CONQUESTA
is a member of
ASTEMI
SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS INNOVATION
OLYMPIADS & COMPETITIONS

031 764 1972 (South Africa)
www.conquestaolympiads.com
conquest@iafrica.com

CONQUESTA 2020

Take the Challenge!

Mathematics 1 – 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		d

Example 2:-

4.	a			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 **B**rackets, then **O**ther (of, square roots, power of, etc), then **D**ivision and **M**ultiplication (from left to right as they rank equally), and lastly, **A**ddition and **S**ubtraction (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 x 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 x 9 x 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 x 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 $\sqrt{\ }$. The **cubed root** symbol is $\sqrt[3]{\ }$.*
- ***Scientific Notation** is a special way of writing numbers. E.g.,*

  700 → 7×10^2

  A number → **In Scientific Notation**

  Why is 700 written as 7×10^2 in Scientific Notation?

  → 700 = 7 x 100

  → and $100 = 10^2$ *(see exponents above)*

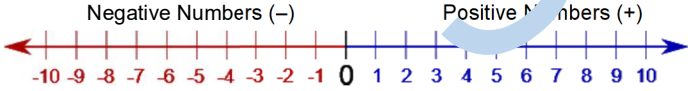
  → so 700 = $\mathbf{7 \times 10^2}$

  Both 700 and 7×10^2 have the same value, just shown differently.
- ***Equilateral Triangle** has **three** equal sides and three equal angles that are always 60°. **Isosceles Triangle** has **two** equal sides and two equal angles. **Scalene Triangle** has **no** equal sides and no equal angles.*

Multiplying with negative & positive numbers

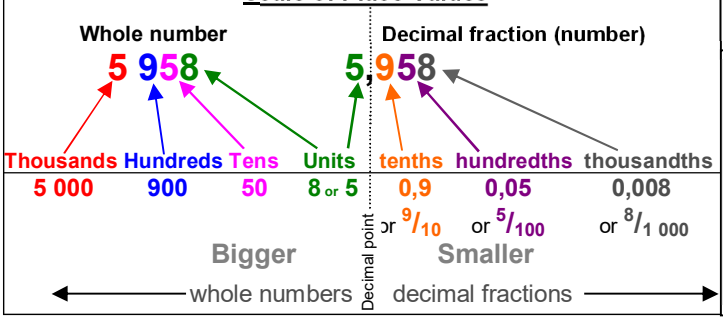
+ x +	(two positives make a positive)	= + E.g. 3 x 2 = 6
– x –	(two negatives make a positive)	= + E.g. (–3) x (–2) = 6
– x +	(a negative multiplied by a positive makes a negative)	E.g. (–3) x 2 = –6
+ x –	(a positive multiplied by a negative makes a negative)	E.g. 3 x (–2) = –6

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



If you multiply any number by a certain number, that number will also be the answer.

1. The number is …… .

(a) 0,1 (b) 10 (c) 1 (d) 0

2. 126 is the product of which of the following prime numbers?

(a) 21 x 2 x 3 (b) 2 x 3 x 7 x 3

(c) $\frac{1}{2}$ x 63 x 2 x 2 (d) 2 x 9 x 7

3. Sam cycles 77 ½ km in 7 hours and 45 minutes. His average speed is ……

(a) 10 km/h. (b) 10,40 km/h.

(c) 6 km/h. (d) 5,77km/h.

An aeroplane is being loaded. The cargo consists of 250 containers weighing 238,5 kg each. The aeroplane can only carry 48 tonnes of cargo.

4. How many containers must be left behind?

(a) 49 (b) 201 (c) 202 (d) 48

40% of the cars in the car park are grey. There are 155 cars in total.

5. How many cars are grey?

(a) 39 (b) 93 (c) 70 (d) 62

6. Calculate:

$$\frac{(-3)(-4)}{(-2)}$$

(a) 6 (b) –6 (c) $\frac{-7}{2}$ (d) $\frac{7}{2}$

7. Calculate:

$$(-5)^2 + 4(-3) - (-2)$$

(a) 15 (b) 11 (c) –35 (d) –39

Toronto is a city in Canada. On a cold winter's day their temperature was –32°C. During the day, the temperature increases by 14°C.

8. The maximum temperature reading that day was ……

(a) –46°C. (b) 46°C. (c) –18°C. (d) 18°C.

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).*

9. Simplify the expression:

$$\sqrt{36x^4} + x\left(\sqrt[3]{8x^3}\right)$$

(a) $6x^2 + 2x$ (b) $8x^2$
(c) $8x^3$ (d) $6x^2 + 2x^2$

Scott buys three books online from America. They cost $15 each when the exchange rate was R12 to the dollar.

He is not happy with one of the books, and returns it to America, but the exchange rate has increased, and they refund him at a rate of R13 to the dollar.

10. How much in Rands, did Scott spend on books?

(a) R345 (b) R32 (c) R360 (d) R167

11. Calculate:

$$\frac{\sqrt[3]{-8} + \sqrt{64}}{\sqrt[4]{16}}$$

(a) –8 (b) 3 (c) 8 (d) –3

Mont Blanc is the highest mountain in Europe. It is about 4,8 thousand metres high.

12. Written in scientific notation, this is:

(a) $4{,}8 \times 10^3$ m (b) $4{,}8 \times 10^4$ m
(c) 4 800 000 m (d) $4\,800 \times 10^3$ m

13. Simplify using the laws of exponents

$$\frac{15x^{\square}y^8}{(3x^{\square}y^4)^3}$$

(a) $\frac{5}{3x^4y^4}$ (b) $\frac{5}{9}x^4y^4$ (c) $\frac{5}{9x^{\square}y^4}$ (d) $5x^2y^4$

14. Calculate:

$$3x^0 \times (0{,}45 \times 10^2)^1 + \frac{x^6}{(x^2)^3}$$

(a) 46 (b) 136 (c) 1,035 (d) 135 + x

Leon is topping up his fish tank. After 1 minute there are 12 litres; after 2 minutes there are 16 litres, after 3 minutes there are 20 litres.

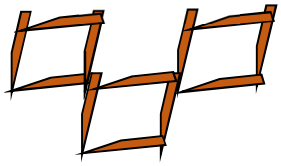
15. If the tank holds 100 litres, how long will it take to fill it?

(a) 20 minutes. (b) 22 minutes.
(c) 25 minutes. (d) 23 minutes.

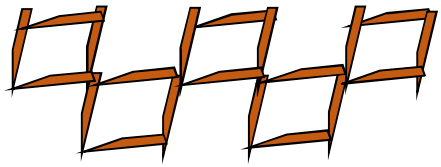
Thandi is using toothpicks to build the pattern below.

Pattern 1

Pattern 2

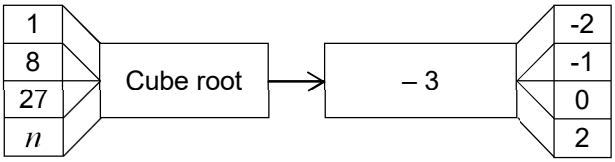


Pattern 3



16. How many toothpicks will the 15th pattern have?

(a) 60 (b) 124 (c) 116 (d) 96



17. Calculate the value of n in the diagram above.

(a) 5 (b) 125 (c) 8 (d) 64

A rectangle has a perimeter of 88 m and a breadth of 102

(Not drawn to scale.)

18. What is the length?

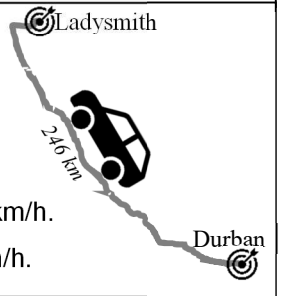
(a) 340 m (b) 732 m (c) 680 m (d) 391 m

19. What is the formula that describes the number pattern below?

–15; –11; –7; –3; .....

(a) $-4x + 19$ (b) $-15x + 4$
(c) $4x - 19$ (d) $4x - 15$

The journey from Durban to Ladysmith takes 3 hours.



20. If Ladysmith is 246 km from Durban, the average speed was .....

(a) 82 km/h. (b) 12,30 km/h.
(c) 8,2 km/h. (d) 123 km/h.

21. How many terms are in the expression below?

$$\frac{3a + b}{4} + 3a + b$$

(a) 1 (b) 2 (c) 3 (d) 4

22. Simplify the following expression:

$$10xyz - 4xz + 9zyx + 5zx$$

(a) $20xyz$ (b) $19xyz + 9xz$
(c) $19xyz + xz$ (d) $10xyz - 4xz + 9zyx + 5zx$