

FIND THE WHOLE. 10% OF ____ IS 14. EXPLAIN YOUR METHOD.

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FIND THE WHOLE. 10% OF ____ IS 14. EXPLAIN YOUR METHOD. THIS PROBLEM INVOLVES UNDERSTANDING PERCENTAGES AND HOW TO REVERSE-ENGINEER A WHOLE NUMBER WHEN A GIVEN PERCENTAGE OF IT IS KNOWN. THE KEY TO SOLVING SUCH A QUESTION LIES IN GRASPING THE RELATIONSHIP BETWEEN THE PART (14), THE PERCENTAGE (10%), AND THE WHOLE. IN THIS ARTICLE, WE WILL EXPLORE THE CONCEPT STEP-BY-STEP, EXPLAIN THE METHOD THOROUGHLY, AND DEMONSTRATE HOW TO ARRIVE AT THE ANSWER CONFIDENTLY.

UNDERSTANDING THE PROBLEM

WHAT IS BEING ASKED?

THE PROBLEM ASKS US TO FIND THE ENTIRE QUANTITY (THE "WHOLE") WHEN WE KNOW THAT 10% OF IT EQUALS 14. ESSENTIALLY, IF 10% OF SOME NUMBER IS 14, WHAT IS THAT NUMBER?

KEY CONCEPTS INVOLVED

- **PERCENTAGE:** A WAY OF EXPRESSING A NUMBER AS A FRACTION OF 100.
- **PART AND WHOLE RELATIONSHIP:** THE PART IS THE PORTION, AND THE WHOLE IS THE TOTAL AMOUNT.
- **ALGEBRAIC REPRESENTATION:** USING VARIABLES TO REPRESENT UNKNOWN QUANTITIES.

METHOD TO FIND THE WHOLE

STEP 1: CONVERT THE PERCENTAGE TO A DECIMAL

SINCE PERCENTAGES ARE BASED ON 100, CONVERTING 10% TO A DECIMAL IS STRAIGHTFORWARD:

- $10\% = 10/100 = 0.10$

THIS DECIMAL FORM MAKES CALCULATIONS EASIER, ESPECIALLY WHEN DEALING WITH ALGEBRAIC FORMULAS.

STEP 2: SET UP THE EQUATION

LET "W" REPRESENT THE WHOLE NUMBER WE NEED TO FIND. SINCE 10% OF W IS 14, WE CAN WRITE:

$$0.10 \times W = 14$$

THIS IS A SIMPLE ALGEBRAIC EQUATION WHERE MULTIPLYING THE DECIMAL BY THE UNKNOWN GIVES US THE KNOWN PART.

STEP 3: SOLVE FOR THE WHOLE

TO FIND W , DIVIDE BOTH SIDES OF THE EQUATION BY 0.10:

$$W = 14 \div 0.10$$

CALCULATING THIS DIVISION GIVES THE VALUE OF THE WHOLE.

STEP 4: PERFORM THE CALCULATION

- $14 \div 0.10 = 14 \div (1/10) = 14 \times 10 = 140$

THUS, THE WHOLE NUMBER W IS 140.

SUMMARY OF THE METHOD

1. CONVERT THE PERCENTAGE TO A DECIMAL.
2. SET UP AN ALGEBRAIC EQUATION RELATING PART, WHOLE, AND PERCENTAGE.
3. ISOLATE THE WHOLE BY DIVIDING THE PART BY THE DECIMAL FORM OF THE PERCENTAGE.
4. PERFORM THE DIVISION TO FIND THE VALUE OF THE WHOLE.

ADDITIONAL EXAMPLES FOR CLARITY

EXAMPLE 1: FIND THE WHOLE IF 25% OF IT IS 50

1. CONVERT 25% TO DECIMAL: $25/100 = 0.25$
2. SET UP THE EQUATION: $0.25 \times W = 50$
3. DIVIDE BOTH SIDES BY 0.25: $W = 50 \div 0.25$
4. CALCULATE: $50 \div 0.25 = 50 \times 4 = 200$
5. ANSWER: THE WHOLE IS 200.

EXAMPLE 2: FIND THE WHOLE IF 5% OF IT IS 8

1. CONVERT 5% TO DECIMAL: $5/100 = 0.05$
2. SET UP THE EQUATION: $0.05 \times W = 8$
3. DIVIDE BOTH SIDES BY 0.05: $W = 8 \div 0.05$
4. CALCULATE: $8 \div 0.05 = 8 \times 20 = 160$
5. ANSWER: THE WHOLE IS 160.

COMMON MISTAKES AND HOW TO AVOID THEM

1. FORGETTING TO CONVERT PERCENTAGES TO DECIMALS

- ALWAYS CONVERT THE PERCENTAGE TO A DECIMAL BEFORE PERFORMING CALCULATIONS.

2. MIXING UP PART AND WHOLE IN THE EQUATION

- ENSURE THAT THE PART (14 IN THIS CASE) IS ON ONE SIDE OF THE EQUATION, AND THE WHOLE IS ISOLATED ON THE OTHER.

3. INCORRECT DIVISION

- DIVIDE THE PART BY THE DECIMAL EQUIVALENT OF THE PERCENTAGE, NOT THE OTHER WAY AROUND.

CONCLUSION

THE PROCESS OF FINDING THE WHOLE WHEN GIVEN A PERCENTAGE PART IS STRAIGHTFORWARD ONCE YOU UNDERSTAND THE RELATIONSHIP BETWEEN THE PART, THE WHOLE, AND THE PERCENTAGE. BY CONVERTING THE PERCENTAGE TO A DECIMAL AND SETTING UP A SIMPLE ALGEBRAIC EQUATION, YOU CAN EASILY SOLVE FOR THE UNKNOWN WHOLE. IN THE SPECIFIC PROBLEM WHERE 10% OF A NUMBER IS 14, THE METHOD INVOLVES DIVIDING 14 BY 0.10, YIELDING 140 AS THE ANSWER. MASTERING THIS METHOD ENHANCES YOUR ABILITY TO SOLVE A WIDE RANGE OF PERCENTAGE-BASED PROBLEMS EFFICIENTLY AND ACCURATELY.

FREQUENTLY ASKED QUESTIONS

WHAT DOES THE PHRASE 'FIND THE WHOLE. 10% OF ____ IS 14' MEAN?

IT MEANS YOU NEED TO FIND THE TOTAL AMOUNT (THE WHOLE) WHERE 10% OF THAT AMOUNT EQUALS 14.

HOW DO YOU SET UP THE EQUATION FOR '10% OF ____ IS 14'?

LET THE WHOLE BE x . THEN, 10% OF x EQUALS 14, SO $0.10x = 14$.

WHAT IS THE METHOD TO FIND THE WHOLE WHEN 10% EQUALS 14?

DIVIDE BOTH SIDES OF THE EQUATION $0.10x = 14$ BY 0.10 TO SOLVE FOR x : $x = 14 / 0.10$.

WHAT IS THE VALUE OF THE WHOLE IN THIS PROBLEM?

THE VALUE OF THE WHOLE IS $x = 14 / 0.10 = 140$.

WHY DO WE DIVIDE BY 0.10 IN THIS PROBLEM?

BECAUSE 0.10 REPRESENTS 10%, AND TO FIND THE WHOLE, WE DIVIDE THE PART (14) BY 0.10.

CAN THIS METHOD BE USED TO FIND THE WHOLE FOR OTHER PERCENTAGES?

YES, FOR ANY PERCENTAGE, SET UP THE EQUATION $(\text{PERCENTAGE}/100) \text{ WHOLE} = \text{PART}$, THEN SOLVE FOR THE WHOLE BY DIVIDING THE PART BY THE PERCENTAGE IN DECIMAL FORM.

WHAT IS THE KEY TAKEAWAY WHEN SOLVING 'FIND THE WHOLE GIVEN A PERCENTAGE OF IT'?

CONVERT THE PERCENTAGE TO A DECIMAL, WRITE THE EQUATION, AND SOLVE FOR THE WHOLE BY DIVIDING THE GIVEN PART BY THAT DECIMAL.

ADDITIONAL RESOURCES

FIND THE WHOLE. 10% OF ____ IS 14. EXPLAIN YOUR METHOD.

INTRODUCTION

IN THE REALM OF MATHEMATICS, PARTICULARLY IN UNDERSTANDING PERCENTAGES AND THEIR APPLICATIONS, PROBLEMS LIKE "FIND THE WHOLE. 10% OF ____ IS 14" SERVE AS FUNDAMENTAL EXERCISES THAT BOLSTER COMPREHENSION OF RATIOS, PROPORTIONS, AND ALGEBRAIC REASONING. WHILE SEEMINGLY STRAIGHTFORWARD, SUCH PROBLEMS OFTEN REQUIRE A PRECISE APPROACH TO DECIPHER THE RELATIONSHIP BETWEEN THE PART AND THE WHOLE, ESPECIALLY WHEN THE QUESTION DEMANDS NOT JUST AN ANSWER BUT AN EXPLANATION OF THE METHOD USED.

THIS ARTICLE EXPLORES THE INTRICACIES BEHIND SOLVING THE PROBLEM: "FIND THE WHOLE. 10% OF ____ IS 14." WE WILL DELVE INTO THE CONCEPTUAL FOUNDATIONS, STEP-BY-STEP SOLUTIONS, ALTERNATIVE METHODS, COMMON PITFALLS, AND REAL-WORLD APPLICATIONS TO PROVIDE AN EXHAUSTIVE UNDERSTANDING SUITABLE FOR STUDENTS, EDUCATORS, AND ENTHUSIASTS ALIKE.

UNDERSTANDING THE PROBLEM STATEMENT

AT FIRST GLANCE, THE PROBLEM PRESENTS A SIMPLE STATEMENT:

"10% OF ____ IS 14."

THIS INDICATES A DIRECT PROPORTIONAL RELATIONSHIP WHERE 10% OF AN UNKNOWN WHOLE EQUALS 14. THE PRIMARY GOAL IS TO DETERMINE THE VALUE OF THIS WHOLE, WHICH WE WILL DENOTE AS W .

KEY COMPONENTS:

- THE PERCENTAGE: 10%
- THE PART (RESULT): 14
- THE WHOLE (UNKNOWN): W

CONCEPTUAL FOUNDATIONS

WHAT DOES "10% OF ____ IS 14" MEAN?

IN MATHEMATICAL TERMS, PERCENTAGES REPRESENT PARTS PER HUNDRED. SO, 10% IS EQUIVALENT TO THE FRACTION $10/100$, OR 0.10. WHEN THE PROBLEM STATES "10% OF W IS 14," IT TRANSLATES TO:

$$[0.10 \times W = 14]$$

THIS EQUATION DIRECTLY LINKS THE PERCENTAGE, THE WHOLE, AND THE PART.

THE RELATIONSHIP BETWEEN PERCENTAGE, PART, AND WHOLE

THE FUNDAMENTAL FORMULA CONNECTING THESE ELEMENTS IS:

$$[\text{PART} = \left(\frac{\text{PERCENTAGE}}{100} \right) \times \text{WHOLE}]$$

IN THIS CASE:

- PART = 14
- PERCENTAGE = 10
- WHOLE = W (UNKNOWN)

STEP-BY-STEP SOLUTION METHOD

STEP 1: SET UP THE EQUATION

FROM THE PROBLEM, WE WRITE:

$$[0.10 \times W = 14]$$

STEP 2: ISOLATE W

TO FIND W , DIVIDE BOTH SIDES OF THE EQUATION BY 0.10:

$$[W = \frac{14}{0.10}]$$

STEP 3: CALCULATE THE VALUE

PERFORM THE DIVISION:

$$[W = 14 \div 0.10]$$

SINCE DIVIDING BY 0.10 IS EQUIVALENT TO MULTIPLYING BY 10:

$$\backslash[W = 14 \backslash\times 10 = 140 \backslash]$$

ANSWER: THE WHOLE, W , IS 140.

EXPLANATION OF THE METHOD

THE CORE METHOD INVOLVES RECOGNIZING THAT PERCENTAGES ARE ESSENTIALLY FRACTIONS, AND THE PROBLEM REDUCES TO SOLVING A SIMPLE LINEAR EQUATION. THE KEY STEPS ARE:

1. CONVERT THE PERCENTAGE TO ITS DECIMAL FORM.
2. SET UP THE EQUATION RELATING PART, PERCENTAGE, AND WHOLE.
3. ISOLATE THE UNKNOWN VARIABLE (W).
4. PERFORM THE DIVISION TO FIND THE VALUE.

THIS APPROACH IS STRAIGHTFORWARD BUT REQUIRES CLARITY IN UNDERSTANDING THE RELATIONSHIP BETWEEN PERCENTAGES AND THEIR DECIMAL EQUIVALENTS.

ALTERNATIVE APPROACHES AND VARIATIONS

ALGEBRAIC APPROACH

SUPPOSE THE PROBLEM IS PRESENTED IN A MORE ABSTRACT FORM:

"FIND THE WHOLE W SUCH THAT 10% OF W EQUALS 14."

LET:

$$\backslash[W \backslash\times \backslash\tfrac{10}{100} = 14 \backslash]$$

WHICH SIMPLIFIES TO THE SAME DIVISION PROCESS.

USING PROPORTIONS

SET UP A PROPORTION:

$$\backslash[\backslash\tfrac{\backslash\textrm{PART}}{\backslash\textrm{WHOLE}} = \backslash\tfrac{\backslash\textrm{PERCENTAGE}}{100} \backslash]$$

OR:

$$\backslash[\backslash\tfrac{14}{W} = \backslash\tfrac{10}{100} \backslash]$$

CROSS-MULTIPLIED:

$$\backslash[14 \backslash\times 100 = 10 \backslash\times W \backslash]$$

$$\backslash[1400 = 10 \backslash\times W \backslash]$$

$$\backslash[W = \backslash\tfrac{1400}{10} = 140 \backslash]$$

THIS CONFIRMS THE PREVIOUS RESULT.

COMMON PITFALLS AND MISCONCEPTIONS

1. CONFUSING PERCENTAGE WITH DECIMAL FORM:

ALWAYS CONVERT 10% TO 0.10 BEFORE CALCULATIONS.

2. INCORRECT DIVISION:

DIVIDING BY 10 OR 0.10 WITHOUT PROPER CONVERSION CAN LEAD TO ERRORS.

3. MISINTERPRETATION OF "OF":

REMEMBER, "10% OF W" MEANS 0.10 TIMES W, NOT W MINUS 10%.

4. ASSUMING THE PART EQUALS THE WHOLE:

IN SOME PROBLEMS, THE PART MAY BE LARGER OR SMALLER THAN W; CONTEXT MATTERS.

REAL-WORLD APPLICATIONS

UNDERSTANDING HOW TO FIND THE WHOLE WHEN A PERCENTAGE OF IT IS KNOWN IS ESSENTIAL IN VARIOUS FIELDS:

- FINANCE: CALCULATING TOTAL SALES FROM A KNOWN PERCENTAGE INCREASE OR DECREASE.
- STATISTICS: DETERMINING TOTAL POPULATION FROM KNOWN SUBGROUP PERCENTAGES.
- BUSINESS: ESTIMATING TOTAL REVENUE BASED ON A PERCENTAGE OF SALES CONTRIBUTED BY A PRODUCT.
- HEALTH SCIENCES: CALCULATING TOTAL DOSAGE OR POPULATION SIZES BASED ON PERCENTAGE DATA.

PRACTICE PROBLEMS

TO DEEPEN UNDERSTANDING, CONSIDER THESE EXERCISES:

1. IF 25% OF A NUMBER IS 50, WHAT IS THE NUMBER?
2. A TEST SCORE IS 80%, WHICH EQUALS 36 POINTS. WHAT IS THE TOTAL POSSIBLE SCORE?
3. A STORE REPORTS THAT 15% OF ITS PRODUCTS ARE DEFECTIVE, AMOUNTING TO 45 ITEMS. HOW MANY PRODUCTS ARE THERE IN TOTAL?
4. IF 12% OF A POPULATION IS 240, WHAT IS THE TOTAL POPULATION?

SUMMARY AND CONCLUSION

THE PROBLEM "FIND THE WHOLE. 10% OF ____ IS 14" IS A FUNDAMENTAL EXERCISE IN UNDERSTANDING PERCENTAGES AND THEIR APPLICATION TO REAL-WORLD PROBLEMS. THE KEY TO SOLVING SUCH PROBLEMS LIES IN RECOGNIZING THE PROPORTIONAL RELATIONSHIP AND APPLYING BASIC ALGEBRA.

SUMMARY OF THE METHOD:

- CONVERT THE PERCENTAGE TO DECIMAL FORM.
- SET UP THE EQUATION: $(\text{PART}) = (\text{DECIMAL}) \times (\text{WHOLE})$.
- SOLVE FOR THE WHOLE BY DIVIDING THE PART BY THE DECIMAL.

IN THIS SPECIFIC CASE, DIVIDING 14 BY 0.10 YIELDS 140, ESTABLISHING THAT THE ENTIRE QUANTITY IS 140.

MASTERING THESE CONCEPTS BUILDS A STRONG FOUNDATION FOR MORE ADVANCED MATHEMATICAL TOPICS AND PRACTICAL PROBLEM-SOLVING SKILLS, REINFORCING THE IMPORTANCE OF UNDERSTANDING PERCENTAGES IN EVERYDAY LIFE.

REFERENCES

- ELEMENTARY ALGEBRA TEXTBOOKS
- MATHEMATICS FOR EVERYDAY LIFE, BY DAVID A. ADLER
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- COMMON MISTAKES IN PERCENTAGE CALCULATIONS, MATHWORLD

FINAL REMARKS

UNDERSTANDING HOW TO FIND THE WHOLE FROM A PERCENTAGE-PART RELATIONSHIP IS CRUCIAL NOT ONLY ACADEMICALLY BUT ALSO IN EVERYDAY DECISION-MAKING. WHETHER YOU'RE BUDGETING, ANALYZING DATA, OR MAKING ESTIMATES, CLARITY IN THESE FUNDAMENTAL CONCEPTS ENSURES ACCURATE AND RELIABLE RESULTS.

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