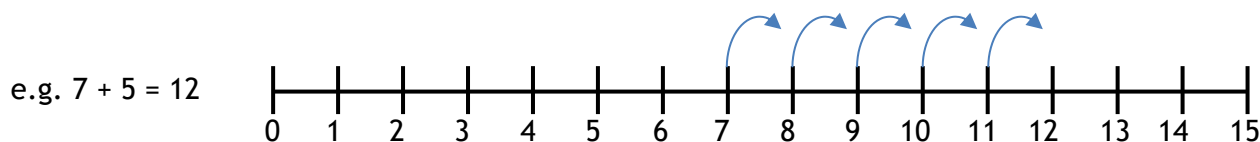


Each section is levelled to help you make progress. Only work on a section if you need to practise it (practice makes perfect). Use a calculator to check.

1. Adding Single-Digit Numbers

Using a number line can help. Adding always makes us jump to the right (\rightarrow).



Start at 7. Now jump 5 places to the right (\rightarrow). We end up at 12!

Now try these.

- | | | | | |
|--------------|--------------|--------------|--------------|---------------|
| 1. $3 + 6 =$ | 2. $2 + 7 =$ | 3. $4 + 5 =$ | 4. $2 + 5 =$ | 5. $5 + 3 =$ |
| 6. $4 + 7 =$ | 7. $6 + 5 =$ | 8. $3 + 8 =$ | 9. $7 + 6 =$ | 10. $8 + 7 =$ |

2. Adding Double-Digit Numbers

Here we have to learn to add up in columns. A number line can help.

eg T U

$$\begin{array}{r} 37 \\ 215 \\ \hline 62 \end{array}$$

We always start from the right (dotted line).

$7 + 5 = 12$. We think of this 12 as $10 + 2$. So 2 goes into U column and we carry the '1' into the T column (doorstep).

Now $3 + 2 + 1 = 6$ (in the T column).

Now try these.

- | | | | | |
|---|---|---|---|---|
| 1. $\begin{array}{r} \text{T U} \\ 26 \\ 35+ \end{array}$ | 2. $\begin{array}{r} \text{T U} \\ 38 \\ 24+ \end{array}$ | 3. $\begin{array}{r} \text{T U} \\ 43 \\ 39+ \end{array}$ | 4. $\begin{array}{r} \text{T U} \\ 58 \\ 23+ \end{array}$ | 5. $\begin{array}{r} \text{T U} \\ 46 \\ 27+ \end{array}$ |
| 6. $\begin{array}{r} 63 \\ 29+ \end{array}$ | 7. $\begin{array}{r} 29 \\ 29+ \end{array}$ | 8. $\begin{array}{r} 67 \\ 24+ \end{array}$ | 9. $\begin{array}{r} 56 \\ 45+ \end{array}$ | 10. $\begin{array}{r} 72 \\ 29+ \end{array}$ |

3. Adding Treble-Digit Numbers

We continue to add the numbers from the right carrying over any '1's onto the doorstep.

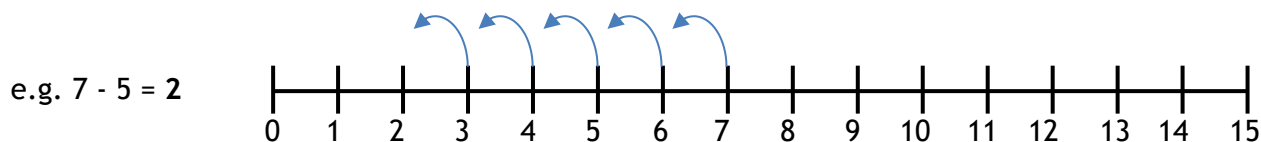
e.g. H T U 4 + 9 = 13. Put the 3 down in U column and carry the '1' into T column.
 3 5 4
 1 6 9 +
 5 2 3
 Now 5 + 6 + 1 = 12. Put the 2 down in T column and carry the '1' into the H column.
 Finally 3 + 1 + 1 = 5 (in the H column).

Now try these.

- | | | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1. HTU
2 6 4
<u>3 2 8</u> + | 2. HTU
3 4 8
<u>2 4 5</u> + | 3. HTU
1 4 3
<u>2 3 9</u> + | 4. HTU
3 5 8
<u>2 3 3</u> + | 5. HTU
5 4 6
<u>2 3 7</u> + |
| 6. 6 3 7
<u>2 9 5</u> + | 7. 2 9 5
<u>4 3 9</u> + | 8. 2 6 7
<u>3 7 4</u> + | 9. 5 6 3
<u>4 5 9</u> + | 10. 7 8 2
<u>2 9 9</u> + |

4. Subtracting Single-Digit Numbers

A number line can help. Subtracting always makes us jump to the left (←).



Start at 7. Now jump 5 places to the left (←). We end up at 2!

Now try these

- | | | | | |
|------------|------------|------------|-------------|--------------|
| 1. 9 - 6 = | 2. 9 - 4 = | 3. 8 - 5 = | 4. 7 - 3 = | 5. 9 - 7 = |
| 6. 8 - 7 = | 7. 6 - 4 = | 8. 9 - 8 = | 9. 10 - 6 = | 10. 12 - 5 = |

We can do subtraction by counting back (adding).

7 - 5 = 2 Start at 5. Now jump 2 places to the right (→) until we end at 7.

5a. Subtracting Double-Digit Numbers (No borrow)

We continue to add the numbers from the right carrying over any '1's onto the doorstep.

eg $\begin{array}{r} \text{T U} \\ 58 \\ 26- \\ \hline 32 \end{array}$ We always start from the right (dotted line).
 $8 - 6 = 2$. We put the 2 into U column.
 Now $5 - 2 = 3$ (in the T column).

Now try these.

- | | | | | |
|---|---|---|---|---|
| 1. $\begin{array}{r} \text{T U} \\ 56 \\ 35- \\ \hline \end{array}$ | 2. $\begin{array}{r} \text{T U} \\ 38 \\ 24- \\ \hline \end{array}$ | 3. $\begin{array}{r} \text{T U} \\ 47 \\ 12- \\ \hline \end{array}$ | 4. $\begin{array}{r} \text{T U} \\ 58 \\ 23- \\ \hline \end{array}$ | 5. $\begin{array}{r} \text{T U} \\ 49 \\ 27- \\ \hline \end{array}$ |
| 6. $\begin{array}{r} 65 \\ 22- \\ \hline \end{array}$ | 7. $\begin{array}{r} 79 \\ 26- \\ \hline \end{array}$ | 8. $\begin{array}{r} 97 \\ 24- \\ \hline \end{array}$ | 9. $\begin{array}{r} 86 \\ 45- \\ \hline \end{array}$ | 10. $\begin{array}{r} 78 \\ 31- \\ \hline \end{array}$ |

5b. Subtracting Double-Digit Numbers ('Borrow 1')

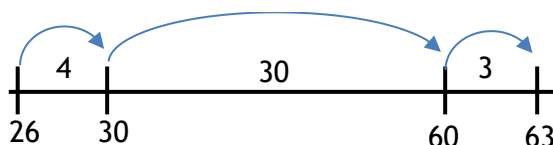
eg $\begin{array}{r} \text{T U} \\ 56 \\ 26- \\ \hline 30 \end{array}$ Starting with U. $3 - 6$ we can't do.
 We borrow 'a ten' ('1') from the 6(T) by changing the 60 into $50 + 10$. Now we have $13 - 6 = 7$ (in the U column).
 Finally $5 - 2 = 3$ (in the T column).

Now try these.

- | | | | | |
|---|---|---|---|---|
| 1. $\begin{array}{r} \text{T U} \\ 62 \\ 35- \\ \hline \end{array}$ | 2. $\begin{array}{r} \text{T U} \\ 42 \\ 27- \\ \hline \end{array}$ | 3. $\begin{array}{r} \text{T U} \\ 73 \\ 35- \\ \hline \end{array}$ | 4. $\begin{array}{r} \text{T U} \\ 74 \\ 29- \\ \hline \end{array}$ | 5. $\begin{array}{r} \text{T U} \\ 43 \\ 27- \\ \hline \end{array}$ |
| 6. $\begin{array}{r} 61 \\ 25- \\ \hline \end{array}$ | 7. $\begin{array}{r} 72 \\ 46- \\ \hline \end{array}$ | 8. $\begin{array}{r} 93 \\ 57- \\ \hline \end{array}$ | 9. $\begin{array}{r} 81 \\ 45- \\ \hline \end{array}$ | 10. $\begin{array}{r} 83 \\ 38- \\ \hline \end{array}$ |

Subtraction can be done by counting backwards using a number line.

Always count up to nearest '10'.
 Finally add up... $4 + 30 + 3 = 37$



5c. Subtracting numbers with zeros ('Borrow 1')

We continue to add the numbers from the right carrying over any '1's onto the doorstep.

$$\begin{array}{r} \text{eg} \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 3 \cancel{4} \cancel{0} \quad 13 \\ 2 \quad 6 \quad 5 \quad - \\ \hline 1 \quad 3 \quad 8 \end{array} \end{array}$$

Starting with **U**. $3 - 5$ we can't do. We can't borrow from the 0(**T**) so we borrow a ten' ('1') from the 4(**H**) by changing 400 into 300 + 90 + 10. Now we have $13 - 5 = 8$ (**U** column). Next we have $9 - 6 = 3$ (**T** column) and finally $3 - 2 = 1$ (**H**)

"All zeros (0) change to nines (9) and the final ten ('1') is added to the (U)"

$$\begin{array}{r} \text{eg} \quad \begin{array}{r} \cancel{0} \cancel{1} \quad \cancel{9} \cancel{0} \quad \cancel{9} \cancel{0} \quad \cancel{9} \cancel{0} \quad \cancel{9} \cancel{0} \quad \cancel{1} \cancel{0} \\ 4 \quad 1 \quad 0 \quad 7 \quad 8 \quad 5 \quad - \\ \hline 5 \quad 8 \quad 9 \quad 2 \quad 1 \quad 5 \end{array} \end{array}$$

Now try these.

$$\begin{array}{r} 1. \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 6 \quad 0 \quad 0 \\ 3 \quad 5 \quad 8 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 2. \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 4 \quad 0 \quad 0 \\ 2 \quad 7 \quad 4 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 3. \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 7 \quad 0 \quad 0 \\ 3 \quad 5 \quad 9 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 4. \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 4 \quad 0 \quad 0 \\ 2 \quad 9 \quad 8 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 5. \quad \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 8 \quad 0 \quad 0 \\ 3 \quad 7 \quad 9 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 6. \quad \begin{array}{r} 6 \quad 0 \quad 0 \\ 2 \quad 5 \quad 9 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 7. \quad \begin{array}{r} 7 \quad 0 \quad 0 \\ 4 \quad 6 \quad 3 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 8. \quad \begin{array}{r} 1 \quad 0 \quad 0 \quad 0 \\ 5 \quad 7 \quad 4 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 9. \quad \begin{array}{r} 1 \quad 0 \quad 0 \quad 0 \\ 7 \quad 2 \quad 8 \quad - \end{array} \end{array}$$

$$\begin{array}{r} 10. \quad \begin{array}{r} 3 \quad 0 \quad 0 \quad 0 \\ 1 \quad 5 \quad 7 \quad 4 \quad - \end{array} \end{array}$$

6a. Multiplying two-digit numbers by single digit numbers

Here we can use the 'GRID' or Farmers Field Method.

e.g. $37 \times 6 = \underline{222}$

<details>

<summary>12/03/2024</summary>

Quadratic Sequences

Further Trigonometry

Foundation Practice Set 2 Paper 2

Higher Practice Set 2 Paper 2

Foundation Practice Set 2 Paper 3

Higher Practice Set 2 Paper 3

</details>

x	30	7
6	180	42

We split 37 into 30 and 7. These two go into column headings and the 6 goes into the row heading. $30 \times 6 = 180$ and $7 \times 6 = 42$.

$$180 + 42 = \underline{222}$$

Finally we add these to get the answer.

Now try these.

1. $24 \times 3 =$ 2. $43 \times 4 =$ 3. $53 \times 6 =$ 4. $72 \times 4 =$ 5. $64 \times 5 =$

6. $27 \times 8 =$ 7. $54 \times 6 =$ 8. $29 \times 9 =$ 9. $83 \times 6 =$ 10. $58 \times 7 =$

6b. Multiplying three-digit numbers by two-digit numbers

We just extend the grid method further.

e.g. $374 \times 63 = 23562$

x	300	70	4
60	18000	4200	240
3	900	210	12

18000
4200
240
900
210
12
+
<u>23562</u>
11

We split 374 into 300, 70 and 4. 63 becomes 60 and 3.

$300 \times 60 = 18000$, $70 \times 60 = 4200$, $4 \times 60 = 240$.

Also $300 \times 3 = 900$, $70 \times 3 = 210$ and $4 \times 3 = 12$.

Finally add up all these answers.

Now try these.

1. $34 \times 25 =$ 2. $43 \times 24 =$ 3. $53 \times 16 =$ 4. $72 \times 24 =$ 5. $64 \times 35 =$

6. $27 \times 38 =$ 7. $54 \times 36 =$ 8. $259 \times 34 =$ 9. $283 \times 42 =$ 10. $458 \times 37 =$

7a. Dividing two and three-digit numbers by one-digit numbers

We can use our multiplication tables to help as they are inverse operations.

e.g. $4 \times 7 = 28$... so ... $28 \div 7 = 4$... and ... $280 \div 7 = 40$

e.g. $42 \div 6 = 7$... because ... $7 \times 6 = 42$ [6 × table ... 6, 12, 18, 24, 30, 36, 42,...]

Now try these.

1. $18 \div 3 =$ 2. $20 \div 5 =$ 3. $24 \div 6 =$ 4. $27 \div 9 =$ 5. $30 \div 6 =$

6. $42 \div 7 =$ 7. $36 \div 9 =$ 8. $48 \div 8 =$ 9. $70 \div 10 =$ 10. $72 \div 8 =$

And these...

11. $180 \div 3 =$ 12. $200 \div 5 =$ 13. $240 \div 6 =$ 14. $120 \div 4 =$ 15. $300 \div 5 =$

16. $280 \div 7 =$ 17. $360 \div 9 =$ 18. $240 \div 8 =$ 19. $700 \div 10 =$ 20. $720 \div 8 =$

7b. Use of 'chunking'

e.g. $266 \div 7 = \underline{38}$

$$\begin{array}{r} 038 \\ 7 \overline{) 266} \\ \underline{21} \\ 56 \\ \underline{56} \\ 0 \end{array}$$

Write our 7 ÷ table: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70
Working from left. '7 into 2' doesn't go. Carry the '2' into next column.
'7 into 26' goes **3** times with '5' left over [as $7 \times 3 = 21$].
Carry the '5' into the next column.
Finally '7 into 56' goes **8** times.

Now try these.

1. $186 \div 3 =$ 2. $145 \div 5 =$ 3. $204 \div 6 =$ 4. $184 \div 4 =$ 5. $234 \div 6 =$

6. $175 \div 7 =$ 7. $234 \div 9 =$ 8. $144 \div 8 =$ 9. $170 \div 10 =$ 10. $576 \div 8 =$

Another way is to use 'chunking' by repeated subtraction or 'building up'.

$$\begin{array}{r} 038 \\ 7 \overline{) 266} \\ \underline{210} \\ 56 \\ \underline{56} \\ 0 \end{array} = 7 \times 8$$

$$\begin{array}{r} 56 \\ 7 \overline{) 56} \\ \underline{56} \\ 0 \end{array} = 7 \times 8$$

Write our 7 ÷ table: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70.
Try to build up with powers of 10: 70, 140, **210**, 280, ...
'**210**' is the closest multiple up to 266 ... 7×30 .
Build this up to '266' by either adding ... $266 - 210 = 56$.
 $7 \times 8 = 56$.
Finally we add up our multiples. $30 + 8 = 38$.

Answer = $30 + 8 = \underline{38}$

Now try these.

11. $192 \div 6 =$ 12. $345 \div 5 =$ 13. $264 \div 6 =$ 14. $232 \div 4 =$ 15. $534 \div 6 =$

16. $441 \div 7 =$ 17. $567 \div 9 =$ 18. $344 \div 8 =$ 19. $1248 \div 4 =$ 20. $1472 \div 8 =$

And these ...

21. $1422 \div 3 =$ 22. $2910 \div 5 =$ 23. $3144 \div 6 =$ 24. $5204 \div 4 =$ 25. $3025 \div 5 =$

26. $3283 \div 7 =$ 27. $4203 \div 9 =$ 28. $3504 \div 8 =$ 29. $7038 \div 6 =$ 30. $7038 \div 9 =$

Answers:

1.

1. 9 2. 9 3. 9 4. 7 5. 8 6. 11 7. 11 8. 11 9. 13 10. 15

2.

1. 61 2. 62 3. 82 4. 81 5. 71 6. 92 7. 58 8. 91 9. 101 10. 101

3.

1. 592 2. 593 3. 382 4. 591 5. 783 6. 932 7. 734 8. 641 9. 1022 10. 1081

4.

1. 3 2. 5 3. 3 4. 4 5. 2 6. 1 7. 2 8. 1 9. 4 10. 7

5a.

1. 21 2. 14 3. 35 4. 35 5. 22 6. 43 7. 53 8. 73 9. 41 10. 47

5b.

1. 27 2. 15 3. 38 4. 45 5. 16 6. 36 7. 26 8. 36 9. 36 10. 45

5c.

1. 242 2. 126 3. 341 4. 102 5. 421 6. 341 7. 237 8. 426 9. 272 10. 1426

6a.

1. 72 2. 172 3. 318 4. 288 5. 320 6. 216 7. 324 8. 261 9. 498 10. 406

6b.

1. 850 2. 1032 3. 848 4. 1728 5. 2240 6. 1026 7. 1944 8. 8806
9. 11886 10. 16946

7a.

1. 6 2. 4 3. 4 4. 3 5. 5 6. 6 7. 4 8. 6 9. 7 10. 9
11. 60 12. 40 13. 40 14. 30 15. 60 16. 40 17. 40 18. 30 19. 70 20. 90

7b.

1. 62 2. 29 3. 34 4. 46 5. 39 6. 25 7. 26 8. 18 9. 17 10. 82
11. 32 12. 69 13. 44 14. 58 15. 89 16. 63 17. 63 18. 43 19. 312 20. 184

21. 474 22. 582 23. 524 24. 1301 25. 605 26. 469 27. 467
28. 438 29. 1173 30. 782