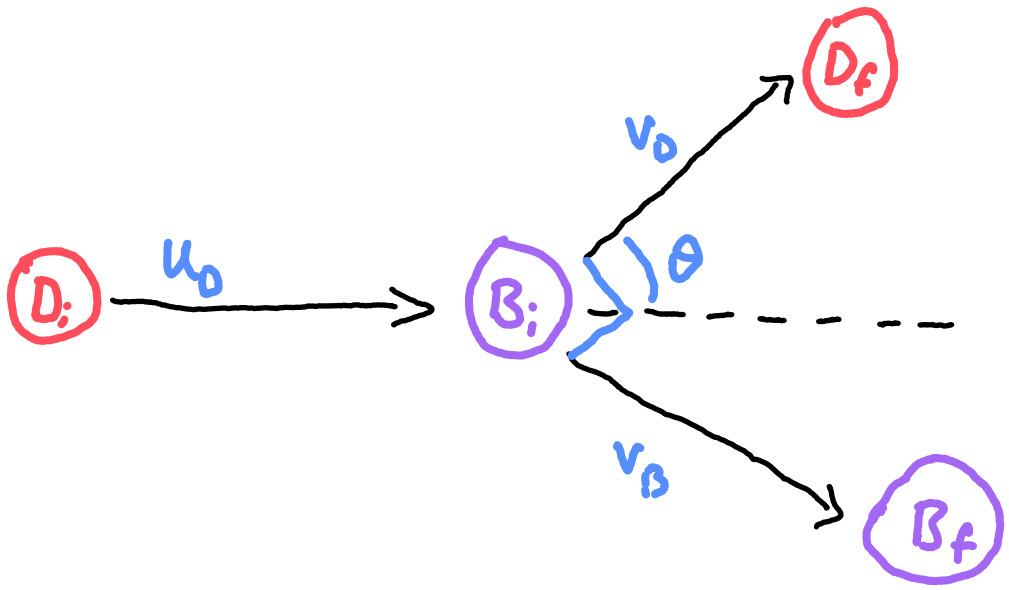
See the HiHW grading rubric posted on Carmen

Name: Gage Farmer Recitation Instructor: Chris Thompson

Diedre rides her sled down an icy, frictionless hill. When she reaches level ground at the bottom, she is traveling at $v_i = 4.0\,\text{m/s}$ and has a glancing collision with her sledding buddy Brynn, who is initially at rest. Both sledders have the same mass, and they are using identical sleds. The collision causes Diedre's velocity vector to deflect by an angle of $\theta = 21°$, and the velocity vectors of both sledders are perpendicular to each other after the collision. What is Brynn's speed v_2 after the collision? For the limits check, investigate what happens to Brynn's speed v_2 as Diedre's initial speed $v_i \to 0$.

Representation:	0	1	2
Physics Concept(s):	0	1	2
Initial Equation(s):	0	0.5	1
Symbolic Answer:	0		1
Units Check:	0	0.5	1
Limits Check:	0	0.5	1
Neatness:	-2	-1	0
Total:			
Correct Answer:	Y	N	

Representation



Physics Concept(s) (Refer to the list posted on Carmen)

Initial Equations

(1) Conservation of Momentum

(2) Collisions

↓ Show Your Equation Work On Next Page ↓

Algebra Work (Symbols only. Don't plug in any numbers yet.)

$$P_{t:} = P_{D:} + P_{B:} = M_{V_{D:}}$$

$$P_{tf} = P_{D:} + P_{Bi} = M[V_D + V_B]$$

$$P_{tf} = MV_D\cos(21) + MV_B\cos(69)$$

$$P_{tf\perp V_{D:}} = MV_D\sin(21) + MV_B\sin(69)$$

$$MV_{D:} = MV_D\cos(21) + MV_B\cos(69) = 0$$

$$V_{D:} = -V_B\cot(21)\cos(21) + V_B\sin(21)$$

$$V_B = \frac{V_{D:}\sin(21)}{\cos^2(21) + \sin^2(21)} = V_{D:}\sin(21)$$

Symbolic Answer: $V_B = V_{D:}\sin(21)$

Units Check

$m/s = m/s$

Limits Check

a) As $v_i \to 0$, what limit does v_2 approach?

$V_2 \to 0$

b) Why does the result make physical sense?

If $V_{i:} = 0$, no collision will occur, so V_2 will always $= 0$

Numerical Answer: (Obtain this by plugging numbers into your symbolic answer.)

1.43 m/s