

**Reflection and Self-Assessment**

**Completion:** Circle the statement that best describes the completion of this practice.

- I completed every question on the practice.
- I did not complete some questions on the practice because:

\_\_\_\_\_

**Answer Checking:** Circle the statement that best describes how you checked your answers

- I checked all my answers against the key at the back and corrected any that were incorrect.
- I did not check all my answers and correct any mistakes because:

\_\_\_\_\_

**Online Worked Solution:** Circle the statement that best describes how you used the online worked solutions.

- I did not use the online worked solution at all.
- I used the online solution to understand some questions I got incorrect.
- I used the online solution to help me learn how to answer some questions.

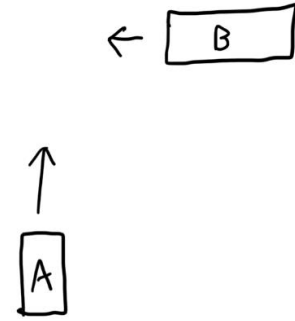
**Confidence:** Circle the statement that best describes your confidence in answering questions of this type in the future.

- I am confident I can answer nearly any question of this type correctly without using notes or other assistance.
- I am confident I can answer **MOST** questions of this type correctly without using notes or other assistance.
- I am **NOT** confident I can answer most questions of this type correctly without using notes or other assistance.

**Time:** Circle the statement below that best describes the total amount of time you spent actively working on this practice:

Less than an hour	Between one and two hours	Between two and three hours	Between three and four hours	More than four hours
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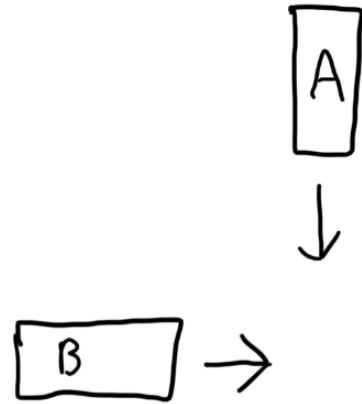
1. A 950 kg car (A) travelling North at 21 m/s collides with, and sticks to a 1200 kg car (B) travelling West at 14 m/s.



- What is the momentum of car A before the collision?
- What is the momentum of car B before the collision?
- What is the total momentum before the collision?  
\*\*You have to add the momentums as vectors.
- What is the total momentum after the collision?
- What is the total mass of the moving object after the collision?
- What is the velocity (magnitude and direction) of the combined cars after the collision?

2. Two 1250 kg cars collide, Car A was initially travelling at 6.5 m/s South, Car B was initially travelling 9.3 m/s East. After the collision, the cars merge and move together.

a. What is the final velocity of the combined cars?



b. How much kinetic energy was converted into other forms during the collision?

3. A 55 kg ball is moving at 65 m/s to the right when it collides with a stationary 24 kg ball. After the collision, the 24 kg ball is moving at 85 m/s,  $18^\circ$  above the right. What is the final velocity of the 55 kg ball?

4. A 25 kg bomb explodes into 2 pieces, a 16 kg piece flies away at 65 m/s,  $18^\circ$  North of West.  
What is the velocity of the other piece after the explosion?

5. A 2.0 kg ball moving due North at 7.0 m/s strikes a stationary 5.0 kg ball. After the collision, the 5.0 kg ball is moving at 1.1 m/s,  $12^\circ$  East of the North. What is the final velocity of the 2.0 kg ball?

6. A 6.3 kg block hits a stationary 7.5 kg block. After the collision, the 6.3 kg block is moving at 2.5 m/s,  $18^\circ$  North of East and the 7.5 kg block is moving at 3.2 m/s,  $14^\circ$  West of South. What was the initial velocity of the 6.3 kg block?

7. Two cars of equal mass collide, one was travelling due North the other due West. After the collision, the cars combine and move in the direction  $32^\circ$  North of West. Which car was travelling faster before the collision?

8. Two particles with the same magnitude of momentum, one moving at  $45^\circ$  below the left, the other moving at  $45^\circ$  below the right collide and stick together, what direction do they move after the collision?



9. A 0.041 kg bullet is fired at 320 m/s and hits a stationary 10.0 kg slab of metal. The bullet ricochets back at an angle of  $7.5^\circ$  off its original path, the slab of metal moves at 1.8 m/s after the collision. What is the speed of the bullet after the collision?



2D Collision Practice

Name: \_\_\_\_\_

<b>Answer Key</b>				
1a) $2.0 \times 10^4$ $\frac{kg \cdot m}{sec}$ North	1b) 17 000 $\frac{kg \cdot m}{sec}$ West	1c) 26 000, 40° West of North	1d) 26 000, 40° West of North	1e) 2150 kg
1f) 12 m/s, 40° West of North	2a) 5.7 m/s, 55° East of South	2b) $4.0 \times 10^4$ J	3) 32 m/s, 21° below the right	4) 120 m/s, 18° South of East
5) 4.3 m/s, 7.5° West of North	6) 3.3 m/s, 26° East of South	7) West car was faster	8) They will move straight down	9) 120 m/s