Place value, ordering and rounding (whole numbers)

Remember

Place value

The ten digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are used to build up numbers.

M	HTh	TTh	Th	H	T	U
1	0	0	0	0	0	0

Read as one million.

Multiplying and dividing by 10 and 100

When you **multiply** numbers by 10 / 100 / 1000 all the digits move 1 / 2 / 3 places to the **left**.
When you **divide** numbers by 10 / 100 / 1000 all the digits move 1 / 2 / 3 places to the **right**.

Comparing numbers

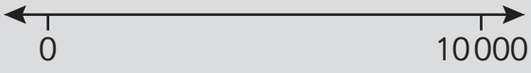
= means **is equal to**, < means **is less than** and > means **is greater than**.

Rounding numbers

When rounding to the nearest 10 look at the units digit, when rounding to the nearest 100 look at the tens digit and when rounding to the nearest 1000 look at the hundreds digit, so 8364 rounds down to 8000.

Positioning numbers on a blank number line

Example:
Draw an arrow to mark the position of 3500 on the blank number line.



Answer:

It is helpful to mark 5000 halfway along the line.

1 Here is a place-value chart.

100 000	200 000	300 000	400 000	500 000	600 000	700 000	800 000	900 000
10 000	20 000	30 000	40 000	50 000	60 000	70 000	80 000	90 000
1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

What number is represented on the chart?
Write the number in words and in figures. _____

_____

What does the digit 6 represent in the number 654 321? _____

Hint: You will need to write 6 followed by one of:
hundred thousand, ten thousand, thousand, hundred, tens, units

2 Here are four numbers.

9009 90 009

9 000 009 9 000 009

Circle the number ninety thousand and nine.

3 Complete each calculation.

☐ × 1000 = 35 000 ☐ ÷ 1000 = 606

68 000 ÷ ☐ = 68 10 100 ÷ ☐ = 101

☐ × 100 = 480 000 ☐ × 100 = 90 100

4 Complete this table to show the numbers rounded to the nearest 1000.

	rounded to the nearest 1000
515	
5151	
51 515	
515 151	

5 Circle the number that is nearest to 10 000.

10 060 11 000 9960 9909

Hint: The number could be greater or less than 10 000.

6 Find your height, in millimetres.

Round to the nearest 10 mm. _____

Round to the nearest 100 mm. _____

Round to the nearest 1000 mm. _____

7 Use the digits 3, 4, 5 and 6 to make the four-digit number that is nearest to 4000.

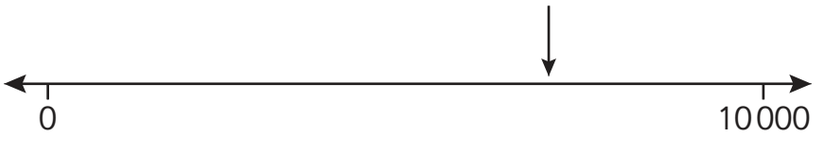
8 Use one of the signs <, > or = to make these number sentences correct.

5 × 1000 ☐ 50 000 ÷ 10

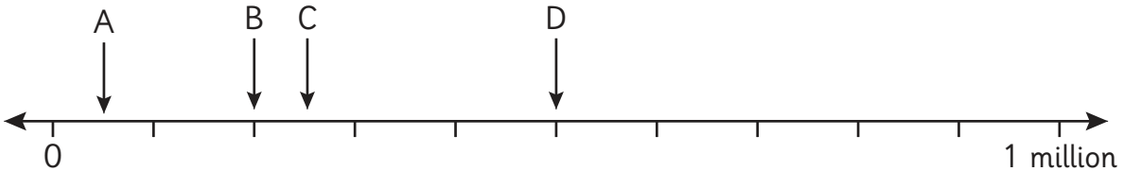
5005 ☐ 50 000 ÷ 10

500 × 1000 ☐ 1 million

9 Estimate the number marked by the arrow on the number line.



10 This number line is from zero to one million.
Write the letter of the arrow that points to the number 50 000. _____



Multiples, factors, odd and even numbers

Remember

Finding common multiples

List the **multiples**, then inspect the lists to find the common multiples.

Example: Find common multiples of 4 and 5:
Multiples of 4: 4, 8, 12, 16, **20**, 24, 28, 32, 36, **40** …
Multiples of 5: 5, 10, 15, **20**, 25, 30, 35, **40** …

20 and 40 are **common multiples** of 4 and 5. 20 is the **lowest common multiple** of 4 and 5.

A **general statement** is a rule that always works.

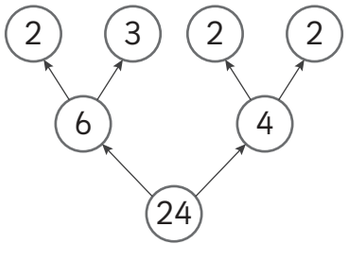
You might be asked to find examples that match a general statement or find a counter-example to show that a statement is false.

Example: The sum of three odd numbers is always odd.
Particular case: 1 + 3 + 5 = 9
General case: odd + odd + odd = odd

You will need: a set of 1–10 number cards and a set of target number cards from Resource 1, page 81, for activity 2; a set of 1–10 number cards for activity 3; keep the additional 0 and 5 cards for Unit 15

Vocabulary
odd, even, multiple, common multiple, factor, general statement, product, prime number

1 You can use a factor tree to find factors of two-digit numbers, for example:



Hint: Be careful not to confuse **factors** with **multiples**. Use a dictionary to check the meaning of mathematical words if you are unsure.

You know you have completed the factorisation when the numbers on the top row are all prime numbers.

Build up factor trees for these numbers.

18 20 32

36 40 48

2 Finding factors – a game for two players

Use the 1–10 number cards and target number cards:

12	14	15	16	18	20	21	24
25	27	30	32	36	40	42	

Shuffle the target cards and place them face down in a pile. Shuffle and share out the 1–10 number cards between the players. Turn over the first target card. Each player looks at their number cards to see if they have a card that is a factor of the target number; if so they put it down in front of them. Players can only play one card each turn. Play continues until one player has laid down all their number cards. This player is the winner.

Hint: You have drawn factor trees for some of the target numbers in activity 1.
You might find it useful to draw factor trees for the other numbers.
Some of the 1–10 cards are more useful than others.
Which is a useful card to have?

3 Odd and evens – a game for two players

Players are designated A and B. Each player shuffles their 1–10 number cards and places them face down in a pile.

Both players turn over the top card from their pile. If the product is even player A gets a point, if the product is odd player B gets a point. The first player to 10 points wins the game.

Hint: Would you rather be player A or player B?

Look at the results for some of the calculations.
The even products are shaded.

×	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

Complete these general statements about the products of odd and even numbers:

odd × odd = _____

odd × even or even × odd = _____

even × even = _____

4 The example shows a way of finding common multiples by writing the first ten multiples for each pair of numbers, then circling the common multiples.

4	6
4	6
8	(12)
(12)	18
16	(24)
20	30
(24)	(36)
28	42
32	48
(36)	54
40	60

Draw similar diagrams for these pairs of numbers.

2	5

3	4

4	7

3	10

Prime numbers

Remember

A prime number has exactly two factors.

NOTE: 1 is **not** a prime number. It has only one factor (1)
Examples of prime numbers: 2, 3, 5, 7, 11, 13, 17, 19

Vocabulary
prime number, factor

1 Here is a number grid from 1 to 100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Use the grid. Follow these instructions.

- Cross out the number 1.
- Shade in all the multiples of 2 except 2.
- What do you notice? Can you explain what you see?
- Shade in all the multiples of 3 except 3.
- Some numbers had already been crossed out. Which ones?
- Shade all the multiples of 5 except 5, then 7 except 7. What do you notice?

Now look at your grid. What is special about the numbers that you have not crossed out?

The process you have followed is known as the Sieve of Eratosthenes after the Greek mathematician who first used the idea to find prime numbers up to 100.

2 Find two different prime numbers that total 9.

☐ + ☐ = 9

Find two different prime numbers that total 16.

☐ + ☐ = 16

3 Use the clues to find the two prime numbers less than 20.

Prime number 1: This prime number added to 3 is a multiple of 8. _____

Prime number 2: This prime number is one more than a multiple of 4. _____

Hint: Try listing all the prime numbers less than 20 and cross out the ones that do not satisfy the clue.

4 Shade all the prime numbers in this grid.

What letter is revealed? _____

14	2	13	5	8
15	3	1	11	15
1	11	19	7	6
9	17	9	15	12
12	5	16	4	14

5 Draw a path between the two shaded numbers on this grid.
You may pass **only** through prime numbers.

You must not move diagonally.

2	4	6	8	13
3	13	19	17	15
1	11	15	7	5
15	12	5	1	2
11	14	16	4	11

Multiplication strategies

Remember

Multiplication strategies

You should learn and remember some mathematical facts, for example. multiplication facts up to 10 × 10.

You can use these facts to work mentally. You can use strategies such as:

- using place value and multiplication facts
- multiplying pairs of multiples of 10
- multiplying near multiples of 10 by multiplying by the multiple and adjusting
- multiplying by halving one number and doubling the other.

Practise these strategies using the examples in this unit.

You will need:
counters for activity 3

Vocabulary
multiple, near multiple of 10

1 Using place value and multiplication facts

Examples: 0.8 × 7 = (8 ÷ 10) × 7
= (8 × 7) ÷ 10
= 56 ÷ 10
= 5.6

4.8 ÷ 6 = (48 ÷ 10) ÷ 6
= (48 ÷ 6) ÷ 10
= 8 ÷ 10
= 0.8

Now try these.

0.9 × 8 =

0.6 × 7 =

6.3 ÷ 9 =

5.6 ÷ 8 =

2 Multiplying pairs of multiples of 10

Examples: I know that 3 × 4 = 12
so 30 × 40 = 1200

I know that 6 × 4 = 24
so 600 × 40 = 24 000

Now try these.

70 × 80 =

40 × 90 =

300 × 70 =

400 × 60 =

3 Three in a row – a game for two players

Use counters or cross out the numbers on the grid.

Take turns to choose a calculation to work out.

Say which you are working on and find the answer on the grid.

Put a counter on the answer.

The winner is the first to get three in a row.

Calculations

30 × 60	30 × 50	50 × 40	40 × 60
30 × 600	30 × 500	50 × 400	40 × 600
300 × 60	300 × 50	500 × 40	400 × 60
300 × 600	300 × 500	500 × 400	400 × 600

2000	200 000	15 000	18 000
24 000	18 000	2400	1500
15 000	24 000	20 000	1800
240 000	180 000	150 000	20 000

Hint: Some numbers are repeated on the grid, for example 15 000 which is the answer to 30 × 500 and 300 × 50.

4 Multiplying near multiples of 10 by multiplying by the multiple and adjusting

Examples: 16 × 51 = (16 × 50) + 16
= 800 + 16
= 816

16 × 49 = (16 × 50) – 16
= 800 – 16
= 784

Now try these.

17 × 41 =

17 × 39 =

14 × 29 =

14 × 31 =

Hint: Show the stages in your working as some test questions require the working in addition to the answer.

5 Multiplying by halving one number and doubling the other

Examples

16 × 5 is equivalent to 8 × 10 = 80
15 × 18 is equivalent to 30 × 9 = 270

7 × 8 = 56
so 14 × 4 = 56
and 28 × 2 = 56

Now try these.

25 × 14 =

45 × 16 =

35 × 24 =

15 × 14 =

Write a set of related facts, starting with 9 × 8 = 72

_____ _____ _____

Write a set of related facts, starting with 3 × 16 = 48

_____ _____ _____

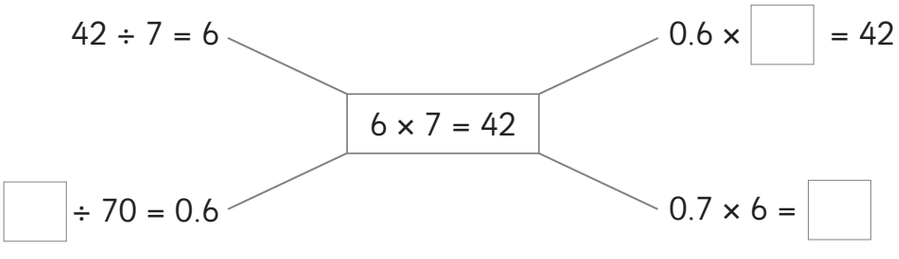
6 Circle each multiplication that gives the answer 2400.

60 × 400 40 × 60 80 × 300 20 × 120

7 Complete this number sentence.

35 × 8 = ☐ × 2 11 × 16 = ☐ × 4

8 Use the fact that 6 × 7 = 42 to complete the diagram.



Unit 1A: Number and problem solving
CPM framework 6Nc7, 6Nc8, 6Nc14, 6Nc15, 6Nc16, 6Pt1, 6Ps1; Teacher's Resource 3.2