Answer on Question # 42891, Physics, Mechanics | Kinematics | Dynamics

Task:

19. The distance *x* of a particle moving in one dimension under the action of constant force is related to the time *t* by the relation, $t = \sqrt{x} + 3.$ Find the displacement of the particle its velocity is 6.0 m/s:

(a)9.0m (b)6.0m (c)4.0m (d)0.0m

Solution:

$$x = (t-3)^2 \Rightarrow \frac{dx}{dt} = V = 2(t-3) \Rightarrow V = 6.0m/s \Rightarrow t = 6.0s.$$

$$t = 6.0 = \sqrt{x} + 3 \Rightarrow x = 9.0m.$$

Answer: (a)9.0m

20. Which of the following pairs of vectors are parallel?

$(a)\vec{A} = \hat{i} - 2\hat{j}; \vec{B} = \hat{i} - 5\hat{j}$

$(b)\vec{A} = \hat{i} - 10\hat{j}; \vec{B} = 2\hat{i} - 5\hat{j}$

$(c)\vec{A} = \hat{i} - 5\hat{j}; \vec{B} = \hat{i} - 10\hat{j}$

$(d)\vec{A} = \hat{i} - 5\hat{j}; \vec{B} = 2\hat{i} - 10\hat{j}$

Solution:

if vectors are parallel then $\angle(\vec{A}, \vec{B}) = \arccos \frac{\vec{A} \cdot \vec{B}}{|\vec{A}| \cdot |\vec{B}|} = 0.$

$$(a)\angle(\vec{A}, \vec{B}) = \arccos \frac{(\hat{i} - 2\hat{j})(\hat{i} - 5\hat{j})}{|\hat{i} - 2\hat{j}| \cdot |\hat{i} - 5\hat{j}|} = \frac{52}{\sqrt{101 \cdot 29}} \neq 0$$

$$(b)\angle(\vec{A}, \vec{B}) = \arccos \frac{(\hat{i} - 10\hat{j})(2\hat{i} - 5\hat{j})}{|\hat{i} - 10\hat{j}| \cdot |2\hat{i} - 5\hat{j}|} = \frac{51}{\sqrt{101 \cdot 26}} \neq 0$$

$$(c)\angle(\vec{A}, \vec{B}) = \arccos \frac{(\hat{i} - 5\hat{j})(\hat{i} - 10\hat{j})}{|\hat{i} - 5\hat{j}| \cdot |\hat{i} - 10\hat{j}|} = \frac{52}{\sqrt{104 \cdot 26}} \neq 0$$

$$(d)\angle(\vec{A}, \vec{B}) = \arccos \frac{(\hat{i} - 5\hat{j})(2\hat{i} - 10\hat{j})}{|\hat{i} - 5\hat{j}| \cdot |2\hat{i} - 10\hat{j}|} = \frac{52}{\sqrt{104 \cdot 26}} = 0$$

Answer: (d)