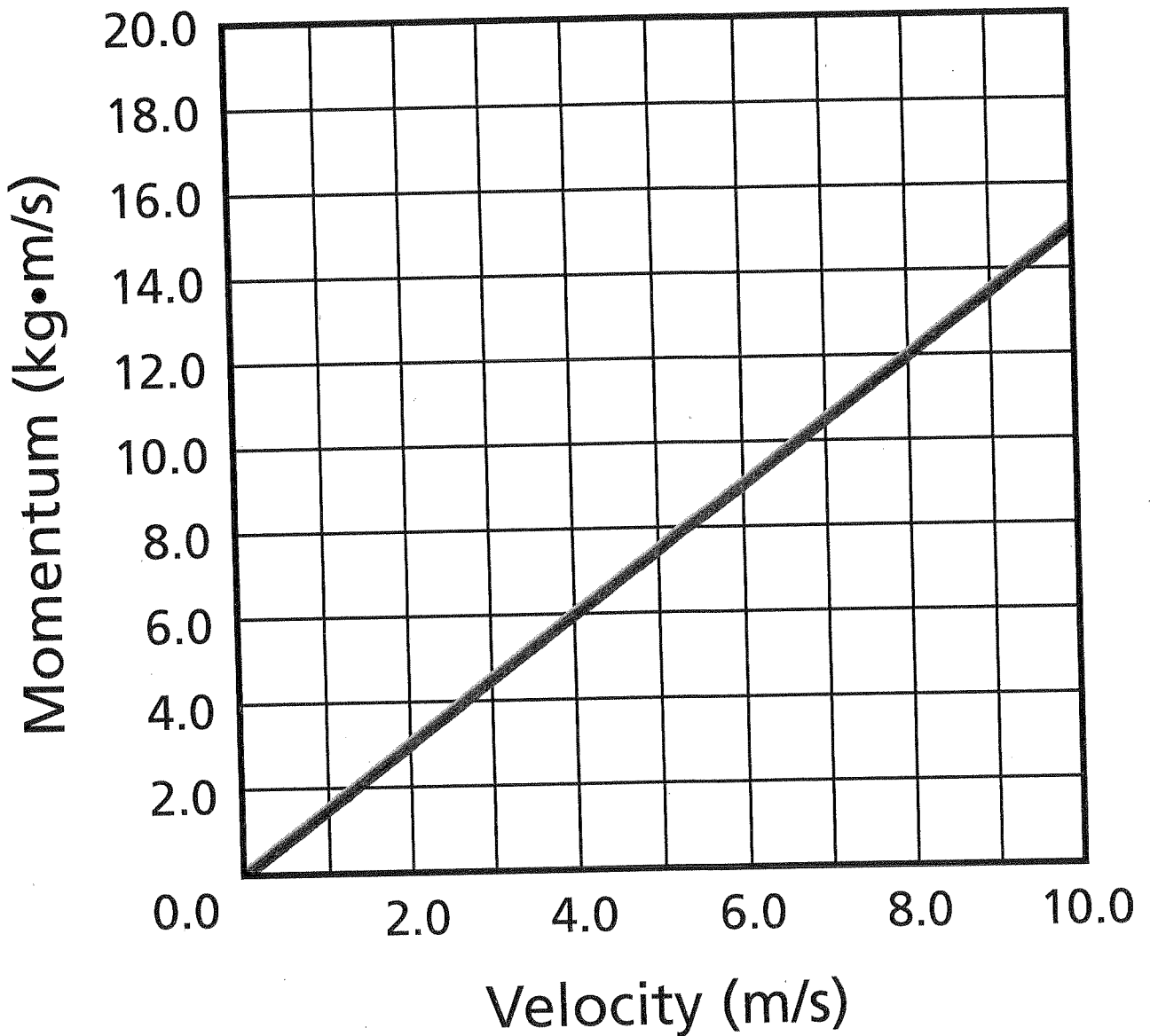


## Velocity and Momentum



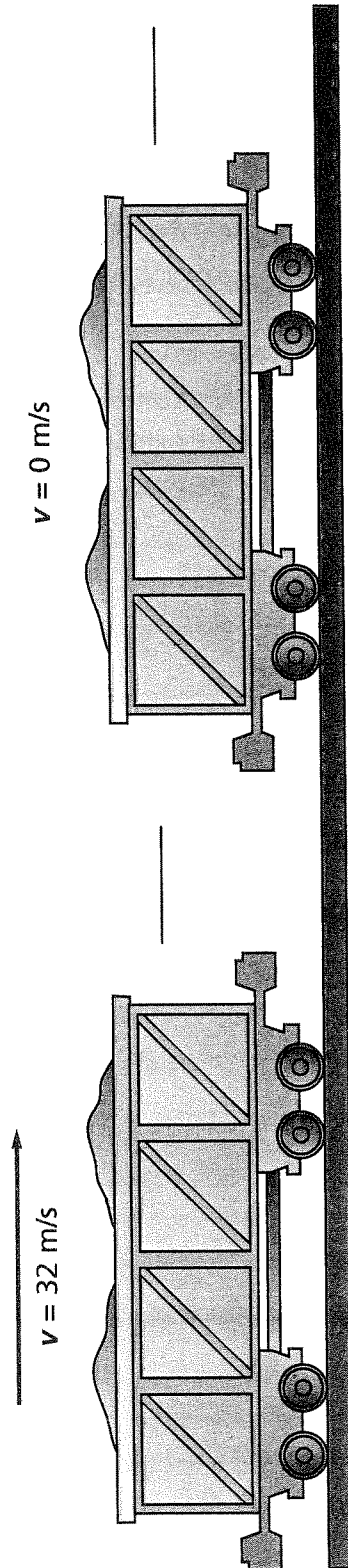
## 9 Transparency 9-1 Worksheet

### Velocity and Momentum

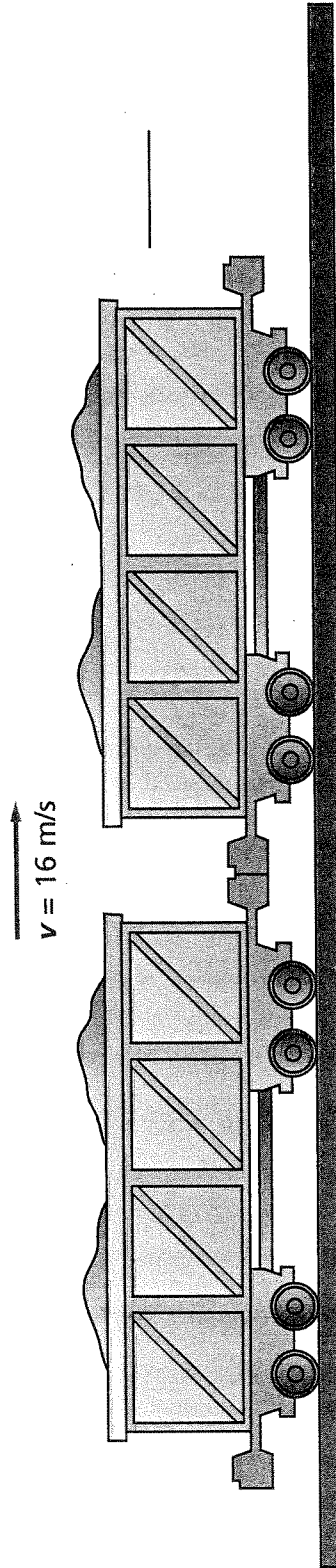
1. What is the object's velocity if the momentum is  $6.0 \text{ kg} \cdot \text{m/s}$ ?
2. What is its momentum if the velocity is  $2.0 \text{ m/s}$ ?
3. Use the graph to predict what the momentum would be if the velocity is  $15.0 \text{ m/s}$ .
4. Describe two ways you could calculate the mass of the object.  
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\_\_\_\_\_  
\_\_\_\_\_
5. What is the mass of the object? Show your work.
6. How would the line on the graph change if the object had a greater mass?  
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7. A similar graph is drawn for an object that has a mass of  $1.0 \text{ kg}$ . Would the line for this graph be above or below the line currently on the graph?  
\_\_\_\_\_

Conservation of Momentum

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(a) Before Colliding



(b) After Colliding

## 9 Transparency 9-2 Worksheet

### Conservation of Momentum

1. Each railway car has a mass of 12,000 kg. Before the cars collide, the car on the left has a velocity of 32 m/s. What is its momentum?

2. Before the collision, what is the momentum of the car on the right?

3. After the collision, what is the momentum of the two cars?

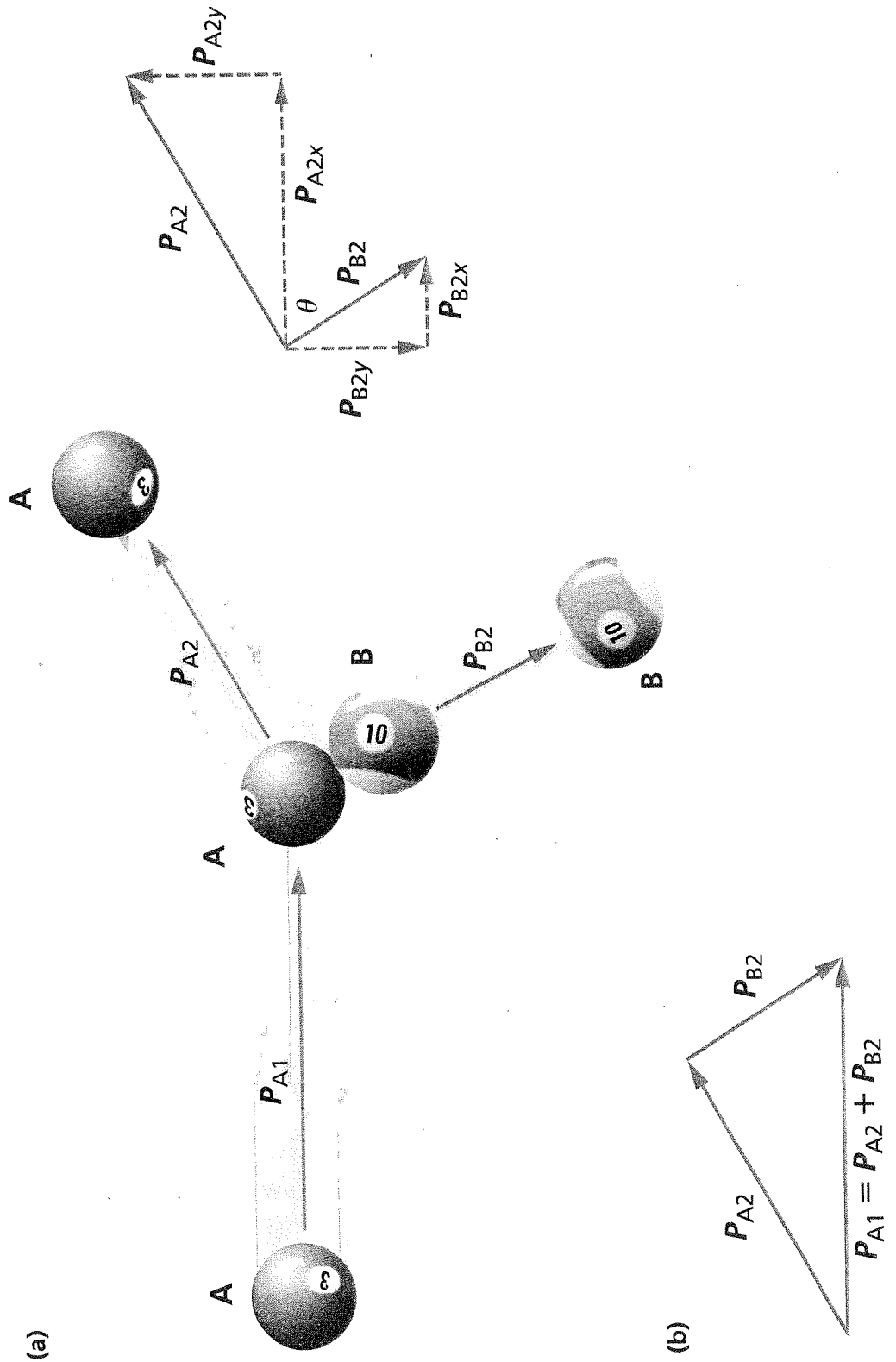
4. After the collision, what is the velocity of the two cars?

5. In order to calculate the velocity of the two connected cars, what was assumed to be true about the momentum of the cars?

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Conservation of Momentum in Two Dimensions

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## 9 Transparency 9-3 Worksheet

### Conservation of Momentum in Two Dimensions

1. Why does the law of conservation of momentum apply to this system containing two billiard balls?

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2. What is the initial momentum of ball A? Ball B?

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3. After the collision, what is the momentum of ball A? Ball B?

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4. What is the total initial momentum? Compare this initial momentum to the final momentum after collision. Explain.

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5. What is the equation that states the relationship between the initial momenta and final momenta of balls A and B?

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6. Compare the vertical components of  $p_{Af}$  and  $p_{Bf}$ . Explain.

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7. If ball A were replaced with another ball twice the mass of ball A, how would the final total momentum change?

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8. How would  $p_{Af}$  be affected if ball A were set in motion at a slower velocity?

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9. How would the final total momentum change if ball B were replaced with another ball that had twice the mass of ball B?

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