

## Mathematics 2 – Grade 8

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	<del>c</del>	d
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Example 2:- 

4.	a	<del>b</del>	<del>c</del>	d
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**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.
- The **exponent** (or **index** or **power**) of a number says how many times to use the number in a **multiplication**. If the exponent is 3, then the number is written as, e.g.,  $9^3$ . In words, this could be called "9 to the third power", "9 to the power of 3" or simply "9 cubed".  $9 \times 9 \times 9 = 729$ . If the exponent is 0, then you get 1, e.g.,  $9^0 = 1$ . If the exponent is 1, then the number remains the same, e.g.,  $9^1 = 9$ . (**Exponential notation** is writing numbers using exponents.)
- A **Squared number** is the result of a number multiplied by itself, e.g.,  $4 \times 4 = 16$ ; or  $4^2 = 16$  (the little 2 is called an exponent); so 16 is a squared number; 4 squared = 16; and the square root of  $16 = 4$ . The **square root** symbol is  $\sqrt{\quad}$ . The **cubed root** symbol is  $\sqrt[3]{\quad}$ .
- Scientific Notation** is a **special way** of writing numbers. E.g.,  

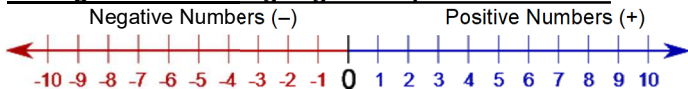
700	→	$7 \times 10^2$
A number	→	In Scientific Notation

 Why is 700 written as  $7 \times 10^2$  in Scientific Notation?  
 →  $700 = 7 \times 100$   
 → and  $100 = 10^2$  (see exponents above)  
 → so  $700 = 7 \times 10^2$
- Both 700 and  $7 \times 10^2$  have the same value, just shown differently.
- Quadrilaterals** are 2D shapes with four sides, e.g., rhombus (diamond, square) and parallelogram.
- A **ratio** compares values. It says how much of one thing there is compared to another and can be scaled. E.g., 3:1 is 6:2.

**Multiplying with negative & positive numbers**

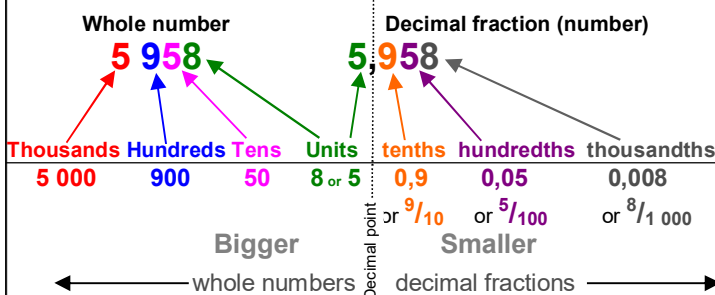
- $+$  x  $+$  (two positives make a positive) = + E.g.  $(+3) \times (+2) = 6$
- $-$  x  $-$  (two negatives make a positive) = + E.g.  $(-3) \times (-2) = 6$
- $-$  x  $+$  (a negative multiplied by a positive makes a negative) = - E.g.  $(-3) \times 2 = -6$
- $+$  x  $-$  (a positive multiplied by a negative makes a negative) = - E.g.  $3 \times (-2) = -6$

**Adding and Subtracting negative & positive numbers**



Adding two positive numbers is simple addition. E.g.  $3 + 2 = 5$ .  
 Subtracting a positive from a negative or adding negative to a positive is subtraction. E.g.  $6 - (+3)$  is the same as  $6 - 3 = 3$ ;  $5 + (-7) = 5 - 7 = -2$ .  
 Subtracting a negative is like adding. E.g.  $14 - (-4) = 14 + 4 = 18$ .

**Scale of Place Values**



1. The highest common factor of 28, 36 and 12 is:  
 (a) 2 (b) 4 (c) 6 (d) 8

2.  $3 \times 12$  written in exponential notation is:  
 (a)  $3^2 \times 2^2$  (b)  $3 \times 2^2$  (c)  $3^2 \times 4^2$  (d)  $3 \times 4^2$

A father has R75 which he wants to share out to his two sons, Mpo and Sazi, in the ratio 3:2.

3. The amount he gives each son is .....

- (a) R37,50 each.
- (b) R45 to Mpo, and R30 to Sazi.
- (c) R50 to Mpo, and R25 to Sazi.
- (d) R15 to Mpo, and R60 to Sazi.



Uranji runs his own computer repair business. He charges R360 per call out, then he charges R180 per hour during normal working hours, and R200 per hour after normal working hours. He attended to a call out which took 6 hours, but 1 hour was after normal working hours.

4. What will the total charge be?

- (a) R1 180 (b) R1 440 (c) R1 100 (d) R1 460

12; -18; 7; -31; 11; -12; -27

5. Arrange the above in **descending** order.

- (a) 12; 11; 7; -31; -27; -18; -12
- (b) -31; -27; -18; -12; 7; 11; 12
- (c) -31; -27; -18; -12; 12; 11; 7
- (d) 12; 11; 7; -12; -18; -27; -31

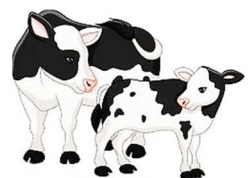


6. Calculate:

$(-5) + (-8) + 2 + (-4)$

- (a) -5 (b) 5 (c) -15 (d) 15

There is a herd of cattle on a farm. At the beginning of the year there were 75 cattle. 22 of the cows gave birth to healthy calves during the year. 4 of these cows each had a set of twin calves. 37 cattle were sold at the farmers' auction.



7. How many cattle were in the herd at the end of the year?

- (a) 64 (b) 66 (c) 68 (d) 60

**Did you know?**

- An **equation** says that two quantities / expressions are equal. It will have an equal sign (=), e.g.,  $x + 2 = 6$ . This example says: **what is on the left ( $x + 2$ ) is equal to what is on the right (6)**. So an equation is like a **statement**, "this equals that".
- A **formula** is a fact or rule that uses mathematical symbols. It usually has 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  $c$ ).

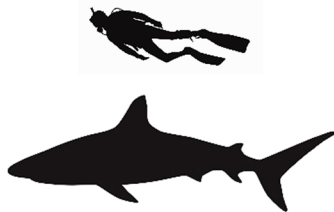
Melissa's bank account is overdrawn. Her bank balance is R-250. At the end of the month she pays R2 500 into her account.

8. Her new bank balance is .....
- (a) R2 250. (b) R2 750. (c) -R2 250. (d) -R2 750.

9. Simplify the expression:
- $$6x(x + y) - 6y(x + 2y) - 18xy$$

- (a)  $6x^2 + 12y^2 - 18xy$  (b)  $-18xy$   
 (c)  $6x^2 - 12y^2 - 18xy$  (d)  $-24x^2y^2$

A shark is swimming at 12 m below sea-level. A diver dives to 5 m below sea-level. The diver is directly above the shark.



10. How far apart are the diver and the shark?
- (a) 17 m (b) -7 m (c) -17 m (d) 7 m

11. Calculate:
- $$\sqrt{10 + 2 \times 3}$$
- (a) 6 (b)  $\sqrt{10} + \sqrt{6}$  (c) 4 (d)  $\sqrt{12} \times \sqrt{3}$

The Great Pyramid of Giza was built using about  $2,3 \times 10^6$  stone blocks.



12. If this was written in ordinary notation, this would be .....
- (a) 2 300 000 blocks. (b) 23 000 000 blocks.  
 (c) 23 000 000 blocks. (d) 2 300 000 000 blocks.

13. Simplify using the laws of exponents:
- $$6x^4 \times (-3x^2) \times (-x)^2$$
- (a)  $-18x^8$  (b)  $72x^8$  (c)  $-72x^8$  (d)  $18x^8$

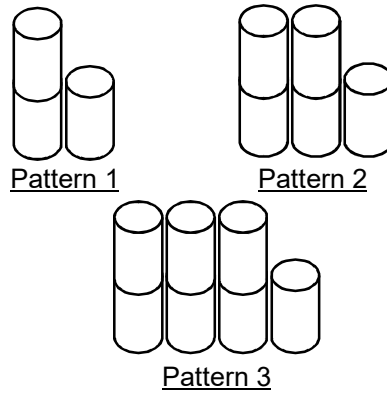
14. Calculate:
- $$-6x^0 + 2 \times (9 + 45)^0$$
- (a) 1 (b) -1 (c) -4 (d) 4

You decide to start saving money. In week one you save R3. In week two you save R5. In week three you save R7. You continue to save R2 more each week.

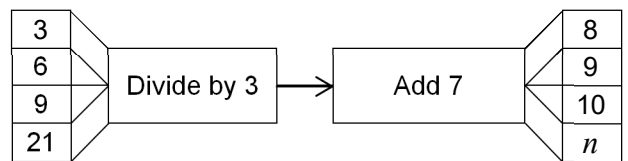


15. In which week will you put R35 into your savings account?
- (a) Week 35. (b) Week 24.  
 (c) Week 17. (d) Week 14.

Dave arranges cans in the display of his shop according to the pattern below.

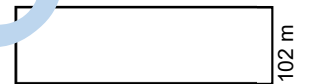


16. How many cans will the 10<sup>th</sup> pattern have?
- (a) 21 (b) 19 (c) 29 (d) 33



17. Calculate the value of  $n$  in the diagram above.
- (a) 14 (b) 11 (c) 30 (d) 56

A rectangle has a perimeter of 80 m and a breadth of 102 m. (Not drawn to scale.)



18. What is the length?
- (a) 680 m (b) 40 m (c) 782 m (d) 391 m

Jabu has R150 in her wallet. She spends  $x$  on a pizza, and  $y$  each for three ice creams.



19. What is the formula that calculates the change Jabu has in her wallet?
- (a)  $150 = x + 3y$  (b)  $150 - x - 3y$   
 (c)  $150 = x - 3y$  (d)  $x + 3y - 150$

20. Simplify the following expression:
- $$x \times y \times (4 + 6) \times z$$
- (a)  $4xy + 6z$  (b)  $xy + 10z$   
 (c)  $10xy + z$  (d)  $10xyz$

21. How many terms are in the expression below? (Hint: Simplify.)
- $$(p + q) + (2p + 2q)$$
- (a) 1 (b) 2 (c) 3 (d) 4

22. Simplify the following expression:
- $$13pqr + 4rqp - 6prq$$
- (a)  $17pqr - 6prq$  (b)  $13pqr - 2rqp$   
 (c)  $11pqr$  (d)  $13pqr + 4rqp - 6prq$

**Did you know?**

- Equilateral Triangle** has three equal sides and three equal angles that are always  $60^\circ$ .
- Isosceles Triangle** has two equal sides and two equal angles.
- Scalene Triangle** has no equal sides and no equal angles.