Applications of Fraction Equations

1. The equation, \( d^2 = \frac{m^2}{4(1 - A)} \), is used in seismic prospecting of the Earth. Solve this equation for A.

2. The equation, \( Ft = \frac{w}{g}v_1 - \frac{w}{g}v_2 \), can be used to describe the striking of a golf ball by a golf club. Solve this equation for \( v_2 \).

3. The equation, \( x^2 + (y - r)^2 = r^2 \), can be used in police work to determine the diameter of a headlight lens from a fragment of its edge. Solve this equation for \( r \).
1. Solve this for $A$

\[ d^2 = \frac{m^2}{4(1 - A)} \]

First, multiply both sides by $4(1 - A)$

\[ 4d^2(1 - A) = m^2 \]

Now divide both sides by $4d^2$

\[ 1 - A = \frac{m^2}{4d^2} \]

Subtract 1 from both sides

\[ -A = \frac{m^2}{4d^2} - 1 \]

Multiply both sides by $-1$

\[ A = 1 - \frac{m^2}{4d^2} \]

\[ \leftarrow \text{Answer} \]

2. Solve for $v_2$

\[ Ft = \frac{w}{g}v_1 - \frac{w}{g}v_2 \]

First, multiply both sides by $g$

\[ Ftg = wv_1 - wv_2 \]

Add $wv_2$ to both sides

\[ Ftg + wv_2 = wv_1 \]

Subtract $Ftg$ from both sides

\[ wv_2 = wv_1 - Ftg \]

Divide both sides by $w$

\[ v_2 = \frac{wv_1 - Ftg}{w} \]

\[ \leftarrow \text{Answer} \]

3. Solve for $r$

\[ x^2 + (y-r)^2 = r^2 \]

First, simplify the left-hand side

\[ x^2 + y^2 - 2yr + r^2 = r^2 \]

Subtract $r^2$ from both sides

\[ x^2 + y^2 - 2yr = 0 \]

Add $2yr$ to both sides

\[ x^2 + y^2 = 2yr \]

Divide both sides by $2y$

\[ \frac{x^2 + y^2}{2y} = r \]

Or $r = \frac{x^2 + y^2}{2y}$

\[ \leftarrow \text{Answer} \]