**Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement**

**identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers**

**know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers**

**establish whether a number up to 100 is prime and recall prime numbers up to 19**

* Use the vocabulary factor, multiple and product. They identify all the factors of a given number; for example, the factors of 20 are 1, 2, 4, 5, 10 and 20. They answer questions such as:
	+ Find some numbers that have a factor of 4 and a factor of 5. What do you notice?
	+ My age is a multiple of 8. Next year my age will be a multiple of 7. How old am I?
* They recognise that numbers with only two factors are prime numbers and can apply their knowledge of multiples and tests of divisibility to identify the prime numbers less than 100. They explain that 73 children can only be organised as 1 group of 73 or 73 groups of 1, whereas 44 children could be organised as 1 group of 44, 2 groups of 22, 4 groups of 11, 11 groups of 4, 22 groups of 2 or 44 groups of 1. They explore the pattern of primes on a 100-square, explaining why there will never be a prime number in the tenth column and the fourth column.

**multiply and divide numbers mentally, drawing upon known facts**

* Rehearse multiplication facts and use these to derive division facts, to find factors of two-digit numbers and to multiply multiples of 10 and 100, e.g. 40 × 50. They use and discuss mental strategies for special cases of harder types of calculations, for example to work out 274 + 96,< 8006 – 2993, 35 × 11, 72 ÷ 3, 50 × 900. They use factors to work out a calculation such as 16 × 6 by thinking of it as 16 × 2 × 3. They record their methods using diagrams (such as number lines) or jottings and explain their methods to each other. They compare alternative methods for the same calculation and discuss any merits and disadvantages.

**multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers**

* Develop and refine written methods for multiplication. They move from expanded layouts (such as the grid method) towards a compact layout for HTU × U and TU × TU calculations. They suggest what they expect the approximate answer to be before starting a calculation and use this to check that their answer sounds sensible. For example, 56 × 27 is approximately 60 × 30 = 1800.



**multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000**

* Recall quickly multiplication facts up to 10 × 10 and use them to multiply pairs of multiples of 10 and 100. They should be able to answer problems such as:
	+ the product is 400. At least one of the numbers is a multiple of 10. What two numbers could have been multiplied together? Are there any other possibilities?

**recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)**

* solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes
* use knowledge of multiplication facts to derive quickly squares of numbers to 12 × 12 and the corresponding squares of multiples of 10. They should be able to answer problems such as:
* tell me how to work out the area of a piece of cardboard with dimensions 30 cm by 30 cm
* find two square numbers that total 45

**divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context**

* Extend written methods for division to include HTU ÷ U, including calculations with remainders. They suggest what they expect the approximate answer to be before starting a calculation and use this to check that their answer sounds sensible. They increase the efficiency of the methods that they are using. For example:

196 ÷ 6 is approximately 200 ÷ 5 = 40

3 2 r4 or 4/6 or 2/3

6 196

**Children know that, depending on the context, answers to division questions may need to be rounded up or rounded down. They explain how they decided whether to round up or down to answer problems such as:**

* Egg boxes hold 6 eggs. A farmer collects 439 eggs. How many boxes can he fill
* Egg boxes hold 6 eggs. How many boxes must a restaurant buy to have 200 eggs?

**solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign**

**solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes.**

**solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates**

* Use written methods to solve problems and puzzles such as:

|  |  |  |  |
| --- | --- | --- | --- |
| 275 | 382 | 81 | 174 |
| 206 | 117 | 414 | 262 |
| 483 | 173 | 239 | 138 |
| 331 | 230 | 325 | 170 |

* + Choose any four numbers from the grid and add them. Find as many ways as possible of making 1000.
	+ Place the digits 0 to 9 to make this calculation correct: ☐☐☐☐ – ☐☐☐ = ☐☐☐.
	+ Two numbers have a total of 1000 and a difference of 246. What are the two numbers?

**Non-Statutory Guidance**

Pupils practise and extend their use of the formal written methods of short multiplication and short division. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, 98 ÷ 4 = 98⁄4 = 24 r 2 = 24 ½ = 24.5 ≈ 25).

Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1,000 in converting between units such as kilometres and metres.

Distributivity can be expressed as a(b + c) = ab + ac.

They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 9² x 10).

Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example 13 + 24 = 12 + 25; 33 = 5 x ?).