Grade 7 Mathematics

Terms 1, 2 and 3 - notes for 18 topics

IN EVERY TOPIC

- What you will learn and the key words.
- Short, clear notes with worked examples.
- Questions to try and a topic test, with the answers at the back.

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Strand 1.0 Numbers | Term 1

1.1 Whole Numbers

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- use place value and total value of digits up to hundreds of millions in real life
- read and write numbers in symbols up to hundreds of millions in real-life situations
- read and write numbers in words up to millions for fluency
- round off numbers up to the nearest hundreds of millions in real-life situations
- classify natural numbers as even, odd and prime in different situations
- apply operations of whole numbers in real life
- identify number sequences in different situations
- create number sequences for playing number games

KEY WORDS

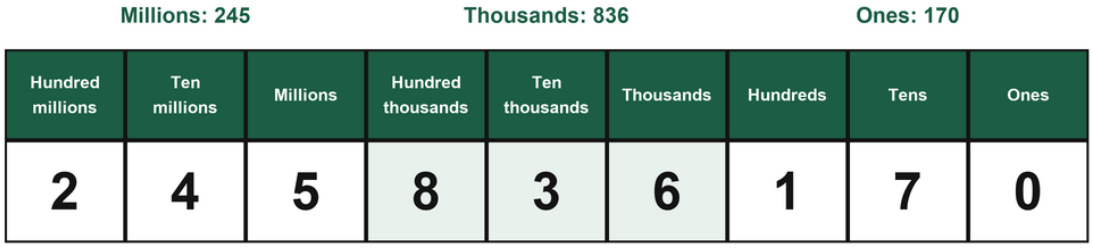
digit, place value, total value, hundreds of millions, round off, natural number, even, odd, prime, sequence, term.

1. Place value up to hundreds of millions

Placing 245,836,170 on a place value chart

Hundred millions 2 | Ten millions 4 | Millions 5 | Hundred thousands 8 | Ten thousands 3 | Thousands 6 | Hundreds 1 | Tens 7 | Ones 0.

Digits are grouped in threes from the right: ones (170), thousands (836), millions (245).



245,836,170: groups of three digits from the right.

245,836,170 on a place value chart

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2. Total value up to hundreds of millions

Total value = digit × value of its place

In 627,401,350: 6 × 100,000,000 = 600,000,000; 2 × 10,000,000 = 20,000,000; 7 × 1,000,000 = 7,000,000.

4 × 100,000 = 400,000; 1 × 1,000 = 1,000; 3 × 100 = 300; 5 × 10 = 50.

Expanded form: 600,000,000 + 20,000,000 + 7,000,000 + 400,000 + 1,000 + 300 + 50 = 627,401,350.

3. Writing numbers in symbols

From words to symbols

Write each group of three: millions group = 304; thousands group = 060; ones group = 012.

Answer: 304,060,012.

Every group except the first must have three digits; fill gaps with zeros.

4. Writing numbers in words

From symbols to words: 7,450,318

Millions group: seven million. Thousands group: four hundred and fifty thousand. Ones group: three hundred and eighteen.

Answer: seven million, four hundred and fifty thousand, three hundred and eighteen.

Use "and" before the tens and ones in each group, and a hyphen in numbers like twenty-one.

5. Writing dummy cheques

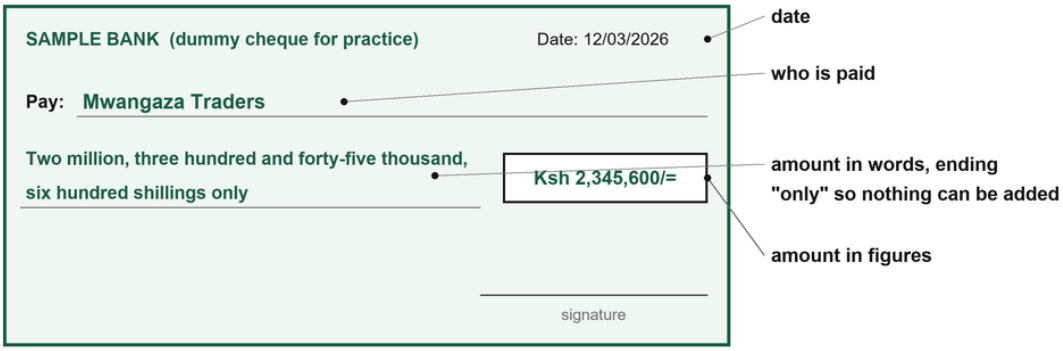
Filling a dummy cheque for Ksh 2,345,600

Pay: name of the person or company.

Amount in words: Two million, three hundred and forty-five thousand, six hundred shillings only.

Amount in figures: Ksh 2,345,600/=

Words make it hard to change the amount; "only" stops anyone adding to it.



Words make it hard to change the amount.

Filling in a dummy cheque

6. Rounding off to the nearest ten, hundred and thousand

Rule: look at the digit to the right of the rounding place

If it is 5 or more, add 1 to the rounding digit; if it is less than 5, keep it. Fill the places to the right with zeros.

48,763 to the nearest 10: the ones digit is 3, so 48,760.

48,763 to the nearest 100: the tens digit is 6, so 48,800.

48,763 to the nearest 1,000: the hundreds digit is 7, so 49,000.

7. Rounding off to the nearest ten thousand, hundred thousand and million

Rounding 47,564,296

To the nearest 10,000: the thousands digit is 4, so 47,560,000.

To the nearest 100,000: the ten thousands digit is 6, so 47,600,000.

To the nearest 1,000,000: the hundred thousands digit is 5, so 48,000,000.

8. Rounding off to the nearest ten million and hundred million

Rounding 362,750,000

To the nearest 10,000,000: the millions digit is 2, so 360,000,000.

To the nearest 100,000,000: the ten millions digit is 6, so 400,000,000.

In teams: make a place value chart, pick a 9-digit number card and round it to three different places.

9. Even and odd numbers

Even and odd

An even number can be divided by 2 exactly; it ends in 0, 2, 4, 6 or 8.
An odd number leaves 1 when divided by 2; it ends in 1, 3, 5, 7 or 9.
Only the last digit matters: 4,567,238 ends in 8, so it is even.
Even + even = even (4 + 6 = 10); odd + odd = even (3 + 5 = 8); even + odd = odd (4 + 3 = 7).

10. Prime numbers

Prime numbers

A prime number has exactly two factors: 1 and itself. 7 = 1 × 7 only, so 7 is prime.
12 = 1 × 12 = 2 × 6 = 3 × 4, so 12 is not prime (it is composite).
1 is not prime (it has one factor). 2 is the only even prime.
Primes up to 50: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47.
Game: on a 1-100 grid, cross out 1, then multiples of 2, 3, 5 and 7 (not the numbers themselves); the rest are prime.

11. Addition of whole numbers

Adding in columns

Line up the ones, tens, hundreds ... and add from the right, carrying when a column passes 9.
2,450,800 + 1,875,650 = 4,326,450.
Check by estimating: about 2,500,000 + 1,900,000 = 4,400,000, which is close.

12. Subtraction of whole numbers

Subtracting with regrouping

Line up the columns and subtract from the right, borrowing from the next column when needed.
5,000,000 - 3,264,580 = 1,735,420.
Check by adding: 1,735,420 + 3,264,580 = 5,000,000.

13. Multiplication of whole numbers

Long multiplication: 4,250 × 236

4,250 × 200 = 850,000.
4,250 × 30 = 127,500.
4,250 × 6 = 25,500.
Add: 850,000 + 127,500 + 25,500 = 1,003,000.
So 4,250 × 236 = 1,003,000.

14. Division of whole numbers

Long division: 1,560,000 ÷ 24

24 into 156 goes 6 times (144), remainder 12; bring down 0 to make 120.
24 into 120 goes 5 times exactly; bring down the remaining zeros.
1,560,000 ÷ 24 = 65,000.
Check: 65,000 × 24 = 1,560,000.

15. Order of operations

Order: Brackets, Of, Division and Multiplication (left to right), Addition and Subtraction (left to right), called BODMAS.

20 - 4 × 3: multiply first, 4 × 3 = 12, then 20 - 12 = 8.

36 ÷ 4 + 5: divide first, 36 ÷ 4 = 9, then 9 + 5 = 14.

(20 - 4) × 3: brackets first, 16 × 3 = 48.

16. Three or more combined operations

8 + (12 - 4) × 3

Brackets: 12 - 4 = 8.

Multiply: 8 × 3 = 24.

Add: 8 + 24 = 32.

Another: 45 ÷ 5 × 2 + 7 - 3. Division then multiplication left to right: 45 ÷ 5 = 9, 9 × 2 = 18; then 18 + 7 = 25, 25 - 3 = 22.

17. Combined operations in real-life problems

Writing one expression

Total cost = 12 × 650 + 400.

Multiply first: 12 × 650 = 7,800. Then 7,800 + 400 = 8,200.

If the trader shares the soda among 4 shops, crates per shop = 12 ÷ 4 = 3.

Check answers with a calculator on a phone or computer if one is available.

18. Identifying number sequences

Finding the rule

Find the difference between neighbouring terms: 7 - 3 = 4, 11 - 7 = 4, 15 - 11 = 4.

Rule: add 4. Next terms: 15 + 4 = 19, 19 + 4 = 23.

A decreasing sequence: 90, 82, 74, 66 ... rule: subtract 8; next: 58.

19. Sequences with multiplying and other patterns

Other kinds of rules

Multiplying: 2, 6, 18, 54: each term × 3. Next: 54 × 3 = 162.

Dividing: 640, 320, 160, 80: each term ÷ 2. Next: 40.

Square numbers: 1, 4, 9, 16, 25: 1 × 1, 2 × 2, 3 × 3 ... Next: 36.

Growing differences: 1, 3, 6, 10, 15: add 2, 3, 4, 5 ... Next: 21.

20. Creating number sequences and puzzles

Make a sequence puzzle

1. Choose a starting number and a rule (for example start at 7, add 6).
2. Write five terms: 7, 13, 19, 25, 31.
3. Hide one or two terms: 7, 13, __, 25, __.
4. Swap with a partner and solve each other's puzzle; the partner states the rule.

Team game: a group makes number cards for a sequence, shuffles them and another group puts them in order.

TRY THESE

1. Write the place value of 7 in 731,045,286.
2. Write the place value of 9 in 409,120,537.
3. What is the total value of 8 in 842,105,600?
4. What is the total value of 5 in 315,240,000?
5. Write in symbols: five hundred and twenty million, four hundred thousand.
6. Write in symbols: eighty-one million, three thousand and seven.
7. Write 3,206,000 in words.
8. Write 9,040,015 in words.
9. Write Ksh 1,250,000 in words for a cheque.
10. Write in figures: four million, sixty thousand shillings only.
11. Round 6,347 to the nearest 10.
12. Round 12,451 to the nearest 100.
13. Round 3,285,000 to the nearest 100,000.
14. Round 15,642,800 to the nearest 1,000,000.
15. Round 548,200,000 to the nearest 100,000,000.
16. Round 87,300,000 to the nearest 10,000,000.
17. Is 3,407,215 even or odd?
18. Is 9,000,006 even or odd?
19. Is 51 prime? Explain.
20. List the prime numbers between 50 and 70.
21. 345,218 + 607,594 = ?
22. 4,080,705 + 2,919,295 = ?
23. 806,450 - 359,782 = ?
24. 10,000,000 - 4,628,315 = ?
25. 3,465 × 24 = ?
26. 1,208 × 305 = ?
27. 8,736 ÷ 12 = ?
28. 45,375 ÷ 125 = ?
29. 15 + 6 × 4 = ?
30. 72 ÷ 8 - 3 = ?
31. 60 - (18 + 12) ÷ 6 = ?
32. 7 × 8 - 24 ÷ 3 + 5 = ?
33. Amina buys 3 books at Ksh 450 and a pen at Ksh 30. What does she pay?
34. A tank holds 5,000 litres. 8 families each take 450 litres. How much is left?
35. Next two terms: 5, 12, 19, 26, ...
36. Next two terms: 100, 91, 82, 73, ...
37. Next term: 3, 12, 48, 192, ...
38. Next term: 1,000, 500, 250, 125, ...
39. Complete: 11, 17, __, 29, __
40. Complete: 3, 6, 12, __, 48

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TOPIC TEST

T1. Using 3, 8, 1, 0, 6, 5, 9, 2, 7 once each, make the largest 9-digit number.

T2. A digit 6 has total value 60,000,000. In which place is it?

T3. How many zeros are in one hundred million?

T4. Write 25,000,025 in words.

T5. A cheque reads "Ksh 3,005,000" and "Three million and five hundred shillings". What is wrong?

T6. Give a number that rounds to 5,000 to the nearest 1,000 and to 4,600 to the nearest 100.

T7. Why do reports often round population figures?

T8. What is the smallest whole number that rounds to 300,000,000 to the nearest 100,000,000?

T9. Is 25 × 4 even or odd? Explain.

T10. Write 30 as the sum of two prime numbers in two ways.

T11. Find two 6-digit numbers that add up to 1,000,000 using no zero digits.

T12. The difference of two numbers is 250,000 and the larger is 1,000,000. Find the smaller.

T13. Which is greater: 999 × 101 or 1,001 × 99?

T14. What number multiplied by 48 gives 102,000?

T15. Put brackets in 6 + 4 × 5 - 2 to make it equal 48.

T16. Use 2, 3, 4 and 5 once each with any operations and brackets to make 24.

T17. Write your own shopping problem that needs three operations, and solve it.

T18. The 1st term is 6 and the rule is add 5. What is the 10th term?

T19. Find the next term of 1, 1, 2, 3, 5, 8, ...

T20. Create a puzzle whose rule is "multiply by 2, then add 1". Start at 1.

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