

## Calculus Practice: Rectilinear Motion 3a

**A particle moves along a coordinate line. Its velocity function is  $v(t)$  for  $t \geq 0$ . For each problem, find the displacement of the particle and the distance traveled by the particle over the given interval.**

1)  $v(t) = 2t - 28$ ;  $8 \leq t \leq 16$

- A) Displacement:  $-32$   
Distance traveled:  $40$
- B) Displacement:  $-40$   
Distance traveled:  $\frac{89}{2} = 44.5$
- C) Displacement:  $64$   
Distance traveled:  $64$
- D) Displacement:  $48$   
Distance traveled:  $50$

2)  $v(t) = -4t^3 + 36t^2$ ;  $9 \leq t \leq 14$

- A) Displacement:  $-7675$   
Distance traveled:  $7675$
- B) Displacement:  $7675$   
Distance traveled:  $7675$
- C) Displacement:  $15735$   
Distance traveled:  $15735$
- D) Displacement:  $9690$   
Distance traveled:  $9690$

3)  $v(t) = 4t^3 - 39t^2$ ;  $7 \leq t \leq 13$

- A) Displacement:  $2058$   
Distance traveled:  $\frac{507723}{128} \approx 3966.586$
- B) Displacement:  $-2058$   
Distance traveled:  $\frac{507723}{128} \approx 3966.586$
- C) Displacement:  $1650$   
Distance traveled:  $\frac{453211}{128} \approx 3540.711$
- D) Displacement:  $9474$   
Distance traveled:  $9474$

4)  $v(t) = 2t - 12$ ;  $5 \leq t \leq 8$

- A) Displacement:  $-9$   
Distance traveled:  $9$
- B) Displacement:  $3$   
Distance traveled:  $5$
- C) Displacement:  $18$   
Distance traveled:  $18$
- D) Displacement:  $48$   
Distance traveled:  $48$

5)  $v(t) = -2t + 5$ ;  $1 \leq t \leq 3$

- A) Displacement:  $32$   
Distance traveled:  $32$
- B) Displacement:  $-2$   
Distance traveled:  $\frac{5}{2} = 2.5$
- C) Displacement:  $-32$   
Distance traveled:  $32$
- D) Displacement:  $2$   
Distance traveled:  $\frac{5}{2} = 2.5$

6)  $v(t) = -2t + 24$ ;  $6 \leq t \leq 13$

- A) Displacement:  $35$   
Distance traveled:  $37$
- B) Displacement:  $-56$   
Distance traveled:  $56$
- C) Displacement:  $-49$   
Distance traveled:  $49$
- D) Displacement:  $-7$   
Distance traveled:  $25$

**A particle moves along a coordinate line. Its acceleration function is  $a(t)$  for  $t \geq 0$ . For each problem, find the displacement of the particle and the distance traveled by the particle over the given interval.**

7)  $a(t) = -2$ ;  $v(0) = 10$ ;  $4 \leq t \leq 11$

- A) Displacement:  $-63$   
Distance traveled:  $63$
- B) Displacement:  $0$   
Distance traveled:  $\frac{49}{2} = 24.5$
- C) Displacement:  $49$   
Distance traveled:  $49$
- D) Displacement:  $-35$   
Distance traveled:  $37$

8)  $a(t) = -12t^2 + 72t$ ;  $v(0) = 0$ ;  $9 \leq t \leq 13$

- A) Displacement:  $-4384$   
Distance traveled:  $4384$
- B) Displacement:  $-1448$   
Distance traveled:  $\frac{18091}{8} = 2261.375$
- C) Displacement:  $2916$   
Distance traveled:  $\frac{397899}{128} \approx 3108.586$
- D) Displacement:  $5852$   
Distance traveled:  $5852$

9)  $a(t) = 2$ ;  $v(0) = -24$ ;  $12 \leq t \leq 14$

- A) Displacement:  $4$   
Distance traveled:  $4$
- B) Displacement:  $26$   
Distance traveled:  $26$
- C) Displacement:  $-16$   
Distance traveled:  $16$
- D) Displacement:  $-24$   
Distance traveled:  $24$

10)  $a(t) = 12t^2 - 72t$ ;  $v(0) = 0$ ;  $6 \leq t \leq 15$

- A) Displacement:  $24057$   
Distance traveled:  $24057$
- B) Displacement:  $8262$   
Distance traveled:  $\frac{1441611}{128} \approx 11262.586$
- C) Displacement:  $11421$   
Distance traveled:  $13203$
- D) Displacement:  $-14580$   
Distance traveled:  $\frac{1985067}{128} \approx 15508.336$

11)  $a(t) = -6t + 60$ ;  $v(0) = -225$ ;  $2 \leq t \leq 10$

- A) Displacement:  $-160$   
Distance traveled:  $272$
- B) Displacement:  $-256$   
Distance traveled:  $\frac{8288}{27} \approx 306.963$
- C) Displacement:  $32$   
Distance traveled:  $\frac{7136}{27} \approx 264.296$
- D) Displacement:  $88$   
Distance traveled:  $412$

12)  $a(t) = -6t + 52$ ;  $v(0) = -169$ ;  $0 \leq t \leq 5$

- A) Displacement:  $-180$   
Distance traveled:  $\frac{5788}{27} \approx 214.37$
- B) Displacement:  $-200$   
Distance traveled:  $200$
- C) Displacement:  $-320$   
Distance traveled:  $\frac{8936}{27} \approx 330.963$
- D) Displacement:  $225$   
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