2019 MX 1 12a **3**

Distance A is inversely proportional to distance B, such that $A = \frac{9}{B}$, where A and B are measured in metres. The two distances vary with respect to time. Distance B is increasing at a rate of 0.2 ms^{-1}. What is the value of $\frac{dA}{dt}$ when $A = 12$?

$A = \frac{9}{B}$

Substitute $A = 12$:

$12 = \frac{9}{B}$

$B = \frac{3}{4}$ ✔

State Mean: **2.43/3**

$A = 9B^{-1}$

$\frac{dA}{dB} = -9B^{-2}$

$\frac{dA}{dB}(\frac{3}{4}) = -9(\frac{3}{4})^{-2}$

$= -16$ ✔

$\frac{dA}{dt} = \frac{dA}{dB} \times \frac{dB}{dt}$

$= -16 \times 0.2$

$= -3.2$ $\therefore \frac{dA}{dt} = -3.2$ ms^{-1} ✔

Marking Feedback:

Students should:

- recognise a related rates question and understand the processes required to solve it.

In better responses students were able to find the:

- show the use of the chain rule
- show their result for $\frac{dA}{dB}$
- evaluate B correctly and substituted it correctly into the chain rule.

Areas for students to improve include:

- using the calculator correctly
- differentiating to find $\frac{dA}{dB}$