

TRANSLATE THE PROBLEM INTO A MATHEMATICAL EXPRESSIONS? THE SUM OF TWO NUMBERS IS 115 AND THE DIFFERENCE

TRANSLATE THE PROBLEM INTO A MATHEMATICAL EXPRESSIONS? THE SUM OF TWO NUMBERS IS 115 AND THE DIFFERENCE

WHEN FACED WITH A WORD PROBLEM INVOLVING NUMBERS AND THEIR RELATIONSHIPS, THE FIRST CRUCIAL STEP IS TO TRANSLATE THE TEXTUAL INFORMATION INTO PRECISE MATHEMATICAL EXPRESSIONS. THIS PROCESS INVOLVES IDENTIFYING THE KEY PIECES OF DATA, DEFINING VARIABLES TO REPRESENT UNKNOWN QUANTITIES, AND THEN FORMING EQUATIONS THAT CAPTURE THE RELATIONSHIPS DESCRIBED IN THE PROBLEM. IN THE CONTEXT OF THE PROBLEM STATED—"THE SUM OF TWO NUMBERS IS 115 AND THEIR DIFFERENCE"—THE CHALLENGE IS TO CONVERT THESE WORDS INTO ALGEBRAIC EXPRESSIONS THAT CAN BE MANIPULATED TO FIND THE UNKNOWN NUMBERS. THIS ARTICLE WILL GUIDE YOU THROUGH THE PROCESS OF TRANSLATING SUCH PROBLEMS INTO MATHEMATICAL LANGUAGE, SETTING UP EQUATIONS, AND PREPARING TO SOLVE THEM SYSTEMATICALLY.

UNDERSTANDING THE COMPONENTS OF THE PROBLEM

BREAKING DOWN THE STATEMENT

THE PROBLEM CONTAINS TWO MAIN PIECES OF INFORMATION:

1. THE SUM OF TWO NUMBERS IS 115.
2. THEIR DIFFERENCE IS ALSO SPECIFIED, ALTHOUGH THE EXACT DIFFERENCE VALUE NEEDS TO BE CLARIFIED OR DEDUCED.

HOWEVER, THE PHRASING "AND THE DIFFERENCE" SUGGESTS THAT THE PROBLEM MIGHT BE INCOMPLETE OR THAT THE DIFFERENCE IS PART OF THE PROBLEM STATEMENT TO BE DETERMINED. TYPICALLY, SUCH PROBLEMS ARE STRUCTURED AS:

- THE SUM OF TWO NUMBERS EQUALS A SPECIFIC VALUE.
- THE DIFFERENCE BETWEEN THE SAME TWO NUMBERS EQUALS ANOTHER VALUE.

FOR THE PURPOSE OF THIS ARTICLE, ASSUME THE FULL PROBLEM IS:

"THE SUM OF TWO NUMBERS IS 115, AND THEIR DIFFERENCE IS A CERTAIN VALUE, SAY D."

IF THE DIFFERENCE VALUE IS KNOWN, WE CAN PROCEED DIRECTLY. IF NOT, THE PROBLEM MIGHT BE ASKING TO FIND TWO NUMBERS GIVEN THE SUM AND THE DIFFERENCE AS VARIABLES, LEADING TO A SYSTEM OF EQUATIONS.

DEFINING VARIABLES

TO TRANSLATE THE PROBLEM INTO MATHEMATICAL EXPRESSIONS, ASSIGN VARIABLES TO THE UNKNOWN QUANTITIES:

- LET x = THE FIRST NUMBER
- LET y = THE SECOND NUMBER

THESE VARIABLES ARE PLACEHOLDERS FOR THE ACTUAL NUMBERS WE WANT TO FIND.

FORMULATING THE EQUATIONS

EXPRESSING THE SUM

SINCE THE SUM OF THE TWO NUMBERS IS 115, WE CAN WRITE:

$$- x + y = 115$$

THIS IS OUR FIRST EQUATION, REPRESENTING THE TOTAL OF THE TWO NUMBERS.

EXPRESSING THE DIFFERENCE

THE DIFFERENCE BETWEEN THE TWO NUMBERS IS THE ABSOLUTE VALUE OF THEIR SUBTRACTION:

$$- |x - y| = D$$

DEPENDING ON THE CONTEXT, THE DIFFERENCE MIGHT BE GIVEN AS A POSITIVE NUMBER, OR WE MIGHT NEED TO CONSIDER BOTH CASES (WHETHER $x > y$ OR $y > x$). FOR SIMPLICITY, ASSUME THE DIFFERENCE IS POSITIVE, AND WRITE:

$$- x - y = D$$

OR

$$- y - x = D$$

TO COVER BOTH POSSIBILITIES.

IF D IS KNOWN, THIS GIVES A SECOND EQUATION. IF D IS NOT SPECIFIED, THE PROBLEM MIGHT INVOLVE EXPRESSING SOLUTIONS IN TERMS OF D .

SETTING UP THE SYSTEM OF EQUATIONS

BASED ON THE ABOVE, THE SYSTEM BECOMES:

1. $x + y = 115$ (SUM EQUATION)
2. $x - y = D$ (DIFFERENCE EQUATION), ASSUMING $x \geq y$

ALTERNATIVELY, IF $y \geq x$, THEN:

1. $x + y = 115$
2. $y - x = D$

THE CHOICE DEPENDS ON THE PROBLEM'S CONTEXT OR THE GIVEN DATA. FOR THE PURPOSE OF THIS ARTICLE, ASSUME THE DIFFERENCE D IS KNOWN AND POSITIVE, AND THAT $x \geq y$, SO THE EQUATIONS ARE:

$$\begin{aligned} - x + y &= 115 \\ - x - y &= D \end{aligned}$$

EXPRESSING THE UNKNOWNNS IN TERMS OF ONE VARIABLE

ADDING THE EQUATIONS

TO ELIMINATE y AND FIND x , ADD THE TWO EQUATIONS:

$$-(x + y) + (x - y) = 115 + D$$

SIMPLIFY:

$$-2x = 115 + D$$

THEN,

$$-x = (115 + D) / 2$$

SUBTRACTING THE EQUATIONS

TO FIND y , SUBTRACT THE SECOND EQUATION FROM THE FIRST:

$$-(x + y) - (x - y) = 115 - D$$

SIMPLIFY:

$$-2y = 115 - D$$

THEREFORE,

$$-y = (115 - D) / 2$$

SUMMARY OF THE MATHEMATICAL EXPRESSIONS

FROM THE ABOVE DERIVATIONS, THE TWO UNKNOWN NUMBERS CAN BE EXPRESSED AS:

$$-x = (115 + D) / 2$$

$$-y = (115 - D) / 2$$

WHERE D IS THE DIFFERENCE BETWEEN THE TWO NUMBERS, ASSUMED POSITIVE, AND THE NUMBERS ARE REAL AND VALID ONLY IF THESE EXPRESSIONS PRODUCE REAL NUMBERS.

SPECIAL CASES AND ADDITIONAL CONSIDERATIONS

WHEN THE DIFFERENCE IS UNKNOWN

IF THE DIFFERENCE D IS NOT SPECIFIED, THE PROBLEM BECOMES FINDING ALL PAIRS OF NUMBERS THAT SATISFY:

$$-x + y = 115$$

$$-|x - y| = D \text{ FOR SOME } D \geq 0$$

IN SUCH CASES, THE SOLUTION INVOLVES EXPRESSING THE NUMBERS IN TERMS OF D AND CONSIDERING THE RANGE OF D THAT MAKES THE NUMBERS VALID (NON-NEGATIVE, REAL NUMBERS).

ENSURING THE NUMBERS ARE VALID

SINCE THE NUMBERS ARE REAL, THE FOLLOWING CONDITIONS MUST HOLD:

$$\begin{aligned} - (115 + D) / 2 &\geq 0 \\ - (115 - D) / 2 &\geq 0 \end{aligned}$$

WHICH IMPLIES:

$$- D \leq 115$$

AND

$$- D \geq 0$$

THUS, THE DIFFERENCE D MUST BE BETWEEN 0 AND 115 INCLUSIVE.

RECONSTRUCTING THE PROBLEM AND FINAL EXPRESSIONS

GIVEN THE INITIAL PROBLEM STATEMENT, THE KEY STEPS TO TRANSLATING IT INTO MATHEMATICAL EXPRESSIONS ARE:

1. DEFINE VARIABLES FOR THE UNKNOWN NUMBERS.
2. WRITE EQUATIONS BASED ON THE SUM AND DIFFERENCE.
3. USE ALGEBRAIC MANIPULATION TO EXPRESS EACH UNKNOWN IN TERMS OF KNOWN QUANTITIES AND THE DIFFERENCE D .
4. CHECK THE VALIDITY OF THE SOLUTIONS BASED ON THE CONSTRAINTS.

FINAL EXPRESSIONS:

$$\begin{aligned} - x &= (115 + D) / 2 \\ - y &= (115 - D) / 2 \end{aligned}$$

THESE EXPRESSIONS PROVIDE A COMPLETE MATHEMATICAL TRANSLATION OF THE PROBLEM, READY FOR SOLVING GIVEN SPECIFIC VALUES OF D OR FURTHER CONDITIONS.

CONCLUSION

TRANSLATING A WORD PROBLEM INVOLVING THE SUM AND DIFFERENCE OF TWO NUMBERS INTO MATHEMATICAL EXPRESSIONS IS A SYSTEMATIC PROCESS. IT INVOLVES UNDERSTANDING THE RELATIONSHIPS DESCRIBED, ASSIGNING APPROPRIATE VARIABLES, AND THEN FORMING EQUATIONS THAT ENCAPSULATE THESE RELATIONSHIPS. ONCE THE EQUATIONS ARE ESTABLISHED, ALGEBRAIC TECHNIQUES SUCH AS ADDITION AND SUBTRACTION OF EQUATIONS ALLOW US TO EXPRESS THE UNKNOWNNS EXPLICITLY. THIS APPROACH PROVIDES CLARITY AND A PATHWAY TO SOLVING FOR THE ACTUAL NUMBERS, WHETHER THE DIFFERENCE D IS GIVEN OR NEEDS TO BE DETERMINED. MASTERING THIS TRANSLATION PROCESS IS FUNDAMENTAL TO SOLVING A WIDE RANGE OF ALGEBRAIC PROBLEMS AND DEVELOPING A SOLID FOUNDATION IN MATHEMATICAL REASONING.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU TRANSLATE THE STATEMENT 'THE SUM OF TWO NUMBERS IS 115' INTO A MATHEMATICAL EXPRESSION?

YOU CAN REPRESENT THE TWO NUMBERS AS x AND y , AND WRITE THE EQUATION AS $x + y = 115$.

WHAT IS THE MATHEMATICAL EXPRESSION FOR 'THE DIFFERENCE OF TWO NUMBERS IS A CERTAIN VALUE'?

IF THE DIFFERENCE IS D , THEN THE EXPRESSION IS $x - y = D$, WHERE x AND y ARE THE TWO NUMBERS.

HOW CAN THE PROBLEM 'THE SUM OF TWO NUMBERS IS 115 AND THEIR DIFFERENCE IS D ' BE WRITTEN AS A SYSTEM OF EQUATIONS?

IT CAN BE WRITTEN AS: $x + y = 115$ AND $x - y = D$.

IF THE DIFFERENCE BETWEEN THE TWO NUMBERS IS 35 AND THEIR SUM IS 115, HOW DO YOU SET UP THE EQUATIONS?

SET UP THE EQUATIONS AS $x + y = 115$ AND $x - y = 35$.

WHAT STEPS ARE INVOLVED IN TRANSLATING A REAL-WORLD PROBLEM INTO A MATHEMATICAL EXPRESSION?

IDENTIFY THE QUANTITIES INVOLVED, ASSIGN VARIABLES, UNDERSTAND THE RELATIONSHIPS (SUCH AS SUM OR DIFFERENCE), AND THEN WRITE EQUATIONS THAT REPRESENT THOSE RELATIONSHIPS.

HOW CAN YOU FIND THE TWO NUMBERS IF THEIR SUM IS 115 AND THEIR DIFFERENCE IS KNOWN?

SET UP THE SYSTEM OF EQUATIONS AND SOLVE SIMULTANEOUSLY, FOR EXAMPLE USING ADDITION OR SUBSTITUTION METHODS TO FIND x AND y .

WHAT IS THE SIGNIFICANCE OF TRANSLATING A WORD PROBLEM INTO A MATHEMATICAL EXPRESSION?

IT SIMPLIFIES THE PROBLEM, ALLOWING FOR SYSTEMATIC SOLVING USING ALGEBRAIC METHODS AND ENSURING CLARITY IN UNDERSTANDING WHAT IS BEING ASKED.

CAN YOU PROVIDE AN EXAMPLE OF TRANSLATING 'THE SUM OF TWO NUMBERS IS 115 AND THE DIFFERENCE IS 45' INTO EQUATIONS?

YES, THE EQUATIONS WOULD BE $x + y = 115$ AND $x - y = 45$.

ADDITIONAL RESOURCES

TRANSLATE THE PROBLEM INTO A MATHEMATICAL EXPRESSIONS IS A FUNDAMENTAL STEP IN SOLVING MANY ALGEBRAIC PROBLEMS. WHEN FACED WITH A WORD PROBLEM, THE ABILITY TO ACCURATELY CONVERT THE GIVEN INFORMATION INTO CLEAR, SOLVABLE MATHEMATICAL EXPRESSIONS CAN MAKE THE DIFFERENCE BETWEEN CONFUSION AND SOLUTION. UNDERSTANDING HOW TO TRANSLATE THE PROBLEM INTO MATHEMATICAL FORM NOT ONLY SIMPLIFIES THE PROCESS BUT ALSO ENHANCES PROBLEM-SOLVING SKILLS, ALLOWING FOR SYSTEMATIC ANALYSIS AND SOLUTION DERIVATION.

IN THIS GUIDE, WE WILL EXPLORE HOW TO INTERPRET A SPECIFIC PROBLEM INVOLVING THE SUM AND DIFFERENCE OF TWO NUMBERS, TRANSFORMING IT INTO MATHEMATICAL EXPRESSIONS THAT PAVE THE WAY TO FINDING THE SOLUTION. THE PROBLEM AT HAND STATES: "THE SUM OF TWO NUMBERS IS 115 AND THEIR DIFFERENCE." WE WILL BREAK DOWN THIS PROBLEM STEP-BY-STEP, FROM UNDERSTANDING THE LANGUAGE TO FORMULATING THE EQUATIONS, AND FINALLY, TO SOLVING FOR THE UNKNOWN.

UNDERSTANDING THE PROBLEM

BEFORE JUMPING INTO THE TRANSLATION PROCESS, IT'S CRUCIAL TO GRASP WHAT THE PROBLEM IS ASKING AND WHAT INFORMATION IT PROVIDES. THE KEY PIECES OF INFORMATION ARE:

- THE SUM OF TWO NUMBERS IS 115.
- THE DIFFERENCE BETWEEN THE SAME TWO NUMBERS (THOUGH THE PROBLEM SNIPPET APPEARS INCOMPLETE, BUT ASSUMING IT ASKS FOR THE DIFFERENCE OR IMPLIES A CERTAIN DIFFERENCE VALUE).

FOR CLARITY, LET'S ASSUME THE COMPLETE PROBLEM STATES:

"THE SUM OF TWO NUMBERS IS 115, AND THEIR DIFFERENCE IS D (SOME VALUE TO BE FOUND OR GIVEN)."

IN MANY SIMILAR PROBLEMS, THE DIFFERENCE IS A SPECIFIC NUMBER, OR SOMETIMES, THE PROBLEM ASKS TO FIND THE TWO NUMBERS GIVEN THEIR SUM AND DIFFERENCE. FOR THIS GUIDE, WE WILL PROCEED WITH THE COMMON SCENARIO:

"THE SUM OF TWO NUMBERS IS 115, AND THEIR DIFFERENCE IS 45. FIND THE TWO NUMBERS."

THIS MAKES FOR A COMPLETE, ILLUSTRATIVE CASE. IF NEEDED, YOU CAN ADAPT THE PROCESS TO OTHER DIFFERENCE VALUES.

STEP 1: ASSIGN VARIABLES TO UNKNOWNNS

THE FIRST STEP IN TRANSLATING THE PROBLEM INTO MATHEMATICAL EXPRESSIONS IS TO ASSIGN VARIABLES TO THE UNKNOWN QUANTITIES—IN THIS CASE, THE TWO NUMBERS.

- LET x BE THE FIRST NUMBER.
- LET y BE THE SECOND NUMBER.

CHOOSING VARIABLES IS OFTEN GUIDED BY CONVENTIONS, USUALLY STARTING WITH x AND y FOR SIMPLICITY.

STEP 2: EXPRESS THE KNOWN RELATIONSHIPS AS EQUATIONS

NOW, CONVERT THE LANGUAGE OF THE PROBLEM INTO ALGEBRAIC EQUATIONS BASED ON THE VARIABLES.

SUM OF TWO NUMBERS

THE PROBLEM STATES THAT:

> "THE SUM OF TWO NUMBERS IS 115."

THIS TRANSLATES TO:

$$x + y = 115$$

DIFFERENCE OF TWO NUMBERS

THE PROBLEM STATES THAT:

> "THEIR DIFFERENCE IS 45."

DEPENDING ON THE ORDER OF THE NUMBERS, THE DIFFERENCE COULD BE EXPRESSED AS:

- IF WE ASSUME $x \geq y$, THEN:

$$x - y = 45$$

- ALTERNATIVELY, IF $y \geq x$, THEN:

$$y - x = 45$$

BUT FOR SIMPLICITY AND CONSISTENCY, WE WILL ASSUME $x \geq y$, SO:

$$x - y = 45$$

STEP 3: FORMULATE THE SYSTEM OF EQUATIONS

WITH THE ABOVE TRANSLATIONS, THE PROBLEM REDUCES TO SOLVING THE FOLLOWING SYSTEM OF EQUATIONS:

$$1. x + y = 115$$

$$2. x - y = 45$$

THIS SYSTEM CAPTURES THE CORE RELATIONSHIPS DESCRIBED IN THE PROBLEM.

STEP 4: VERIFY THE EQUATIONS AND THEIR CONSISTENCY

BEFORE SOLVING, ENSURE THE EQUATIONS ARE CONSISTENT AND CORRECTLY DERIVED FROM THE PROBLEM STATEMENT. BOTH EQUATIONS ARE LINEAR AND REPRESENT THE SUM AND DIFFERENCE OF THE SAME TWO UNKNOWNNS, WHICH IS A TYPICAL SYSTEM IN ALGEBRA.

STEP 5: SOLVING THE SYSTEM OF EQUATIONS

NOW, THE CRUCIAL STEP IS SOLVING FOR x AND y . THERE ARE MULTIPLE METHODS—SUBSTITUTION, ELIMINATION, OR GRAPHICAL. FOR SIMPLICITY, WE WILL USE THE ELIMINATION METHOD HERE.

STEP 5.1: ADD THE EQUATIONS

ADDING THE TWO EQUATIONS:

$$(x + y) + (x - y) = 115 + 45$$

SIMPLIFIES TO:

$$2x = 160$$

STEP 5.2: SOLVE FOR x

DIVIDE BOTH SIDES BY 2:

$$x = 160 / 2 = 80$$

STEP 5.3: FIND y

SUBSTITUTE $x = 80$ INTO ONE OF THE ORIGINAL EQUATIONS; USING THE FIRST:

$$x + y = 115$$

$$80 + y = 115$$

SUBTRACT 80 FROM BOTH SIDES:

$$y = 115 - 80 = 35$$

STEP 6: VERIFY THE SOLUTION

ALWAYS VERIFY YOUR SOLUTIONS BY PLUGGING BACK INTO THE ORIGINAL EQUATIONS.

- SUM: $80 + 35 = 115$ ✓ CORRECT.
- DIFFERENCE: $80 - 35 = 45$ ✓ CORRECT.

SINCE BOTH CONDITIONS ARE SATISFIED, THE SOLUTIONS ARE VALID.

GENERAL APPROACH AND ADDITIONAL NOTES

WHEN THE DIFFERENCE IS UNKNOWN

IF THE PROBLEM ONLY STATES THE SUM AND ASKS TO FIND THE TWO NUMBERS ASSUMING THEY ARE DIFFERENT, YOU MIGHT BE ASKED TO FIND POSSIBLE PAIRS. IN SUCH CASES, YOU CAN SET THE DIFFERENCE AS A VARIABLE, SAY D , AND FOLLOW SIMILAR STEPS:

- $x + y = S$ (SUM)
- $x - y = D$ (DIFFERENCE)

THEN, SOLVE FOR x AND y IN TERMS OF S AND D :

- $x = (S + D) / 2$
- $y = (S - D) / 2$

THIS FORM ALLOWS FLEXIBILITY IN SOLVING FOR THE NUMBERS GIVEN DIFFERENT VALUES OF D .

HANDLING NEGATIVE DIFFERENCES OR DIFFERENT ORDERINGS

IF THE PROBLEM INVOLVES NEGATIVE DIFFERENCES OR THE ORDER OF THE NUMBERS IS UNKNOWN, CONSIDER THE ABSOLUTE VALUE OF THE DIFFERENCE OR SET UP TWO EQUATIONS TO ACCOUNT FOR BOTH POSSIBILITIES.

KEY TAKEAWAYS FOR TRANSLATING WORD PROBLEMS INTO MATHEMATICAL EXPRESSIONS

- IDENTIFY THE UNKNOWN(S) AND ASSIGN VARIABLES.
- READ CAREFULLY TO UNDERSTAND WHAT RELATIONSHIPS ARE GIVEN (E.G., SUM, DIFFERENCE, PRODUCT).
- TRANSLATE WORDS INTO EQUATIONS BY INTERPRETING PHRASES LIKE "SUM," "DIFFERENCE," "PRODUCT," ETC.
- USE THE APPROPRIATE ALGEBRAIC METHODS (SUBSTITUTION, ELIMINATION, GRAPHING) TO SOLVE THE SYSTEM.
- VERIFY YOUR SOLUTIONS TO ENSURE THEY SATISFY ALL CONDITIONS OF THE PROBLEM.
- ADJUST FOR DIFFERENT SCENARIOS BY MODIFYING THE EQUATIONS IF ADDITIONAL INFORMATION IS PROVIDED OR IF THE PROBLEM'S CONDITIONS CHANGE.

FINAL THOUGHTS

TRANSLATING A WORD PROBLEM INTO A MATHEMATICAL EXPRESSION IS OFTEN THE MOST CHALLENGING PART OF PROBLEM-SOLVING, BUT WITH PRACTICE, IT BECOMES A SYSTEMATIC PROCESS. THE CLARITY OF YOUR EQUATIONS DIRECTLY IMPACTS THE EASE AND ACCURACY OF YOUR SOLUTION. IN THE CASE OF THE SUM AND DIFFERENCE PROBLEM, SETTING UP THE RIGHT

SYSTEM OF EQUATIONS SIMPLIFIES WHAT INITIALLY SEEMS COMPLEX INTO A STRAIGHTFORWARD ALGEBRAIC SOLUTION.

BY MASTERING THIS TRANSLATION PROCESS, YOU'LL DEVELOP A VALUABLE SKILL THAT APPLIES TO A BROAD RANGE OF MATHEMATICAL PROBLEMS, FROM BASIC ARITHMETIC TO ADVANCED ALGEBRA, CALCULUS, AND BEYOND. REMEMBER, THE KEY TO SUCCESS LIES IN CAREFULLY READING THE PROBLEM, ASSIGNING MEANINGFUL VARIABLES, AND TRANSLATING LANGUAGE INTO PRECISE EQUATIONS BEFORE PROCEEDING WITH CALCULATIONS.

Translate The Problem Into A Mathematical Expressions The Sum Of Two Numbers Is 115 And The Difference

Translate The Problem Into A Mathematical Expressions The Sum Of Two Numbers Is 115 And The Difference

Related Articles

- [WILL GIVE BRAINLYEST IF CORRECT PLEASE HELP.Read The Excerpt From The Adventure Of The Blue Carbuncle.I](#)
- [To Qualify Legally As A Bribe, The Gift Or Payment Must Be Made Directly From Donor To Recipient. \(True](#)
- [Select The Correct Text In The Passage. Which Detail From Paragraph 16 Most Strongly Supports The Claim](#)

[Back to Home](#)