Chapter 2, Question 5: Integral Momentum Equation

A fighter aircraft is being refueled in mid-air by a tanker. The refueling boom enters the aircraft at an angle of 30 degrees from its flight path. The fuel flow rate through the boom is 20kg/s at a velocity of 30m/s relative the two aircraft. The density of the fuel is 700kg/m³. What additional lift force is necessary to overcome the force on the fighter due to the momentum transfer during refueling?

1) $20 \times 30 \times (\sin 30)^2$
2) $20 \times (30 \times \sin 30)^2$
3) $20 \times 30 \times \sin 30$
4) I don’t know

L.O. B
The correct answer is 3) $\Delta F_y = \text{massflow} \times \text{velocity} \times \sin(\theta) = 20 \times 30 \times \sin(30)$

There are are two ways to arrive at this:

Class performance (2004):
Class performance (2003):
Class performance (2001):

Quiz 1 started at 9:20:08 AM

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1: 2%
2: 6%
3: 65%
4: 11%
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