Velocity Profile Problems – Answer Key

A red car travels with constant velocity. At the instant it passes the origin, a blue car starts up from rest with constant acceleration. Their velocity profiles are shown.

1) When does the blue car have the same speed as the red car? \( t = 20 \text{ s} \)
2) When does the blue car pass the red car? \( t = 40 \text{ s} \)
3) How fast is the blue car going when it passes the red car? \( 20 \text{ m/s} \)
4) How far have the cars traveled when the blue car catches up to the red car? \( 400 \text{ m} \)
5) What is the acceleration of the blue car? \( 0.5 \text{ m/s}^2 \) the red car? \( 0 \text{ m/s}^2 \)

A car starts from rest at the origin. Its velocity profile is shown below.

6) What is the car’s velocity at 5 seconds? \( 10 \text{ m/s} \)
7) What is the car’s acceleration at 5 seconds? \( \frac{2 \text{ m/s}^2}{15} \text{ s} \) at 15 seconds? \( 0 \text{ m/s}^2 \)
8) How far has the car gone after 10 seconds? \( 100 \text{ m} \) after 20 seconds? \( 300 \text{ m} \)
9) When does the car turn around? \( t = 25 \text{ s} \)
10) When does the car return to the origin? \( t = 45 \text{ s} \)
11) When is the car’s velocity negative? \( t = 25 \text{ s} \text{ to end} \)
12) When the car’s acceleration negative? \( t = 20 \text{ s} \text{ to } t = 30 \text{ s} \)