

Q3 FIND AN EQUATION OF THE LINE THAT CONTAINS THE GIVEN PAIR OF POINTS. THE EQUATION OF THE LINE IS $(21, 26), (2, 7)$

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UNDERSTANDING HOW TO FIND THE EQUATION OF A LINE PASSING THROUGH TWO POINTS IS A FUNDAMENTAL SKILL IN COORDINATE GEOMETRY. IN THIS ARTICLE, WE WILL EXPLORE THE STEP-BY-STEP PROCESS OF DETERMINING THE EQUATION OF A LINE THAT PASSES THROUGH THE POINTS $(21, 26)$ AND $(2, 7)$. WHETHER YOU'RE A STUDENT PREPARING FOR EXAMS OR A MATH ENTHUSIAST BRUSHING UP ON YOUR SKILLS, THIS COMPREHENSIVE GUIDE WILL HELP YOU MASTER THE CONCEPT.

INTRODUCTION TO THE EQUATION OF A LINE

BEFORE DIVING INTO THE SPECIFICS OF CALCULATING THE LINE PASSING THROUGH TWO POINTS, IT'S ESSENTIAL TO UNDERSTAND THE BASIC CONCEPTS INVOLVED.

WHAT IS THE EQUATION OF A LINE?

AN EQUATION OF A LINE IS A MATHEMATICAL EXPRESSION THAT DESCRIBES ALL POINTS LYING ON THAT LINE IN A COORDINATE PLANE. THE MOST COMMON FORMS INCLUDE:

- SLOPE-INTERCEPT FORM: $y = mx + b$
- POINT-SLOPE FORM: $y - y_1 = m(x - x_1)$
- STANDARD FORM: $Ax + By + C = 0$

EACH FORM HAS ITS ADVANTAGES, BUT THE SLOPE-INTERCEPT FORM IS OFTEN USED FOR ITS SIMPLICITY.

KEY TERMS AND CONCEPTS

- POINTS: COORDINATES IN THE FORM (x, y) , REPRESENTING LOCATIONS ON A PLANE.
- SLOPE (M): THE MEASURE OF THE STEEPNESS OF THE LINE, CALCULATED AS THE CHANGE IN Y OVER THE CHANGE IN X (RISE OVER RUN).
- EQUATION OF A LINE: A MATHEMATICAL EXPRESSION THAT INCLUDES ALL POINTS THAT LIE ON THE LINE.

HOW TO FIND THE EQUATION OF A LINE GIVEN TWO POINTS

THE PROCESS INVOLVES DETERMINING THE SLOPE OF THE LINE AND THEN USING ONE OF THE POINTS TO FIND THE LINE'S EQUATION.

STEP 1: CALCULATE THE SLOPE (M)

GIVEN TWO POINTS, (x_1, y_1) AND (x_2, y_2) , THE SLOPE IS CALCULATED AS:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

APPLYING TO OUR POINTS:

$$(x_1, y_1) = (21, 26)$$

$$(x_2, y_2) = (2, 7)$$

$$m = \frac{7 - 26}{2 - 21} = \frac{-19}{-19} = 1$$

RESULT: THE SLOPE OF THE LINE IS 1.

STEP 2: USE THE POINT-SLOPE FORM

ONCE THE SLOPE IS KNOWN, SUBSTITUTE IT ALONG WITH ONE OF THE POINTS INTO THE POINT-SLOPE FORM:

$$y - y_1 = m(x - x_1)$$

USING POINT $(21, 26)$:

$$y - 26 = 1(x - 21)$$

SIMPLIFY:

$$y - 26 = x - 21$$

ADD 26 TO BOTH SIDES:

$$y = x - 21 + 26$$
$$y = x + 5$$

FINAL EQUATION: THE LINE PASSING THROUGH POINTS $(21, 26)$ AND $(2, 7)$ IS:

$$\boxed{y = x + 5}$$

VERIFYING THE EQUATION OF THE LINE

IT'S ALWAYS GOOD PRACTICE TO VERIFY THAT BOTH POINTS SATISFY THE DERIVED EQUATION.

- CHECK POINT (21, 26):

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\[
y = x + 5 \\
26 = 21 + 5 \\
26 = 26 \quad \text{{(TRUE)}}
\]
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- CHECK POINT (2, 7):

```
\[
7 = 2 + 5 \\
7 = 7 \quad \text{{(TRUE)}}
\]
```

BOTH POINTS SATISFY THE EQUATION, CONFIRMING ITS CORRECTNESS.

UNDERSTANDING THE SIGNIFICANCE OF THE EQUATION $y = x + 5$

THE EQUATION $y = x + 5$ IS A STRAIGHT LINE WITH:

- SLOPE (M): 1, INDICATING A 45-DEGREE ANGLE OF INCLINATION.
- Y-INTERCEPT (B): 5, WHERE THE LINE CROSSES THE Y-AXIS.

THIS LINE ASCENDS DIAGONALLY, PASSING THROUGH ALL POINTS WHERE THE Y-COORDINATE IS EXACTLY 5 UNITS GREATER THAN THE X-COORDINATE.

ADDITIONAL METHODS TO FIND THE EQUATION OF A LINE

WHILE THE POINT-SLOPE METHOD IS STRAIGHTFORWARD, THERE ARE ALTERNATIVE APPROACHES:

1. USING THE TWO-POINT FORM OF A LINE

THE TWO-POINT FORM IS:

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\[
\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}
\]
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WHICH SIMPLIFIES TO THE SLOPE-INTERCEPT FORM AFTER ALGEBRAIC MANIPULATION.

2. STANDARD FORM

CONVERT THE SLOPE-INTERCEPT FORM TO STANDARD FORM:

$$\begin{aligned} & \backslash [\\ y = x + 5 & \backslash \text{IMPLIES } x - y + 5 = 0 \\ & \backslash] \end{aligned}$$

THIS FORM CAN BE USEFUL FOR CERTAIN APPLICATIONS LIKE INTERSECTION CALCULATIONS.

COMMON MISTAKES TO AVOID

WHEN CALCULATING THE EQUATION OF A LINE, BE CAUTIOUS OF THE FOLLOWING PITFALLS:

- INCORRECT SLOPE CALCULATION: ALWAYS SUBTRACT Y-VALUES FROM THE SECOND POINT MINUS THE FIRST, OR VICE VERSA, BUT STAY CONSISTENT.
- DIVISION BY ZERO: ENSURE THAT $x_2 \neq x_1$; IF X-COORDINATES ARE THE SAME, THE LINE IS VERTICAL, AND THE SLOPE IS UNDEFINED.
- FORGETTING TO VERIFY: ALWAYS CHECK IF BOTH POINTS SATISFY THE FINAL EQUATION.

REAL-WORLD APPLICATIONS OF FINDING A LINE EQUATION

UNDERSTANDING HOW TO DETERMINE THE EQUATION OF A LINE HAS PRACTICAL USES IN VARIOUS FIELDS:

- PHYSICS: CALCULATING THE TRAJECTORY OF AN OBJECT.
- ECONOMICS: MODELING COST OR REVENUE FUNCTIONS.
- ENGINEERING: DESIGNING ROADS, BRIDGES, OR WIRING LAYOUTS.
- DATA ANALYSIS: FITTING A LINE TO DATA POINTS FOR TREND ANALYSIS.

SUMMARY OF KEY POINTS

- TO FIND THE EQUATION OF A LINE PASSING THROUGH TWO POINTS, COMPUTE THE SLOPE FIRST.
- USE THE SLOPE AND ONE POINT IN THE POINT-SLOPE FORM TO DERIVE THE LINEAR EQUATION.
- VERIFY THE EQUATION WITH BOTH POINTS.
- THE LINE THROUGH $(21, 26)$ AND $(2, 7)$ HAS THE EQUATION $y = x + 5$.

CONCLUSION

FINDING THE EQUATION OF A LINE THAT CONTAINS SPECIFIC POINTS IS AN ESSENTIAL SKILL IN COORDINATE GEOMETRY. IN THE CASE OF POINTS $(21, 26)$ AND $(2, 7)$, THE PROCESS INVOLVES CALCULATING THE SLOPE, APPLYING THE POINT-SLOPE FORM, AND SIMPLIFYING TO ARRIVE AT THE SLOPE-INTERCEPT FORM $y = x + 5$. MASTERING THIS PROCEDURE ENABLES YOU TO ANALYZE

LINEAR RELATIONSHIPS EFFECTIVELY AND SOLVE RELATED PROBLEMS ACROSS VARIOUS DISCIPLINES.

KEYWORDS FOR SEO OPTIMIZATION:

EQUATION OF A LINE, LINE PASSING THROUGH TWO POINTS, COORDINATE GEOMETRY, SLOPE CALCULATION, POINT-SLOPE FORM, SLOPE-INTERCEPT FORM, LINEAR EQUATIONS, FIND LINE EQUATION, ALGEBRA, MATH TUTORIAL, GEOMETRY PROBLEMS, HOW TO FIND THE EQUATION OF A LINE.

FREQUENTLY ASKED QUESTIONS

HOW DO I FIND THE EQUATION OF A LINE GIVEN TWO POINTS (21, 26) AND (2, 7)?

FIRST, CALCULATE THE SLOPE (m) USING THE FORMULA $m = (y_2 - y_1) / (x_2 - x_1)$. THEN, USE POINT-SLOPE FORM WITH ONE OF THE POINTS TO FIND THE EQUATION.

WHAT IS THE SLOPE OF THE LINE PASSING THROUGH (21, 26) AND (2, 7)?

THE SLOPE $m = (7 - 26) / (2 - 21) = (-19) / (-19) = 1$.

HOW DO I WRITE THE EQUATION OF THE LINE ONCE I KNOW THE SLOPE AND A POINT?

USE THE POINT-SLOPE FORM: $y - y_1 = m(x - x_1)$. SUBSTITUTE THE SLOPE AND ONE OF THE POINTS TO GET THE EQUATION.

WHAT IS THE EQUATION OF THE LINE PASSING THROUGH (21, 26) WITH SLOPE 1?

USING POINT-SLOPE FORM: $y - 26 = 1(x - 21)$. SIMPLIFY TO GET $y = x + 5$.

CAN YOU PROVIDE THE SLOPE-INTERCEPT FORM OF THE LINE PASSING THROUGH THE GIVEN POINTS?

YES, THE LINE'S EQUATION IN SLOPE-INTERCEPT FORM IS $y = x + 5$.

IS THE LINE PASSING THROUGH (21, 26) AND (2, 7) A STRAIGHT LINE? HOW DO WE CONFIRM?

YES, IT'S A STRAIGHT LINE. WE CONFIRM BY CALCULATING THE CONSTANT SLOPE BETWEEN THE POINTS, WHICH IS 1, INDICATING A LINEAR RELATIONSHIP.

WHAT IS THE SIGNIFICANCE OF THE SLOPE IN THE LINE'S EQUATION?

THE SLOPE INDICATES THE RATE OF CHANGE OF y WITH RESPECT TO x ; IN THIS CASE, THE LINE RISES 1 UNIT FOR EVERY 1 UNIT INCREASE IN x .

HOW DO I VERIFY THE EQUATION $y = x + 5$ PASSES THROUGH BOTH POINTS?

PLUG IN THE x AND y VALUES FROM EACH POINT INTO THE EQUATION TO SEE IF IT HOLDS TRUE. FOR (21, 26): $26 = 21 + 5$; FOR (2, 7): $7 = 2 + 5$. BOTH SATISFY THE EQUATION.

WHAT ARE COMMON MISTAKES TO AVOID WHEN FINDING THE EQUATION OF A LINE FROM TWO POINTS?

COMMON MISTAKES INCLUDE MISCALCULATING THE SLOPE, CONFUSING THE ORDER OF POINTS, OR FORGETTING TO SIMPLIFY THE EQUATION PROPERLY. ALWAYS DOUBLE-CHECK CALCULATIONS.

CAN I USE THE TWO-POINT FORM TO FIND THE LINE'S EQUATION? HOW?

YES, THE TWO-POINT FORM IS: $(y - y_1) / (x - x_1) = (y_2 - y_1) / (x_2 - x_1)$. USING THIS, YOU CAN DERIVE THE EQUATION DIRECTLY.

ADDITIONAL RESOURCES

Q3 FIND AN EQUATION OF THE LINE THAT CONTAINS THE GIVEN PAIR OF POINTS. THE EQUATION OF THE LINE IS $(21, 26), (2, 7)$

UNDERSTANDING HOW TO FIND THE EQUATION OF A LINE GIVEN TWO POINTS IS A FUNDAMENTAL SKILL IN COORDINATE GEOMETRY. WHEN ASKED TO FIND THE EQUATION OF THE LINE THAT CONTAINS THE GIVEN PAIR OF POINTS, SUCH AS $(21, 26)$ AND $(2, 7)$, IT'S ESSENTIAL TO GRASP THE UNDERLYING CONCEPTS AND SYSTEMATIC STEPS INVOLVED. THIS PROCESS NOT ONLY REINFORCES YOUR GRASP OF ALGEBRA AND GEOMETRY BUT ALSO PREPARES YOU FOR MORE COMPLEX PROBLEMS INVOLVING LINES, SLOPES, AND EQUATIONS IN VARIOUS CONTEXTS.

INTRODUCTION: THE IMPORTANCE OF FINDING A LINE'S EQUATION

IN MATHEMATICS, ESPECIALLY IN COORDINATE GEOMETRY, THE ABILITY TO DETERMINE THE EQUATION OF A LINE FROM TWO POINTS IS FOUNDATIONAL. IT ENABLES US TO MODEL REAL-WORLD PHENOMENA SUCH AS TRAJECTORIES, ECONOMIC TRENDS, OR PHYSICAL PATHS, WHERE THE RELATIONSHIP BETWEEN TWO VARIABLES CAN BE REPRESENTED BY A STRAIGHT LINE. BY MASTERING THESE CONCEPTS, YOU ACQUIRE A VERSATILE TOOL TO ANALYZE AND INTERPRET DATA GEOMETRICALLY.

STEP 1: UNDERSTAND THE BASIC CONCEPTS

BEFORE DIVING INTO CALCULATIONS, IT'S CRUCIAL TO UNDERSTAND THE KEY TERMS INVOLVED:

POINTS IN THE COORDINATE PLANE

- COORDINATE POINTS ARE REPRESENTED AS ORDERED PAIRS (x, y) .
- FOR EXAMPLE, THE POINTS GIVEN ARE $(21, 26)$ AND $(2, 7)$.

THE EQUATION OF A LINE

- THE STANDARD FORM: $y = mx + b$, WHERE:
- m IS THE SLOPE.
- b IS THE y -INTERCEPT.

SLOPE OF A LINE

- THE SLOPE INDICATES THE STEEPNESS AND DIRECTION OF THE LINE.
 - CALCULATED AS THE RISE OVER RUN:
- $$m = (\text{CHANGE IN } y) / (\text{CHANGE IN } x) = (y_2 - y_1) / (x_2 - x_1).$$

STEP 2: CALCULATE THE SLOPE (m)

GIVEN THE POINTS $(21, 26)$ AND $(2, 7)$:

1. ASSIGN:

- POINT 1: $(x_1, y_1) = (21, 26)$

- POINT 2: $(x_2, y_2) = (2, 7)$

2. COMPUTE THE CHANGE IN Y:

$$- y_2 - y_1 = 7 - 26 = -19$$

3. COMPUTE THE CHANGE IN X:

$$- x_2 - x_1 = 2 - 21 = -19$$

4. CALCULATE THE SLOPE:

$$- m = (y_2 - y_1) / (x_2 - x_1) = (-19) / (-19) = 1$$

RESULT: THE SLOPE, $m = 1$.

NOTE: WHEN THE NUMERATOR AND DENOMINATOR ARE THE SAME (AND NON-ZERO), THE SLOPE SIMPLIFIES TO 1, INDICATING A LINE THAT RISES AT A 45-DEGREE ANGLE.

STEP 3: FIND THE EQUATION USING THE POINT-SLOPE FORM

THE POINT-SLOPE FORM OF A LINE'S EQUATION IS:

$$y - y_1 = m(x - x_1)$$

USING ONE OF THE POINTS, SAY $(21, 26)$:

1. SUBSTITUTE $x_1 = 21$, $y_1 = 26$, AND $m = 1$:

$$y - 26 = 1(x - 21)$$

2. SIMPLIFY:

$$y - 26 = x - 21$$

3. ADD 26 TO BOTH SIDES:

$$y = x - 21 + 26$$

$$y = x + 5$$

STEP 4: WRITE THE FINAL EQUATION

THE EQUATION OF THE LINE PASSING THROUGH POINTS $(21, 26)$ AND $(2, 7)$ IN SLOPE-INTERCEPT FORM IS:

$$y = x + 5$$

STEP 5: VERIFY THE EQUATION

TO ENSURE ACCURACY, VERIFY THAT BOTH POINTS SATISFY THE DERIVED EQUATION:

- FOR $(21, 26)$:

$$y = x + 5 \quad 26 = 21 + 5 \quad 26 = 26$$

- For (2, 7):

$$y = x + 5 \quad 7 = 2 + 5 \quad 7 = 7$$

SINCE BOTH POINTS SATISFY THE EQUATION, IT IS CORRECT.

ADDITIONAL CONSIDERATIONS

SPECIAL CASES

- IF THE TWO POINTS HAVE THE SAME X-COORDINATE, THE SLOPE IS UNDEFINED, AND THE LINE IS VERTICAL, WITH AN EQUATION OF THE FORM $x = \text{CONSTANT}$.
- IF THE POINTS ARE IDENTICAL, THEY DON'T DEFINE A UNIQUE LINE.

GRAPHING THE LINE

- TO GRAPH $y = x + 5$:
- PLOT THE Y-INTERCEPT AT (0, 5).
- USE THE SLOPE (RISE OVER RUN = 1) TO FIND OTHER POINTS, FOR EXAMPLE:
- FROM (0, 5), MOVE UP 1 AND RIGHT 1 TO (1, 6).
- DRAW A STRAIGHT LINE PASSING THROUGH THESE POINTS.

SUMMARY

FINDING THE EQUATION OF A LINE THAT CONTAINS TWO GIVEN POINTS INVOLVES A SYSTEMATIC APPROACH:

1. CALCULATE THE SLOPE (m) USING THE TWO POINTS.
2. USE THE POINT-SLOPE FORM WITH EITHER POINT.
3. SIMPLIFY TO SLOPE-INTERCEPT FORM ($y = mx + b$).
4. VERIFY THE SOLUTION BY PLUGGING IN THE POINTS.

IN OUR SPECIFIC CASE, THE LINE PASSING THROUGH (21, 26) AND (2, 7) HAS THE EQUATION:

$$y = x + 5$$

THIS PROCESS HIGHLIGHTS THE ELEGANCE OF COORDINATE GEOMETRY, WHERE ALGEBRAIC MANIPULATIONS REVEAL THE UNDERLYING LINEAR RELATIONSHIPS BETWEEN POINTS.

PRACTICAL APPLICATIONS

UNDERSTANDING HOW TO DERIVE THE EQUATION OF A LINE FROM TWO POINTS IS INVALUABLE IN VARIOUS FIELDS:

- PHYSICS: CALCULATING THE TRAJECTORY OF AN OBJECT.
- ECONOMICS: MODELING COST OR REVENUE FUNCTIONS.
- ENGINEERING: DESIGNING LINEAR SYSTEMS.
- DATA ANALYSIS: FITTING STRAIGHT-LINE MODELS TO DATA POINTS.

MASTERING THIS SKILL EMPOWERS YOU TO INTERPRET DATA GEOMETRICALLY, SOLVE REAL-WORLD PROBLEMS, AND BUILD A SOLID FOUNDATION FOR ADVANCED MATHEMATICAL CONCEPTS.

CLOSING REMARKS

WHETHER YOU'RE A STUDENT PREPARING FOR EXAMS OR A PROFESSIONAL APPLYING MATHEMATICAL MODELS, KNOWING HOW TO

FIND THE EQUATION OF A LINE FROM TWO POINTS IS A CRITICAL COMPETENCY. WITH PRACTICE, THIS PROCESS BECOMES INTUITIVE, ENABLING YOU TO ANALYZE AND VISUALIZE LINEAR RELATIONSHIPS EFFICIENTLY AND ACCURATELY.

Q3find An Equation Of The Line That Contains The Given Pair Of Points The Equation Of The Line Is 21 26 2 7

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