Year 8 Knowledge Organiser
PLACE VALUE, DECIMALS & USING SCALES

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

Key Words

Decimal: A number that contains a point.

Metric measure: The unit used to measure length, mass etc.

Scale: The conversion to convert between drawings and real life sizes.

Examples

Ordering Decimals

0.3, 0.21, 0.305, 0.38, 0.209

Add zero's so that they all have the same number of decimal places.

0.300, 0.210, 0.305, 0.380, 0.209

Then they can be placed in order:

0.209, 0.21, 0.3, 0.305, 0.38

Multiplying/Dividing by powers of 10

3.4×100

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

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13-16, 46, 691, 864

Tip

- Add digits when ordering decimals.
- The number of zero's tells you the number of places to move the digits.

Questions

1) Order 1.52, 1.508, 1.5, 1.05, 1.51

2) Work out a) 1.35×10 b) 0.6×100 c) $4.5 \div 100$

3) Convert a) 36 mm to cm b) 7 cm to mm c) 450 cm to m
d) 620 g to kg e) 4.2 kg to g f) 0.7 kg to g

ANSWERS: 1) 1.05, 1.5, 1.508, 1.51, 1.52 2) a) 13.5 b) 60 c) 0.045
3) a) 3.6cm b) 70mm c) 4.5m d) 0.62kg e) 4200 f) 700g

Year 8 Knowledge Organiser

FOUR OPERATIONS WITH INTEGERS & DECIMALS

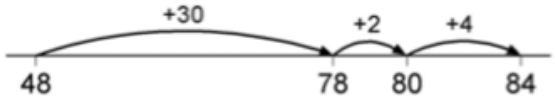
Key Words

Place Value: The value a digit takes when placed in a particular position of a number.

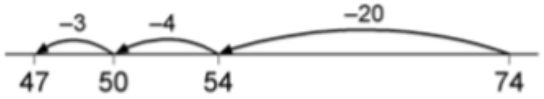
Add Sum Total All together Plus In all	Multiply Product Times Twice Total Multiplied by
Subtract Remain Difference Less than Fewer How many more Minus	Divide Quotient Goes into Split Equally Each

Examples

48 + 36 = 84



74 – 27 = 47 worked by counting back:



$$\begin{array}{r} 97 \\ 3\overline{)291} \end{array}$$

$$\begin{array}{r} 258 \\ +\ 87 \\ \hline 345 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 3\ 15 \\ 4\ 5- \\ 2\ 8 \\ \hline 1\ 7 \end{array}$$

$$\begin{array}{r} 38 \\ \times\ 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}$$

56 × 27

×	20	7	
50	1000	350	1350
6	120	42	162
			1512
			1

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Clip Numbers

1-22, 141-146, 47

Tip

Multiplication and addition are associative, so you can work them out in any order.
So 3 × 4 is the same as 4 × 3.
4 + 3 is the same as 3 + 4

Questions

1) a) 49 + 37 b) 125 + 69 c) 5.6 + 24.8
2) a) 64 – 28 b) 134 – 57 c) 16.2 – 9.5
3) a) 7 × 146 b) 34 × 67 c) 2.9 × 7.2 4) a) 294 ÷ 7 b) 192 ÷ 6

ANSWERS : 1) a) 86 b) 194 c) 30.4 2) a) 36 b) 77 c) 6.7
3) a) 1022 b) 2278 c) 20.88 4) a) 42 b) 32

Year 8 Knowledge Organiser
ORDER OF OPERATIONS

Key Concept

B Brackets

I Indices

D Division

M Multiplication

A Addition

S Subtraction

If a calculation contains the looped calculations work from left to right.

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24, 39-44, 120, 150, 181-189

Key Words

Operation: In maths these are the functions × ÷ + -.

Commutative: Calculations are commutative if changing the order does not change the result.

Associative: In these calculations you can re-group numbers and you will get the same answer.

Indices: These are the squares, cubes and powers.

Tip

- Put brackets around the calculations which need to be done first.
- Indices also includes roots.

Examples

$$5 \times 4 - 8 \div 2$$

$$20 \quad - \quad 4 \quad = \mathbf{16}$$

$$(2^2 + 6)^2 \times 4 - 8$$

$$(4 + 6)^2 \times 4 - 8$$

$$(10)^2 \times 4 - 8$$

$$100 \times 4 - 8$$

$$400 - 8 = \mathbf{392}$$

Questions

1) $7 - 10 \div 2$
2) $4^3 - 13 \times 4$
3) $21 \div 7 - 2$
4) $12 \div (7 - 3)$
5) $20 \div 2^2$
6) $(16 - 13) \div 3$
7) Place brackets to make the calculation work $20 \div 5 - 3 = 10$

ANSWERS: 1) 2 2) 12 3) 1 4) 3 5) 5 6) 1 7) $20 \div (5 - 3) = 10$

Year 8 Knowledge Organiser
FACTORS, MULTIPLES AND PRIMES

Key Concept

Factors:
Find these in pairs
12
1, 12
2, 6
3, 4

Multiples:
Start with the number itself
7 – 7, 14, 21, 28, …

Key Words

Factor: The numbers which fit into a number exactly.
Multiple: The numbers in the times table.
Prime: Numbers which have only two factors which are 1 and itself.
Highest Common Factor: The highest factor which is common for both numbers.
Lowest Common Multiple: The smallest multiple which is common to both numbers.

Examples

Lowest Common Multiple (LCM)

Q - Find the LCM of 6 and 7:
6 – 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, …
7 – 7, 14, 21, 28, 35, 42, 49, 56, …
LCM = 42

Highest Common Factor (HCF)

Q – Find the HCF of 18 and 24
18 – 1, 2, 3, 6, 9, 18
24 – 1, 2, 3, 4, 6, 8, 12, 24
HCF = 6

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Clip Numbers
4,6,10, 26 – 34

Tip

There is only one even prime number which is the number 2. This can be used to help solve lots of problems.

Questions

1) List the first 5 multiples of: a) 7 b) 12 c) 50
2) List the factors of: a) 12 b) 15 c) 16
3) a) Find the LCM of 5 and 7 b) Find the HCF of 20 and 16

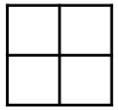
ANSWERS: 1) a) 7, 14, 21, 28, 35 b) 12, 24, 36, 48, 60 c) 50, 100, 150, 200, 250
2) a) 1, 2, 3, 4, 6, 12 b) 1, 3, 5, 15 c) 1, 2, 4, 8, 16 3) a) 35 b) 4

Year 8 Knowledge Organiser
POWERS AND ROOTS

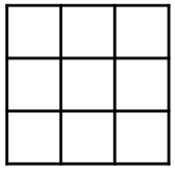
Key Concept

Square numbers

1^2
$1 \times 1 = 1$



2^2
$2 \times 2 = 4$

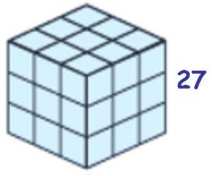


3^2
$3 \times 3 = 9$

Cube numbers

1^3
$1 \times 1 \times 1$

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



3^3
$3 \times 3 \times 3$

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Clip Numbers
27-30, 99-101

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.

Tip

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

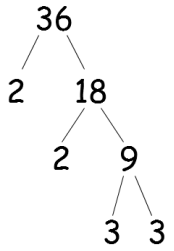
Examples

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.

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