^2}{25a^2b^4}$$

- (a) $\frac{6}{5}a^4b^2$ (b) $\frac{6ba^4}{5}$ (c) $\frac{\sqrt{6}}{5}a^7b^2$ (d) $\frac{6a^3}{5b}$

19. Which one of the following statements is false?

- (a) $3x + 2 = 11 \therefore x = 3$
 (b) $x + 2 = -1 \therefore x = -3$
 (c) $5x - 4 = 1 \therefore x = 1$
 (d) $x - 13 = 10 \therefore x = 3$



Jaya has a photo of her baby that is 105 mm wide and 9 cm high. She wants to enlarge this photo to a width of 35 cm.

20. How high will the enlargement be?

- (a) 300 mm (b) 270 mm (c) 0,27 m (d) 30 mm

Penny runs a successful hairdressing salon. Leah wants to rent a space in Penny's shop to operate a manicure table. She needs 4,5 m² and Penny charges R810 a year for rent.

21. What is the rate per square metre that Leah will be paying each month?

- (a) R67,50 (b) R303,75 (c) R1,25 (d) R15,00

22. Solve for x :

$$3x - 3 = 6(2 - 7x)$$

- (a) $x = 13$ (b) $x = 3$
 (c) $x = \frac{1}{3}$ (d) $x = -\frac{13}{3}$

A mile is 1,623 km. Kathy travels at 50 miles per hour on the highway.

23. What is her equivalent speed in km/h?

- (a) 81,15 km/h (b) 19,47 km/h
 (c) 30,8 km/h (d) 51,23 km/h

