TOPIC 11

Numbers

Strand: Number
Strand unit: Number Theory

Curriculum Objectives

619 Identify simple prime and composite numbers.
620 Identify and explore square numbers.
621 Identify and explore simple square roots.
622 Identify common factors and multiples.
623 Write whole numbers in exponential form.

Looking back: What the 5th class programme covered

1. Identifying simple prime and composite numbers.
2. Identifying square and rectangular numbers.
3. Identifying factors and multiples.

Maths skills used in this topic

1. **Applying and problem-solving:** Plan and implement solutions to problems in a variety of contexts.
2. **Communicating and expressing:** Communicate and express mathematical ideas, processes and results in oral and written form.
3. **Integrating and connecting:** Make mathematical connections within mathematics itself, throughout other subjects, and in applications of mathematics in practical everyday contexts.
4. **Reasoning:** Reason, investigate and hypothesise with patterns and relationships in mathematics.

Concrete materials

Calculators, squared paper, 100 squares, peg boards

Vocabulary

Prime number, factor, odd number, even number, predict, composite number, classify, square number, square root, 5 squared, 7th square number, exponential form, exponents, indices, 2 cubed, find the value of, megabytes, gigabytes, terabytes, multiples, lowest common multiple, first 6 multiples, factor pairs, common factor, highest common factor, the power of 4, product

Teaching points

1. A lot of this chapter is very language based and the children will revise vocabulary to which they were introduced in 5th class (prime and composite numbers, square numbers, etc.) but now they will be introduced to new labels which will become familiar to them during 6th class and into secondary school, e.g. multiples, lowest common multiple, factors, highest common factor, square root, indices, exponential form, power of numbers, etc.

2. The children will enjoy exploring square numbers. Drawing their construction will consolidate the concept for the children. It is important that they actually draw out the squares numbers in dots in order to see each number's shape emerge.
3. The children should also be encouraged to explore larger numbers by using a calculator.

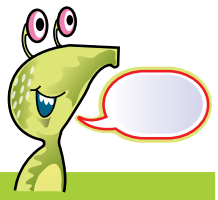
Oral and mental activities

Counting stick:

Counting in 2s, 3s, 4s, etc. forwards and backwards and starting at various numbers.

Fans:

Show the 1st, 2nd, 3rd square number. In pairs ask each other the square root of 4, 9, 25, etc. Show a prime number. Show factors for various numbers. What is the product of various factors? Show 2 to the power of 2, 2 to the power of 3, 4, 5, etc.



Loop game (see Folens Online resources):

Square roots

Topic suggestions

1. Use a peg board or a Geoboard to show the following square numbers: 4, 9, 16, 100, 25, 36, 49, 64, 81.
2. Use a peg board or a Geoboard to show composite numbers in a few different ways, e.g.
   $32 = 8 \times 4$ $\quad$ $24 = 12 \times 2$
   $= 16 \times 2$ $\quad$ $= 6 \times 4$
   $= 3 \times 8$
3. Identify and record prime numbers with the Sieve of Eratosthenes.
4. Pair work: Ask each other what is the square roots of 4, 9, 25, 36, 49, 64, 81, 100. Then have a timed contest amongst the whole class.
5. Ensure the children realise the difference between (3×2) and (3^2).
6. Pose mental and written questions based on area. For example: What is the area of a square garden when each side of the garden measures 8 metres? What is the length of 1 side of a square kitchen when the area of the kitchen is $25m^2$?
7. More difficult questions (based on the previous question) can be put to the children when they use calculators. For example: Find $\sqrt{4,225}$, $\sqrt{6,889}$, $\sqrt{5,041}$, $\sqrt{1,764}$.
8. Find the area of a square whose sides measures 56cm, 78cm, 49cm and 36cm.
9. On a 100 square colour all the multiples of 2 blue. List the multiples.
   On a 100 square colour all the multiples of 3 green. List the multiples.
   On a 100 square colour all the multiples of 4 yellow. List the multiples.
   On a 100 square colour all the multiples of 5 pink. List the multiples.
   On a 100 square colour all the multiples of 6 red. List the multiples.
   On a 100 square colour all the multiples of 7 orange. List the multiples.
   On a 100 square colour all the multiples of 8 purple. List the multiples.
   On a 100 square colour all the multiples of 9 brown. List the multiples.
   On a 100 square colour all the multiples of 10 black. List the multiples.
10. List common multiples of 2 and 3, 3 and 4, 4 and 5, 6 and 8, 6 and 7, 3 and 9, etc.
11. The teacher plays Fantastic Factors with the class. The teacher calls out the factors of a number. The first child to correctly identify the number wins a point. If the incorrect number is guessed, the child loses a point. The child with the most points wins.

Activity A

1. Name the first 4 multiples of 5. (5, 10, 15, 20)
2. What number multiplied by itself will give me 25? (5)
3. What is the first prime number? (2)
4. Prime numbers are divisible by itself and what number? (1)
5. Show 16 as a square number. (2nd from left)
6. What are the factors of 8? (1, 2, 4, 8)
7. Show the 4th triangular number; what is it? (5th from left)
8. 2 x 2 x 2 = ____. (8)
9. Write out the first 4 multiples of 2. (2, 4, 6, 8)

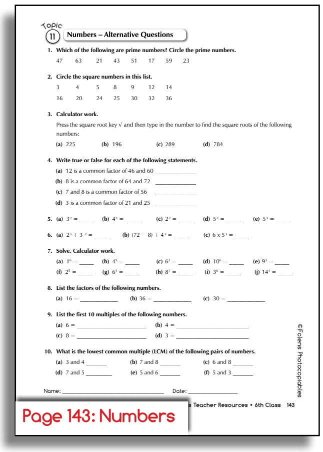
Differentiation

Lower attainers:

Separate activity sheet

Higher attainers:

Separate activity sheet



Topic 11 Numbers – Alternative Questions

1. Which of the following are prime numbers? Circle the prime numbers.
   47 63 21 43 51 17 59 23
2. Circle the square numbers in this list.
   3 4 5 8 9 12 14
   16 20 24 25 30 32 36
3. Calculator work.
   Press the square root key √ and then type in the number to find the square roots of the following numbers:
   (a) 225 (b) 196 (c) 289 (d) 784
4. Write true or false for each of the following statements.
   (a) 12 is a common factor of 46 and 60 ____
   (b) 8 is a common factor of 64 and 72 ____
   (c) 7 and 8 is a common factor of 56 ____
   (d) 3 is a common factor of 21 and 25 ____
5. (a) 3^2 = ____ (b) 4^3 = ____ (c) 2^2 = ____ (d) 5^2 = ____ (e) 5^3 = ____
6. (a) $2^3 + 3^2$ = ____ (b) $(72 \div 8) + 4^3$ = ____ (c) 6×5^3 = ____
7. Solve. Calculator work.
   (a) 1^6 = ____ (b) 4^9 = ____ (c) 6^3 = ____ (d) 10^6 = ____ (e) 9^3 = ____
   (f) 2^5 = ____ (g) 6^4 = ____ (h) 8^1 = ____ (i) 3^6 = ____ (j) 14^4 = ____
8. List the factors of the following numbers.
   (a) 16 = ____ (b) 36 = ____ (c) 30 = ____
9. List the first 10 multiples of the following numbers.
   (a) 6 = ____ (b) 4 = ____
   (c) 8 = ____ (d) 3 = ____
10. What is the lowest common multiple (LCM) of the following pairs of numbers.
    (a) 3 and 4 ____ (b) 7 and 8 ____ (c) 6 and 8 ____
    (d) 7 and 5 ____ (e) 5 and 6 ____ (f) 5 and 3 ____

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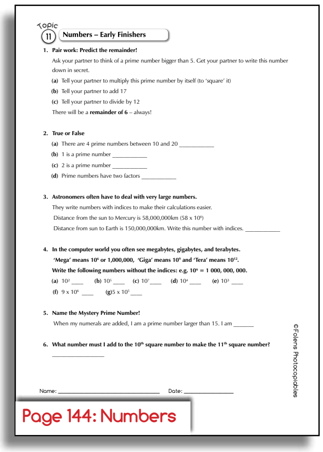

Topic 11 Numbers – Early Finishers

1. Pair work: Predict the remainder!
   Ask your partner to think of a prime number bigger than 5. Get your partner to write this number down in secret.
   (a) Tell your partner to multiply this prime number by itself (to 'square' it)
   (b) Tell your partner to add 17
   (c) Tell your partner to divide by 12
   There will be a **remainder of 6** – always!
2. True or False
   (a) There are 4 prime numbers between 10 and 20 ____
   (b) 1 is a prime number ____
   (c) 2 is a prime number ____
   (d) Prime numbers have two factors ____
3. Astronomers often have to deal with very large numbers.
   They write numbers with indices to make their calculations easier.
   Distance from the sun to Mercury is 58,000,000km (58×10^6)
   Distance from sun to Earth is 150,000,000km. Write this number with indices. ____
4. In the computer world you often see megabytes, gigabytes, and terabytes.
   'Mega' means 10^6 or 1,000,000, 'Giga' means 10^9 and 'Tera' means 10^{12}.
   Write the following numbers without the indices: e.g. 10^9 = 1 000, 000, 000.
   (a) 10^2 ____ (b) 10^5 ____ (c) 10^7 ____ (d) 10^4 ____ (e) 10^3 ____
   (f) 9×10^6 ____ (g) 5×10^5 ____
5. Name the Mystery Prime Number!
   When my numerals are added, I am a prime number larger than 15. I am ____
6. What number must I add to the 10^{th} square number to make the 11^{th} square number?
   ____

Name: ____ Date: ____

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Linkage

Algebra: Rules and properties
Shape and Space: 2D shapes
Number: Operations (multiplication, division)

Integration

SESE Geography: The planets – distances from the sun
SESE Science: Astronomy, computers

Maths at home/parental involvement

1. Note distances of planets from the sun – in real terms and written in exponents.
2. Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s.
3. Make a quiz game: Who is the first to say all the factors of 15, 21, 46? What is the root of: 64, 81, 25, 36, 100?