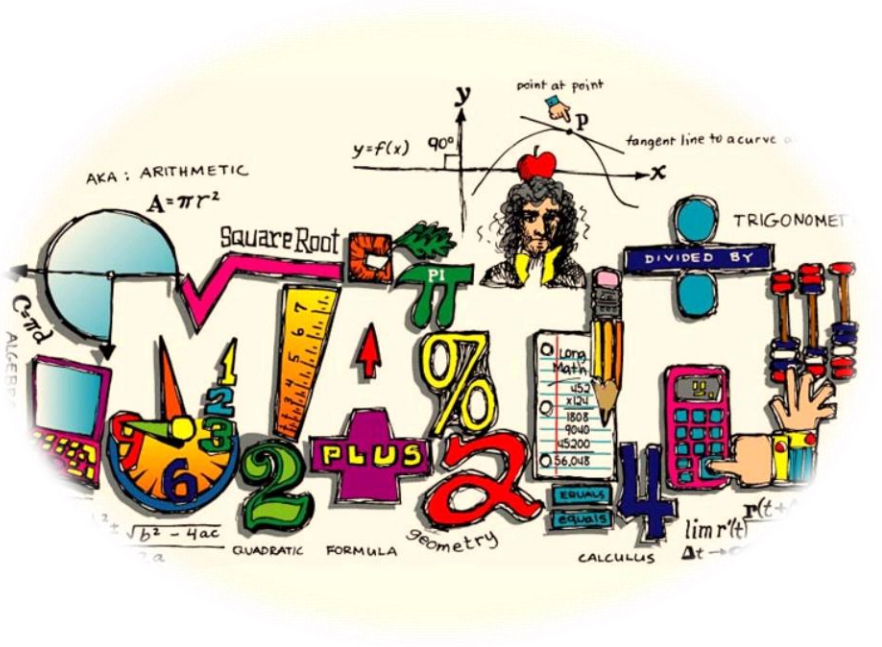
Year 8 – MYP 2

Math

"Operations – Exponents – Order of Operations"



2019-2020

Number Properties

Addition - Subtraction

Properties	Addition
Commutative	3 + 5 = 5 + 3
Associative	(3+1)+4 =3 + (1+4)
Identity (Neutral) Element	4 + 0 = 4

Symbol	Words
+	Addition, Add, Plus, Increase, total
-	Subtraction, Subtract, Less, Minus, Difference, Decrease

Multiplication - Division

Properties	Multiplication
Commutative	2 x 3 = 3 x 2
Associative	2 x (3x 4)=(2 x 3)x 3
Identity (Neutral) Element	6·1=6

Symbol	Words
×	Multiplication, Multiply, Product, By, Times
÷	Division, Divide, Quotient

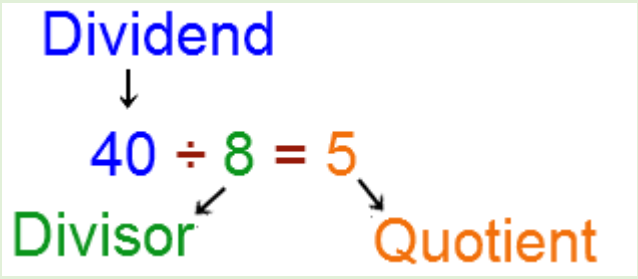
Multiplication

To find the **product** of two or more numbers we **multiply** them. (We multiply the **Factors)**

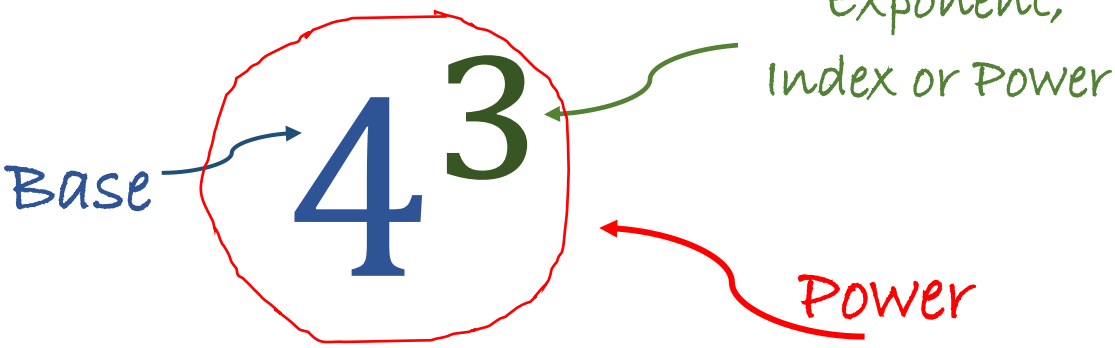
6 (Factor) x 4 (Factor) = 24 (Product)

Division

To find the quotient of two numbers we divide the first one by the second one. The number being divided is the dividend and the number we are dividing by is called the divisor

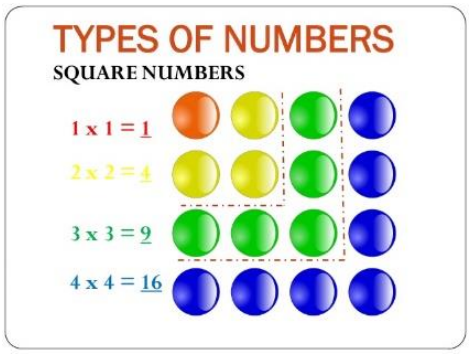


Exponents (Indices)



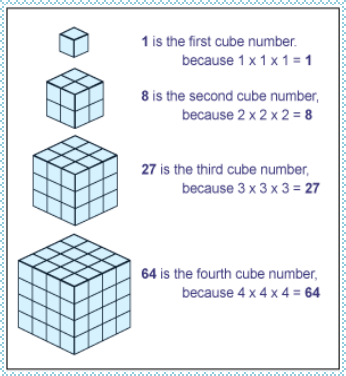
$$4^3 = \underbrace{4 \cdot 4 \cdot 4}$$

Base multiplied exponent number of times.



Cubic numbers

Examples 2^3, 3^3, 10^3 ...



When we use 10 as a base, the index shows the place value or number of zeros following the one.

10^1

$10^2 = 10 \times 10 =$

$10^3 = 10 \times 10 \times 10 =$

$10^4 = 10 \times 10 \times 10 \times 10 =$

$10^5 = 10 \times 10 \times 10 \times 10 \times 10 =$

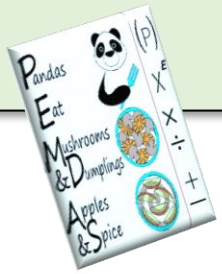
$10^6 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 =$

$10^7 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 =$

Tens of millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units
						1	0
					1	0	0
				1	0	0	0
			1	0	0	0	0
		1	0	0	0	0	0
	1	0	0	0	0	0	0
1	0	0	0	0	0	0	0

Order of Operations

Step 1. Do any operations that are inside parenthesis (round brackets)	**P**arenthesis
Step 2. Do any operations involving exponents.	**E**xponents
Step 3. Do the multiplications and/or division starting from left to right.	**M**ultiplication **D**ivision
Step 4. Do addition and subtraction starting from left to right.	**A**ddition **S**ubtraction



Exercises

1) Calculate
   a) $2^3 =$
   b) $3^2 =$
   c) $5^2 =$
   d) $6^1 =$
   e) $2^4 + 3^2 =$
   f) $(2 + 1)^2 =$

2) Write the following in index form (index notation)
   a) 3 × 3 × 3=
   b) 4 × 4 =
   c) 5 × 5 × 5 × 5 × 5=
   d) 2 × 2 × 2 × 2 × 2 × 2=
   e) 3 × 3 × 3 + 3 × 3 =
   f) 7 × 7 × 7 + 4 × 4 =

3) Do the operations in the correct order.
   a. 15 – 8 + 3 =
   b. 15 + 8 – 3 =
   c. $4^2 + 3^2 \times 2$ =
   d. 30 × 2 + 10 =
   e. 30 ÷ 2 + 10 ÷ 2 =
   f. $10 + (20 \div 4)^2$ =
   g. $100 \div 2^2 \div 5$ =
   h. $2^3 + (10 - 6) + 2 \times 5$ =
   i. $(2 \times 6) + 5^2 + (1+1)^2 - 100 \div 10 + 5$=

4) Fill in the blanks with the correct operation (+, -, ×, ÷) so that the statement is correct.
   a. 15 ….. 8 ….. 2 = 21
   b. 10 ….. 8 ….. 3 = 5
   c. 4^1 ….. 3^2 ….. 2 = 11
   d. 30 ….. 2 ….. 10 = 70
   e. 30 ….. 2 ….. 10 = 5

Activity

$$1 = 1 = 1^2$$
$$1 + 3 = 4 = 2^2$$
$$1 + 3 + 5 = 9 = 3^2$$
$$1 + 3 + 5 + 7 =$$
$$1 + 3 + 5 + 7 + 9 =$$

$$1^3 = 1 \quad = 1 \quad = 1^2$$
$$1^3 + 2^3 = 1 + 8 \quad = 9 \quad = 3^2$$
$$1^3 + 2^3 + 3^3 = \quad = \quad =$$
$$1^3 + 2^3 + 3^3 + 4^3 = \quad = \quad =$$

1. Solve:

$12 + 8 - (2 \times 2)^2 + 2 =$	$36 \div (8 + 4) - 2 - (9 + 5) =$
$63 \div (9 - 2) + 5 =$	$(10 - 2) \times 4 - (6 + 4) \div 5 =$
$2 + 9 - 36 \div (18 \div 2) =$	$13 - (4 \times 3) + 36 \div (4 + 2) - 5 =$
$36 \div (3 \times 2) - 5 =$	$8 + (5 - 3) \times 4 - 12 \div 3 =$

2. Mark the following statements as true or false:

1. 12 x 4 - 3 = 45	TRUE	FALSE
2. 11 - 5 x 8 ÷ 4 = 1	TRUE	FALSE
3. 32 + 5 - 6 x 2 = 62	TRUE	FALSE
4. 10 + 5 - 3 x 4 = 3	TRUE	FALSE
5. 6 + 10 ÷ 2 = 8	TRUE	FALSE
6. 15 ÷ 5 - 2 + 14 = 19	TRUE	FALSE
7. 10 -2 + 1 · 2 = 10	TRUE	FALSE
8. 9 + 4 -3 +7 =3	TRUE	FALSE
9. 8 + 16 ÷ 2 x 2 = 6	TRUE	FALSE
10. 7 + 2 ÷ 7 - 4 = 3	TRUE	FALSE

11. Solve

[2 + (4 + 5) x 3] ÷ 5 =
{[3 x 5 x (3+6 x 2) -125] + 20} ÷ 10 =
5 – {5 – 5 x[5 –(5 - 5)]} ÷ 3)] ÷ 5 =
1 – 2 + 3 x 4 -5 x {6 – [7 – (-8)] x 9} =
{20 – [12 - (6 – 4) x 2] ÷ 2} + 5 =
40 +{[2 +(4 – 4) x 2] ÷ 2} - 10 =