Coordinates varying at constant rates

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Write position from initial $(3, 2)$ m and velocity $(4, -1)$ m/s. [2 marks]

Use initial position plus t times velocity.

Check at $t = 0$.

Answer: $(3 + 4t, 2 - t)$ m.

2. Find speed for $(5 + 8t, -2 + 6t)$ m. [2 marks]

Velocity is $(8, 6)$.

Speed is $\sqrt{64 + 36}$.

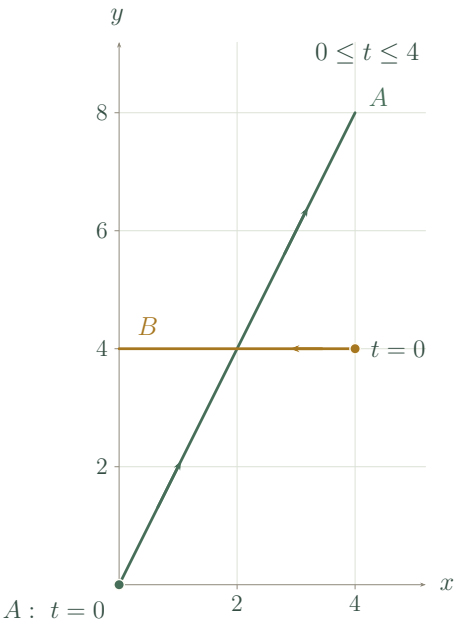
Answer: 10 m/s.

3. A is at $(t, 2t)$ and B at $(4 - t, 4)$. Find collision time. [2 marks]

Equate x to get $t = 2$.

Both y coordinates then equal 4.

Answer: $t = 2$, at $(2, 4)$.



4. A is at (t, t) and B at $(2-t, 3-t)$. Do they collide? [2 marks]

Equal x requires $t=1$.

At $t=1$, their y values are 1 and 2.

Answer: No.

5. A particle moves from $(1, 1, 2)$ to $(7, -3, 2)$ in 2 s. Find constant velocity. [2 marks]

Displacement is $(6, -4, 0)$.

Divide by 2.

Answer: $(3, -2, 0)$ units/s.

6. Find distance travelled by $(1+2t, 3+t)$ on $0 \le t \le 4$. [2 marks]

Constant speed is $\sqrt{5}$.

Multiply by elapsed time 4.

Answer: $4\sqrt{5}$ units.