9 assessment

10 since $a|b$ and every integer divides itself we have $a|(a+b)$ since $a+b$ is odd and not divisible by any even number it state that a is odd

14 e. $a = -2002$ $d = 87 \Rightarrow a = -2002 = -2088 + 86 = (-24) \cdot 87 + 86 =$ $(-24) d \cdot 87 + 86 = (-24) d + 86 \Rightarrow q = -24$; $r = 86$

18 b. $c = 11b \pmod{13} \Rightarrow 11 \cdot 9 \pmod{13} \Rightarrow 99 \pmod{13} \Rightarrow 8 \pmod{13}$

30 b. $a = 17 \pmod{29} \Rightarrow 17 - 29 \pmod{29} \Rightarrow -12 \pmod{29} \Rightarrow a = -12$

38 c. $(7^3 \bmod 23)^2 \bmod 31 \Rightarrow (343 \bmod 23)^2 \bmod 31$
$a = 343 = 322 + 21 = 14 \cdot 23 + 21 = 14d + 21 \Rightarrow 21^2 \bmod 31 \Rightarrow 441 \bmod 31$
$\Rightarrow 7$

44 $n = 2m \Rightarrow n^2 = 4m^2 \Rightarrow n^2 - 0 = 4m^2 \Rightarrow n^2 \equiv 0 \pmod 4$ 1st case
$n = 2m+1 \Rightarrow n^2 = 4m^2 + 4m + 1 \Rightarrow n^2 - 1 = 4m^2 + 4m \Rightarrow n^2 - 1 = 4m^2 + m \Rightarrow$
$n^2 - 1 = 4(m^2 + m) = n^2 \equiv 1 \pmod 4 \Rightarrow n^2 \equiv 0$ or $\bmod 4 \Rightarrow n^2 \equiv 0$ or $1 \pmod 4$