Shortest Distance Involving Decimals and Fractions

An algebraic solution allows us to determine the exact value for a shortest distance involving decimals and fractions.

Example – Determine the shortest distance from the point P (–7.7, 1.5) to the line $5x - 2y = 31$.

When we calculate the length of the perpendicular line segment from point P (x_1, y_1) to the point of intersection (x_2, y_2), we can express the Pythagorean theorem as a length formula:

$$L^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

Example – Determine the shortest distance from P $\left(8, \frac{21}{4}\right)$ to $2x + 3y = 22$.

Homework: Please solve the following problems.

1. Determine the shortest distance from P $\left(6,-\frac{5}{4}\right)$ to $6x-8y=-29$.

2. Determine the shortest distance from P (9, 2) to the line $3x+18y=-11$.

3. Determine the shortest distance from P (–10, 3) to the line $9x - 21y = -37$.

4. Determine the shortest distance from P (–1, –7.6) to the line $15x+25y=16$.

Answers:

1. The shortest distance is 7.5 units from $\left(6,-\frac{5}{4}\right)$ to $\left(\frac{3}{2},\frac{19}{4}\right)$.

2. The shortest distance is $\sqrt{\frac{148}{9}}$ units from (9, 2) to $\left(\frac{25}{3},-2\right)$.

3. The shortest distance is $\sqrt{\frac{232}{9}}$ units from (–10, 3) to $\left(-8,-\frac{5}{3}\right)$.

4. The shortest distance is $\sqrt{57.46}$ units from (–1, –7.6) to (2.9, –1.1).

Answers to examples on note:

1. The shortest distance is $\sqrt{181.25}$ units from (–7.7, 1.5) to (4.8, –3.5).

2. The shortest distance is $\sqrt{\dfrac{117}{16}}$ units from $\left(8, \dfrac{21}{4}\right)$ to $\left(\dfrac{13}{2},\ 3\right)$.