

Question 5

The Kelvin scale is one way of measuring temperature. To convert a from degrees Fahrenheit (F) to kelvin (K), you:

Add 459.69 to F, then multiply your answer by 5 and divide by 9

a) Convert 212 degrees Fahrenheit(F) to kelvin(K)

First add 459.69 to 212.

$$459.69 + 212 = 671.69$$

Now multiply 671.69 by 5.

$$671.69 \times 5 = 3358.45$$

To finish, divide 3358.45 by 9.

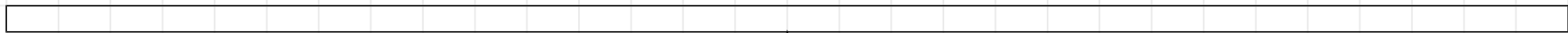
$$3358.45 \div 9 = 373.161$$

b) Write an algebraic formula to express K in terms of F.

kelvin(K)

=

Fahrenheit(F) + 459.69
all multiplied by 5
all then divided by 9



kelvin(K)

=

$$\frac{5(F + 459.69)}{9}$$

c) Hence, or otherwise, convert 400 kelvin(K) to degrees Fahrenheit(F).

Even though the formula in part (b) express K in terms of F, we can still use this formula to convert kelvin to Fahrenheit. We substitute the information available into this formula and hopefully that will leave us with an equation that contains one unknown.

$$\text{kelvin(K)} = \frac{5(F + 459.69)}{9}$$

$$400\text{K} = \frac{5(F + 459.69)}{9}$$

$$9 \times 400 = \frac{5(F + 459.69)}{9} \times \frac{9}{1}$$

$$3600 = 5(F + 459.69)$$

$$3600 = 5F + 2298.45$$

$$3600 - 2298.45 = 5F$$

$$1301.55 = 5F$$

$$\frac{1301.55}{5} = F$$

$$260.31 = F$$

400 kelvin(K) is equal to 260.31 Fahrenheit(F).