Unit 6 · Decimal

STUDY NOTES

Key terms

Decimal number (decimal): a number written with a decimal point: 1.25.

Decimal point: the dot; whole ones before it, parts of one after it.

Tenth: 1/10 = 0.1, "zero point one".

Hundredth: 1/100 = 0.01, "zero point zero one".

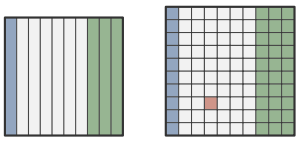
Thousandth: 1/1000 = 0.001; a hundredth cut into 10.

Places after the point

Ones	.	Tenths	Hundredths	Thousandths
5	.	2	8	
0	.	7	9	
0	.	1	2	5

- each place is **ten times smaller** than the place on its left
- 10 tenths = 1 one; 10 hundredths = 1 tenth
- 5.42 = 5 ones, 4 tenths, 2 hundredths = 5 and 42 hundredths
- no whole ones → 0 in the ones place: 0.79
- **0.2 = 0.20**: 2 columns of a hundred-square = 20 small squares; a zero at the end, after the point, changes nothing
- 1 rupee = 100 paisa: 1 paisa = Rs 0.01; Rs 12.75 = 12 rupees 75 paisa

Fraction → decimal



A B

A: 1 strip of 10 = 1/10 = 0.1; 3 strips = 0.3. B: 1 column of 100 = 10/100 = 0.10; 1 small square = 0.01; 3 columns = 0.30.

Denominator	Digits after the point	Example
10	one	3/10 = 0.3; 41/10 = 4.1
100	two	45/100 = 0.45
1000	three	125/1000 = 0.125

- numerator too short: zeros **before** it
  - 5/100 = 0.05
  - 9/1000 = 0.009
  - 47/1000 = 0.047
- other denominators: multiply **top and bottom** by the same number to make 10, 100 or 1000

Denominator	×	Example
2	5	1/2 = 5/10 = 0.5
5	2	2/5 = 4/10 = 0.4; 3/5 = 0.6
4	25	3/4 = 75/100 = 0.75; 1/4 = 0.25
25	4	7/25 = 28/100 = 0.28

- or **divide** the top by the bottom: 2 ÷ 5 = 0.4; 13 ÷ 5 = 2.6
- improper fraction: 13/5 = 26/10 = 2 6/10 = 2.6
- mixed number: the whole number before the point: 5 2/5 = 5.4; 2 7/25 = 2.28

```
  2.6
5)13.0
 -10
   30
  -30
    0
```

- 13 ÷ 5: when 5 can't go into 3, put the point after 2 and go on with a 0 after the 3

Decimal → fraction

- the digits without the point on top
- below: **1 and a zero for each digit after the point**
  - 0.4 = 4/10
  - 0.125 = 125/1000
  - 0.60 = 60/100
  - 2.6 = 26/10
  - 0.07 = 7/100
- whole ones apart: 3.48 = 3 + 0.48 = 3 48/100 (or 348/100)

Comparing

- compare the **tenths first**: 0.5 > 0.25 (5 tenths against 2 tenths)
- write 0.5 as 0.50: 50 hundredths against 25
- 1.25 and 1.52: same kilogram, different tenths (1.2, 1.5)

Adding and taking away

1. write the numbers one under another, **points in a line**
2. fill empty places at the end with **zeros**
3. add or subtract as whole numbers; carry or borrow as usual
4. the answer's point goes **under the other points**

```
  2.50      5.34      12.00
+ 7.82    - 2.75    -  8.37
 10.32      2.59       3.63
```

- tenths with tenths, hundredths with hundredths: 0.6 + 0.08 = 0.60 + 0.08 = 0.68
- 1.05 + 2.35 = 3.40 = 3.4 (5 + 5 = 10 hundredths: write 0, carry 1 tenth)
- borrow 1 tenth = 10 hundredths; borrow 1 one = 10 tenths
- a whole number gets a point and zeros: 12 = 12.00; 10 − 3.06 = 6.94
- check a subtraction by adding back: 6.94 + 3.06 = 10.00 ✓
- adding and taking away together, too much to take away: **add first**, then take away
  - 8.5 − 9.25 + 5.07 → 8.50 + 5.07 = 13.57; 13.57 − 9.25 = **4.32**
- 25 packets of 2.5 kg: 25 × 2 = 50, 25 halves = 12.5 → **62.5 kg**
- two pieces sold from 45 cm: 45 − (15.91 + 17.28) = 45 − 33.19 = **11.81 cm**

1.25 kg, three ways

- 1 one, 2 tenths, 5 hundredths of a kilogram
- 1.25 = 1 25/100; 25/100 = 1/4 → **1 kilogram and a quarter**, सवा किलो
- 1 kg = 1,000 g → 1.25 kg = 1,250 g

Where it is used

- Everest: 8,848.86 m; 100 m record: 9.58 seconds
- some countries write a comma: 1,25 kg in France = 1.25 kg
- **not a decimal:** cricket's 10.3 overs = 10 overs and 3 balls (6 balls an over)

COMMON MISTAKES

✗ 7/100 = 0.7
✓ over 100, two digits: 0.07.

✗ 1/4 = 0.4
✓ 1/4 = 25/100 = 0.25.

✗ 2/5 = 2/10 (only the bottom multiplied)
✓ multiply both: 4/10 = 0.4.

✗ 0.25 > 0.5, as 25 > 5
✓ compare tenths first: 0.5 is bigger.

✗ 2.5 + 7.82 with the last digits lined up
✓ line up the points: 2.50 + 7.82 = 10.32.

✗ 0.6 + 0.08 = 0.14
✓ different places: 0.68.