

REFER TO THE GIVEN COORDINATE GRID. FIND POINT G ON AB SUCH THAT THE RATIO OF AG TO GB IS 3:2.

AROYUVBSX

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UNDERSTANDING HOW TO LOCATE A SPECIFIC POINT ON A LINE SEGMENT BASED ON A GIVEN RATIO IS A FUNDAMENTAL CONCEPT IN COORDINATE GEOMETRY. WHETHER YOU ARE A STUDENT PREPARING FOR EXAMS OR A MATH ENTHUSIAST SEEKING TO DEEPEN YOUR UNDERSTANDING, MASTERING THIS TOPIC ENHANCES YOUR PROBLEM-SOLVING SKILLS AND GEOMETRIC INTUITION. THIS ARTICLE EXPLORES THE PROCESS OF FINDING POINT G ON SEGMENT AB SUCH THAT THE RATIO OF AG TO GB IS 3:2, PROVIDING STEP-BY-STEP GUIDANCE, ILLUSTRATIVE EXAMPLES, AND TIPS FOR MASTERING THE CONCEPT.

UNDERSTANDING THE PROBLEM AND ITS CONTEXT

BEFORE DIVING INTO CALCULATIONS, IT'S ESSENTIAL TO GRASP THE PROBLEM'S DETAILS AND THE CONCEPTS INVOLVED.

WHAT IS THE GIVEN COORDINATE GRID?

- THE COORDINATE GRID IS A TWO-DIMENSIONAL PLANE WITH AXES LABELED X AND Y.
- POINTS ON THE GRID ARE REPRESENTED AS ORDERED PAIRS (x, y) .
- SEGMENTS LIKE AB ARE DEFINED BY THEIR ENDPOINTS, EACH WITH SPECIFIC COORDINATES.

WHAT DOES THE RATIO 3:2 SIGNIFY?

- THE RATIO INDICATES HOW POINT G DIVIDES SEGMENT AB.
- AG REPRESENTS THE SEGMENT FROM POINT A TO POINT G.
- GB REPRESENTS THE SEGMENT FROM POINT G TO POINT B.
- THE RATIO 3:2 MEANS THAT G DIVIDES AB INTO TWO PARTS WHERE AG IS 3 PARTS, AND GB IS 2 PARTS.

KEY CONCEPTS IN COORDINATE GEOMETRY FOR DIVIDING A SEGMENT

TO SOLVE SUCH PROBLEMS, UNDERSTANDING THE SECTION FORMULA AND HOW RATIOS INFLUENCE POINT PLACEMENT IS CRUCIAL.

SECTION FORMULA

- THE SECTION FORMULA HELPS FIND A POINT DIVIDING A SEGMENT IN A GIVEN RATIO.
- IF A POINT G DIVIDES SEGMENT AB IN THE RATIO M:N, THEN THE COORDINATES OF G ARE GIVEN BY:

$$G(x, y) = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$

WHERE:

- $(A(x_1, y_1))$
- $(B(x_2, y_2))$
- (m) AND (n) ARE POSITIVE REAL NUMBERS REPRESENTING THE RATIO PARTS.

STEP-BY-STEP GUIDE TO FINDING POINT G

LET'S ASSUME YOU ARE PROVIDED WITH THE COORDINATES OF POINTS A AND B. THE PROCESS INVOLVES:

1. IDENTIFYING COORDINATES OF A AND B

- FOR EXAMPLE, SUPPOSE:

$$\begin{aligned} A(x_1, y_1) &= (x_A, y_A) \\ B(x_2, y_2) &= (x_B, y_B) \end{aligned}$$

2. SETTING UP THE RATIO

- GIVEN RATIO: $AG : GB = 3 : 2$
- SINCE G DIVIDES AB, THE RATIO OF THE SEGMENTS FROM A TO G AND G TO B IS 3:2, SO:

$$m = 3, \quad n = 2$$

3. APPLYING THE SECTION FORMULA

- COORDINATES OF G ARE GIVEN BY:

$$\begin{aligned} G_x &= \frac{m \times x_B + n \times x_A}{m + n} \\ G_y &= \frac{m \times y_B + n \times y_A}{m + n} \end{aligned}$$

4. CALCULATING COORDINATES OF G

- SUBSTITUTE KNOWN VALUES INTO THE FORMULA:

$$\begin{aligned} G_x &= \frac{3 \times x_B + 2 \times x_A}{5} \\ G_y &= \frac{3 \times y_B + 2 \times y_A}{5} \end{aligned}$$

5. INTERPRETING THE RESULT

- THE RESULTING COORDINATES GIVE THE EXACT LOCATION OF G ON THE SEGMENT AB SATISFYING THE RATIO CONDITION.

EXAMPLE PROBLEM: FINDING POINT G

SUPPOSE YOU ARE GIVEN THE FOLLOWING POINTS:

- $A(2, 3)$
- $B(8, 7)$

FIND POINT G SUCH THAT $AG : GB = 3 : 2$.

STEP 1: IDENTIFY COORDINATES

$$\begin{aligned} & \left[\begin{aligned} & x_A = 2, \quad y_A = 3 \\ & \end{aligned} \right] \\ & \left[\begin{aligned} & x_B = 8, \quad y_B = 7 \\ & \end{aligned} \right] \end{aligned}$$

STEP 2: APPLY THE RATIO

$$\left[\begin{aligned} & m = 3, \quad n = 2 \\ & \end{aligned} \right]$$

STEP 3: CALCULATE G'S X-COORDINATE

$$\left[\begin{aligned} & G_x = \frac{3 \times 8 + 2 \times 2}{5} = \frac{24 + 4}{5} = \frac{28}{5} = 5.6 \\ & \end{aligned} \right]$$

STEP 4: CALCULATE G'S Y-COORDINATE

$$\left[\begin{aligned} & G_y = \frac{3 \times 7 + 2 \times 3}{5} = \frac{21 + 6}{5} = \frac{27}{5} = 5.4 \\ & \end{aligned} \right]$$

FINAL ANSWER:

$$\left[\begin{aligned} & G(5.6, 5.4) \\ & \end{aligned} \right]$$

THIS POINT G DIVIDES SEGMENT AB IN THE RATIO 3:2, WITH THE SPECIFIED COORDINATES.

ADDITIONAL TIPS AND VARIATIONS

1. WHEN COORDINATES ARE NOT GIVEN

- IF ONLY THE LENGTH OF SEGMENTS OR OTHER INFORMATION IS PROVIDED, USE THE DISTANCE FORMULA TO FIND COORDINATES OR VERIFY RATIOS.

2. DIVIDING IN DIFFERENT RATIOS

- THE SAME PROCESS APPLIES FOR ANY RATIO, WHETHER DECIMAL, FRACTIONAL, OR WHOLE NUMBERS.
- FOR EXAMPLE, DIVIDING IN RATIO 1:1 WOULD LOCATE THE MIDPOINT.

3. EXTENDING TO THREE DIMENSIONS

- THE SECTION FORMULA EXTENDS NATURALLY TO 3D SPACE WITH AN ADDITIONAL Z-COORDINATE:

$$G(z) = \frac{m \times z_2 + n \times z_1}{m + n}$$

4. VISUALIZING THE PROBLEM

- DRAWING A COORDINATE PLANE WITH POINTS A AND B HELPS IN UNDERSTANDING THE DIVISION VISUALLY.
- MARK THE RATIO DIVISIONS ACCORDINGLY FOR BETTER COMPREHENSION.

COMMON MISTAKES TO AVOID

- MIXING UP THE ORDER OF POINTS WHEN APPLYING THE SECTION FORMULA.
- INCORRECTLY ASSIGNING THE RATIO PARTS TO THE RESPECTIVE POINTS.
- FORGETTING TO ADD THE PARTS (m + n) IN THE DENOMINATOR.
- MISCALCULATING THE COORDINATES, ESPECIALLY WITH FRACTIONS.

CONCLUSION: MASTERING THE DIVISION OF LINE SEGMENTS

FINDING POINT G ON SEGMENT AB SUCH THAT IT DIVIDES THE SEGMENT IN A SPECIFIED RATIO IS A VITAL SKILL IN COORDINATE GEOMETRY. BY UNDERSTANDING AND APPLYING THE SECTION FORMULA SYSTEMATICALLY, YOU CAN SOLVE A VARIETY OF PROBLEMS INVOLVING SEGMENT DIVISION, WHETHER IN TWO OR THREE DIMENSIONS. PRACTICE WITH DIFFERENT RATIOS AND COORDINATE SETS TO STRENGTHEN YOUR GRASP AND BECOME PROFICIENT IN GEOMETRIC CONSTRUCTIONS AND CALCULATIONS.

REMEMBER: THE KEY STEPS INVOLVE IDENTIFYING THE COORDINATES, SETTING THE RATIO CORRECTLY, APPLYING THE SECTION FORMULA, AND INTERPRETING THE RESULTING COORDINATES ACCURATELY. WITH CONSISTENT PRACTICE, LOCATING SUCH POINTS WILL BECOME AN INTUITIVE PART OF YOUR GEOMETRIC TOOLKIT.

NOTE: THE RATIO 3:2 INDICATES THAT POINT G IS CLOSER TO POINT A THAN B, DIVIDING THE SEGMENT ACCORDINGLY. THIS APPROACH CAN BE EXTENDED TO MORE COMPLEX GEOMETRIC PROBLEMS INVOLVING RATIOS, MEDIANS, AND CENTROID CALCULATIONS.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU FIND POINT G ON SEGMENT AB SUCH THAT THE RATIO AG TO GB IS 3:2?

TO FIND POINT G, DIVIDE THE SEGMENT AB INTO 5 EQUAL PARTS (SINCE $3 + 2 = 5$). G IS LOCATED 3 PARTS FROM A ALONG AB. USE THE SECTION FORMULA OR COORDINATE DIVISION TO DETERMINE G'S COORDINATES.

WHAT IS THE SIGNIFICANCE OF THE RATIO 3:2 IN DIVIDING A SEGMENT ON A COORDINATE GRID?

THE RATIO 3:2 INDICATES THAT POINT G DIVIDES SEGMENT AB INTO TWO PARTS, WITH G LOCATED SUCH THAT THE DISTANCE FROM A TO G IS THREE-FIFTHS OF AB, AND FROM G TO B IS TWO-FIFTHS, ENABLING PRECISE COORDINATE CALCULATION.

CAN YOU EXPLAIN THE SECTION FORMULA USED TO FIND POINT G ON SEGMENT AB?

YES, THE SECTION FORMULA STATES THAT IF A POINT G DIVIDES SEGMENT AB IN THE RATIO $m:n$, THEN G'S COORDINATES ARE GIVEN BY $((mx_2 + nx_1)/(m + n), (my_2 + ny_1)/(m + n))$. FOR RATIO 3:2, SUBSTITUTE $m=3$ AND $n=2$.

IF THE COORDINATES OF A AND B ARE KNOWN, HOW DO YOU COMPUTE THE COORDINATES OF G?

GIVEN $A(x_1, y_1)$ AND $B(x_2, y_2)$, AND THE RATIO 3:2, G'S COORDINATES ARE $((3x_2 + 2x_1)/5, (3y_2 + 2y_1)/5)$. PLUG IN THE KNOWN VALUES TO FIND G.

WHAT ARE COMMON MISTAKES TO AVOID WHEN FINDING A POINT DIVIDING A SEGMENT IN A GIVEN RATIO ON A COORDINATE GRID?

COMMON MISTAKES INCLUDE MIXING UP THE ORDER OF POINTS, INCORRECTLY APPLYING THE RATIO, OR MISCALCULATING THE WEIGHTED AVERAGE. DOUBLE-CHECK THE RATIO PLACEMENT AND FORMULA APPLICATION.

WHAT DOES THE NOTATION 'ARoyUVBSX' IMPLY IN THE CONTEXT OF THIS PROBLEM?

THE NOTATION 'ARoyUVBSX' APPEARS TO BE EXTRANEIOUS OR A CODE; IT DOES NOT DIRECTLY RELATE TO THE GEOMETRIC PROBLEM. FOCUS ON THE GIVEN RATIO AND COORDINATES TO FIND POINT G ON SEGMENT AB.

ADDITIONAL RESOURCES

REFER TO THE GIVEN COORDINATE GRID. FIND POINT G ON AB SUCH THAT THE RATIO OF AG TO GB IS 3:2.
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IN THE REALM OF COORDINATE GEOMETRY, UNDERSTANDING HOW TO LOCATE SPECIFIC POINTS ALONG A LINE SEGMENT BASED ON GIVEN RATIOS IS A FUNDAMENTAL SKILL. SUCH PROBLEMS NOT ONLY ENHANCE SPATIAL REASONING BUT ALSO UNDERPIN PRACTICAL APPLICATIONS IN FIELDS RANGING FROM ENGINEERING TO COMPUTER GRAPHICS. TODAY, WE DELVE INTO A CLASSIC PROBLEM: GIVEN A COORDINATE GRID WITH A LINE SEGMENT AB, HOW DO WE ACCURATELY FIND A POINT G ON AB SUCH THAT THE RATIO OF THE SEGMENTS AG TO GB IS 3:2? THIS PROBLEM EXEMPLIFIES THE UTILITY OF THE SECTION FORMULA—A POWERFUL TOOL IN COORDINATE GEOMETRY—ALLOWING US TO DETERMINE PRECISE POINTS DIVIDING A SEGMENT IN A SPECIFIED RATIO. BY EXPLORING THIS PROBLEM, WE WILL UNCOVER THE STEP-BY-STEP METHODOLOGY, UNDERSTAND THE UNDERLYING PRINCIPLES, AND SEE HOW THESE CONCEPTS CAN BE APPLIED IN VARIOUS REAL-WORLD CONTEXTS.

UNDERSTANDING THE BASICS: COORDINATE GEOMETRY AND RATIO DIVISION

BEFORE DIVING INTO THE SOLUTION, IT'S ESSENTIAL TO FAMILIARIZE OURSELVES WITH SOME FOUNDATIONAL CONCEPTS.

WHAT IS COORDINATE GEOMETRY?

COORDINATE GEOMETRY, ALSO KNOWN AS ANALYTIC GEOMETRY, INVOLVES REPRESENTING GEOMETRIC FIGURES USING ALGEBRAIC EQUATIONS AND COORDINATES. THE CARTESIAN COORDINATE SYSTEM ASSIGNS EACH POINT A PAIR OF NUMBERS (x, y) , REPRESENTING ITS POSITION ALONG THE HORIZONTAL (X-AXIS) AND VERTICAL (Y-AXIS) AXES.

THE LINE SEGMENT AND ITS ENDPOINTS

GIVEN TWO POINTS, $A(x_1, y_1)$ AND $B(x_2, y_2)$, THE LINE SEGMENT AB CONNECTS THESE POINTS IN THE PLANE. THE TASK IS TO FIND A POINT G ON THIS SEGMENT SUCH THAT THE RATIO OF THE LENGTHS ALONG AB IS 3:2, WITH G DIVIDING AB ACCORDINGLY.

THE SECTION FORMULA: THE KEY TO DIVIDING A SEGMENT

THE CORE MATHEMATICAL TOOL FOR SOLVING THIS PROBLEM IS THE SECTION FORMULA. IT PROVIDES A STRAIGHTFORWARD WAY TO FIND A POINT DIVIDING A SEGMENT IN A GIVEN RATIO.

WHAT IS THE SECTION FORMULA?

SUPPOSE A POINT G DIVIDES THE SEGMENT AB IN THE RATIO M:N, STARTING FROM A TOWARD B. THEN THE COORDINATES OF G, DENOTED AS (X, Y), ARE GIVEN BY:

$$X = \frac{MX_2 + NX_1}{M + N}$$

$$Y = \frac{MY_2 + NY_1}{M + N}$$

THIS FORMULA ESSENTIALLY COMPUTES A WEIGHTED AVERAGE OF THE ENDPOINTS' COORDINATES, WITH WEIGHTS PROPORTIONAL TO THE RATIO COMPONENTS.

APPLYING THE FORMULA

IN OUR PROBLEM, SINCE G DIVIDES AB IN THE RATIO 3:2, THE FORMULA SIMPLIFIES TO:

$$X_G = \frac{3X_2 + 2X_1}{3 + 2} = \frac{3X_2 + 2X_1}{5}$$

$$Y_G = \frac{3Y_2 + 2Y_1}{5}$$

THUS, ONCE THE COORDINATES OF A AND B ARE KNOWN, THE COORDINATES OF G CAN BE DIRECTLY CALCULATED.

STEP-BY-STEP SOLUTION APPROACH

LET'S OUTLINE THE TYPICAL STEPS INVOLVED IN SOLVING SUCH A PROBLEM:

1. IDENTIFY COORDINATES OF A AND B

- USUALLY PROVIDED OR CAN BE READ FROM THE COORDINATE GRID.
- FOR EXAMPLE, $(A(x_1, y_1))$ AND $(B(x_2, y_2))$.

2. DETERMINE THE RATIO COMPONENTS

- GIVEN RATIO: $AG:GB = 3:2$.
- ASSIGN $M = 3, N = 2$.

3. APPLY THE SECTION FORMULA

- PLUG THE COORDINATES INTO THE FORMULAS:

$$X_G = \frac{3X_2 + 2X_1}{5}$$

$$y_G = \frac{3y_2 + 2y_1}{5}$$

4. COMPUTE COORDINATES OF G

- PERFORM THE CALCULATIONS TO FIND THE NUMERICAL VALUES.

5. VERIFY THE POSITION

- CONFIRM THAT G LIES ON THE SEGMENT AB BY CHECKING THE COORDINATES RELATIVE TO A AND B.

PRACTICAL EXAMPLE: WORKING THROUGH A SAMPLE PROBLEM

SUPPOSE THE COORDINATE GRID SHOWS:

- POINT A AT (2, 3)
- POINT B AT (8, 7)

THE TASK: FIND POINT G ON AB SUCH THAT AG:GB = 3:2.

STEP 1: ASSIGN COORDINATES

- $A(2, 3)$
- $B(8, 7)$

STEP 2: RATIO COMPONENTS

- $m = 3$
- $n = 2$

STEP 3: APPLY THE SECTION FORMULA

CALCULATE x_G :

$$x_G = \frac{3 \times 8 + 2 \times 2}{5} = \frac{24 + 4}{5} = \frac{28}{5} = 5.6$$

CALCULATE y_G :

$$y_G = \frac{3 \times 7 + 2 \times 3}{5} = \frac{21 + 6}{5} = \frac{27}{5} = 5.4$$

STEP 4: COORDINATES OF G

$$G(5.6, 5.4)$$

STEP 5: INTERPRETATION

POINT G AT (5.6, 5.4) DIVIDES THE SEGMENT AB IN THE RATIO 3:2, CLOSER TO B THAN A, CONSISTENT WITH THE RATIO.

VISUALIZING THE SOLUTION: THE POWER OF GRAPHS AND DIAGRAMMS

WHILE ALGEBRAIC CALCULATION PROVIDES PRECISE COORDINATES, VISUAL UNDERSTANDING ENHANCES COMPREHENSION. PLOTTING POINTS A, B, AND G ON THE COORDINATE GRID ILLUSTRATES HOW G DIVIDES AB PROPORTIONALLY.

- LINE SEGMENT AB: CONNECTS POINTS A AND B.
- POINT G: LOCATED ALONG AB, CLOSER TO B IF THE RATIO FAVORS B.
- RATIOS: VISUAL AIDS HELP VERIFY THAT G DIVIDES AB IN THE RATIO 3:2, WITH DISTANCES ALONG AB CORRESPONDING TO THE RATIO.

EXTENDING THE CONCEPT: OTHER RATIOS AND APPLICATIONS

THE SECTION FORMULA IS VERSATILE, APPLICABLE TO A VARIETY OF PROBLEMS INVOLVING DIVISION OF LINE SEGMENTS:

- DIFFERENT RATIOS: FOR RATIOS LIKE 1:1 (MIDPOINT), 2:3, OR 5:1.
- MULTIPLE DIVISIONS: DIVIDING A SEGMENT INTO SEVERAL PARTS.
- COORDINATE GEOMETRY IN PRACTICE: DESIGNING COMPUTER GRAPHICS, NAVIGATION, ENGINEERING DESIGN, AND EVEN IN ARCHITECTURE.

ADDRESSING COMMON CHALLENGES

WHILE THE SECTION FORMULA IS STRAIGHTFORWARD, SOME COMMON PITFALLS INCLUDE:

- INCORRECT RATIO ASSIGNMENT: ENSURING THE RATIO M:N CORRESPONDS TO THE CORRECT SEGMENT DIVISION.
- COORDINATE CONFUSION: MIXING UP THE ORDER OF ENDPOINTS.
- CALCULATION ERRORS: CAREFUL ARITHMETIC IS ESSENTIAL, ESPECIALLY WHEN DEALING WITH FRACTIONS.

TO AVOID THESE ISSUES:

- CLEARLY LABEL ALL POINTS AND RATIOS.
- DOUBLE-CHECK CALCULATIONS.
- USE GRAPHICAL TOOLS OR SOFTWARE FOR VERIFICATION WHEN POSSIBLE.

REAL-WORLD APPLICATIONS AND SIGNIFICANCE

UNDERSTANDING HOW TO FIND POINTS DIVIDING A SEGMENT IN SPECIFIC RATIOS IS NOT JUST AN ACADEMIC EXERCISE; IT HAS TANGIBLE APPLICATIONS:

- DESIGN AND ENGINEERING: DETERMINING OPTIMAL PLACEMENT OF COMPONENTS ALONG A LINE OR STRUCTURE.
- NAVIGATION AND GPS: CALCULATING WAYPOINTS ALONG A ROUTE.
- COMPUTER GRAPHICS: RENDERING IMAGES WHERE OBJECTS NEED PRECISE POSITIONING.
- ROBOTICS: PLANNING PATHS THAT DIVIDE SPACES OR SEGMENTS PROPORTIONALLY.

CONCLUSION: MASTERING THE ART OF DIVIDING LINE SEGMENTS

THE PROBLEM OF FINDING POINT G ON SEGMENT AB SUCH THAT $AG:GB = 3:2$ EXEMPLIFIES THE ELEGANCE OF COORDINATE GEOMETRY. THROUGH THE APPLICATION OF THE SECTION FORMULA, PRECISE AND RELIABLE RESULTS ARE ACHIEVABLE WITH STRAIGHTFORWARD CALCULATIONS. THIS APPROACH UNDERSCORES THE IMPORTANCE OF ALGEBRAIC TOOLS IN SOLVING GEOMETRIC PROBLEMS, BRIDGING THE GAP BETWEEN ABSTRACT CONCEPTS AND PRACTICAL SOLUTIONS. WHETHER IN ACADEMIC EXERCISES, ENGINEERING DESIGNS, OR DIGITAL GRAPHICS, MASTERING THESE METHODS EQUIPS PROFESSIONALS AND STUDENTS ALIKE WITH A POWERFUL SKILL SET TO ANALYZE AND MANIPULATE THE SPATIAL WORLD WITH CONFIDENCE AND ACCURACY.

Refer To The Given Coordinate Grid Find Point G On Ab Such That The Ratio Of Ag To Gb Is 3 2 Aroyuvbsx

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