

CHAPTER 2

ARITHMETIC EXPRESSIONS

Complete Notes with Solutions

LEARNING OBJECTIVES

- Understand what arithmetic expressions are and find their values
- Compare expressions using $<$, $>$, $=$ without heavy calculation
- Use brackets correctly to clarify order of operations
- Identify terms in an expression by converting subtraction to addition
- Apply commutative and associative properties of addition
- Remove brackets using sign-change rules
- Use the distributive property for multiplication
- Solve multiplications efficiently using splitting strategies

2.1 SIMPLE EXPRESSIONS

What is an Arithmetic Expression?

Mathematical phrases formed using numbers and operations ($+$, $-$, $\times$, $\div$) are called arithmetic expressions.

Examples: $13 + 2$ $20 - 4$ 12×5 $18 \div 3$

Value of an Expression

Every arithmetic expression evaluates to a number. This number is its VALUE. Example: Value of $13 + 2$ is 15. We write: $13 + 2 = 15$.

Multiple Expressions for the Same Value

Different expressions can have the same value. For the number 12:

$$10 + 2 = 12 \quad | \quad 15 - 3 = 12 \quad | \quad 3 \times 4 = 12 \quad | \quad 24 \div 2 = 12$$

EXAMPLE 1 (Textbook Example)

Mallika spends ₹25 every day for lunch at school. Write the expression for the total amount she spends on lunch in a week (Monday to Friday).

Given:

Daily lunch expense = ₹25 Number of school days in week = 5

To Find:

Expression for total weekly lunch cost

Solution:

Step 1: Number of days from Monday to Friday = 5 days

Step 2: Total amount = 5×25

★ **Final Answer:** Expression = 5×25 (read as '5 times 25' or 'product of 5 and 25')

COMPARING EXPRESSIONS

We compare expressions using = (equal to), < (less than), > (greater than) based on their VALUES.

Example: $10 + 2 > 7 + 1$ because $12 > 8$
 $13 - 2 < 4 \times 3$ because $11 < 12$

EXAMPLE 2 — Comparing with Marble Reasoning

|Which is greater? $1023 + 125$ OR $1022 + 128$?

Concept Used:

Logical reasoning using a real-life situation (no calculation needed)

Solution:

Step 1: Imagine: Raja has 1023 marbles and gets 125 more. Joy has 1022 and gets 128 more.

Step 2: Raja started with 1 MORE marble than Joy.

Step 3: But Joy received 3 MORE marbles than Raja ($128 - 125 = 3$).

Step 4: So Joy ends with $3 - 1 = 2$ MORE marbles than Raja.

★ **Final Answer:** $1023 + 125 < 1022 + 128$

EXAMPLE 3 — Equal Expressions by Reasoning

|Which is greater? $113 - 25$ OR $112 - 24$?

Solution:

Step 1: Raja had 113 marbles, lost 25. Joy had 112 marbles, lost 24.

Step 2: Raja started with 1 MORE marble than Joy.

Step 3: Raja also LOST 1 MORE marble than Joy ($25 - 24 = 1$).

Step 4: The extra marble Raja had at start was exactly the extra marble he lost.

★ **Final Answer:** $113 - 25 = 112 - 24$

FIGURE IT OUT — Basic Expressions

Question 1: Fill in the blanks

|Fill in the blanks to make expressions equal on both sides of the = sign:

(a) $13 + 4 = \underline{\quad} + 6$

Solution:

LHS value = $13 + 4 = 17$

RHS = $\underline{\quad} + 6 = 17 \rightarrow \underline{\quad} = 17 - 6 = 11$

★ **Final Answer:** $13 + 4 = 11 + 6$

(b) $22 + \underline{\quad} = 6 \times 5$

Solution:

RHS value = $6 \times 5 = 30$

$$22 + \underline{\quad} = 30 \rightarrow \underline{\quad} = 30 - 22 = 8$$

★ Final Answer: $22 + 8 = 6 \times 5$

(c) $8 \times \underline{\quad} = 64 \div 2$

Solution:

$$\text{RHS value} = 64 \div 2 = 32$$

$$8 \times \underline{\quad} = 32 \rightarrow \underline{\quad} = 32 \div 8 = 4$$

★ Final Answer: $8 \times 4 = 64 \div 2$

(d) $34 - \underline{\quad} = 25$

Solution:

$$34 - \underline{\quad} = 25 \rightarrow \underline{\quad} = 34 - 25 = 9$$

★ Final Answer: $34 - 9 = 25$

Question 2: Ascending Order

Arrange in ascending (increasing) order: (a) $67-19$ (b) $67-20$ (c) $35+25$ (d) 5×11 (e) $120 \div 3$

Solution — Evaluate each:

(a) $67 - 19 = 48$

(b) $67 - 20 = 47$

(c) $35 + 25 = 60$

(d) $5 \times 11 = 55$

(e) $120 \div 3 = 40$

★ Final Answer: $120 \div 3 < 67 - 20 < 67 - 19 < 5 \times 11 < 35 + 25$ $40 < 47 < 48 < 55$
 < 60

Comparison Questions (Page 26)

Use $>$, $<$ or $=$ to compare each pair. Use reasoning, not calculation:

(a) $245 + 289$ vs $246 + 285$

246 is 1 more than 245, but 285 is 4 less than 289.

So second expression = first + 1 - 4 = first - 3 $\rightarrow$ LHS is MORE

★ Final Answer: $245 + 289 > 246 + 285$

(b) $273 - 145$ vs $272 - 144$

272 is 1 less than 273. 144 is 1 less than 145.

Started with 1 less, but also lost 1 less $\rightarrow$ both equal.

★ Final Answer: $273 - 145 = 272 - 144$

(c) $364 + 587$ vs $363 + 589$

363 is 1 less than 364. 589 is 2 more than 587.

Second = first - 1 + 2 = first + 1 $\rightarrow$ LHS is LESS

★ Final Answer: $364 + 587 < 363 + 589$

(d) $124 + 245$ vs $129 + 245$

Same second term (245). $129 > 124$. So $\text{RHS} > \text{LHS}$.

★ Final Answer: $124 + 245 < 129 + 245$

(e) $213 - 77$ vs $214 - 76$

214 is 1 more than 213. 76 is 1 less than 77 (subtracting 1 less = more).

So second expression = first + 1 + 1 = first + 2 → LHS is LESS

★ Final Answer: $213 - 77 < 214 - 76$

2.2 READING AND EVALUATING COMPLEX EXPRESSIONS

When an expression has multiple operations, there can be confusion about which operation to do first. We need tools — BRACKETS and the idea of TERMS — to resolve this.

💡 Language Analogy

"Shalini sat next to a friend with toys" — ambiguous! "Shalini sat next to a friend, with toys" — the comma clarifies meaning. Similarly, brackets clarify order of operations in mathematics.

📊 EXAMPLE 4 — Why Order Matters

Mallesha brought 30 marbles. Arun brought 5 bags with 4 marbles each. How many marbles total?

Expression written:

$$30 + 5 \times 4$$

Two interpretations:

Purna (WRONG): Added first → $(30 + 5) \times 4 = 35 \times 4 = 140$

Mallesha (RIGHT): Multiplied first → $30 + (5 \times 4) = 30 + 20 = 50$

The correct answer is 50 — Arun has $5 \times 4 = 20$ marbles, added to Mallesha's 30.

🔑 KEY RULE: Always use BRACKETS to specify order of operations clearly.

Brackets in Expressions

Brackets tell us: evaluate what is INSIDE the brackets FIRST, then do the remaining operations.

$$30 + (5 \times 4) = 30 + 20 = 50 \quad \checkmark$$

EXAMPLE 5 — Brackets for Change Calculation

Irfan bought biscuits for ₹15 and toor dal for ₹56. He gave ₹100. Find his change.

Given:

Cost of biscuits = ₹15 Cost of toor dal = ₹56 Amount given = ₹100

To Find:

Change = $100 - (\text{total cost})$

Why we need brackets:

Writing $100 - 15 + 56$ is WRONG → gives $85 + 56 = 141$ (absurd!)

Correct expression uses brackets: $100 - (15 + 56)$

Solution:

Step 1: Evaluate inside brackets first: $15 + 56 = 71$

Step 2: Subtract from 100: $100 - 71 = 29$

★ Final Answer: ₹29 is the change Irfan receives

TERMS IN EXPRESSIONS

💡 Definition of Terms

TERMS are the parts of an expression separated by a '+' sign. Since subtraction $a - b = a + (-b)$, we convert all subtractions to additions first, then identify terms.

Examples:

$$\begin{aligned}12 + 7 &\rightarrow \text{Terms are: } 12 \text{ and } 7 \\83 - 14 &= 83 + (-14) \rightarrow \text{Terms are: } 83 \text{ and } -14 \\-18 - 3 &= -18 + (-3) \rightarrow \text{Terms are: } -18 \text{ and } -3 \\6 \times 5 + 3 &\rightarrow \text{Terms are: } 6 \times 5 \text{ and } 3 \quad (6 \times 5 \text{ is ONE term}) \\2 - 10 + 4 \times 6 &= 2 + (-10) + 4 \times 6 \rightarrow \text{Terms: } 2, -10, 4 \times 6\end{aligned}$$

🔑 KEY RULE: Products like 6×5 are a SINGLE term. A term is never split by multiplication or division.

Table: Expression → Terms

Expression	Sum of Terms	Terms
$13 - 2 + 6$	$13 + (-2) + 6$	13, -2, 6
$5 + 6 \times 3$	$5 + 6 \times 3$	5, 6×3
$4 + 15 - 9$	$4 + 15 + (-9)$	4, 15, -9
$23 - 2 \times 4 + 16$	$23 + (-2 \times 4) + 16$	23, -2×4 , 16

$28 + 19 - 8$

$28 + 19 + (-8)$

$28, 19, -8$

SWAPPING AND GROUPING (Properties of Addition)

EXAMPLE 6 — Drone Problem (Commutative Property)

Madhu's drone goes 6 m up, then 4 m down. Write an expression for the final height from the terrace.

Solution:

Step 1: Final height = $6 - 4 = 2$ m above terrace

Step 2: Written as sum of terms: $6 + (-4) = 2$

Step 3: Swap the terms: $(-4) + 6 = 2 \rightarrow$ Same value!

★ **Final Answer:** Final height = 2 m above the terrace

 **KEY RULE: COMMUTATIVE PROPERTY:** Term 1 + Term 2 = Term 2 + Term 1
(Swapping terms does NOT change the sum)

 **KEY RULE: ASSOCIATIVE PROPERTY:** $(T1 + T2) + T3 = T1 + (T2 + T3)$ (Grouping terms differently does NOT change the sum)

Key result: In any expression with only additions, the terms can be added in ANY ORDER — the value remains the same!

Commutative Property of Addition

Swapping the order of terms does NOT change the sum. Example: $6 + (-4) = (-4) + 6 = 2$

Associative Property of Addition

Grouping the terms differently does NOT change the sum. Example: $(-7 + 10) + (-11) = -7 + (10 + (-11)) = -8$

Real-life example: Manasa can wear 'hat then shoes' or 'shoes then hat' — looks the same! But 'socks then shoes' is very different from 'shoes then socks'. Order matters for some things, but NOT for addition.

Manasa's problem: She totalled $1342 + 774 + 8611 + 1022 = 11749$, but forgot 9055. By associative property, she can just add: $11749 + 9055 = 20804$. No need to restart!

EVALUATING EXPRESSIONS WITH MULTIPLE OPERATIONS

For expressions with multiplication, division AND addition — evaluate TERMS first, then add.

Rule: Each term is evaluated independently. Then the terms are added together.

$$\begin{aligned}
 30 + 5 \times 4 &= [30] + [5 \times 4] = 30 + 20 = 50 \\
 5 \times (3 + 2) + 7 \times 8 + 3 &= [5 \times (3+2)] + [7 \times 8] + [3] \\
 &= [5 \times 5] + [56] + [3] \\
 &= 25 + 56 + 3 = 84
 \end{aligned}$$

MORE EXPRESSIONS AND THEIR TERMS



EXAMPLE 7 — Dosa Problem

4 friends ordered dosas (₹23 each) and want to tip ₹5. Write the expression for total cost.

Solution:

Step 1: Cost of 4 dosas = 4×23

Step 2: Total with tip = $4 \times 23 + 5$

Step 3: Evaluate: $4 \times 23 = 92 \rightarrow 92 + 5 = 97$

★ **Final Answer:** Total cost = $4 \times 23 + 5 = ₹97$

Terms: 4×23 and 5

If 7 friends go (tip same): Expression = $7 \times 23 + 5 = 161 + 5 = ₹166$. Terms: 7×23 , 5



EXAMPLE 8 — Fire in the Mountain Game (Grouping Students)

33 students are playing. Teacher calls '5'. Ruby writes: $6 \times 5 + 3$. Explain.

Solution:

Step 1: 33 students make groups of 5 $\rightarrow 33 \div 5 = 6$ groups (remainder 3)

Step 2: 6 complete groups of 5 + 3 leftover students

Step 3: Expression: $6 \times 5 + 3$

Step 4: Terms: 6×5 and 3

★ **Final Answer:** $6 \times 5 + 3 = 30 + 3 = 33$ students

If teacher calls '4': $33 \div 4 = 8$ groups R 1 $\rightarrow$ Expression: $8 \times 4 + 1$ (Terms: 8×4 , 1)

If teacher calls '7': $33 \div 7 = 4$ groups R 5 $\rightarrow$ Expression: $4 \times 7 + 5$ (Terms: 4×7 , 5)



EXAMPLE 9 — Packets of Rice

Raghu packed 100 kg of rice into 2 kg packets. He already had 4 such packets. Find total packets.

Solution:

Step 1: New packets from 100 kg = $100 \div 2 = 100/2$

Step 2: Total packets = $4 + 100/2$

★ **Final Answer:** Total = $4 + 100/2 \rightarrow$ Terms: 4 and $100/2$

EXAMPLE 10 — Paying ₹432 with Coins & Notes

|Kannan pays ₹432 using ₹1, ₹5, ₹10, ₹20, ₹50, ₹100 notes and coins. Show two ways.

Way 1:

$$432 = 4 \times 100 + 1 \times 20 + 1 \times 10 + 2 \times 1$$

(4 notes of ₹100, 1 note of ₹20, 1 note of ₹10, 2 coins of ₹1)

Terms: 4×100 , 1×20 , 1×10 , 2×1

Way 2:

$$432 = 8 \times 50 + 1 \times 10 + 4 \times 5 + 2 \times 1$$

(8 notes of ₹50, 1 note of ₹10, 4 coins of ₹5, 2 coins of ₹1)

Terms: 8×50 , 1×10 , 4×5 , 2×1

EXAMPLE 11 — Array Models (Visual Representation)

|Which picture matches $5 \times 2 + 3$? The left picture has 5 green + 1 pink block. The right has 2 tall yellow + 1 blue column.

Solution:

Step 1: $5 \times 2 + 3 = [5 \times 2] + [3] = 10 + 3 = 13$

Step 2: This means '3 more than 5 groups of 2' → LEFT picture matches

Step 3: RIGHT picture shows 2 columns with (5+3) each → expression: $2 \times (5 + 3)$

Step 4: This can also be written as: $5 + 3 + 5 + 3$ OR $5 \times 2 + 3 \times 2$

★ **Final Answer:** LEFT picture matches $5 \times 2 + 3 = 13$

FIGURE IT OUT — Expressions

|Question 1: Find Values by Identifying Terms

|Q.1a Find the value of $28 - 7 + 8$

Terms:

$$28 - 7 + 8 = [28] + [-7] + [8] \rightarrow \text{Terms: } 28, -7, 8$$

Step 1: Evaluate term by term: $28 + (-7) + 8$

Step 2: $= 21 + 8 = 29$

★ **Final Answer:** $28 - 7 + 8 = 29$

|Q.1b Find the value of $39 - 2 \times 6 + 11$

Terms:

$$= [39] + [-2 \times 6] + [11] \rightarrow \text{Terms: } 39, -2 \times 6, 11$$

Step 1: Evaluate $-2 \times 6 = -12$

Step 2: $= 39 + (-12) + 11 = 27 + 11 = 38$

★ **Final Answer:** $39 - 2 \times 6 + 11 = 38$

|Q.1c Find the value of $40 - 10 + 10 + 10$

Terms:

$$= [40] + [-10] + [10] + [10] \rightarrow \text{Terms: } 40, -10, 10, 10$$

$$\text{Step 1: } = 40 - 10 + 10 + 10 = 50$$

$$\star \text{ Final Answer: } 40 - 10 + 10 + 10 = 50$$

Q.1d Find the value of $48 - 10 \times 2 + 16 \div 2$

Terms:

$$= [48] + [-10 \times 2] + [16 \div 2] \rightarrow \text{Terms: } 48, -10 \times 2, 16 \div 2$$

$$\text{Step 1: } -10 \times 2 = -20$$

$$\text{Step 2: } 16 \div 2 = 8$$

$$\text{Step 3: } = 48 + (-20) + 8 = 28 + 8 = 36$$

$$\star \text{ Final Answer: } 48 - 10 \times 2 + 16 \div 2 = 36$$

Q.1e Find the value of $6 \times 3 - 4 \times 8 \times 5$

Terms:

$$= [6 \times 3] + [-4 \times 8 \times 5] \rightarrow \text{Terms: } 6 \times 3, -4 \times 8 \times 5$$

$$\text{Step 1: } 6 \times 3 = 18$$

$$\text{Step 2: } 4 \times 8 \times 5 = 160 \rightarrow -4 \times 8 \times 5 = -160$$

$$\text{Step 3: } = 18 + (-160) = -142$$

$$\star \text{ Final Answer: } 6 \times 3 - 4 \times 8 \times 5 = -142$$

Question 2: Write a Story and Find Value

Q.2a Write a story for $89 + 21 - 10$ and find its value

Story:

A library had 89 books. The librarian added 21 new books. Then 10 books were borrowed by students. How many books remain?

Solution:

$$\text{Step 1: } 89 + 21 - 10$$

$$\text{Step 2: } = [89] + [21] + [-10]$$

$$\text{Step 3: } = 110 - 10 = 100$$

$$\star \text{ Final Answer: } 89 + 21 - 10 = 100 \text{ books remain}$$

Q.2b Write a story for $5 \times 12 - 6$ and find its value

Story:

A shopkeeper had 5 boxes of 12 pens each. He sold 6 pens. How many remain?

Solution:

$$\text{Step 1: } 5 \times 12 - 6 = [5 \times 12] + [-6]$$

$$\text{Step 2: } = 60 - 6 = 54$$

$$\star \text{ Final Answer: } 5 \times 12 - 6 = 54$$

|Q.2c Write a story for $4 \times 9 + 2 \times 6$ and find its value

Story:

4 baskets have 9 mangoes each and 2 baskets have 6 mangoes each. Total mangoes?

Solution:

Step 1: $4 \times 9 + 2 \times 6 = [4 \times 9] + [2 \times 6]$

Step 2: $= 36 + 12 = 48$

★ Final Answer: $4 \times 9 + 2 \times 6 = 48$

Question 3: Situational Problems

|Q.3a Princess Elsa & Anna gold coins problem

Given:

Queen gave 100 coins to Elsa and 100 to Anna.

Elsa doubled her coins: 2×100

Anna has half left: $100/2$

Expression:

$$\text{Total} = 2 \times 100 + 100/2$$

Terms: 2×100 and $100/2$

Step 1: $2 \times 100 = 200$

Step 2: $100/2 = 50$

Step 3: Total = $200 + 50 = 250$

★ Final Answer: Together they have 250 gold coins

|Q.3b(i) Metro tickets — 4 adults and 3 children

Given:

Adult ticket = ₹40 Child ticket = ₹20

$$\text{Expression} = 4 \times 40 + 3 \times 20$$

Terms: 4×40 and 3×20

Step 1: $4 \times 40 = 160$

Step 2: $3 \times 20 = 60$

Step 3: Total = $160 + 60 = 220$

★ Final Answer: Total cost = ₹220

|Q.3b(ii) Metro tickets — 2 groups of 3 adults each

$$\text{Expression} = 2 \times (3 \times 40)$$

Step 1: $3 \times 40 = 120$ (one group)

Step 2: $2 \times 120 = 240$

★ Final Answer: Total cost = ₹240

Q.3c Find total height of window from the picture

Given measurements:

Border = 3 cm (top and bottom: 2×3)

Grill = 2 cm (multiple rows: 6×2)

Gap = 5 cm (multiple sections: 7×5)

$$\text{Expression} = 7 \times 5 + 6 \times 2 + 2 \times 3$$

Terms: 7×5 , 6×2 , 2×3

Step 1: $7 \times 5 = 35$

Step 2: $6 \times 2 = 12$

Step 3: $2 \times 3 = 6$

Step 4: Total = $35 + 12 + 6 = 53$ cm

★ **Final Answer:** Total height of window = 53 cm

REMOVING BRACKETS — I

Rule for Removing Brackets

Case 1: When a + sign (or nothing) is BEFORE the bracket: $a + (b + c) = a + b + c$
(signs inside do NOT change) $a + (b - c) = a + b - c$ (signs inside do NOT change)

Case 2: When a - sign is BEFORE the bracket: $a - (b + c) = a - b - c$ (signs inside CHANGE: + becomes -, - becomes +)
 $a - (b - c) = a - b + c$ (signs inside CHANGE)

EXAMPLE 12 — Removing Brackets (Negative Sign Before Bracket)

Evaluate $200 - (40 + 3)$ by removing brackets.

Method 1 (bracket first):

Step 1: $40 + 3 = 43$

Step 2: $200 - 43 = 157$

Method 2 (remove brackets):

Step 1: $200 - (40 + 3) = 200 - 40 - 3$ [minus sign flips both: + becomes -]

Step 2: $= 160 - 3 = 157$

★ **Final Answer:** $200 - (40 + 3) = 200 - 40 - 3 = 157$

Irfan's change: $100 - (15 + 56) = 100 - 15 - 56 = 85 - 56 = 29 \rightarrow ₹29$

EXAMPLE 13 — Bracket with Subtraction Inside

Is it possible to write $500 - (250 - 100)$ without brackets?

Solution:

Step 1: $500 - (250 - 100) \rightarrow$ Minus sign before bracket

Step 2: Remove bracket: sign of 250 changes from + to -, sign of -100 changes to +100

Step 3: $= 500 - 250 + 100$

Step 4: $= 250 + 100 = 350$

Verification:

$$500 - (250 - 100) = 500 - 150 = 350 \quad \checkmark$$

★ **Final Answer:** $500 - (250 - 100) = 500 - 250 + 100 = 350$

EXAMPLE 14 — Removing Brackets (Positive Sign Before Bracket)

Hira has 28 coins in bag 1 and 35 in bag 2. She gifts 10 from bag 2. How many are left?

Expression:

$$28 + (35 - 10)$$

Step 1: Positive sign before bracket → signs inside do NOT change

Step 2: $= 28 + 35 - 10$

Step 3: $= 63 - 10 = 53$

★ **Final Answer:** Hira has 53 coins left

 **KEY RULE: SUMMARY:** When - precedes bracket, ALL signs inside FLIP. When + precedes bracket, signs stay the SAME.

FIGURE IT OUT — Removing Brackets

Question 1: Fill in blanks

(a) $24 + (6 - 4) = 24 + 6 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$

Since + is before bracket, signs inside stay same: $24 + 6 - 4$

★ **Final Answer:** $24 + (6 - 4) = 24 + 6 - 4$

(b) $38 + (\underline{\hspace{1cm}} \underline{\hspace{1cm}} \underline{\hspace{1cm}}) = 38 + 9 - 4$

RHS has $38 + 9 - 4$. Since + before bracket, inside keeps same signs → bracket contains $9 - 4$

★ **Final Answer:** $38 + (9 - 4) = 38 + 9 - 4$

(c) $24 - (6 + 4) = 24 \underline{\hspace{1cm}} \underline{\hspace{1cm}} 6 - 4$

Since - before bracket, signs flip: +6 becomes -6, +4 stays +4 (but was already written as positive)

$$= 24 - 6 - 4$$

★ **Final Answer:** $24 - (6 + 4) = 24 - 6 - 4$

(d) $24 - 6 - 4 = 24 - 6 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$

$= 24 - 6 - 4$ (same expression, no bracket needed)

$$\star \text{ Final Answer: } 24 - 6 - 4 = 24 - 6 - 4$$

(e) $27 - (8 + 3) = 27 _ 8 _ 3$

Minus before bracket: both signs flip $\rightarrow = 27 - 8 - 3$

$$\star \text{ Final Answer: } 27 - (8 + 3) = 27 - 8 - 3$$

(f) $27 - (_ _ _) = 27 - 8 + 3$

After removing bracket (RHS): $-8 + 3 \rightarrow$ in bracket with minus sign: $(8 - 3)$

$$\star \text{ Final Answer: } 27 - (8 - 3) = 27 - 8 + 3$$

Question 2: Remove Brackets

(a) $14 + (12 + 10) \rightarrow$ Positive before bracket

$$\star \text{ Final Answer: } = 14 + 12 + 10 = 36$$

(b) $14 - (12 + 10) \rightarrow$ Negative before bracket, flip signs

$$\star \text{ Final Answer: } = 14 - 12 - 10 = -8$$

(c) $14 + (12 - 10) \rightarrow$ Positive before bracket

$$\star \text{ Final Answer: } = 14 + 12 - 10 = 16$$

(d) $14 - (12 - 10) \rightarrow$ Negative before bracket, flip signs

$$\star \text{ Final Answer: } = 14 - 12 + 10 = 12$$

(e) $-14 + (12 - 10) \rightarrow$ Positive before bracket

$$\star \text{ Final Answer: } = -14 + 12 - 10 = -12$$

(f) $14 - (-12 - 10) \rightarrow$ Negative before bracket, flip signs

$$-12 \rightarrow +12 \quad -10 \rightarrow +10$$

$$\star \text{ Final Answer: } = 14 + 12 + 10 = 36$$

Question 3: Compare Pairs of Expressions

Q.3a $(6 + 10) - 2$ vs $6 + (10 - 2)$

Step 1: $(6 + 10) - 2 = 16 - 2 = 14$

Step 2: $6 + (10 - 2) = 6 + 8 = 14$

★ Final Answer: $(6 + 10) - 2 = 6 + (10 - 2) = 14$ [EQUAL]

|Q.3b $16 - (8 - 3)$ vs $(16 - 8) - 3$

Step 1: $16 - (8 - 3) = 16 - 8 + 3 = 11$

Step 2: $(16 - 8) - 3 = 8 - 3 = 5$

★ Final Answer: $16 - (8 - 3) \neq (16 - 8) - 3$ [$11 \neq 5$ — NOT EQUAL]

|Q.3c $27 - (18 + 4)$ vs $27 + (-18 - 4)$

Step 1: $27 - (18 + 4) = 27 - 18 - 4 = 5$

Step 2: $27 + (-18 - 4) = 27 - 18 - 4 = 5$

★ Final Answer: $27 - (18 + 4) = 27 + (-18 - 4) = 5$ [EQUAL]

Question 4: Identify Same Value Expressions

|Q.4a From: $319+537$, $319-537$, $-537+319$, $537-319$ → which are equal?

Convert to terms: $319 - 537 = 319 + (-537)$. $-537 + 319 = (-537) + 319$. Same terms!

★ Final Answer: $319 - 537 = -537 + 319$ (same terms, same value)

|Q.4b From: $87+46-109$, $87-46+109$, $87-(46+109)$, $(87-46)+109$

$87 + 46 - 109$ has terms 87, 46, -109.

$87 - 46 + 109$ has terms 87, -46, 109. Different!

$87 - (46 + 109) = 87 - 46 - 109$. Terms: 87, -46, -109. Different!

$(87 - 46) + 109 = 87 - 46 + 109$. Terms: 87, -46, 109. Same as $87 - 46 + 109$.

★ Final Answer: $87 + 46 - 109$ (3 times, all equal) AND $87 - 46 + 109 = (87-46) + 109$ (equal to each other)

Question 5: Add Brackets to Get the Given Value

|Q.5a $34 - 9 + 12 = 13$

Without brackets: $34 - 9 + 12 = 37$ (not 13)

Try: $34 - (9 + 12) = 34 - 21 = 13$ ✓

★ Final Answer: $34 - (9 + 12) = 13$

|Q.5b $56 - 14 - 8 = 34$

Without brackets (L to R): $56 - 14 - 8 = 34$ ✓ (already correct)

Or with brackets: $(56 - 14) - 8 = 42 - 8 = 34$ ✓

★ Final Answer: $(56 - 14) - 8 = 34$

|Q.5c $-22 - 12 + 10 + 22 = -22$

Try: $-22 - (12 + 10) + 22 = -22 - 22 + 22 = -22$ ✓

★ Final Answer: $-22 - (12 + 10) + 22 = -22$

Question 6: Fill Blanks using Reasoning

|Q.6a $423 + \underline{\quad} = 419 + \underline{\quad}$

$423 = 419 + 4$, so $423 + x = 419 + (x + 4)$

Example: $423 + 419 = 419 + 423$ (Commutative property)

★ Final Answer: $423 + 419 = 419 + 423$

|Q.6b $207 - 68 = 210 - \underline{\quad}$

$207 + 3 = 210$, so we added 3 to 207. To keep equality, add 3 to 68 too.

★ Final Answer: $207 - 68 = 210 - 71$

Question 8: Jasoda's Subtraction Strategy

|Q.8a Jasoda subtracts 10 and adds 1 instead of subtracting 9. Is she always correct?

$36 - 9 = 36 - (10 - 1) = 36 - 10 + 1 = 26 + 1 = 27$ ✓

★ Final Answer: YES — she always gets the correct answer because $-9 = -10 + 1$

|Q.8b Other similar strategies:

- Subtract 8: subtract 10, add 2 (since $-8 = -10 + 2$)
- Subtract 19: subtract 20, add 1
- Subtract 99: subtract 100, add 1

★ Final Answer: These strategies work because they use the same total subtraction

Question 9: Matching Expressions

|Q.9 Find expressions equal to (a) $73 - 14 + 1$ and (b) $73 - 14 - 1$

(a) $73 - 14 + 1 \rightarrow$ Terms: 73, -14, 1

(i) $73 - (14 + 1) = 73 - 14 - 1 \rightarrow$ terms: 73, -14, -1 $\neq$ NOT EQUAL

(ii) $73 - (14 - 1) = 73 - 14 + 1 \rightarrow$ terms: 73, -14, +1 ✓ EQUAL

(iii) $73 + (-14 + 1) = 73 - 14 + 1 \rightarrow$ terms: 73, -14, +1 ✓ EQUAL

(iv) $73 + (-14 - 1) = 73 - 14 - 1 \rightarrow$ terms: 73, -14, -1 ≠ NOT EQUAL

(b) $73 - 14 - 1 \rightarrow$ Terms: 73, -14, -1

(i) $73 - (14 + 1) = 73 - 14 - 1 \rightarrow$ terms: 73, -14, -1 ✓ EQUAL

(iv) $73 + (-14 - 1) = 73 - 14 - 1 \rightarrow$ terms: 73, -14, -1 ✓ EQUAL

★ **Final Answer: Equal to 73-14+1: expressions (ii) and (iii) Equal to 73-14-1: expressions (i) and (iv)**

REMOVING BRACKETS — II (Distributive Property)

💡 The Distributive Property

Multiplying a number by a sum (or difference) = multiplying the number by EACH term separately. $a \times (b + c) = a \times b + a \times c$ $a \times (b - c) = a \times b - a \times c$ Also: $(b + c) \times a = b \times a + c \times a$

📊 EXAMPLE 15 — Hotel Bill (Distributive Property)

Lhamo and Norbu each ordered a vegetable cutlet (₹43) and a rasgulla (₹24). Find total cost.

Wrong expression:

$2 \times 43 + 24$ (This means '24 more than 2×43 ' — WRONG)

Correct expression:

$2 \times (43 + 24)$ (This means 'twice of $43 + 24$ ' — CORRECT)

Using Distributive Property:

Step 1: $2 \times (43 + 24) = 2 \times 43 + 2 \times 24$

Step 2: $= 86 + 48 = 134$

★ **Final Answer: Total bill = $2 \times (43 + 24) = ₹134$**

If Sangmu joins: Expression = $3 \times (43 + 24) = 3 \times 43 + 3 \times 24 = 129 + 72 = ₹201$

📊 EXAMPLE 16 — Republic Day Parade (Array Model)

Boy scouts march in 4 rows of 5. Girl guides march in 3 rows of 5. Total marchers?

Solution — Method 1:

Step 1: Scouts: $4 \times 5 = 20$ Guides: $3 \times 5 = 15$

Step 2: Total = $4 \times 5 + 3 \times 5 = 20 + 15 = 35$

Solution — Method 2 (Distributive):

Step 1: Total rows = $4 + 3 = 7$

Step 2: Total = $(4 + 3) \times 5 = 7 \times 5 = 35$

Conclusion:

$4 \times 5 + 3 \times 5 = (4 + 3) \times 5$ [both equal 35]

★ **Final Answer: 35 scouts and guides are marching**

Note: $5 \times 4 + 3 \neq 5 \times (4 + 3)$ because:

$$5 \times 4 + 3 = 20 + 3 = 23$$

$$5 \times (4 + 3) = 5 \times 7 = 35 \rightarrow \text{these are different!}$$

General Distributive Property

Consider $10 \times 98 + 3 \times 98 = (10 + 3) \times 98 = 13 \times 98$

This is because 10 times 98 added to 3 times 98 = 13 times 98.

$$a \times b + c \times b = (a + c) \times b$$

$$a \times b - c \times b = (a - c) \times b$$

PATTERNS IN MULTIPLICATION — Splitting Numbers

EXAMPLE 17 — Finding 63×18

| Given: $53 \times 18 = 954$. Find 63×18 .

Concept Used:

Split $63 = 53 + 10$, then use distributive property

Solution:

Step 1: $63 = 53 + 10$

Step 2: $63 \times 18 = (53 + 10) \times 18$

Step 3: $= 53 \times 18 + 10 \times 18$

Step 4: $= 954 + 180$ [using given fact]

Step 5: $= 1134$

★ **Final Answer:** $63 \times 18 = 1134$

EXAMPLE 18 — Shortcut: 97×25

| Find an effective way to calculate 97×25 .

Concept Used:

97 is close to 100. Write $97 = 100 - 3$, use distributive property.

Solution:

Step 1: $97 = 100 - 3$

Step 2: $97 \times 25 = (100 - 3) \times 25$

Step 3: $= 100 \times 25 - 3 \times 25$

Step 4: $= 2500 - 75 = 2425$

★ **Final Answer:** $97 \times 25 = 2425$

Apply same method to:

(a) $95 \times 8 = (100 - 5) \times 8 = 100 \times 8 - 5 \times 8 = 800 - 40 = 760$

(b) $104 \times 15 = (100 + 4) \times 15 = 100 \times 15 + 4 \times 15 = 1500 + 60 = 1560$

$$(c) 49 \times 50 = (50 - 1) \times 50 = 50 \times 50 - 1 \times 50 = 2500 - 50 = 2450$$

 **KEY RULE:** This shortcut works best when one number is CLOSE to a multiple of 10, 50, 100, etc.



FIGURE IT OUT — Distributive Property

Question 1: Fill blanks using Distributive Property

$$(c) 3 \times (5 + 8) = 3 \times 5 \underline{\hspace{1cm}} 3 \times \underline{\hspace{1cm}}$$

$$\star \text{ Final Answer: } 3 \times (5 + 8) = 3 \times 5 + 3 \times 8 = 15 + 24 = 39$$

$$(d) (9 + 2) \times 4 = 9 \times 4 \underline{\hspace{1cm}} 2 \times \underline{\hspace{1cm}}$$

$$\star \text{ Final Answer: } (9 + 2) \times 4 = 9 \times 4 + 2 \times 4 = 36 + 8 = 44$$

$$(e) 3 \times (\underline{\hspace{1cm}} + 4) = 3 \times \underline{\hspace{1cm}} + 3 \times 4$$

$$\star \text{ Final Answer: } 3 \times (10 + 4) = 3 \times 10 + 3 \times 4$$

$$(f) (\underline{\hspace{1cm}} + 6) \times 4 = 13 \times 4 + 6 \times 4$$

$$\star \text{ Final Answer: } (13 + 6) \times 4 = 13 \times 4 + 6 \times 4$$

$$(g) 3 \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}}) = 3 \times 5 + 3 \times 2$$

$$\star \text{ Final Answer: } 3 \times (5 + 2) = 3 \times 5 + 3 \times 2$$

$$(h) (\underline{\hspace{1cm}} + \underline{\hspace{1cm}}) \times \underline{\hspace{1cm}} = 2 \times 4 + 3 \times 4$$

$$\star \text{ Final Answer: } (2 + 3) \times 4 = 2 \times 4 + 3 \times 4$$

$$(i) 5 \times (9 - 2) = 5 \times 9 - 5 \times \underline{\hspace{1cm}}$$

$$\star \text{ Final Answer: } 5 \times (9 - 2) = 5 \times 9 - 5 \times 2 = 45 - 10 = 35$$

$$(j) (5 - 2) \times 7 = 5 \times 7 - 2 \times \underline{\hspace{1cm}}$$

$$\star \text{ Final Answer: } (5 - 2) \times 7 = 5 \times 7 - 2 \times 7 = 35 - 14 = 21$$

$$(k) 5 \times (8 - 3) = 5 \times 8 \underline{\hspace{1cm}} 5 \times \underline{\hspace{1cm}}$$

$$\star \text{ Final Answer: } 5 \times (8 - 3) = 5 \times 8 - 5 \times 3 = 40 - 15 = 25$$

$$(l) (8 - 3) \times 7 = 8 \times 7 \underline{\hspace{1cm}} 3 \times 7$$

$$\star \text{ Final Answer: } (8 - 3) \times 7 = 8 \times 7 - 3 \times 7 = 56 - 21 = 35$$

(m) $5 \times (12 - \underline{\quad}) = \underline{\quad} 5 \times \underline{\quad}$

★ Final Answer: $5 \times (12 - 3) = 5 \times 12 - 5 \times 3 = 60 - 15 = 45$

(n) $(15 - \underline{\quad}) \times 7 = \underline{\quad} 6 \times 7$

★ Final Answer: $(15 - 6) \times 7 = 15 \times 7 - 6 \times 7 = 105 - 42 = 63$

(o) $5 \times (\underline{\quad} - \underline{\quad}) = 5 \times 9 - 5 \times 4$

★ Final Answer: $5 \times (9 - 4) = 5 \times 9 - 5 \times 4 = 45 - 20 = 25$

(p) $(\underline{\quad} - \underline{\quad}) \times \underline{\quad} = 17 \times 7 - 9 \times 7$

★ Final Answer: $(17 - 9) \times 7 = 17 \times 7 - 9 \times 7 = 119 - 63 = 56$

Question 2: Compare using Reasoning

|Q.2a $(8 - 3) \times 29$ vs $(3 - 8) \times 29$

$8 - 3 = 5$ (positive) vs $3 - 8 = -5$ (negative)

Multiplied by same positive number (29), so $5 \times 29 > -5 \times 29$

★ Final Answer: $(8 - 3) \times 29 > (3 - 8) \times 29$

|Q.2b $15 + 9 \times 18$ vs $(15 + 9) \times 18$

LHS: 9×18 is one term, then add 15 $\rightarrow = 15 + 162 = 177$

RHS: $(15 + 9) \times 18 = 24 \times 18 = 432$

Alternatively: LHS = $15 + (9 \times 18)$ vs RHS = $15 \times 18 + 9 \times 18$ (RHS includes 15×18 extra)

★ Final Answer: $15 + 9 \times 18 < (15 + 9) \times 18$

|Q.2c $23 \times (17 - 9)$ vs $23 \times 17 + 23 \times 9$

By distributive: $23 \times (17 - 9) = 23 \times 17 - 23 \times 9$

But RHS = $23 \times 17 + 23 \times 9$ (addition, not subtraction) $\rightarrow$ RHS is bigger

★ Final Answer: $23 \times (17 - 9) < 23 \times 17 + 23 \times 9$

|Q.2d $(34 - 28) \times 42$ vs $34 \times 42 - 28 \times 42$

By distributive: $(34 - 28) \times 42 = 34 \times 42 - 28 \times 42$

★ Final Answer: $(34 - 28) \times 42 = 34 \times 42 - 28 \times 42$

Question 3: Ways to Make 14

Given: $2 \times (1 + 6) = 14$. Find more:

(a) $2 \times (5 + 2) = 14$

(b) $2 \times (3 + 4) = 14$

(c) $7 \times (1 + 1) = 14$

(d) $2 \times (6 + 1) = 14$

Question 4: Sum of Numbers in Pictures

Picture I: 3×3 grid with 4s in corners/edges and 8s in center cross

Numbers: four 4s in corners, four 8s in cross positions, one 4 in center

Way 1: $(5 \times 4) + (4 \times 8) = 20 + 32 = 52$

Way 2: $2 \times (4 + 8 + 4) + (8 + 4 + 8) = 32 + 20 = 52$

Picture II: 4×4 grid with 5s in corners/edges and 6s in cross

Way 1: $(8 \times 5) + (8 \times 6) = 40 + 48 = 88$

Way 2: $8 \times (5 + 6) = 8 \times 11 = 88$

FINAL FIGURE IT OUT — Mixed Problems

Question 1: Situational Expressions

|Q.1a Mangoes — Rahim (9 kg/day) and Shyam (11 kg/day) for a week

Expression:

$$7 \times (9 + 11) = 7 \times 20 = 140 \text{ kg}$$

OR: $7 \times 9 + 7 \times 11 = 63 + 77 = 140 \text{ kg}$

★ Final Answer: Total mangoes in a week = 140 kg

|Q.1b Binu's savings — Monthly income ₹20,000, expenses ₹12,000, for a year

Monthly savings:

$$20,000 - (5,000 + 5,000 + 2,000) = 20,000 - 12,000 = ₹8,000$$

Annual savings:

$$12 \times 8,000 = ₹96,000$$

Expression: $12 \times 20,000 - 12 \times (5,000 + 5,000 + 2,000)$

★ Final Answer: Binu saves ₹96,000 in a year

|Q.1c Snail climbing a 10 cm post (climbs 3 cm, slips 2 cm each day)

Net progress per day: $3 - 2 = 1 \text{ cm per day}$

Analysis:

After 7 days, snail is at $7 \times 1 = 7 \text{ cm}$

On Day 8: climbs 3 cm → reaches $7 + 3 = 10 \text{ cm}$ → GETS THE TREAT!

$$\text{Expression: } 7 \times (3 - 2) + 3 = 7 + 3 = 10 \text{ cm}$$

★ Final Answer: The snail gets the treat on Day 8

Question 2: Melvin's Reading — Which expressions are correct?

|Melvin reads a 2-page story every day EXCEPT Tuesdays and Saturdays. Stories in 8 weeks?

Analysis:

Days per week he reads = $7 - 2 = 5$ days

In 8 weeks = $5 \times 8 = 40$ days

Each day = 1 story (2 pages per story, reads 2 pages per day)

Total stories = 40

Check each option:

(a) $5 \times 2 \times 8 = 80$ X (counts pages, not stories)

(b) $(7 - 2) \times 8 = 5 \times 8 = 40$ ✓ CORRECT

(g) $7 \times 8 - 2 \times 8 = 56 - 16 = 40$ ✓ CORRECT

★ Final Answer: Expressions (b) and (g) correctly describe the scenario. Answer = 40 stories

Question 3: Different Ways to Evaluate

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

Way 1 — Group positives and negatives:

$$(1 + 3 + 5 + 7 + 9) + (-2 - 4 - 6 - 8 - 10) = 25 + (-30) = -5$$

Way 2 — Pair consecutive terms:

$$\begin{aligned} &(1-2) + (3-4) + (5-6) + (7-8) + (9-10) \\ &= (-1) + (-1) + (-1) + (-1) + (-1) = -5 \end{aligned}$$

★ Final Answer: $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + 9 - 10 = -5$

|Q.3b $1 - 1 + 1 - 1 + 1 - 1 + 1 - 1 + 1 - 1$

Way 1 — Pair from left:

$$(1-1) + (1-1) + (1-1) + (1-1) + (1-1) = 0 + 0 + 0 + 0 + 0 = 0$$

Way 2 — Group all:

$$(1 + 1 + 1 + 1 + 1) + (-1 - 1 - 1 - 1 - 1) = 5 - 5 = 0$$

★ Final Answer: = 0

Question 4: Compare Pairs

(a) $49 - 7 + 8$ vs $49 - 7 + 8 \rightarrow$ Identical!

★ Final Answer: = (EQUAL)

(b) $83 \times 42 - 18$ vs $83 \times 40 - 18$

Same second term (-18). $83 \times 42 > 83 \times 40$ ($42 > 40$ with same multiplier)

★ Final Answer: > (LHS greater)

(c) $145 - 17 \times 8$ vs $145 - 17 \times 6$

$17 \times 8 = 136 > 17 \times 6 = 102$. Subtracting more $\rightarrow$ LHS smaller

★ Final Answer: < (LHS less)

(d) $23 \times 48 - 35$ vs $23 \times (48 - 35)$

LHS = $23 \times 48 - 35$. RHS = $23 \times 48 - 23 \times 35 =$ LHS - 22×35 more subtracted... wait.

LHS = $(23 \times 48) - 35$. RHS = $23 \times 13 = 299$. LHS = $1104 - 35 = 1069 > 299$

★ Final Answer: > (LHS greater)

(e) $(16-11) \times 12$ vs $-11 \times 12 + 16 \times 12$

RHS = $16 \times 12 - 11 \times 12 = (16-11) \times 12$ [by distributive property]

★ Final Answer: = (EQUAL)

(f) $(76-53) \times 88$ vs $88 \times (53-76)$

$76-53 = 23$ (positive) vs $53-76 = -23$ (negative)

$23 \times 88 > -23 \times 88$

★ Final Answer: > (LHS greater)

(g) $25 \times (42 + 16)$ vs $25 \times (43 + 15)$

$42 + 16 = 58$ vs $43 + 15 = 58$ [same sum!]

★ Final Answer: = (EQUAL)

(h) $36 \times (28-16)$ vs $35 \times (27-15)$

36×12 vs $35 \times 12 \rightarrow 36 > 35$, same multiplier 12

★ Final Answer: > (LHS greater)

Question 5: Identify Equal Expressions without Computation

Q.5a Given: $83 - 37 - 12 \rightarrow$ Terms: 83, -37, -12

(i) $84 - 38 - 12 \rightarrow$ Terms: 84, -38, -12. $84-38 = 83-37$ (both diff by 1). YES equal!

(ii) $84 - (37 + 12) = 84 - 37 - 12 \rightarrow$ Terms: 84, -37, -12. Differ from original.

(iii) $83 - 38 - 13 \rightarrow$ Terms: 83, -38, -13. Differ.

(iv) $-37 + 83 - 12 \rightarrow$ Terms: 83, -37, -12 (same as given!). EQUAL!

★ Final Answer: Equal to $83 - 37 - 12$: (i) and (iv)

Q.5b Given: $93 + 37 \times 44 + 76 \rightarrow$ Terms: 93, 37×44 , 76

(i) $37 + 93 \times 44 + 76 \rightarrow$ Terms: 37, 93×44 , 76. Different (term 93×44 vs 37×44). NOT equal.

(ii) $93 + 37 \times 76 + 44 \rightarrow$ Terms: 93, 37×76 , 44. Different middle term.

(iii) $(93+37) \times (44+76) \rightarrow$ This is a product of sums, completely different structure.

(iv) $37 \times 44 + 93 + 76 \rightarrow$ Terms: 37×44 , 93, 76. Same terms, just reordered! EQUAL!

★ Final Answer: Equal to $93 + 37 \times 44 + 76$: only (iv)

Question 6: Create Ten Expressions with Same Value

Choose number = 36. Ten expressions:

1. $18 + 18$
2. $40 - 4$
3. 6×6
4. $72 \div 2$
5. $30 + 6$
6. 4×9

7. 9×4
8. $100 - 64$
9. $6 \times (4 + 2)$
10. $40 - (2 + 2)$

CHAPTER SUMMARY



KEY CONCEPTS AT A GLANCE

CONCEPT	EXPLANATION & FORMULA
Arithmetic Expression	A mathematical phrase using numbers and operations (+, -, ×, ÷) Example: $13 + 2$, 5×4 , $30 + 5 \times 4$
Value of Expression	The number the expression evaluates to. Example: Value of $13 + 2$ is 15
Comparing Expressions	Compare based on values using =, < or >. Example: $10 + 2 > 7 + 1$ since $12 > 8$
Brackets	Always evaluate brackets FIRST. Example: $30 + (5 \times 4) = 30 + 20 = 50$
Terms	Parts of an expression separated by '+' sign. Convert: $a - b = a + (-b)$, then identify terms. Example: $83 - 14 \rightarrow$ Terms: 83 and -14
Commutative Property	$T1 + T2 = T2 + T1$ Swapping terms does NOT change the sum.
Associative Property	$(T1 + T2) + T3 = T1 + (T2 + T3)$ Grouping terms differently does NOT change sum.
Removing Brackets (+)	$a + (b + c) = a + b + c$ $a + (b - c) = a + b - c$ [signs unchanged]
Removing Brackets (-)	$a - (b + c) = a - b - c$ $a - (b - c) = a - b + c$ [signs FLIP]
Distributive Property	$a \times (b + c) = a \times b + a \times c$ $a \times (b - c) = a \times b - a \times c$ The multiple of a sum = sum of multiples



PUZZLE TIME — Expression Engineer!

Using three 3s and any operations + - × ÷ and brackets:

$$(3 + 3) \div 3 = 2$$

$$3 + 3 - 3 = 3$$

$$3 \times 3 - 3 = 6$$

$$3 \times 3 + 3 = 12$$

Challenge: Using FOUR 4s, make every number from 1 to 20:

$$1 = (4 + 4) \div (4 + 4) \quad 2 = (4 + 4) \div 4 \times (4/4) \quad 3 = (4 + 4 + 4) \div 4$$

$$4 = 4 + 4 \times (4 - 4) \quad 5 = (4 + 4!) \div 4 \div 4 \quad \text{Try the rest!}$$