Warm Up Question 1

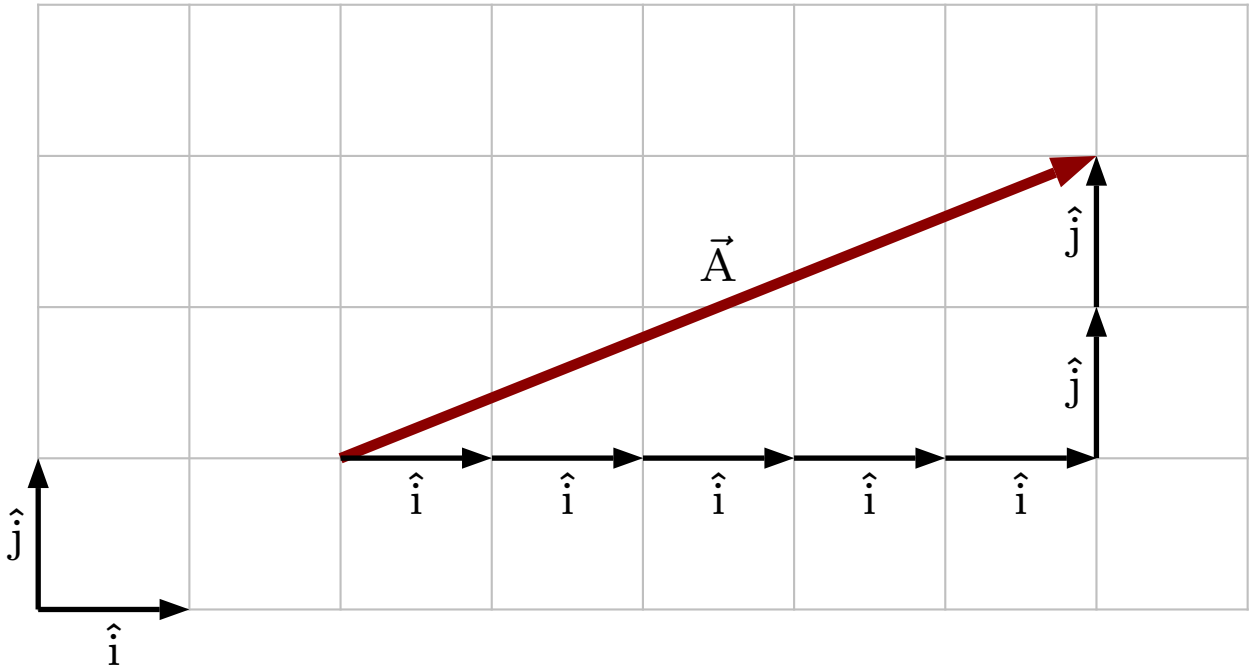
A displacement vector with magnitude $10\,\mathrm{m}$ points at an angle of 60° from the $+y$-axis. Determine the y-component of this vector.

1. $5\,\mathrm{m}$, since $10\cos(60^\circ)$.
2. $5\,\mathrm{m}$, since $10\sin(30^\circ)$.
3. $8.66\,\mathrm{m}$, since $10\sin(60^\circ)$.

Constructing a Vector from Unit Vectors

How the illustrated vector $\vec{A}$ is decomposed into unit vectors

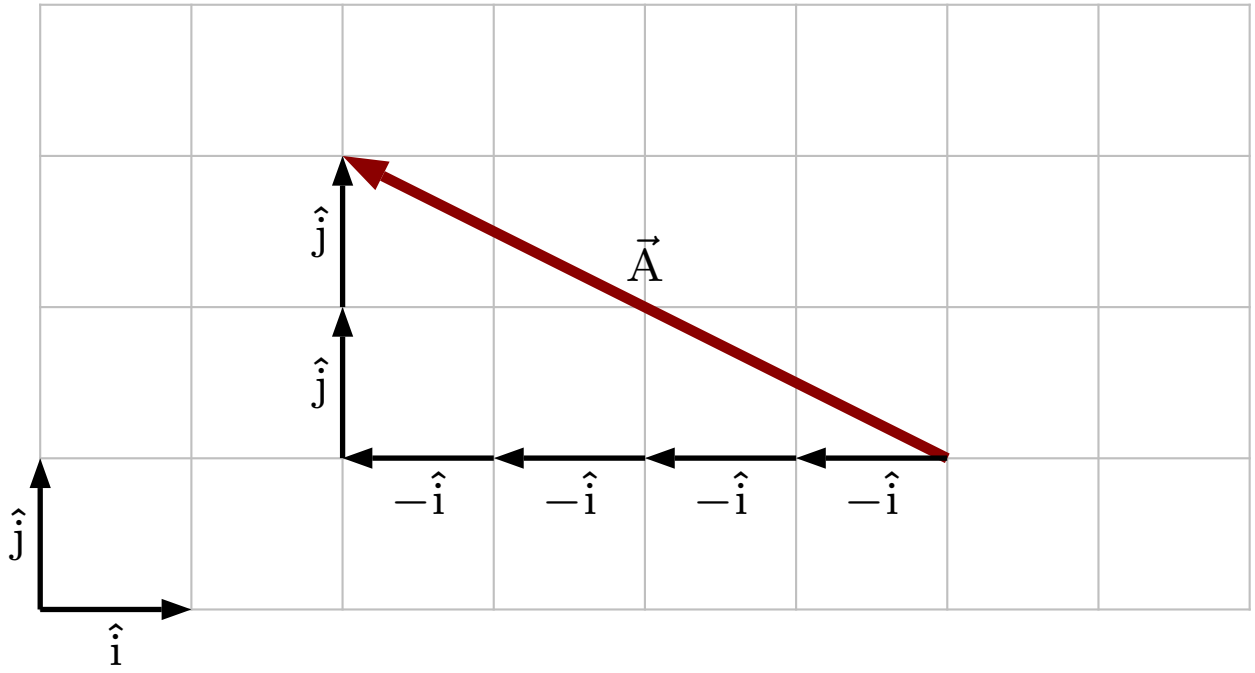
$$\vec{A} = 5\hat{i} + 2\hat{j}$$



Constructing a Vector from Unit Vectors

How the illustrated vector $\vec{\mathrm{A}}$ is decomposed into unit vectors

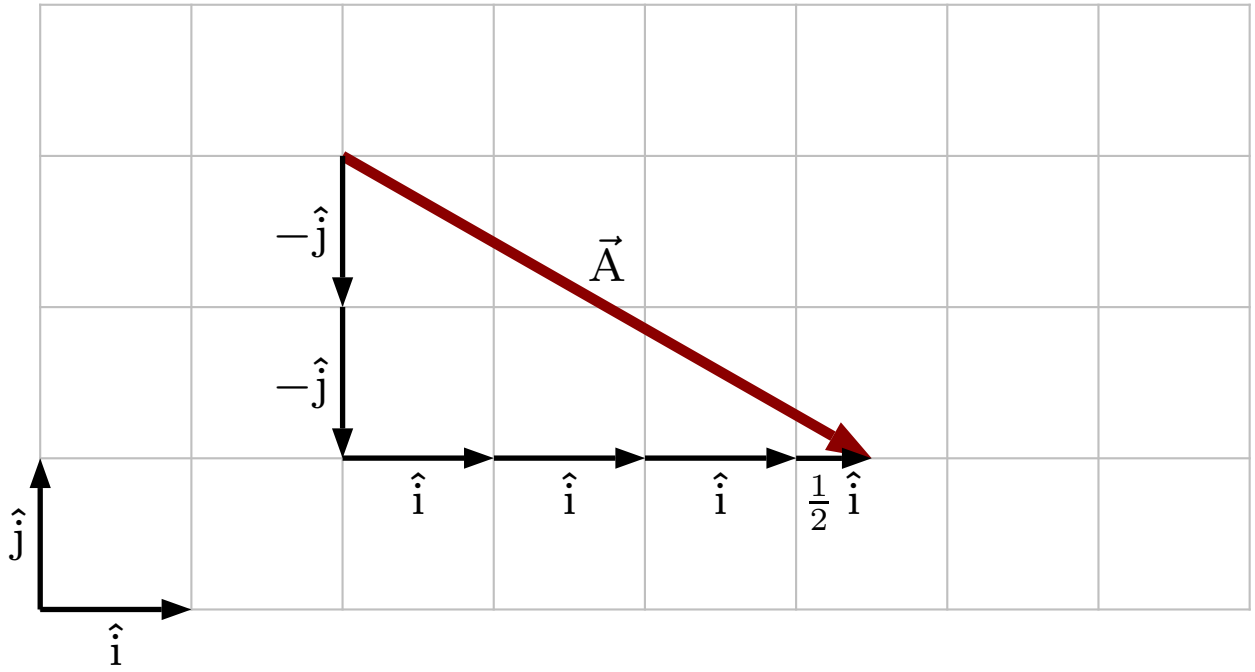
$$\vec{\mathrm{A}} = -4\hat{\mathrm{i}} + 2\hat{\mathrm{j}}$$



Constructing a Vector from Unit Vectors

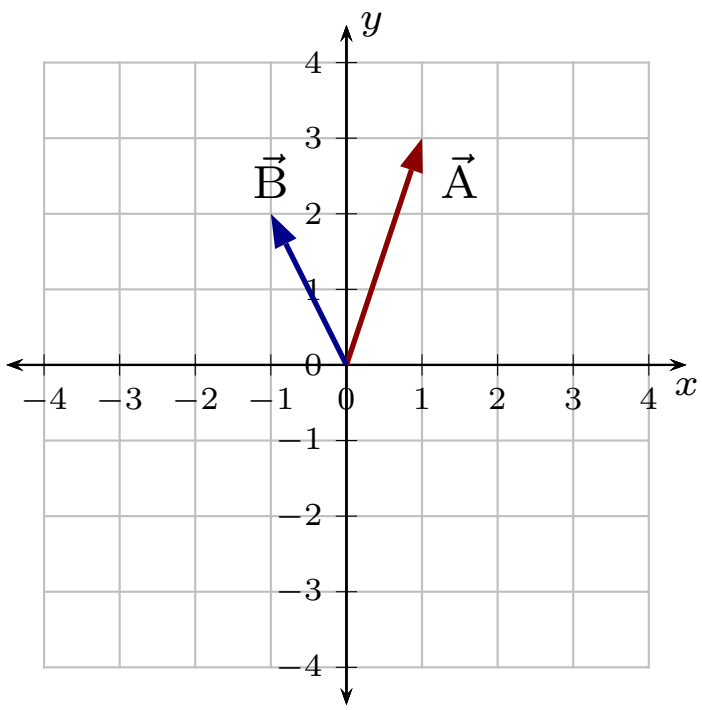
How the illustrated vector $\vec{A}$ is decomposed into unit vectors

$$\vec{A} = 3.5\hat{i} - 2\hat{j}$$



Question 1

Two vectors are illustrated.



Let $\vec{C} = \vec{A} - \vec{B}$. Which of the following represents $\vec{C}$?

1. $\vec{C} = 2\hat{i} + \hat{j}$
2. $\vec{C} = 2\hat{i} - \hat{j}$
3. $\vec{C} = 2\hat{i} - 2\hat{j}$
4. $\vec{C} = 5\hat{j}$
5. $\vec{C} = -5\hat{j}$

Warm Up Question 2

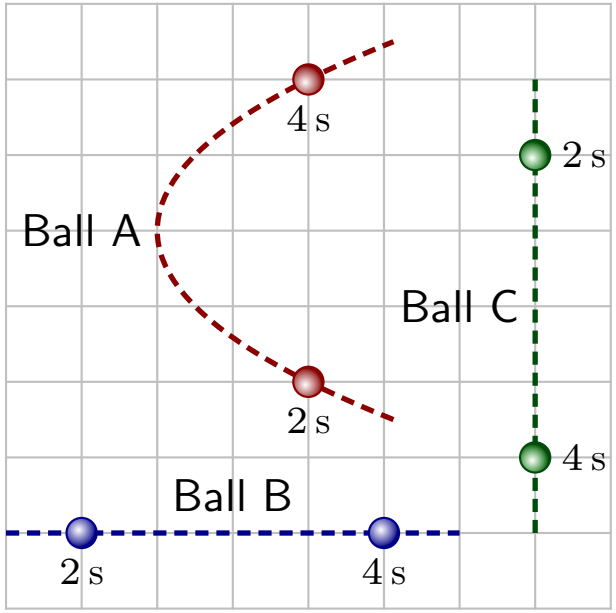
Let $\vec{\mathrm{A}} = 2\hat{\mathrm{i}} + 3\hat{\mathrm{j}}$ and suppose that $\vec{\mathrm{B}} = \alpha\vec{\mathrm{A}}$ for some real number α. Explain whether it is possible that

$$\vec{\mathrm{B}} = 20\hat{\mathrm{i}} - 30\hat{\mathrm{j}}.$$

1. No. The signs of the components of $\vec{\mathrm{B}} = \alpha\vec{\mathrm{A}}$ must be the same as each other.
2. No. Multiplying by $\alpha = 10$ would produce the correct $\hat{\mathrm{i}}$ component but an incorrect $\hat{\mathrm{j}}$ component.
3. No. $\vec{\mathrm{B}} = \alpha\vec{\mathrm{A}}$ must be parallel to $\vec{\mathrm{A}}$ and $20\hat{\mathrm{i}} - 30\hat{\mathrm{j}}$ is not.
4. Yes. $c = 10$ works.

Question 2

Various balls follow the illustrated trajectories.



Which balls have the same average velocity in the interval from $2\,\mathrm{s}$ to $4\,\mathrm{s}$?

1. All have the same.
2. None have the same.
3. A and B.
4. B and C.
5. A and C.