



Motion in Two Dimensions

Chapter: Mechanics • Level ★★★ • Time: 30 min

SCORE

___ / 20

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

- ✓ Understand: Independence of Perpendicular Motion
- ✓ Understand: Position Vector
- ✓ Understand: Velocity Components
- ✓ Understand: Relative Velocity

**Section A • Concept Check**

• BEGINNER

4 × 1 = 4

- 1 A velocity has magnitude 15 m/s at 60°. Find v_x . ($\cos(60^\circ)=0.5$)

- 2 Using the same velocity, find v_y . ($\sin(60^\circ)\sim 0.866$)

- 3 Find the resultant magnitude of $v_x=6$, $v_y=8$.

- 4 A plane flies at 200 km/h east while a 50 km/h wind blows east. Find the plane's ground speed.

**Section B • Problem Solving**

• INTERMEDIATE

4 × 3 = 12

- 5 A plane flies at 200 km/h east while a 50 km/h wind blows west (opposing). Find the plane's ground speed.

- 6 Why can horizontal and vertical motion be treated independently in 2D projectile-style problems?

- 7 A velocity has magnitude 8 m/s at 45°. Find v_x and v_y ($\cos(45^\circ)=\sin(45^\circ)\sim 0.707$).

- 8 Two velocities (3,0) and (0,4) act on an object. Find the resultant vector.

**Section C • Challenge**

• CHALLENGE

2 × 2 = 4

- 9 What is 'relative velocity'?

- 10 A car travels at 60 km/h north relative to the road; another car travels at 40 km/h north. Find the first car's velocity relative to the second.

Reflection — the most useful thing I learned: _____

A ___/4 B ___/12 C ___/4 **Total ___/20**

Teacher's Signature

Parent's Signature

⌘ ANSWER KEY – FOLD OR CUT BEFORE HANDING OUT

1 = 7.5 m/s 2 = ≈ 12.99 m/s 3 = 10 4 = 250 km/h | 5 = 150 km/h 6 = Because gravity (or any vertical force) doesn't affect horizontal velocity, and horizontal forces don't affect vertical velocity 7 = $v_x \approx 5.66$, $v_y \approx 5.66$ 8 = (3,4), magnitude 5 | 9 = The velocity of one object as measured from the perspective of another moving object 10 = 20 km/h north