

[1]  $y = x^2 \pm 4x + 3$

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[2]  $y = \frac{1}{4}x^4 + x^2$

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[3]  $\sqrt{13}$

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[4]  $\langle 12, \pm 8 \rangle$

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[5] 2

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[6]  $\langle -4, -2 \rangle$

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[7]  $\cos^{-1}\left(\frac{2}{\sqrt{20}\sqrt{13}}\right) \approx 82.9^\circ$

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Let  $\vec{u} = \langle u_1, u_2 \rangle$ ,  $\vec{v} = \langle v_1, v_2 \rangle$  and  $\vec{w} = \langle w_1, w_2 \rangle$ . Then  $\vec{u} \bullet \vec{v} + \vec{u} \bullet \vec{w} =$   
 [8]  $u_1v_1 + u_2v_2 + u_1w_1 + u_2w_2 = u_1(v_1 + w_1) + u_2(v_2 + w_2) = \vec{u} \bullet (\vec{v} + \vec{w}).$

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[9] Let  $\vec{u} = \langle u_1, u_2 \rangle$  and  $\vec{v} = \langle v_1, v_2 \rangle$ . Then  $\vec{u} \bullet \vec{v} = u_1v_1 + u_2v_2 = v_1u_1 + v_2u_2 = \vec{v} \bullet \vec{u}.$

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[10]  $\left\langle \frac{2}{\sqrt{13}}, -\frac{3}{\sqrt{13}} \right\rangle$  and  $\left\langle -\frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle$

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[11]  $\langle 0, -2 \rangle$  and  $\langle 0, 2 \rangle$

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[12]  $\langle 435 \cos 58^\circ, 435 \sin 58^\circ \rangle \approx \langle 230.5, 368.9 \rangle$

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[13]  $\langle 320 \cos 135^\circ, 320 \sin 135^\circ \rangle \approx \langle \pm 226.3, 226.3 \rangle$

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[14]  $\approx 315 \text{ mph at } \approx 39.2^\circ \text{N of E}$

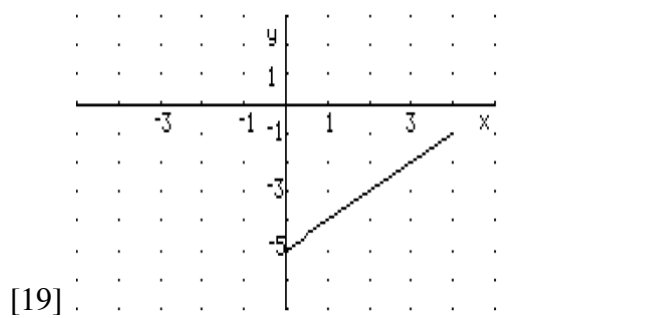
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[15] 1.3 mph moving upstream at an angle of  $\approx 77.1^\circ$  with the bank

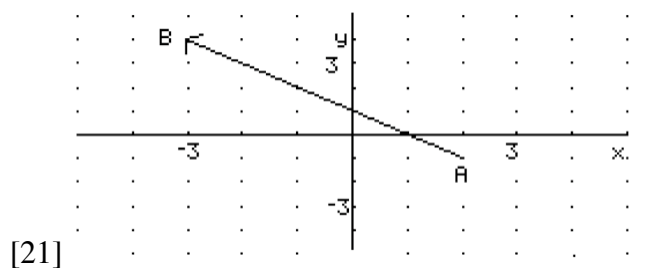
[16]  $14 \frac{\text{ft}}{\text{sec}}$

[17] 4 ft in front of the thrower, and 4 ft above the ground

[18]  $\approx 4.2$  ft from the initial point

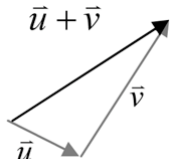


[20] The length of the segment would be twice as long.



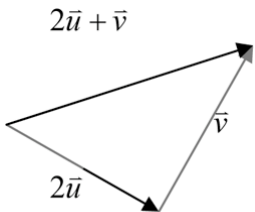
[22]  $\langle -5, 5 \rangle$

[23] Answers may vary. Sample:  $[5\sqrt{2}, 180^\circ - \tan^{-1}(1)]$  or  $[5\sqrt{2}, 135^\circ]$  or  $[5\sqrt{2}, \frac{3\pi}{4}]$

[24]  

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The diagram shows a vector  $\vec{u}$  starting from a point and ending at another. A second vector  $\vec{v}$  starts at the tip of  $\vec{u}$  and ends at a third point. A third vector, labeled  $\vec{u} + \vec{v}$ , starts at the same origin as  $\vec{u}$  and ends at the same tip as  $\vec{v}$ , representing the sum of the two vectors.

[25]  

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The diagram shows a vector  $2\vec{u}$  starting from a point and ending at another. A second vector  $\vec{v}$  starts at the tip of  $2\vec{u}$  and ends at a third point. A third vector, labeled  $2\vec{u} + \vec{v}$ , starts at the same origin as  $2\vec{u}$  and ends at the same tip as  $\vec{v}$ , representing the sum of the two vectors.

[26] 
$$\begin{cases} x = 1.5t + 3 \\ y = 7.33t - 2 \end{cases}$$
 

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[27] 
$$\begin{cases} x = \pm 4t + 4 \\ y = 3.2t - 1 \end{cases}$$
 

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