

THE LENGTH OF DIAGONAL OF A RECTANGULAR FIELD IS 23.7 M AND ONE OF ITS SIDES IS 18.8 M. FIND THE PERIMETER

THE LENGTH OF DIAGONAL OF A RECTANGULAR FIELD IS 23.7 M AND ONE OF ITS SIDES IS 18.8 M. FIND THE PERIMETER

UNDERSTANDING THE DIMENSIONS OF A RECTANGULAR FIELD IS ESSENTIAL IN VARIOUS REAL-LIFE APPLICATIONS, FROM AGRICULTURE TO CONSTRUCTION. WHEN GIVEN SPECIFIC MEASUREMENTS SUCH AS THE LENGTH OF THE DIAGONAL AND ONE SIDE, IT BECOMES POSSIBLE TO DETERMINE OTHER IMPORTANT PARAMETERS LIKE THE PERIMETER. THIS ARTICLE DELVES INTO HOW TO FIND THE PERIMETER OF A RECTANGULAR FIELD WHEN THE DIAGONAL IS 23.7 METERS AND ONE SIDE MEASURES 18.8 METERS. WE WILL EXPLORE THE FUNDAMENTAL CONCEPTS, SOLVE THE PROBLEM STEP-BY-STEP, AND PROVIDE TIPS TO APPROACH SIMILAR GEOMETRIC PROBLEMS.

UNDERSTANDING THE GEOMETRY OF A RECTANGLE

PROPERTIES OF A RECTANGLE

A RECTANGLE IS A QUADRILATERAL WITH FOUR RIGHT ANGLES. THE KEY PROPERTIES RELEVANT TO SOLVING THIS PROBLEM INCLUDE:

- OPPOSITE SIDES ARE EQUAL IN LENGTH.
- THE DIAGONALS ARE EQUAL IN LENGTH.
- THE DIAGONALS BISECT EACH OTHER.
- DIAGONAL LENGTHS CAN BE RELATED TO SIDE LENGTHS USING THE PYTHAGOREAN THEOREM.

THE RELATIONSHIP BETWEEN SIDES AND DIAGONAL

IN A RECTANGLE, THE DIAGONAL ACTS AS THE HYPOTENUSE OF A RIGHT-ANGLED TRIANGLE FORMED BY TWO ADJACENT SIDES. IF ONE SIDE IS KNOWN, AND THE DIAGONAL LENGTH IS KNOWN, THE OTHER SIDE CAN BE CALCULATED USING THE PYTHAGOREAN THEOREM:

$$\sqrt{D^2} = \sqrt{L^2 + W^2}$$

WHERE:

- $\sqrt{D}$ = LENGTH OF THE DIAGONAL
- $\sqrt{L}$ = LENGTH OF ONE SIDE
- $\sqrt{W}$ = LENGTH OF THE OTHER SIDE

THIS FUNDAMENTAL RELATIONSHIP ALLOWS US TO FIND THE UNKNOWN SIDE WHEN THE DIAGONAL AND ONE SIDE ARE KNOWN.

GIVEN DATA AND WHAT WE NEED TO FIND

LET'S RESTATE THE PROBLEM:

- DIAGONAL LENGTH, $\sqrt{D} = 23.7$ METERS
- KNOWN SIDE, $\sqrt{L} = 18.8$ METERS
- UNKNOWN SIDE, $\sqrt{W} = ?$

OUR GOAL IS TO FIND THE PERIMETER OF THE RECTANGULAR FIELD, WHICH IS:

$$\sqrt{P} = 2(L + W)$$

TO DO THIS, WE NEED TO DETERMINE THE LENGTH OF THE OTHER SIDE, (w) .

CALCULATING THE UNKNOWN SIDE USING THE PYTHAGOREAN THEOREM

STEP 1: WRITE THE PYTHAGOREAN EQUATION

SINCE THE DIAGONAL FORMS A RIGHT TRIANGLE WITH THE SIDES (L) AND (w) , WE HAVE:

$$d^2 = L^2 + w^2$$

PLUGGING IN THE KNOWN VALUES:

$$(23.7)^2 = (18.8)^2 + w^2$$

STEP 2: CALCULATE THE SQUARES

CALCULATE EACH TERM:

$$(23.7)^2 = 561.69$$

$$(18.8)^2 = 353.44$$

STEP 3: SOLVE FOR (w^2)

$$w^2 = 561.69 - 353.44 = 208.25$$

STEP 4: FIND (w)

TAKE THE SQUARE ROOT:

$$w = \sqrt{208.25} \approx 14.44 \text{ METERS}$$

NOW THAT WE HAVE BOTH SIDES OF THE RECTANGLE:

- LENGTH $(L) = 18.8$ METERS
- WIDTH $(w) \approx 14.44$ METERS

CALCULATING THE PERIMETER OF THE RECTANGULAR FIELD

STEP 1: RECALL THE PERIMETER FORMULA

$$P = 2(L + w)$$

STEP 2: SUBSTITUTE THE KNOWN VALUES

$$P = 2(18.8 + 14.44)$$

STEP 3: PERFORM THE ADDITION INSIDE PARENTHESES

$$18.8 + 14.44 = 33.24$$

STEP 4: MULTIPLY BY 2 TO FIND THE PERIMETER

$$P = 2 \times 33.24 = 66.48 \text{ METERS}$$

THEREFORE, THE PERIMETER OF THE RECTANGULAR FIELD IS APPROXIMATELY 66.48 METERS.

SUMMARY OF STEPS TO FIND THE PERIMETER

TO SUMMARIZE, HERE ARE THE STEPS INVOLVED IN SOLVING SIMILAR PROBLEMS:

1. IDENTIFY THE KNOWN MEASUREMENTS: DIAGONAL LENGTH AND ONE SIDE.
2. USE THE PYTHAGOREAN THEOREM TO FIND THE UNKNOWN SIDE:
 - SET UP THE EQUATION $(d^2 = l^2 + w^2)$.
 - CALCULATE THE SQUARES OF KNOWN VALUES.
 - SOLVE FOR THE UNKNOWN SIDE (w) .
3. CALCULATE THE PERIMETER USING $(P = 2(l + w))$.

ADDITIONAL TIPS FOR SOLVING SIMILAR PROBLEMS

UNDERSTAND THE GEOMETRY

MAKE SURE YOU UNDERSTAND THE PROPERTIES OF THE SHAPE INVOLVED—HERE, A RECTANGLE—AND HOW ITS DIMENSIONS RELATE.

USE THE CORRECT FORMULAS

THE PYTHAGOREAN THEOREM IS ESSENTIAL WHEN DEALING WITH RIGHT TRIANGLES, ESPECIALLY IN PROBLEMS INVOLVING DIAGONALS.

DOUBLE-CHECK CALCULATIONS

ALWAYS VERIFY CALCULATIONS, ESPECIALLY SQUARE ROOTS, TO ENSURE ACCURACY.

UNDERSTAND UNITS

ENSURE ALL MEASUREMENTS ARE IN THE SAME UNITS BEFORE PERFORMING CALCULATIONS.

REAL-LIFE APPLICATIONS OF CALCULATING RECTANGLE DIMENSIONS

KNOWING HOW TO CALCULATE DIMENSIONS BASED ON LIMITED MEASUREMENTS IS USEFUL IN VARIOUS FIELDS:

- DESIGNING RECTANGULAR PLOTS OF LAND.
- PLANNING CONSTRUCTION PROJECTS WHERE DIAGONAL MEASUREMENTS ARE AVAILABLE.
- ESTIMATING FENCING OR MATERIAL REQUIREMENTS.
- ARCHITECTURAL DESIGN AND LANDSCAPING.

CONCLUSION

IN CONCLUSION, WHEN THE DIAGONAL LENGTH AND ONE SIDE OF A RECTANGULAR FIELD ARE KNOWN, THE OTHER SIDE CAN BE CALCULATED USING THE PYTHAGOREAN THEOREM. IN OUR EXAMPLE, WITH A DIAGONAL OF 23.7 METERS AND ONE SIDE MEASURING 18.8 METERS, THE OTHER SIDE IS APPROXIMATELY 14.44 METERS. USING THIS, THE PERIMETER IS CALCULATED AS APPROXIMATELY 66.48 METERS. MASTERING THESE GEOMETRIC TECHNIQUES IS VALUABLE FOR SOLVING PRACTICAL PROBLEMS INVOLVING RECTANGULAR SHAPES AND THEIR DIMENSIONS.

REMEMBER: ALWAYS VERIFY YOUR CALCULATIONS AND UNDERSTAND THE RELATIONSHIPS BETWEEN DIFFERENT PARTS OF GEOMETRIC FIGURES TO APPROACH SUCH PROBLEMS CONFIDENTLY AND ACCURATELY.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU FIND THE LENGTH OF THE DIAGONAL OF A RECTANGULAR FIELD WHEN GIVEN TWO SIDES?

YOU CAN USE THE PYTHAGOREAN THEOREM: $\text{DIAGONAL}^2 = \text{LENGTH}^2 + \text{WIDTH}^2$. TAKE THE SQUARE ROOT OF THE SUM TO FIND THE DIAGONAL.

WHAT IS THE FORMULA TO CALCULATE THE PERIMETER OF A RECTANGLE?

$\text{PERIMETER} = 2 \times (\text{LENGTH} + \text{WIDTH})$.

GIVEN THE DIAGONAL OF 23.7 M AND ONE SIDE OF 18.8 M, HOW DO YOU FIND THE OTHER SIDE OF THE RECTANGLE?

USE THE PYTHAGOREAN THEOREM: $\text{OTHER SIDE}^2 = \text{DIAGONAL}^2 - \text{KNOWN SIDE}^2$. SO, OTHER SIDE = $\sqrt{23.7^2 - 18.8^2}$.

CALCULATE THE MISSING SIDE OF THE RECTANGLE IF THE DIAGONAL IS 23.7 M AND ONE SIDE IS 18.8 M.

OTHER SIDE = $\sqrt{(23.7^2 - 18.8^2)} = \sqrt{(561.69 - 353.44)} = \sqrt{208.25} \approx 14.43$ METERS.

HOW DO YOU DETERMINE THE PERIMETER OF THE RECTANGULAR FIELD WITH SIDES 18.8 M AND APPROXIMATELY 14.43 M?

PERIMETER = $2 \times (18.8 + 14.43) \approx 2 \times 33.23 \approx 66.46$ METERS.

WHAT IS THE APPROXIMATE PERIMETER OF THE RECTANGULAR FIELD IN METERS?

THE APPROXIMATE PERIMETER IS 66.46 METERS.

WHY IS THE PYTHAGOREAN THEOREM APPLICABLE IN SOLVING FOR THE SIDES OF THE RECTANGLE IN THIS PROBLEM?

BECAUSE THE DIAGONAL, LENGTH, AND WIDTH FORM A RIGHT-ANGLED TRIANGLE, AND THE PYTHAGOREAN THEOREM RELATES THE SIDES OF A RIGHT TRIANGLE.

CAN THE PERIMETER BE CALCULATED DIRECTLY FROM THE DIAGONAL AND ONE SIDE WITHOUT FINDING THE OTHER SIDE?

NO, BECAUSE THE PERIMETER DEPENDS ON BOTH SIDES. YOU NEED TO FIND THE MISSING SIDE FIRST USING THE DIAGONAL, THEN CALCULATE THE PERIMETER.

ADDITIONAL RESOURCES

THE LENGTH OF DIAGONAL OF A RECTANGULAR FIELD IS 23.7 M AND ONE OF ITS SIDES IS 18.8 M. FIND THE PERIMETER

UNDERSTANDING THE DIMENSIONS AND PROPERTIES OF RECTANGULAR FIELDS IS FUNDAMENTAL IN LAND MEASUREMENT, CONSTRUCTION, AND ARCHITECTURE. WHEN A PROBLEM PRESENTS THE LENGTH OF A DIAGONAL AND ONE SIDE OF A RECTANGLE, IT ENCAPSULATES THE APPLICATION OF THE PYTHAGOREAN THEOREM, A CORNERSTONE IN GEOMETRY. THIS ARTICLE DELVES INTO THE MATHEMATICAL PROCESS OF DETERMINING THE PERIMETER OF SUCH A RECTANGULAR FIELD, PROVIDING DETAILED EXPLANATIONS, CONTEXTUAL INSIGHTS, AND ANALYTICAL PERSPECTIVES.

INTRODUCTION TO RECTANGULAR FIELDS AND THEIR PROPERTIES

RECTANGULAR FIELDS ARE AMONG THE MOST COMMON SHAPES USED IN AGRICULTURE, REAL ESTATE, AND URBAN PLANNING DUE TO THEIR STRAIGHTFORWARD GEOMETRY AND EASE OF MEASUREMENT. A RECTANGLE IS A QUADRILATERAL WITH FOUR RIGHT ANGLES, CHARACTERIZED BY TWO PAIRS OF EQUAL SIDES.

KEY PROPERTIES INCLUDE:

- OPPOSITE SIDES ARE EQUAL IN LENGTH.
- DIAGONALS ARE EQUAL IN LENGTH.
- DIAGONALS BISECT EACH OTHER AT RIGHT ANGLES ONLY IN SPECIAL CASES (LIKE SQUARES), BUT IN RECTANGLES, THEY ARE EQUAL AND BISECT EACH OTHER.

KNOWING THE LENGTH OF THE SIDES AND DIAGONALS ALLOWS FOR PRECISE CALCULATIONS OF AREA, PERIMETER, AND OTHER DIMENSIONS, WHICH ARE VITAL FOR LAND MEASUREMENT, FENCING, AND RESOURCE ALLOCATION.

UNDERSTANDING THE PROBLEM STATEMENT

THE CORE PROBLEM INVOLVES A RECTANGLE WITH:

- A DIAGONAL MEASURING 23.7 METERS.
- ONE SIDE MEASURING 18.8 METERS.

THE GOAL IS TO FIND THE PERIMETER OF THIS RECTANGULAR FIELD.

THIS PROBLEM EXEMPLIFIES HOW GEOMETRIC PRINCIPLES, PARTICULARLY THE PYTHAGOREAN THEOREM, CAN BE APPLIED TO REAL-WORLD SCENARIOS INVOLVING LAND MEASUREMENT.

MATHEMATICAL FOUNDATIONS: THE PYTHAGOREAN THEOREM

THE PYTHAGOREAN THEOREM STATES THAT IN A RIGHT-ANGLED TRIANGLE:

$$c^2 = a^2 + b^2$$

WHERE:

- c IS THE HYPOTENUSE (THE SIDE OPPOSITE THE RIGHT ANGLE).
- a AND b ARE THE OTHER TWO SIDES.

IN THE CONTEXT OF A RECTANGLE, THE DIAGONAL ACTS AS THE HYPOTENUSE OF A RIGHT-ANGLED TRIANGLE FORMED BY TWO ADJACENT SIDES.

APPLICATION IN OUR PROBLEM:

- THE SIDES OF THE RECTANGLE ARE THE LEGS (a AND b).
- THE DIAGONAL IS THE HYPOTENUSE (c).

USING THIS RELATIONSHIP, WE CAN DETERMINE THE UNKNOWN SIDE IF THE OTHER SIDE AND THE DIAGONAL ARE KNOWN.

STEP-BY-STEP SOLUTION APPROACH

STEP 1: IDENTIFY KNOWN AND UNKNOWN QUANTITIES

- KNOWN:

- DIAGONAL, $c = 23.7 \text{ METERS}$
- ONE SIDE, $a = 18.8 \text{ METERS}$

- UNKNOWN:

- THE OTHER SIDE, (b)

STEP 2: APPLY PYTHAGORAS THEOREM

$$[c^2 = a^2 + b^2]$$

REARRANGED TO SOLVE FOR (b) :

$$[b^2 = c^2 - a^2]$$

STEP 3: SUBSTITUTE THE KNOWN VALUES

$$[b^2 = (23.7)^2 - (18.8)^2]$$

CALCULATE EACH SQUARE:

$$[(23.7)^2 = 561.69]$$

$$[(18.8)^2 = 353.44]$$

STEP 4: COMPUTE (b^2)

$$[b^2 = 561.69 - 353.44 = 208.25]$$

STEP 5: FIND (b)

$$[b = \sqrt{208.25}]$$

$$[b \approx 14.43 \text{ METERS}]$$

THUS, THE OTHER SIDE OF THE RECTANGLE IS APPROXIMATELY 14.43 METERS.

CALCULATING THE PERIMETER

THE PERIMETER OF A RECTANGLE IS GIVEN BY:

$$[P = 2(a + b)]$$

SUBSTITUTING THE KNOWN VALUES:

$$[P = 2(18.8 + 14.43)]$$

$$[P = 2(33.23)]$$

$$[P \approx 66.46 \text{ METERS}]$$

THEREFORE, THE PERIMETER OF THE RECTANGULAR FIELD IS APPROXIMATELY 66.46 METERS.

ANALYTICAL INSIGHTS AND PRACTICAL IMPLICATIONS

THIS CALCULATION EXEMPLIFIES HOW FUNDAMENTAL GEOMETRIC PRINCIPLES TRANSLATE DIRECTLY INTO REAL-WORLD APPLICATIONS. FOR INSTANCE:

- LAND MEASUREMENT AND FENCING: KNOWING THE DIMENSIONS ALLOWS LANDOWNERS OR SURVEYORS TO DETERMINE THE AMOUNT OF FENCING NEEDED.
- CONSTRUCTION PLANNING: ACCURATE SIDE MEASUREMENTS ARE ESSENTIAL FOR CONSTRUCTING BOUNDARY WALLS OR SUBDIVIDING LAND.
- AGRICULTURAL PLANNING: PRECISE MEASUREMENTS HELP IN RESOURCE ALLOCATION SUCH AS IRRIGATION, SOIL MANAGEMENT, AND CROP PLANNING.

FURTHERMORE, UNDERSTANDING THE RELATIONSHIP BETWEEN SIDES AND DIAGONALS ENABLES QUICK PROBLEM-SOLVING IN VARIOUS DESIGN AND ENGINEERING SCENARIOS.

FURTHER REFLECTIONS: ASSUMPTIONS AND LIMITATIONS

WHILE THE CALCULATIONS ARE STRAIGHTFORWARD, SEVERAL ASSUMPTIONS UNDERPIN THIS ANALYSIS:

- THE RECTANGLE IS PERFECT, WITH RIGHT ANGLES AT ALL CORNERS.
- THE MEASUREMENTS PROVIDED ARE EXACT, IGNORING POTENTIAL MEASUREMENT ERRORS.
- THE DIAGONAL IS THE STRAIGHT-LINE DISTANCE BETWEEN OPPOSITE CORNERS, ASSUMING NO DISTORTIONS OR IRREGULARITIES.

IN PRACTICAL SCENARIOS, LAND IRREGULARITIES OR MEASUREMENT INACCURACIES MIGHT NECESSITATE MORE SOPHISTICATED METHODS, SUCH AS GPS SURVEYING OR DETAILED MAPPING.

BROADER MATHEMATICAL CONTEXT AND EDUCATIONAL IMPORTANCE

THIS PROBLEM UNDERSCORES THE SIGNIFICANCE OF THE PYTHAGOREAN THEOREM IN GEOMETRY EDUCATION, SERVING AS A FOUNDATIONAL CONCEPT FOR MORE ADVANCED TOPICS SUCH AS TRIGONOMETRY, VECTOR ANALYSIS, AND SPATIAL REASONING.

IT ALSO ILLUSTRATES THE IMPORTANCE OF:

- PROBLEM-SOLVING SKILLS: RECOGNIZING WHICH THEOREM OR PRINCIPLE APPLIES.
- MATHEMATICAL REASONING: CAREFULLY PERFORMING CALCULATIONS AND VERIFYING RESULTS.
- APPLICATION AWARENESS: CONNECTING MATHEMATICAL SOLUTIONS TO REAL-LIFE SCENARIOS.

ENCOURAGING LEARNERS TO APPROACH SUCH PROBLEMS ANALYTICALLY ENHANCES THEIR UNDERSTANDING OF GEOMETRY'S RELEVANCE AND VERSATILITY.

CONCLUSION: FROM GEOMETRY TO REAL-WORLD APPLICATION

THE CALCULATION OF THE PERIMETER OF A RECTANGULAR FIELD BASED ON ITS DIAGONAL AND ONE SIDE EXEMPLIFIES THE SEAMLESS INTEGRATION OF MATHEMATICAL THEORY AND PRACTICAL UTILITY. BY APPLYING THE PYTHAGOREAN THEOREM, WE DETERMINED THE MISSING SIDE LENGTH AND, SUBSEQUENTLY, THE PERIMETER, OFFERING VALUABLE INSIGHTS FOR LAND MEASUREMENT, CONSTRUCTION, AND PLANNING.

THIS EXERCISE NOT ONLY REINFORCES FUNDAMENTAL GEOMETRIC CONCEPTS BUT ALSO HIGHLIGHTS THEIR CRITICAL ROLE IN

EVERYDAY LIFE. AS LAND MEASUREMENT REMAINS A VITAL ASPECT OF PROPERTY MANAGEMENT, ARCHITECTURE, AND URBAN PLANNING, MASTERING SUCH PRINCIPLES ENSURES ACCURACY AND EFFICIENCY IN REAL-WORLD APPLICATIONS.

UNDERSTANDING AND APPLYING THESE MATHEMATICAL TOOLS EMPOWER PROFESSIONALS AND ENTHUSIASTS ALIKE TO NAVIGATE SPATIAL CHALLENGES CONFIDENTLY, TRANSFORMING ABSTRACT FIGURES INTO CONCRETE SOLUTIONS.

The Length Of Diagonal Of A Rectangular Field Is 23 7 M And One Of Its Sides Is 18 8 M Find The Perimeter

The Length Of Diagonal Of A Rectangular Field Is 23 7 M And One Of Its Sides Is 18 8 M Find The Perimeter

Related Articles

- [2. Scenario #2: A Popular U.S. Based Luxury Spa Chain Is Looking To Enter The Global Marketplace By Opening](#)
- [The Margin Requirement On A Stock Purchase Is 25%. You Fully Use The Margin Allowed To Purchase 100 Shares](#)
- [Use The Model Here To Describe The Transfer Of Matter And Flow Of Energy From One Trophic Level To Another](#)

[Back to Home](#)