

Answer on Question #65515-Physics-Other

A star destroyer of mass 12255 kg carries a tie fighter of mass 547 kg travels at a speed 345 m/s to the right. The tie fighter launches to the right and afterwards the star destroyer is moving backwards at a speed of -25 m/s. How fast did the tie fighter launch?

Solution

From the conservation of momentum:

$$(M + m)V = mv - MV'$$

$$mv = (M + m)V + MV'$$

The speed of the tie fighter is

$$v = \left(\frac{M}{m} + 1\right)V + \frac{M}{m}V' = \left(\frac{12255}{547} + 1\right)345 + \frac{12255}{547}25 = 8634 \frac{m}{s}.$$

Answer: $8634 \frac{m}{s}$.

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