Grade 5 Mathematics

Terms 1, 2 and 3 - notes for 19 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 thousands in different situations
- read and write numbers up to tens of thousands in words in different situations
- order numbers up to tens of thousands in different situations
- round off numbers up to tens of thousands to the nearest hundred and thousand in different situations
- apply divisibility tests of 2, 5 and 10 in real-life situations
- determine Highest Common Factor (HCF) and Greatest Common Divisor (GCD) in different situations
- determine Least Common Multiple (LCM) in real-life situations

KEY WORDS

digit, place value, total value, hundreds of thousands, ascending, descending, round off, divisible, divisibility test.

1. Place value up to hundreds of thousands

Placing 254,318 on a place value chart

Hundred thousands 2 | Ten thousands 5 | Thousands 4 | Hundreds 3 | Tens 1 | Ones 8.

Read the places from the right: ones, tens, hundreds, then thousands, ten thousands, hundred thousands.

The comma separates the thousands group (254) from the ones group (318), which helps us read the number.

Thousands group: 254 **Ones group: 318**

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
2	5	4	3	1	8

254,318 = two hundred and fifty-four thousand, three hundred and eighteen

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2. Total value of a digit

Total value = digit × value of its place

In 254,318: 2 × 100,000 = 200,000; 5 × 10,000 = 50,000; 4 × 1,000 = 4,000.

3 × 100 = 300; 1 × 10 = 10; 8 × 1 = 8.

Check: 200,000 + 50,000 + 4,000 + 300 + 10 + 8 = 254,318.

3. Expanding numbers using total value

Writing 135,240 in expanded form

135,240 = 100,000 + 30,000 + 5,000 + 200 + 40.

The 0 in the ones place has total value 0, so it does not appear in the sum.

Going back: 600,000 + 8,000 + 70 + 3 = 608,073. Put 0 in any empty place.

4. Place value and total value in real-life numbers

Reading digits in a real number

In 120,500 the 2 is in the ten thousands place, so its total value is 2 × 10,000 = 20,000.

If the 2 moved to the hundreds place (100,520), it would be worth only 2 × 100 = 200.

So the same digit can be worth very different amounts. Its place decides its worth.

5. Place value and total value: review and problems

Solving a number riddle

Draw the six columns. Put 3 under hundred thousands and 7 under thousands.
Fill the other four columns with 0: 307,000.
Check: 300,000 + 7,000 = 307,000.

6. Reading numbers up to tens of thousands in words

Reading 45,207

Read the group before the comma first: 45 is "forty-five", then say "thousand".
Read the group after the comma: 207 is "two hundred and seven".
Together: forty-five thousand, two hundred and seven.

7. Writing numbers up to tens of thousands in words

Writing 63,815 in words

Thousands group: 63 is "sixty-three thousand".
Ones group: 815 is "eight hundred and fifteen".
Answer: sixty-three thousand, eight hundred and fifteen. Check the spellings: forty, ninety, fifteen, thousand.

8. Writing numbers in figures from words

Writing "seventy thousand and six" in figures

Thousands group: seventy thousand gives 70 before the comma.
Ones group: six has no hundreds and no tens, so write 006.
Answer: 70,006 (not 706 or 7,006).

9. Comparing numbers up to tens of thousands

Comparing 34,560 and 34,650

Compare from the left. Ten thousands: 3 and 3, the same. Thousands: 4 and 4, the same.
Hundreds: 5 and 6. Since 6 is greater, 34,650 is greater.
So 34,650 is greater than 34,560, and 34,560 is less than 34,650.

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10. Ordering numbers in ascending and descending order

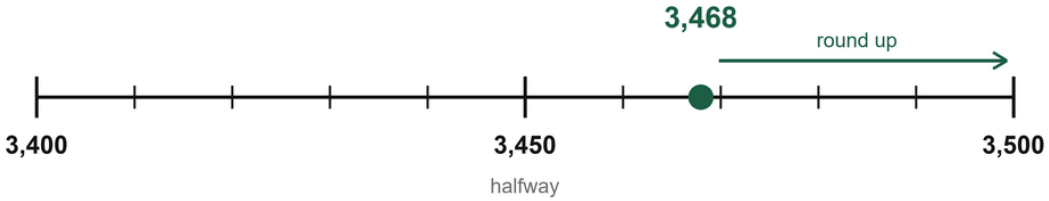
Ordering 23,410; 23,140; 24,310; 21,430

Ten thousands are all 2. Thousands: 3, 3, 4, 1. So 21,430 is smallest and 24,310 largest.
For the two with 3 thousands, compare hundreds: 4 and 1, so 23,140 comes before 23,410.
Ascending (smallest first): 21,430; 23,140; 23,410; 24,310. Descending is the reverse.

11. Rounding off to the nearest hundred

Rounding 3,468 to the nearest hundred

3,468 lies between 3,400 and 3,500. Look at the tens digit: 6.
If the tens digit is 5 or more, round up; if it is 4 or less, round down.
The tens digit is 6, so 3,468 rounds up to 3,500.



3,468 is past halfway (3,450), so it is nearer 3,500.

12. Rounding off to the nearest thousand

Rounding 23,712 to the nearest thousand

23,712 is between 23,000 and 24,000. Look at the hundreds digit: 7.
7 is 5 or more, so round up: 24,000.
To the nearest hundred the same number is 23,700 (the tens digit 1 means round down).

13. Rounding off 5-digit numbers to the nearest hundred and thousand

Rounding 46,550 two ways

Nearest hundred: tens digit is 5, so round up to 46,600.
Nearest thousand: hundreds digit is 5, so round up to 47,000.
Rounding to the nearest thousand gives a rougher answer than rounding to the nearest hundred.

14. Divisibility test of 2

The test for 2: look at the ones digit

A number is divisible by 2 if its ones digit is 0, 2, 4, 6 or 8 (an even digit).
346 ends in 6, so it is divisible by 2: 346 ÷ 2 = 173.
1,357 ends in 7, so it is not divisible by 2.

15. Divisibility tests of 5 and 10

The tests for 5 and 10

Divisible by 5: the ones digit is 0 or 5. 135 ends in 5, so 135 ÷ 5 = 27.
Divisible by 10: the ones digit is 0. 135 does not end in 0, so it is not divisible by 10.
240 ends in 0, so it is divisible by 10, by 5 and by 2.

16. Using the tests of 2, 5 and 10 together

Sorting 60, 75, 84 and 91

60 ends in 0: divisible by 2, 5 and 10.
75 ends in 5: divisible by 5 only. 84 ends in 4: divisible by 2 only.
91 ends in 1: divisible by none of 2, 5 or 10.

17. Factors and the Highest Common Factor (HCF)

Finding the HCF of 12 and 18

Factors of 12: 1, 2, 3, 4, 6, 12. Factors of 18: 1, 2, 3, 6, 9, 18.
Common factors: 1, 2, 3 and 6. The highest is 6, so the HCF of 12 and 18 is 6.
The HCF is also called the Greatest Common Divisor (GCD): the biggest number that divides both exactly.

18. Using the HCF in real-life situations

Cutting 24 m and 36 m of cloth into the longest equal pieces with none left

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24. Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36.

The HCF is 12, so each piece is 12 m long: 2 pieces from the 24 m cloth and 3 pieces from the 36 m cloth.

Use the HCF when sharing things into the LARGEST equal groups or pieces with nothing left over.

19. Multiples and the Least Common Multiple (LCM)

Finding the LCM of 4 and 6

Multiples of 4: 4, 8, 12, 16, 20, 24, ... Multiples of 6: 6, 12, 18, 24, ...

Common multiples: 12, 24, ... The least is 12, so the LCM of 4 and 6 is 12.

The LCM is the smallest number that both numbers divide into exactly.

20. HCF and LCM in real life: review

Two bells ringing together

Multiples of 6: 6, 12, 18, 24, ... Multiples of 8: 8, 16, 24, ...

The LCM is 24, so they ring together again after 24 minutes, at 8:24.

Use the LCM when things repeat and we want to know when they MEET again; use the HCF to share into the LARGEST equal parts.

Whole numbers are used every day: counting money, reading timetables, packing goods and planning events.

TRY THESE

1. Write the place value of 7 in 703,215.
2. Write the place value of 6 in 418,962.
3. What is the total value of 6 in 461,027?
4. What is the total value of 9 in 309,452?
5. Write 427,516 in expanded form.
6. Write 500,000 + 3,000 + 40 + 9 as one number.
7. A lorry carried 18,450 kg of maize. What is the total value of 8?
8. A farmer earned 236,000 shillings. What is the place value of 3?
9. I have 5 in the hundred thousands place, 2 in the hundreds place and 0 everywhere else. Who am I?
10. What is the total value of 4 in 640,000?
11. Read 36,450 in words.
12. Read 80,019 in words.
13. Write 27,640 in words.
14. Write 54,008 in words.
15. Write "fifty-two thousand, three hundred and one" in figures.
16. Write "eighty-one thousand and forty" in figures.
17. Which is greater: 45,098 or 45,980?
18. Which is less: 70,001 or 69,999?
19. Arrange in ascending order: 56,200; 52,600; 56,020.
20. Arrange in descending order: 41,001; 40,110; 41,100.
21. Round 2,743 to the nearest hundred.
22. Round 15,350 to the nearest hundred.
23. Round 6,481 to the nearest thousand.
24. Round 38,500 to the nearest thousand.

25. Round 82,349 to the nearest hundred and to the nearest thousand.
26. Round 19,951 to the nearest hundred and to the nearest thousand.
27. Is 4,518 divisible by 2?
28. Is 9,075 divisible by 2?
29. Is 2,345 divisible by 5?
30. Is 2,345 divisible by 10?
31. Which tests does 450 pass?
32. Which tests does 1,265 pass?
33. Find the HCF of 8 and 12.
34. Find the HCF of 15 and 25.
35. 18 mangoes and 27 oranges are packed into bags, each bag holding the same number of one fruit, as many as possible. How many fruits in each bag?
36. 30 boys and 45 girls are put into equal groups of boys only or girls only, as large as possible. How many in each group?
37. Find the LCM of 3 and 5.
38. Find the LCM of 4 and 10.
39. Two buses leave a stage together at 7:00. One leaves every 10 minutes and the other every 15 minutes. When do they next leave together?
40. Find the HCF of 28 and 42.

TOPIC TEST

T1. Using the digits 9, 0, 3, 5, 1 and 8 once each, make the largest 6-digit number.
T2. A digit 8 has a total value of 800,000 in a number that ends in 5. Give two possible numbers.
T3. Which is larger: 300,000 + 5,000 + 20 or 300,000 + 500 + 200? By how much?
T4. Find a number in a newspaper or on a receipt at home that has six digits. Write the total value of each digit.
T5. Write a riddle for your partner about a 6-digit number and check their answer.
T6. Read 70,070 and 70,700 in words and explain how they differ.
T7. A cheque reads "thirty thousand, three hundred and three". Write the amount in figures.
T8. Write in figures: the number that is one more than "forty-nine thousand, nine hundred and ninety-nine".
T9. Write the smallest 5-digit number greater than 59,999.
T10. Use 4, 0, 7, 2 and 9 once each to make the largest and smallest 5-digit numbers, then write three numbers between them in ascending order.
T11. Write three different numbers that round to 6,200 to the nearest hundred.
T12. What is the smallest whole number that rounds to 45,000 to the nearest thousand?
T13. A number rounds to 8,000 to the nearest thousand and to 7,500 to the nearest hundred. Give one possible number.
T14. Using 3, 4 and 7 once each, make every 3-digit number that is divisible by 2.
T15. Find a number between 70 and 90 that is divisible by 2, 5 and 10.
T16. Why is every number that ends in 0 divisible by both 2 and 5?
T17. Find the HCF of 24, 36 and 60.
T18. A farmer has 42 kg of beans and 56 kg of maize to pack in bags of the same mass, as heavy as possible. What mass is each bag?
T19. Find the LCM of 8 and 12.
T20. Three lights flash every 2, 3 and 5 seconds. They flash together now. After how many seconds will they flash together again?

Strand 1.0 Numbers | Term 1

1.2 Addition

WHAT YOU WILL LEARN

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

- add up to three 6-digit numbers without regrouping up to a sum not exceeding 1,000,000 in different situations
- add up to two 6-digit numbers with double regrouping with the sum not exceeding 1,000,000 in different situations
- estimate sum by rounding off the addends to the nearest hundred and thousand in different situations
- create patterns involving the addition of numbers up to a sum of 1,000,000 in real-life situations

KEY WORDS

add, sum, total, addend, regroup, carry, estimate, pattern.

1. Adding up to three 6-digit numbers without regrouping

Adding 213,401 + 342,152 + 124,335

Write the numbers one under another so that ones are under ones, tens under tens and so on.

Add each column from the right: ones 1 + 2 + 5 = 8, tens 0 + 5 + 3 = 8, hundreds 4 + 1 + 3 = 8.

Thousands 3 + 2 + 4 = 9, ten thousands 1 + 4 + 2 = 7, hundred thousands 2 + 3 + 1 = 6. Total: 679,888.

2. Adding two 6-digit numbers with regrouping

Adding 456,378 + 287,465

Ones: 8 + 5 = 13, write 3 and carry 1 ten. Tens: 7 + 6 + 1 = 14, write 4 and carry 1.

Hundreds: 3 + 4 + 1 = 8. Thousands: 6 + 7 = 13, write 3 and carry 1. Ten thousands: 5 + 8 + 1 = 14, write 4 and carry 1.

Hundred thousands: 4 + 2 + 1 = 7. Answer: 743,843.

3. Addition with regrouping in real-life problems

A factory packed 186,575 packets of milk in January and 237,848 in February. How many in the two months?

The word "in the two months" tells us to find the total, so we add.

186,575 + 237,848: ones 5 + 8 = 13, tens 7 + 4 + 1 = 12, hundreds 5 + 8 + 1 = 14, thousands 6 + 7 + 1 = 14, ten thousands 8 + 3 + 1 = 12, hundred thousands 1 + 2 + 1 = 4.

Answer: 424,423 packets.

4. Estimating sums by rounding off

Estimating 34,682 + 27,415

To the nearest thousand: 35,000 + 27,000 = 62,000.

To the nearest hundred: 34,700 + 27,400 = 62,100.

The exact sum is 62,097, which is close to both estimates, so it is reasonable.

5. Creating patterns in addition

Finding and continuing a pattern

From 125,000 to 150,000 the number grows by 25,000, and again from 150,000 to 175,000.

The rule is "add 25,000". Next: 175,000 + 25,000 = 200,000, then 225,000.

Make your own: start at 400,000 and add 50,000: 400,000; 450,000; 500,000; 550,000.