**Find (a) the dot product of the two vectors and (b) the angle between the two vectors.**

1. <-2, 5>, <3, 6> 2. 4i - j, -3i + 2j 3. 9i, 5i + 4j 4. <10, 7>, <-2, $-\frac{7}{5}$>

**Show that the vectors are orthogonal.**

5. <4, -1>, <2, 8> 6. -4j, -7i

**Show that the vectors are parallel, and determine whether they have the same direction or opposite directions.**

7. **a** = 3i - 5j, **b** = $-\frac{12}{7}i+ \frac{20}{7}$ j 8. **a** = <$\frac{2}{3}, \frac{1}{2}$>, **b** = <8, 6>

**Determine m such that the two vectors are orthogonal.**

9. 3i - 2j, 4i + 5mj 10. 9i - 16mj, i + 4mj

**Given that a = <2, -3>, b = <3, 4>, and c = <-1, 5>, find the number.**

11. (a) a ∙ (b + c) (b) a ∙ b + a ∙ c 12. (2a +b) ∙ (3c) (b) (a - b) ∙ (b + c)

13. compb (a + c) 14. compc b

**If c represents a constant force, find the work done if the point of application of c moves along the line segment from P to Q.**

15. c = 3i + 4j; P(0,0), Q(5,-2)

16. A child pulls a wagon along level ground by exerting a force of 20 pounds on a handle that makes an angle of 30° with the horizontal. Find the work done in pulling the wagon 100 feet.

17. Find the work done if the wagon is pulled, with the same force, 100 feet up an incline that makes an angle of 30° with the horizontal.

18. The sun has a radius of 432,000 miles, and its center is 93,000,000 miles from the center of Earth. Let v and w be the vectors illustrated in the figure.

(a) Express v and w in **i, j** form.

v

w

Earth

Sun

(b) Approximate the angle between v and w.