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3.

a. If b/d and a/d are relatively prime, this implies that $gcd(b/d,\ a/d)\ = 1$. If b/d and a/d are not relatively prime, meaning that $gcd(b/d,\ a/d)\ \neq 1$, then $gcd(b,\ a)\ \neq d$, as there will always be some number $(gcd(b,\ a)\ > d)$ larger than d that would be the real gcd. This number will continue to become larger until it satisfies the condition that $gcd(b,\ a)\ = d,\ gcd(b/d,\ a/d)\ = 1$.
More formally,
By Bezout's Lemma, we know $as + bt = d \rightarrow (a/d)s + (b/d)t = 1$. We can rewrite the equation setting $a' = (a/d),\ b' = (b/d) \rightarrow a's + b't = 1$. By Theorem 1.7 (Corollary to Bezout's Lemma), we can see that $a',\ b'$ are both relatively prime.

b. We can apply similar logic to show that s and t are relatively prime.
By Bezout's Lemma, we know $as + bt = d \rightarrow (a/d)s + (b/d)t = 1$. We can rewrite the equation setting $s' = (a/d),\ t' = (b/d),\ a' = s,\ b' = t \rightarrow a's' + b't' = 1$. By Theorem 1.7 (Corollary to Bezout's Lemma), we can see that $a',\ b'$ are both relatively prime, meaning that both s and t are relatively prime.