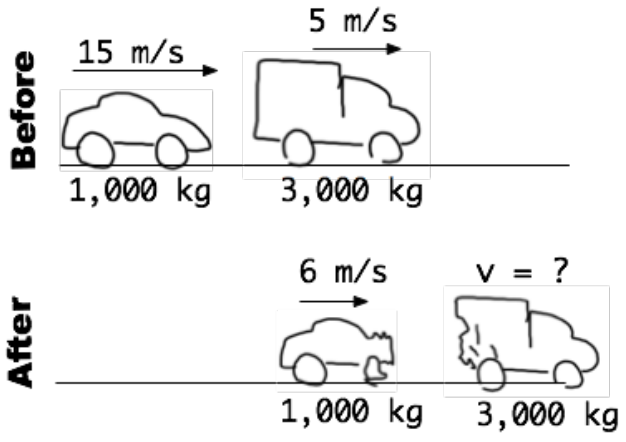
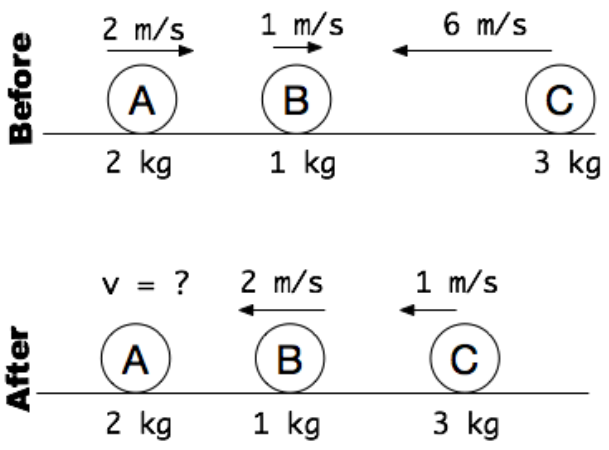
In any system of objects where there are only internal forces...

Momentum is Conserved.

$$p_{i\,(\text{total})} = p_{f\,(\text{total})}$$

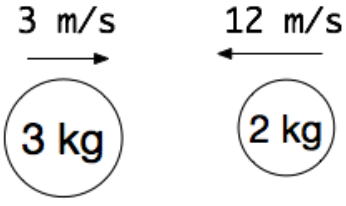


v = 8 m/s


Before
2 m/s
1 m/s
6 m/s
A
B
C
2 kg
1 kg
3 kg
After
v = ?
2 m/s
1 m/s
A
B
C
2 kg
1 kg
3 kg

v = - 4 m/s

Before

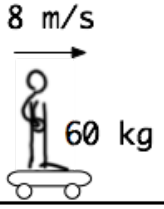


After

v = - 3 m/s

$$(3)(3)+(2)(-12)=(5)(v)$$

Before



After

v = 37 m/s

$$(60)(8) = (58)(7) + (2)v$$

Kinetic Energy

$$K = \frac{mv^2}{2}$$

Predicts

How hard it is to stop.

Stopping distance.

Damage it can do.

Speed at the bottom of a hill

Momentum

$$p = mv$$

Predicts

How things move after a collision.

(Direction & Speed)

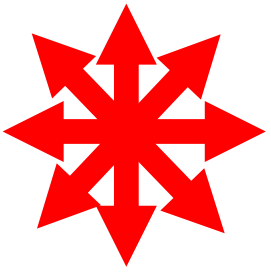
LAW OF CONSERVATION OF MOMENTUM

If no outside forces act, momentum is conserved.

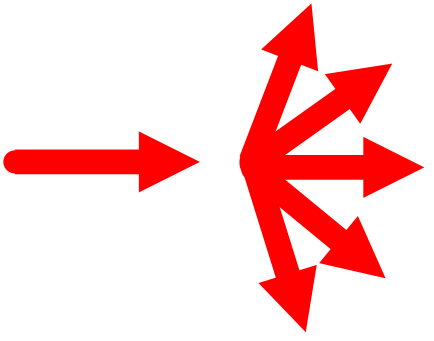
Total momentum is not changed by explosions, collisions or any other situation where objects in a system push on each other.

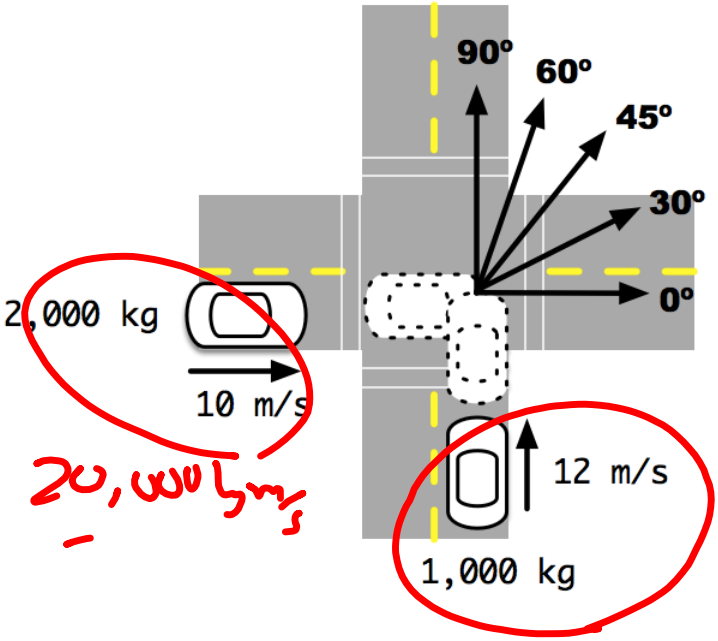
Explosion & Splatter Patterns

If it starts with
NO momentum



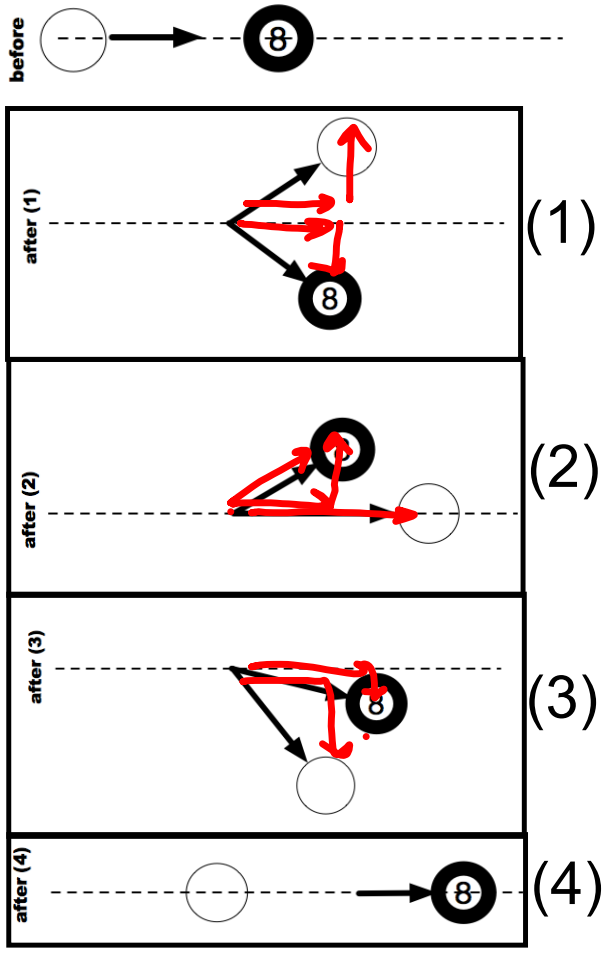
If it starts with
SOME momentum





The two vehicles collide and move together after the collision.

Which angled path is the most likely direction of movement after the collision for the combined wreck? **30°**



The cue ball and the 8-ball have nearly the same mass

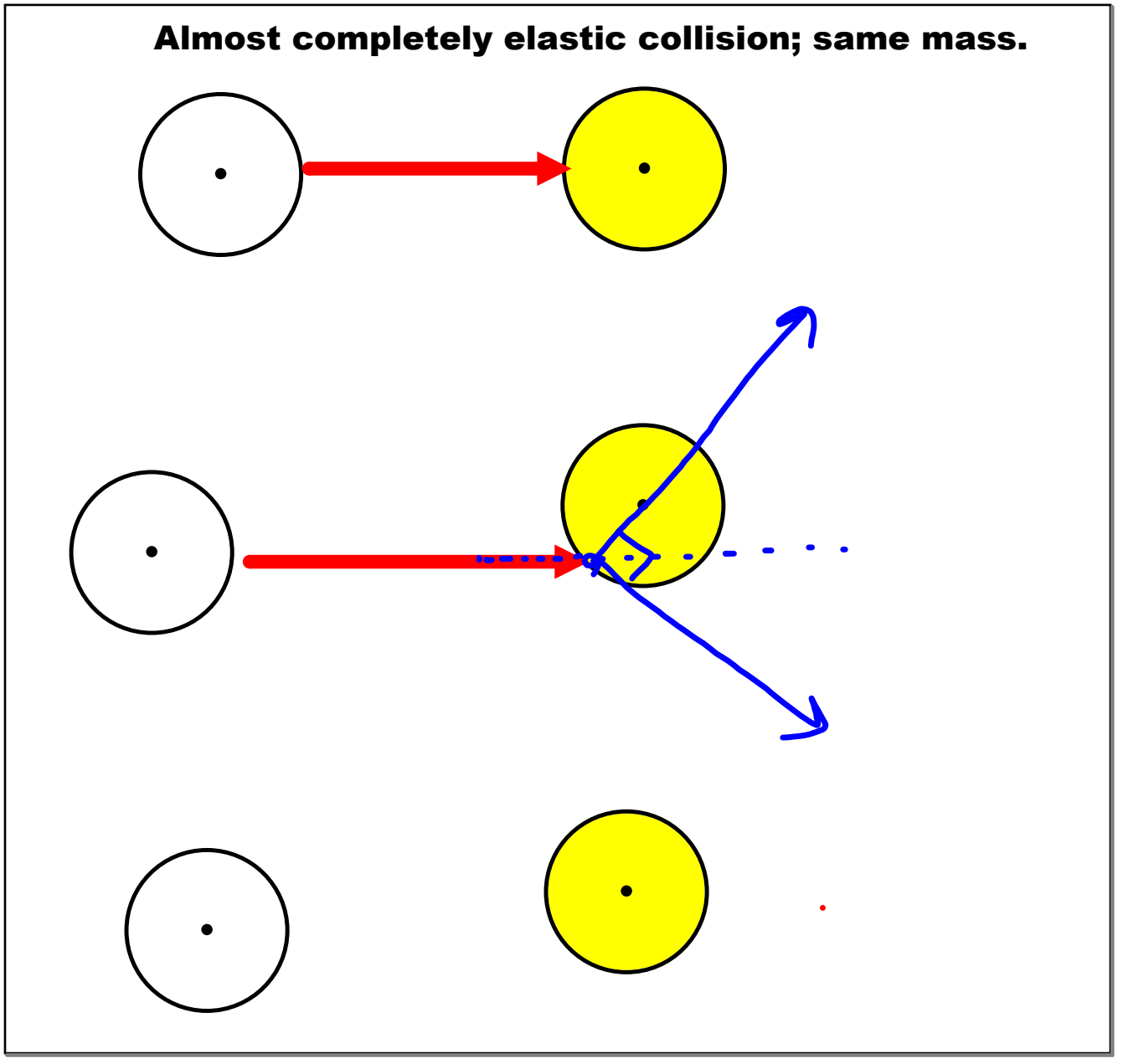
The cue ball (white) is hit at the 8-ball (black) as shown. Of the four after-situations...

Which are possible?

Ones with no momentum in the y-direction.

Which are impossible?

Ones with momentum in the y-direction.


Almost completely elastic collision; same mass.