Chapter C5: Applying Momentum Conservation

C5.2: Interactions with the Earth

The earth is way bigger than you.

C5.3: When Multiple Interactions Act

Momentum transfers combine via vector addition. When multiple interactions act, it's possible for the momentum transfers to cancel out. Nevertheless, we still use the term "momentum transfer" for the momentum that would have been transferred it wasn't canceled by another interaction.

C5.4 Different Types of Isolation

The momentum of a system is conserved when the system is isolated. Strictly, speaking, isolated means that no external interactions affect the system. However, there are some systems we can treat as isolated, even though they really aren't.

1.

2.

3.

An Example

You are in a spaceship floating in deep space. Nearby is a 1000kg asteroid. Suddenly, the asteroid explodes into two 500kg fragments. One fragment flies off at 20 m/s due west. What is the velocity of the other fragment? Express your answer both using components and by giving the magnitude and direction of the velocity.

Problem Solving Advice

- Always draw a picture. Clearly indicate your choice of coordinates, including which direction(s) you're taking as positive.
- **Units units units!** Answers need to have units. Also, you should keep units on the numbers during all stages of a calculation. Keeping units can help you catch lots of errors.
- I strongly recommend working symbolically and not substituting numbers until the end of the problem.
- Minus signs often require thought.
- Yes, I want you to use the framework for problem solving introduced in Chapter C5. Don't worry about writing perfect prose, but you should give some verbal clues as to what your strategy is for the problem. If you use some physics formula, say why that formula is applicable. If you conserve momentum, say why you think momentum is conserved.
- Stay calm. Write neatly. Seek help if you need it.