Recall that the total distance in these problems is length of train + length of bridge, or $D = L_b + L_t$. So using the equation $D = ST$ where D is distance, S is speed, and T is time, we can determine that $L_b + L_t = ST$, or $S = \frac{L_b + L_t}{T}$.

1. $\boxed{\text{240 m}}$

2. $\boxed{\text{4 min}}$

3. We can create two equations from the information given in the problem.

   A train passes by a signal post in 9 seconds. We consider the length of the signal post to be zero, so we can write this problem as $S = \frac{L_t}{9}$, where S is the speed of the train and L_t is the length of the train.

   ...and crosses a 468-meter bridge in 35 seconds. We can write the equation $S = \frac{L_t + 468}{35}$.

   Now, since the speed of the train is constant in both cases, we can set the two equations equal to each other. So $S = \frac{L_t}{9} = \frac{L_t + 468}{35}$. Now we must solve the equation for L_t. Cross multiply and get $35L_t = 9(L_t + 468) = 9L_t + 4212$. Subtract $9L_t$ from both sides and get $26L_t = 4212$. Divide both sides by 26 and get $L_t = \boxed{\text{162 m}}$

4. $\boxed{\text{208 m}}$

5. $\boxed{\text{9 s}}$

6. If Anthony counts from the 1st post to the 51st post, how many posts did he count? 51. How many spaces are between the 51 posts? 50. Since the posts are 40 meters apart, he traveled a distance of $50 \times 40 = 2000$ meters. Since Anthony is sitting in one spot on the train and not moving, we can ignore the length of the train. We just need to find the speed of Anthony, and that will tell us the speed of the train. So Anthony travels 2000 m in 2 minutes, but we need the speed in kilometers per hour. So we will perform a sequence of multiplications:

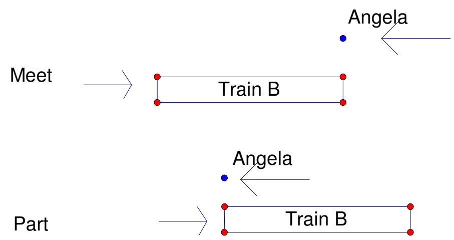
$$\frac{2000\ m}{2\ min} \times \frac{1\ km}{1000\ m} \times \frac{60\ min}{1\ hr}$$

   Notice you can cancel the 2 and the 1000 in the denominators with the 2000 in the numerator, so all we have now is 60 in the numerator and 1 in the denominator. So we arrive at the speed of $\boxed{\text{60 km/hr}}$

7. $\boxed{\text{72 m}}$

8. This problem has a lot of elements, so we must try to simplify it as much as possible. First, let's ignore Train A. We will not include the train in our problem, just Angela, who is traveling from the east at 50 miles per hour. Now let's draw a diagram of what is happening in the problem. First, to understand what is happening, slide a pen along your table as train B and slide your finger in the opposite direction as Angela. Watch as they pass each other. What happens? First, at one point, the head of the train is at the same place as Angela; they

pass each other. In my diagram, that is the first image. Then, as each of them moves along, finally, Angela passes the tail of the train, which is shown at the bottom of my image.

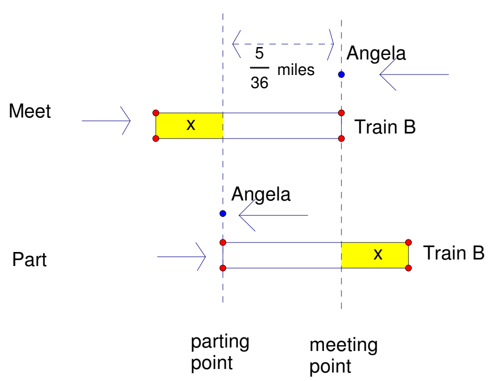


Now we must consider some facts. The speeds are given are in miles per hour, but we need it to be miles per second. So we convert each of the speeds.

$$Angela: \frac{50\ miles}{1\ hour} \times \frac{1\ hour}{60\ minutes} \times \frac{1\ minute}{60\ seconds} = \frac{1}{72}\ mi/per\ sec$$

$$Train\ B: \frac{58\ miles}{1\ hour} \times \frac{1\ hour}{60\ minutes} \times \frac{1\ minute}{60\ seconds} = \frac{29}{1800}\ mi/sec$$

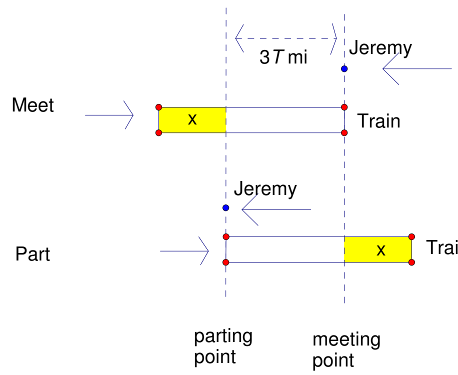
So if Angela travels at $\frac{1}{72}$ mi/sec, and she traveled past the train in 10 seconds, she has traveled $\frac{1}{72} \times 10 = \frac{5}{36}$ miles. Label this on our diagram.



We see that part of train B is $\frac{5}{36}$ miles long. We need to find the length of the rest of the train, the yellow portion marked x. We see that the head of the train travels x miles in 10 seconds. Since the train travels at $\frac{29}{1800}$ mi/sec, we can see that $x = \frac{29}{1800} \times 10 = \frac{29}{180}$ miles. So the total length of the train is $\frac{5}{36} + x = \frac{5}{36} + \frac{29}{180} = \frac{25}{180} + \frac{29}{180} = \frac{54}{180} = \frac{3}{10} = \boxed{.3 \text{ mi}}$

9. This problem is the same as the problem immediately prior, only we are solving for time instead of length of the train. I will draw a diagram similar to the previous problem. We

know $D = RT$. The distance Jeremy travels is $D = 3T$, because his speed is 3 meters per second, and he travels for T seconds. So I will label this on my diagram.



et's consider the additional part of the train, marked in yellow, as x. We know the whole length of the train is 147 from the problem, so we can write the equation $x + 3T = 147$. We also know the head of the train traveled x meters in T seconds. Since $D = RT$, we can write $x = 18T$. So replace the x in the equation $x + 3T = 147$ with $18T$. We have $18T + 3T = 21T = 147$, and we divide both sides by 21, and we get $T = \boxed{7 \text{ s}}$

10. $\boxed{81 \text{ m}, 9 \text{ m/s}}$