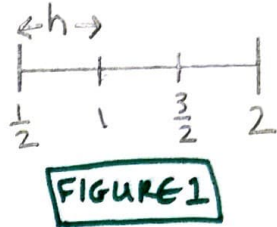


TMUA 2021 Paper 1 Question 10

Use the trapezium rule with 3 strips to estimate

$$\int_{\frac{1}{2}}^2 2 \log_{10} x \, dx$$

A  $\log_{10} \frac{\sqrt{6}}{2}$  Let  $f(x) = 2 \log_{10} x$   
 FIGURE 1 shows  $h = \frac{1}{2}$



B  $\log_{10} \frac{3}{2}$  Now, using the trapezium rule, I have

C  $\log_{10} \frac{9}{4}$   $\frac{h}{2} (f(\frac{1}{2}) + 2f(1) + 2f(\frac{3}{2}) + f(2))$

D  $\log_{10} 3$   $= \frac{1}{2} \times \frac{1}{2} (2 \log_{10}(\frac{1}{2}) + 4 \log_{10}(1) + 4 \log_{10}(\frac{3}{2}) + 2 \log_{10}(2))$

E  $\log_{10} \frac{81}{16}$   $= \frac{1}{2} (\log_{10}(\frac{1}{2}) + 2 \log_{10}(\frac{3}{2}) + \log_{10}(2))$

F  $\log_{10} \frac{\sqrt{23}}{2}$   $= \frac{1}{2} (\log_{10}(\frac{1}{2}) + \log_{10}(\frac{9}{4}) + \log_{10}(2))$

$= \frac{1}{2} (\log_{10}(\frac{9}{4}))$

$= \log_{10} \sqrt{\frac{9}{4}}$

$= \log_{10}(\frac{3}{2})$

$\log_{10}(1) = 0$

$2 \log_{10}(\frac{3}{2}) = \log_{10}(\frac{3}{2})^2$

$\log_{10}(\frac{1}{2}) = -\log_{10} 2$

$\frac{1}{2} (\log_{10}(\frac{9}{4})) = \log_{10}(\frac{9}{4})^{\frac{1}{2}}$

so the correct answer is B