

#1:
$$m^2 = 1 - \left(\frac{F \cdot (f2 - f1)}{F - f2 \cdot f1} \right)^2$$

#2:
$$\text{SOLVE} \left(m^2 = 1 - \left(\frac{F \cdot (f2 - f1)}{F - f2 \cdot f1} \right)^2, F \right)$$

#3: $F = -$

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{(f1^2 + 2 \cdot f1 \cdot f2 \cdot (1 - 2 \cdot m^2) + f2^2)} \cdot |f1 - f2| - f1^2 + f2 \cdot (2 \cdot f1 \cdot m^2 - f2))}}{2 \cdot \sqrt{(m^2 - 1)}} \vee F =$$

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{(f1^2 + 2 \cdot f1 \cdot f2 \cdot (1 - 2 \cdot m^2) + f2^2)} \cdot |f1 - f2| - f1^2 + f2 \cdot (2 \cdot f1 \cdot m^2 - f2))}}{2 \cdot \sqrt{(m^2 - 1)}} \vee F = -$$

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{(f1^2 + 2 \cdot f1 \cdot f2 \cdot (1 - 2 \cdot m^2) + f2^2)} \cdot |f1 - f2| + f1^2 - 2 \cdot f1 \cdot f2 \cdot m^2 + f2^2)}}{2 \cdot \sqrt{(1 - m^2)}} \vee F =$$

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{(f1^2 + 2 \cdot f1 \cdot f2 \cdot (1 - 2 \cdot m^2) + f2^2)} \cdot |f1 - f2| + f1^2 - 2 \cdot f1 \cdot f2 \cdot m^2 + f2^2)}}{2 \cdot \sqrt{(1 - m^2)}} \vee F =$$

$$\frac{\quad}{+ f_2^2)}$$

There are 4 distinct solutions for "F":

#4: F = -

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{f_1^2 + 2 \cdot f_1 \cdot f_2 \cdot (1 - 2 \cdot m^2)} + f_2^2) \cdot |f_1 - f_2| - f_1^2 + \sqrt{2} \cdot f_2 \cdot (2 \cdot f_1 \cdot m^2 - f_2)}}{2 \cdot \sqrt{(m^2 - 1)}}$$

#5: F =

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{f_1^2 + 2 \cdot f_1 \cdot f_2 \cdot (1 - 2 \cdot m^2)} + f_2^2) \cdot |f_1 - f_2| - f_1^2 + \sqrt{2} \cdot f_2 \cdot (2 \cdot f_1 \cdot m^2 - f_2)}}{2 \cdot \sqrt{(m^2 - 1)}}$$

#6: F = -

$$\frac{\sqrt{2} \cdot \sqrt{(\sqrt{f_1^2 + 2 \cdot f_1 \cdot f_2 \cdot (1 - 2 \cdot m^2)} + f_2^2) \cdot |f_1 - f_2| + f_1^2 - \sqrt{2} \cdot f_1 \cdot f_2 \cdot m^2}}{2 \cdot \sqrt{(1 - m^2)}}$$

$$\frac{\quad}{+ f2^2)}$$

#7: F =

$$\frac{\sqrt{2} \cdot \sqrt{\left(\sqrt{f1^2 + 2 \cdot f1 \cdot f2 \cdot (1 - 2 \cdot m^2)} + f2^2\right) \cdot |f1 - f2| + f1^2 - 2 \cdot f1 \cdot f2 \cdot m^2}}{2 \cdot \sqrt{(1 - m^2)}}$$

Our constants are:

#8: $m = \rho = \frac{\sqrt{5} - 1}{2}$

#9: $f1 = 376$

#10: $f2 = 476$

Substituting in each solution:

#11: F = -

$$\frac{\sqrt{2} \cdot \sqrt{\left(\sqrt{376^2 + 2 \cdot 376 \cdot 476 \cdot \left(1 - 2 \cdot \left(\frac{\sqrt{5} - 1}{2}\right)^2\right)} + 476^2\right) \cdot |376 - 476| - 376^2}}{2 \cdot \sqrt{\left(\left(\frac{\sqrt{5} - 1}{2}\right)^2 - 1\right)}}$$

$$\frac{6^2 + 476 \cdot \left(2 \cdot 376 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 - 476 \right)}{\sqrt{F} =}$$

$$\frac{\sqrt{2} \cdot \sqrt{\left(\sqrt{\left(376^2 + 2 \cdot 376 \cdot 476 \cdot \left(1 - 2 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 \right) + 476^2 \right)} \cdot |376 - 476| - 376 \right)}}{2 \cdot \sqrt{\left(\left(\frac{\sqrt{5} - 1}{2} \right)^2 - 1 \right)}}$$

$$\frac{6^2 + 476 \cdot \left(2 \cdot 376 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 - 476 \right)}{\sqrt{F} = -}$$

$$\frac{\sqrt{2} \cdot \sqrt{\left(\sqrt{\left(376^2 + 2 \cdot 376 \cdot 476 \cdot \left(1 - 2 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 \right) + 476^2 \right)} \cdot |376 - 476| + 376 \right)}}{2 \cdot \sqrt{\left(1 - \left(\frac{\sqrt{5} - 1}{2} \right)^2 \right)}}$$

$$\frac{6^2 - 2 \cdot 376 \cdot 476 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 + 476^2}{\sqrt{F} =}$$

$$\frac{\sqrt{2} \cdot \sqrt{\left(\sqrt{\left(376^2 + 2 \cdot 376 \cdot 476 \cdot \left(1 - 2 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 \right) + 476^2 \right)} \cdot |376 - 476| + 376 \right)}}{2 \cdot \sqrt{\left(1 - \left(\frac{\sqrt{5} - 1}{2} \right)^2 \right)}}$$

$$\frac{6^2 - 2 \cdot 376 \cdot 476 \cdot \left(\frac{\sqrt{5} - 1}{2} \right)^2 + 476^2}{\sqrt{F} =}$$

Evaluating simultaneously:

#12: $F = -364.2086538 \vee F = 364.2086538 \vee F = -491.4106188 \vee F = 491.4106188$

The four solutions for F are:

#13: $F = -364.2086538$

#14: $F = 364.2086538$

#15: $F = -491.4106188$

#16: $F = 491.4106188$

As you can see, there are really only 2 solutions, but each plus or minus the same number.

We check both positive solutions by substitution into the original equation.

First we check #14 above:

$$\#17: \left(\frac{\sqrt{5} - 1}{2} \right)^2 = 1 - \left(\frac{364.2086538 \cdot (476 - 376)}{364.2086538^2 - 476 \cdot 376} \right)^2$$

Evaluating:

#18: $0.3819660112 = 0.3819660134$

This agrees to 7 decimal places.

Next we check #16 above:

$$\#19: \left(\frac{\sqrt{5} - 1}{2} \right)^2 = 1 - \left(\frac{491.4106188 \cdot (476 - 376)}{491.4106188^2 - 476 \cdot 376} \right)^2$$

Evaluating:

#20: $0.3819660112 = 0.3819660104$

This agrees to 7 decimal places as well. So both (positive) answers check to 7 decimal places!

Do you need anything else?