Maths: Year 7 Autumn Term 1: Number Skills

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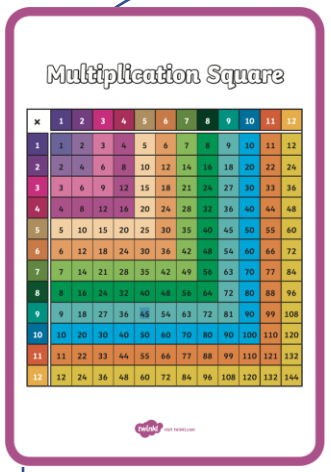
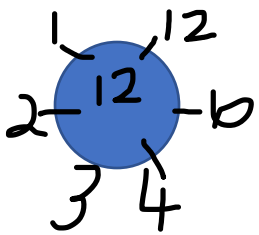
Topic

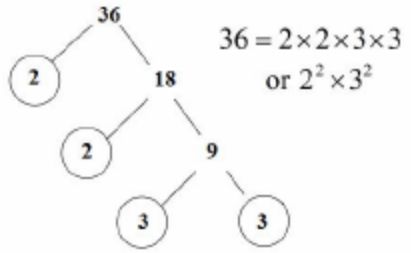
- Multiples and Factors
- Order of Operations/BIDMAS
- Place Value and Rounding
- Multiplying and Dividing
- Negative numbers

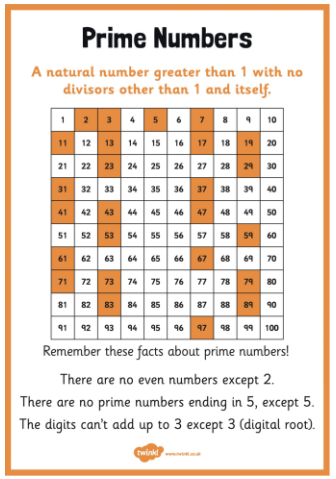
Key words

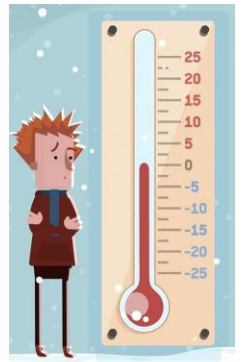
- ((Lowest) common) multiple and LCM
- ((Highest) common) factor and HCF
- Negative number
- Directed number
- Power
- (Square and cube) root
- Triangular number, Square number, Cube number, Prime number
- Linear sequence, Arithmetic sequence
- Operation
- Inverse
- Long multiplication
- Short division
- Long division
- Remainder





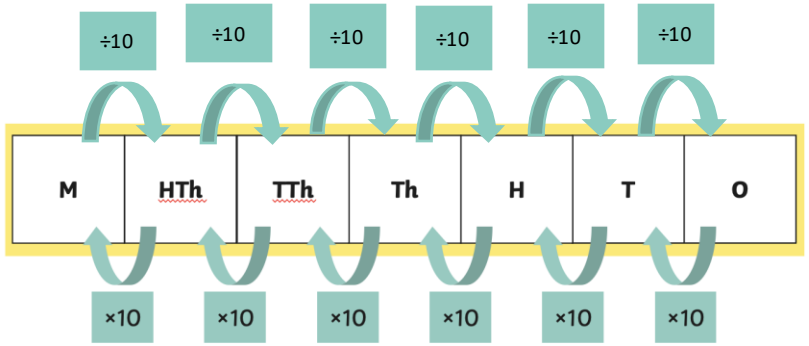






Place Value

Tm	M	Hth	Tth	Th	H	T	O	t	h	th
Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
10 000 000	1 000 000	100 000	10 000	1000	100	10	1	0.1 $\frac{1}{10}$	0.01 $\frac{1}{100}$	0.001 $\frac{1}{1000}$



Remember **BIDMAS** is the agreed order of operations in Maths:

- **Brackets**
- **Indices** are **powers**, eg 3^2 or 4^3
- **Division** - start on the left and work them out in the order that you find them
- **Multiplication** - start on the left and work them out in the order that you find them
- **Addition**
- **Subtraction**

When only **addition** and **subtraction** are left in the calculation, work them out in the order you find them - starting from the left of the calculation and working towards the right.

MathsWatch Clips

N10; N11; N20; N1a, b, c;

Year 7 Autumn Term 2: Decimals

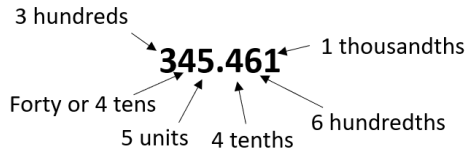
Key concepts:

Place value:

Th H T U . t h th

- When adding and subtracting decimals we must ensure the decimal places are underneath each other when setting up.
- When multiplying decimals, calculate without the decimal point and use estimation to help replace it.
- To find equivalent fractions multiply/divide the numerator and denominator by the same number.
- To convert all numbers to the same form, either fractions, decimals or percentages.

Add/subtract decimals:



$42.8 + 5.32$

42.80
+ 5.32
48.12

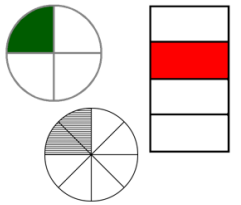
$42.8 - 5.32$

31 71
42.80
- 5.32
37.48

Equivalence:

$\frac{1}{4}$

$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16}$



= 0.25

Key Words

Decimal: A number that contains a point
Fraction: A fraction is made up of a numerator (top) and a denominator (bottom).
Equivalence: Two fractions are equivalent if one is a multiple of the other.
Simplify: Cancel a fraction down to give the smallest numbers possible.
Ascending Order: Place in order, smallest to largest.
Descending Order: Place in order, largest to smallest.

Key Concept: Multiply/Divide by powers of 10

10 000	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
				•			

Multiplying

X 10 digits move LEFT **1** space
X 100 digits move LEFT **2** spaces
X 1000 digits move LEFT **3** spaces

Dividing

÷ 10 digits move RIGHT **1** space
÷ 100 digits move RIGHT **2** spaces
÷ 1000 digits move RIGHT **3** spaces

Simplify $\frac{3}{24}$ a fraction

$\frac{3}{24} \xrightarrow{\div 3} \frac{1}{8}$

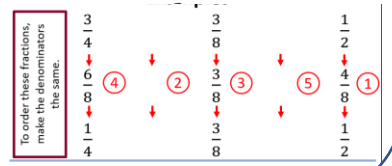
Write 0.34 as

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0 •	3	4	

$= \frac{34}{100} = \frac{17}{50}$

Write $\frac{6}{7}$ as a decimal

$\frac{6}{7} \rightarrow 7\overline{)6.00000}$ (0.85714; 60, 40, 50, 10, 30)



MathsWatch Clips
N1b, N2b,N13b, N14b, N15b, N28b,N29b, N32

Year 7 Autumn Term 2: Equations

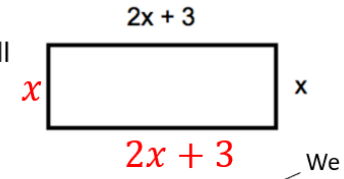
Algebra can be used to support us to find unknowns in a **contextual problem**.

We can always apply a letter to an unknown quantity, to then **set up an equation**.

It will often be used in area and perimeter problems and angle problems in geometry.

Solve to find the value of x when the perimeter is 42cm.

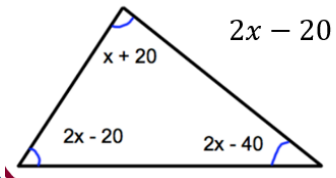
HINT: Write on all of the lengths of the sides.



We know the perimeter is 42cm

$$2x + 3 + 2x + 3 + x + x = 42$$
$$9x + 6 = 42$$
$$6x = 36$$
$$x = 6$$

Angles in a triangle sum to 180°



$$2x - 20 + x + 20 + 2x - 40 = 180$$
$$5x - 40 = 180$$
$$5x = 220$$
$$x = 45$$

$x + 9 = 16$ -9 -9 **x = 7**	$x - 12 = 20$ +12 +12 **x = 32**	$\frac{x}{3} = 5$ ×3 ×3 **x = 15**	$2x + 5 = 14$ -5 -5 $2x = 9$ ÷2 ÷2 **x = 4.5**

$\frac{x}{4} - 2 = 4$ +2 +2 $\frac{x}{4} = 6$ ×4 ×4 **x = 24**	$2(3x + 5) = -14$ expand $6x + 10 = -14$ -10 -10 $6x = -24$ ÷6 ÷6 **x = - 4**	$2x + 7 = 5x + 1$ -2x (smallest x term) $+7 = 3x + 1$ -1 -1 $6 = 3x$ ÷3 ÷3 **2 = x**

Answers can be:

- Integers
- Decimals
- Fractions
- negatives

MathsWatch Clips

A12, A17, A19a, A19b

Key words:
Unknown: A letter which represents a number we do not know the value of.
Terms: The numbers and letters in the expression or equation.
Inverse: The operation which will do the opposite. **Solving equations:**
Working with inverse operations to find the value of a variable.

Rearranging an equation:
Working with inverse operations to isolate a highlighted variable.

In solving and rearranging we **undo the operations** starting from the last one.

Year 8 Autumn 1:FACTORS AND POWERS

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Key Words

Square: A square number is the result of multiplying a number by itself.
Cube: A cube number is the result of multiplying a number by itself twice.
Root: A root is the reverse of a power.
Prime number: A prime is a number that has only two factors which are 1 and itself.
Reciprocal: This is found by doing 1 divided by the number.
Factor: A number that fits into another number exactly.

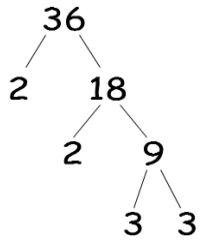
Examples

What is 2^4 ? $2 \times 2 \times 2 \times 2 = 16$

What is $\sqrt{64}$? $8^2 = 64$, so $\sqrt{64} = \pm 8$

What is the reciprocal of 5? $\frac{1}{5}$

Write 36 as a product of prime factors



$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

Product means 'multiply'

Questions

1) a) 2^5
b) 3^3
c) 1^{17}
d) $\sqrt{81}$
e) $\sqrt{16}$
f) $\sqrt[3]{64}$
2) Find the reciprocal of: a) 4 b) $\frac{1}{3}$ c) 0.25
3) Write 72 as a product of primes.

MATHSWATCH

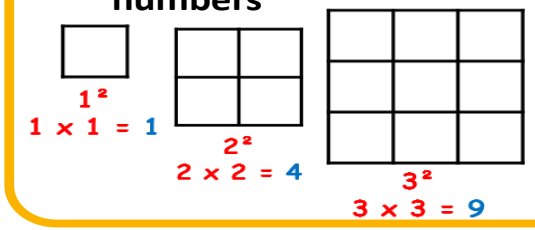
28,29, 78,82,154

Tip

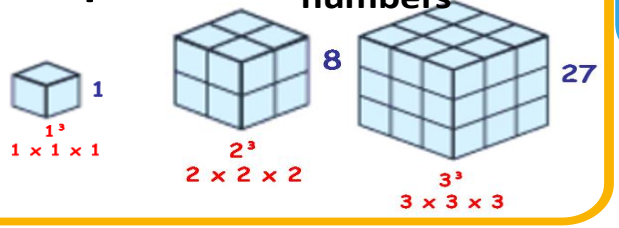
A number with an odd amount of factors must be a square number.

Key Concept

Square numbers



Cube numbers



ANSWERS: 1) a) 32 b) 27 c) 1 d) ∓ 9 e) ∓ 4 f) 4
2) a) $\frac{1}{4}$ b) 3 c) 4 3) $2^3 \times 3^2$

Year 8 Autumn 2: Solving equations

Key Concept

Inverse Operations

Operation	Inverse
+	−
−	+
×	÷
÷	×
x^2	$\sqrt{x}$

Key Words

Unknown: A letter which represents a number we do not know the value of.
Terms: The numbers and letters in the expression or equation.
Inverse: The operation which will do the opposite.

Examples

x + 9 = 16 -9 -9 **x = 7**	x − 12 = 20 +12 +12 **x = 32**	$\frac{x}{3} = 5$ ×3 ×3 **x = 15**	2x + 5 = 14 -5 -5 2x = 9 ÷2 ÷2 **x = 4.5**

$\frac{x}{4} - 2 = 4$ +2 +2 $\frac{x}{4} = 6$ ×4 ×4 **x = 24**	2(3x + 5) = -14 expand 6x + 10 = -14 -10 -10 6x = - 24 ÷6 ÷6 **x = - 4**	2x + 7 = 5x + 1 -2x (smallest x term) +7 = 3x + 1 -1 -1 6 = 3x ÷3 ÷3 **2 = x**

Tip

Answers can be:

- Integers
- Decimals
- Fractions
- negatives

MATHSWATCH

A12, A17, A19a, A19b,

Questions

1) x + 8 = 19 2) y − 25 = 15 3) 2y = 82

4) $\frac{t}{4} = 7$

5) $\frac{p}{2} - 6 = 2$ 6) 3(2x − 3) = 15 7) 4x − 8 = 2x + 1

ANSWERS: 1) x = 11, 2) y = 40, 3) y = 41, 4) t = 28, 5) p = 16, 6) x = 4, 7) x = 4.5

Year 9 Autumn Term 1: Number

Glossary

- Estimation
- Factors, Multiples and Primes
- Indices
- Standard Form
- Surds

Surds are irrational numbers that cannot be simplified to an integer from a root.

Examples of a surd:
$\sqrt{3}, \sqrt{5}, 2\sqrt{6}$

Simplify:

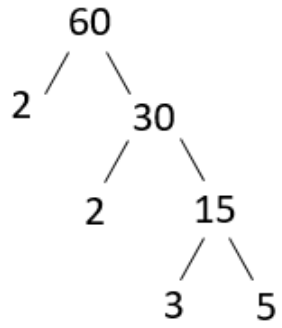
$$4\sqrt{20} \times 2\sqrt{3} = 8\sqrt{20 \times 3}$$
$$= 8\sqrt{60}$$
$$= 8\sqrt{4}\sqrt{15}$$
$$= 16\sqrt{15}$$

Key words

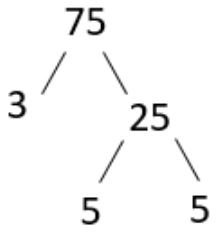
Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd, surd, rational, irrational standard form, simplify

Examples

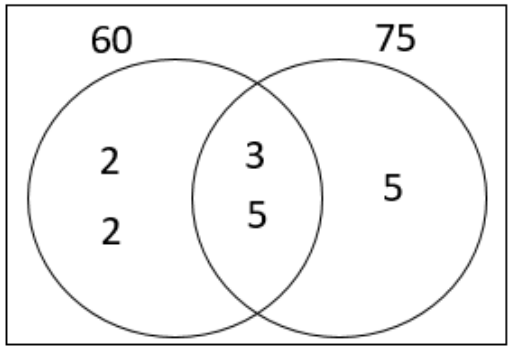
Find the **highest common factor** and **lowest common multiple** of 60 and 75:



$2 \times 2 \times 3 \times 5$
$2^2 \times 3 \times 5$



$3 \times 5 \times 5$
3×5^2



HCF – Mulitiply all numbers in the intersection
$= 3 \times 5 = 15$

LCM – Multiply all numbers in the Venn diagram
$= 2 \times 2 \times 3 \times 5 \times 5 = 300$

Year 9 Autumn Term 2: Simplifying Expressions and Substitution

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Key Concepts

When collecting like terms involving addition or subtraction, add/subtract the numbers in front of the letters.

If the like terms are multiplied, multiply the numbers in front of the letters and put the letters next to each other.

If the like terms are divided, divide the numbers in front of the letters.

Examples

Simplify the following expressions:

1) $4p + 6t + p - 2t = 5p + 4t$
2) $3 + 2t + p - t + 2 = 5 + t + p$
3) $f + 3g - 4f = 3g - 3g$
4) $f^2 + 4f^2 - 2f^2 = 3f^2$
5) $6a \times 3b \times 2c = 36abc$
6) $\frac{9b}{3} = 3b$
7) $C = \frac{5(F-32)}{9}$ is a formula (involves more than on letter and includes an equal sign)

5) Find the value of $3x + 2$ when $x = 5$

$(3 \times 5) + 2 = 17$

6) Where $A = b^2 + c$, find A when $b = 2$ and $c = 3$

$A = 2^2 + 3$
$A = 4 + 3$
$A = 7$

Mathswatch clips
A6, 95

Questions

Simplify:

1) $7p + 3q + p - 3q$
2) $5 + 4t + 3p - 2t + 7$
3) $m - 8g - 5m$
4) $b^2 - 7b^2 + 2b^2$
5) $2a \times 5b \times 4c$
6) $8m \times 3n \times 2m$
7) $\frac{36p}{12}$
8) $\frac{6t}{18}$
9) Find the value of $5x - 7$ when $x = 3$
10) Where $A = d^2 + e$, find A when $d = 5$ and $e = 2$

Key Words

Simplify
Term
Collect
Formulae
Substitution

ANSWERS: 1) $8p$ 2) $12 + 2t + 3p$ 3) $-4m - 8g$ 4) $-4b^2$
5) $40abc$ 6) $48m^2n$ 7) $3p$ 8) $\frac{t}{3}$ 9) 8 10) A = 27