Find The Ratio E:f, If 5e - 13ef - 6f = 0 Where E And F 0 "

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When encountering algebraic expressions involving multiple variables, one common task is to determine the ratio between those variables. In this case, we are asked to find the ratio E : F given the equation:

5e - 13ef - 6f = 0, where E and F are non-zero variables.

Understanding how to analyze such an equation to find the ratio is essential for students and learners of algebra. This article will guide you through the process step by step, exploring algebraic manipulation, substitution, and ratio analysis to determine E : F efficiently.

Understanding the Given Equation

Before jumping into calculations, it's important to understand the structure of the equation:

5e - 13ef - 6f = 0

- The variables involved are e and f.
- The coefficients are numerical constants: 5, -13, and -6.
- The variables E and F are related through the equation, and both are non-zero.

Key Point: Since the question asks for the ratio E : F, and the equation involves lowercase e and f, it's typical to interpret E and F as proportional to e and f respectively.

Therefore, our goal is to establish the ratio E : F by analyzing e and f in the given equation.

Step 1: Rewrite the Equation in Terms of e and f

The original equation:

$5e - 13ef - 6f = 0$

can be viewed as an algebraic relation between e and f. To find the ratio e : f, it's helpful to express e in terms of f, or vice versa.

Step 2: Isolate Terms and Factor

Let's attempt to factor the equation for easier analysis.

Rearranged:

$5e - 13ef - 6f = 0$

Group the terms:

$(5e) - (13ef + 6f) = 0$

Notice that $13ef + 6f$ has a common factor of f:

$(5e) - f(13e + 6) = 0$

Rearranged:

$5e = f(13e + 6)$

Step 3: Express e in Terms of f or vice versa

From the equation:

$5e = f(13e + 6)$

Divide both sides by $(13e + 6)$ (assuming $13e + 6 \neq 0$):

$e / (13e + 6) = f / 5$

Alternatively, to find the ratio $e : f$, cross-multiplied:

$5e = f(13e + 6)$

Express e in terms of f:

$$
5e = 13e f + 6f
$$

Bring all terms to one side:

$$
5e - 13e f - 6f = 0
$$

But this is the original equation. To find the ratio $e : f$, assume $e = k \times f$, where k is the ratio we want to find.

Step 4: Substituting e = kf

Let’s substitute $e = kf$, where k is the ratio $e : f$.

Plug into the original equation:

$$
5(kf) - 13 (k f) f - 6f = 0
$$

Simplify each term:

- $5k f$
- $-13 k f^2$
- $-6f$

The new equation:

$$

$$
5k f - 13 k f^2 - 6f = 0
$$

Divide through by f (since $f \neq 0$):

$$
5k - 13 k f - 6 = 0
$$

Now, f appears in the second term, so isolate f:

$$
-13 k f + (5k - 6) = 0
$$

Rearranged:

$$
13 k f = 5k - 6
$$

Express f:

$$
f = \frac{5k - 6}{13 k}
$$

Since e = kf, then:

$$
e = k \times \frac{5k - 6}{13 k} = \frac{5k - 6}{13}
$$

\]

But, the key is that e and f are proportional through k; the ratio E : F corresponds to e : f.

Step 5: Find the Value of k (the Ratio e : f)

To find k, note that e and f must satisfy the initial relation. Since e = kf, and f ≠ 0, k is a constant ratio.

From the previous step, f = \(\frac{5k - 6}{13k}\).

Because f ≠ 0, the numerator must not be zero:

\[
5k - 6 \neq 0
\]

which implies:

\[
k \neq \frac{6}{5}
\]

Now, substitute e = kf into the original equation to verify consistency:

Original equation:

\[
5e - 13 e f - 6f = 0

\]

Replace e with k f:

$$
5 (k f) - 13 (k f) f - 6f = 0
$$

Simplify:

$$
5k f - 13 k f^2 - 6f = 0
$$

Divide through by f:

$$
5k - 13 k f - 6 = 0
$$

Express f again:

$$
13 k f = 5k - 6
$$

which confirms our earlier expression for f.

Given that, the ratio e : f is k : 1.

Step 6: Find the Exact Numerical Ratio

From $f = (5k - 6) / (13k)$, and $e = kf$, the ratio $e : f$ is $k : 1$.

To find a specific numeric value for k, consider the proportion:

$$
\text{Since } e : f = k : 1
$$

and the relation:

$$
f = \frac{5k - 6}{13k}
$$

which simplifies to:

$$
f = \frac{5k}{13k} - \frac{6}{13k} = \frac{5}{13} - \frac{6}{13k}
$$

To have a consistent ratio, f must be proportional to 1, and e to k.

Alternatively, to find the exact ratio E : F, observe that the ratio is directly k : 1.

Key step: Equate e and f to the ratio k : 1:

$$
\frac{e}{f} = k
$$

From the earlier substitution, the ratio e : f is k : 1 itself. To determine k, choose a value that satisfies the relationship, or better yet, solve for k directly.

Step 7: Solve for the Ratio k

Recall the expression for f:

$$
f = \frac{5k - 6}{13k}
$$

Since f □ 0, and e = kf, the ratio E : F is e : f = k : 1.

To find k, analyze the consistency condition. One way is to choose any value of k that satisfies the relation, but perhaps the simplest is to set the numerator 5k - 6 to a specific value, for example, 1, to find the ratio.

Let’s set:

$$
f = 1
$$

then:

$$
1 = \frac{5k - 6}{13k}
$$

Multiply both sides by $13k$:

$$
13k = 5k - 6
$$

Bring all to one side:

$$
13k - 5k = -6
$$

$$
8k = -6
$$

$$
k = -\frac{6}{8} = -\frac{3}{4}
$$

Thus, the ratio $e : f$ is $k : 1 = -\frac{3}{4} : 1$.

This simplifies to:

$$
\boxed{\textbf{E : F} = -3 : 4}
$$

Final Answer and Interpretation

The ratio E : F is -3 : 4.

This means:

- E is \(-\frac{3}{4}\) times F.
- The negative

Frequently Asked Questions

How do I find the ratio E : F given the equation 5E - 13EF - 6F = 0 with E and F not equal to zero?

To find the ratio E : F, we can divide the entire equation by F (assuming F □ 0), which simplifies to 5(E/F) - 13E - 6 = 0. Let x = E/F; substituting gives 5x - 13x - 6 = 0, leading to -8x - 6 = 0, thus x = -6/8 = -3/4. Therefore, the ratio E : F = E/F = -3/4.

What steps are involved in solving for the ratio E:F from the equation 5E - 13EF - 6F = 0?

The steps include: (1) Divide the entire equation by F to express in terms of E/F, (2) Let x = E/F, (3) Simplify the equation to solve for x, (4) Find the ratio E:F as E/F = x, which results in -3/4.

Can I determine the ratio E:F directly from the equation 5E - 13EF - 6F = 0 without substitution?

It's difficult to find the ratio directly without substitution. The standard approach is to divide through by F (assuming F □ 0), then substitute E/F = x to solve for the ratio. This simplifies the process and yields E:F = -3:4.

If E and F are non-zero, what is the significance of the ratio E:F in the given equation?

The ratio E:F indicates the proportional relationship between E and F that satisfies the equation. In this case, the ratio E:F = -3:4 shows how E and F are related to maintain the equality in the equation 5E - 13EF - 6F = 0.

What is the final answer for the ratio E:F based on the equation 5E - 13EF - 6F = 0?

The ratio E:F is -3:4.

Additional Resources

Find The Ratio E:f, If 5e - 13ef - 6f = 0 Where E And F □ 0

Introduction

Mathematics often presents us with intriguing relationships that challenge our understanding of algebraic structures and ratios. One such problem involves determining the ratio E : F given a specific algebraic equation:

\[5E - 13EF - 6F = 0 \]

where both E and F are non-zero real numbers.

This problem, seemingly straightforward, opens the door to a detailed exploration of algebraic manipulation, ratio analysis, and the underlying principles governing proportional relationships. In this review, we will systematically analyze the given equation, derive the ratio, and discuss the broader implications of such algebraic relationships.

The Significance of the Equation

Understanding equations of this form is vital in various mathematical disciplines, including proportional reasoning, algebra, and applied mathematics. The given equation:

$$ 5E - 13EF - 6F = 0 $$

represents a linear relation involving products of variables, which can be interpreted in many contexts, such as rate problems, ratio analysis, or algebraic modeling.

The primary goal is to find the ratio:

$$ \boxed{\frac{E}{F}} $$

which simplifies the problem and reveals proportional relationships between E and F.

Deep Dive into the Equation

Step 1: Recognize the Structure

The equation:

$$ 5E - 13EF - 6F = 0 $$

contains terms with E, F, and their product EF. Since both variables are non-zero, dividing through by F (or E) can simplify the relation.

Step 2: Divide Entire Equation by F

Assuming $F \neq 0$, divide both sides by F:

$$
\frac{5E}{F} - 13E - 6 = 0
$$

But note that dividing each term individually:

$$
\frac{5E}{F} - 13E - 6 = 0
$$

This form suggests a substitution to streamline the process.

Expressing the Equation in Terms of E/F

Let:

$$
x = \frac{E}{F}
$$

which implies:

$$
E = xF
$$

Substituting into the original equation:

$$
5(xF) - 13(xF)F - 6F = 0
$$

Simplify each term:

$$
5xF - 13xF^2 - 6F = 0
$$

Divide through by F:

$$
5x - 13xF - 6 = 0
$$

Now, the term xF appears. To eliminate F, express everything in terms of x and F.

Step 3: Isolate F

Rearranged, the equation becomes:

\[

$$
5x - 13xF - 6 = 0
$$

Expressed as:

$$
-13xF = -5x + 6
$$

So,

$$
F = \frac{5x - 6}{13x}
$$

Since $F \neq 0$, the numerator must be non-zero, but more importantly, E and F are related via the ratio x.

Step 4: Confirming the Ratio

Recall that E = xF, and the relationship between E and F is encapsulated in x. To find x, examine the earlier step where F is expressed as a function of x.

Express the original equation in terms of x:

$$
F = \frac{5x - 6}{13x}
$$

Since $F \neq 0$, the numerator $(5x - 6)$ must be non-zero.

Step 5: Derive the Ratio

Alternatively, revisit the original equation and substitute $E = xF$ directly:

$$
5E - 13EF - 6F = 0
$$

becomes:

$$
5xF - 13xF^2 - 6F = 0
$$

Divide through by F:

$$
5x - 13xF - 6 = 0
$$

Rearranged as:

$$
13xF = 5x - 6
$$

Express F:

$$
F = \frac{5x - 6}{13x}
$$

Now, because $F \neq 0$, the key is to find x such that the relation holds true. The critical step is recognizing that the equation must be consistent for the ratio x.

Solving for x

From the relation:

$$
F = \frac{5x - 6}{13x}
$$

and knowing $E = xF$, the ratio $E : F$ equals $x : 1$. To find x, consider the original relation as a quadratic in x.

Alternatively, going back to the earlier substitution, we can recognize that the ratio $E : F$ is simply x, so finding x amounts to solving an equation derived from the original.

Re-deriving the Equation for x

Starting from the original:

$$
5E - 13EF - 6F = 0
$$

\]

divide through by F:

$$
\frac{5E}{F} - 13E - 6 = 0
$$

Recall E = xF, so:

$$
5x - 13xF - 6 = 0
$$

Express F in terms of x:

$$
F = \frac{5x - 6}{13x}
$$

The key insight is that F must be real and non-zero, so the numerator (5x - 6) and denominator (13x) cannot be zero simultaneously, and the entire expression must be defined.

Now, to find x, consider the condition that F is real, which implies $13x \neq 0$ and (5x - 6) is real.

The step now involves equating the original relation to find a quadratic in x.

Alternative Approach: Expressing Entire Equation in Terms of x

Recall the original:

$$
5E - 13EF - 6F = 0
$$

Substitute E = xF:

$$
5xF - 13xF^2 - 6F = 0
$$

Divide through by F:

$$
5x - 13xF - 6 = 0
$$

Express F:

$$
F = \frac{5x - 6}{13x}
$$

Now, substitute F back into the expression for E:

$$
E = xF = x \times \frac{5x - 6}{13x} = \frac{5x - 6}{13}
$$

Given that E and F are non-zero, the ratio E : F is:

\[
\frac{E}{F} = x
\]

Our goal reduces to finding x satisfying the relation derived from the original equation.

Final Step: Formulating the Quadratic in x

From F = \frac{5x - 6}{13x}, since F [illegible] 0, the numerator (5x - 6) [illegible] 0.

Recall the original relation:

\[
5E - 13EF - 6F = 0
\]

Substitute E = xF:

\[
5xF - 13xF^2 - 6F = 0
\]

Divide through by F:

\[
5x - 13xF - 6 = 0
\]

Now, substitute F:

$$
F = \frac{5x - 6}{13x}
$$

Plug into the above:

$$
5x - 13x \times \frac{5x - 6}{13x} - 6 = 0
$$

Simplify:

$$
5x - (5x - 6) - 6 = 0
$$

$$
5x - 5x + 6 - 6 = 0
$$

$$
0 = 0
$$

This indicates the relation is an identity for all x where F is defined (i.e., $x \neq 0$). However, since the derivation led to an identity, it suggests that x can take any value, but considering the original variables E and F are non-zero, the ratio E : F can be any value satisfying the constraints.

But this seems counterintuitive; perhaps an alternative approach is necessary to determine a specific ratio.

Alternative Direct Method: Treat the Equation as Linear in E

Original equation:

$$
5E - 13EF - 6F = 0
$$

Rearranged as:

$$
(5 - 13F)E = 6F
$$

Since $E \neq 0$, this yields:

$$
E = \frac{6F}{5 - 13F}
$$

Similarly, the

Find The Ratio E F If 5e 13ef 6f 0 Where E And F 0

Find The Ratio E F If 5e 13ef 6f 0 Where E And F 0

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