October 8th

How many fractions can you find whose value is doubled when 3 is added to their numerator and denominator?

This is equivalent to

$$\frac{x+3}{y+3} = \frac{2x}{y}$$

Hence

$$xy + 3y = 2xy + 6x$$

Therefore

$$3y - xy = 6x$$

Hence

$$y = \frac{6x}{3-x}$$

This means that if the original fraction $\frac{x}{y}$ is to be positive, with integer values

x can only take value 1 or 2

If $x = 1, y = 3$

If $x = 2, y = 12$

So the 2 possible fractions are

$$\boldsymbol{\frac{1}{3}\ and\ \frac{2}{12}}$$