Name_____

Completing the Square

Date KEY Period____

1) $a^2 + 2a - 3 = 0$

$\cdot \frac{2}{2} = 1$

$\cdot 1^2 = 1$

$y = a^2 + 2a - 3$

$y = (a+1)^2 - 4$

2) $a^2 - 2a - 8 = 0$

$\cdot \frac{-2}{2} = -1$

$\cdot (-1)^2 = 1$

$y = a^2 - 2a - 8$

$y = a^2 - 2a + 1 - 1 - 8$

$y = (a-1)^2 - 9$

3) $p^2 + 16p - 22 = 0$

$\cdot \frac{16}{2} = 8$

$\cdot 8^2 = 64$

$y = p^2 + 16p - 22$

$y = (p+8)^2 - 86$

4) $k^2 + 8k + 12 = 0$

$\cdot \frac{8}{2} = 4$

$\cdot 4^2 = 16$

$y = k^2 + 8k + 12$

$y = k^2 + 8k + 16 - 16 + 12$

$y = (k+4)^2 - 4$

5) $r^2 + 2r - 33 = 0$

$\cdot \frac{2}{2} = 1$

$\cdot 1^2 = 1$

$y = r^2 + 2r - 33$

$y = r^2 + 2r + 1 - 1 - 33$

$y = (r+1)^2 - 34$

6) $a^2 - 2a - 48 = 0$

$\cdot \frac{-2}{2} = -1$

$\cdot (-1)^2 = 1$

$y = a^2 - 2a - 48$

$y = (a-1)^2 - 49$

7) $m^2 - 12m + 26 = 0$

$\cdot \frac{-12}{2} = -6$

$\cdot (-6)^2 = 36$

$y = m^2 - 12m + 26$

$y = m^2 - 12m + 36 - 36 + 26$

$y = (m-6)^2 - 10$

8) $x^2 + 12x + 20 = 0$

$\cdot \frac{12}{2} = 6$

$\cdot 6^2 = 36$

$y = x^2 + 12x + 20$

$y = (x+6)^2 - 16$

9) $k^2 - 8k - 48 = 0$

$\cdot \frac{-8}{2} = -4$

$\cdot (-4)^2 = 16$

$y = k^2 - 8k - 48$

$y = k^2 - 8k + 16 - 16 - 48$

$y = (k-4)^2 - 64$

10) $p^2 + 2p - 63 = 0$

$\cdot \frac{2}{2} = 1$

$\cdot 1^2 = 1$

$y = p^2 + 2p - 63$

$y = (p+1)^2 - 64$

11) $m^2 + 2m - 48 = -6$

$\cdot \frac{2}{2} = 1$

$\cdot 1^2 = 1$

$y = m^2 + 2m - 42$

$y = m^2 + 2m + 1 - 1 - 42$

$y = (m+1)^2 - 43$

12) $p^2 - 8p + 21 = 6$

$\cdot \frac{-8}{2} = -4$

$\cdot (-4)^2 = 16$

$y = p^2 - 8p + 15$

$y = p^2 - 8p + 16 - 16 + 15$

$y = (p-4)^2 - 1$

13) $m^2 + 10m + 14 = -7$

$y = m^2 + 10m + 21$ • $\frac{10}{2} = 5$ • $5^2 = 25$

$y = m^2 + 10m + 25 - 25 + 21$

$y = (m+5)^2 - 4$

14) $v^2 - 2v = 3$

$y = v^2 - 2v - 3$ • $\frac{-2}{2} = -1$ • $(-1)^2 = 1$

$y = v^2 - 2v + 1 - 1 - 3$

$y = (v-1)^2 - 4$

15) $5v^2 - 21 = 10v$

$y = 5v^2 - 10v - 21$ • $\frac{-2}{2} = -1$ • $(-1)^2 = 1$

$y = 5(v^2 - 2v) - 21$

$y = 5(v^2 - 2v + 1 - 1) - 21$

$y = 5(v-1)^2 - 26$

16) $4v^2 + 16v = 65$

$y = 4v^2 + 16v - 65$ • $4/2 = 2$ • $(2)^2 = 4$

$y = 4(v^2 + 4v) - 65$

$y = 4(v^2 + 4v + 4 - 4) - 65$

$y = 4(v+2)^2 - 81$

17) $7b^2 - 14b - 56 = 0$

$y = 7(b^2 - 2b) - 56$ • $\frac{-2}{2} = -1$ • $(-1)^2 = 1$

$y = 7(b^2 - 2b + 1 - 1) - 56$

$y = 7(b-1)^2 - 63$

18) $2n^2 + 12n + 10 = 0$

$y = 2(n^2 + 6n) + 10$ • $6/2 = 3$ • $(3)^2 = 9$

$y = 2(n^2 + 6n + 9 - 9) + 10$

$y = 2(n+3)^2 - 8$

19) $n^2 + 13n + 22 = 7$

$y = n^2 + 13n + 15$ • $13/2$ • $(13/2)^2 = \frac{169}{4}$

$y = n^2 + 13n + \frac{169}{4} - \frac{169}{4} + 15$

$y = (n + 13/2)^2 - \frac{109}{4}$

20) $5n^2 + 19n - 68 = -2$

$y = 5n^2 + 19n - 66$ • $\frac{19/5}{2} = \frac{19}{10}$ • $\left(\frac{19}{10}\right)^2 = \frac{361}{100}$

$y = 5(n^2 + 19/5n) - 66$

$y = 5(n^2 + 19/5n + \frac{361}{100} - \frac{361}{100}) - 66$

$y = 5(n + 19/10)^2 - \frac{8405}{100}$

21) $r^2 - 9r - 38 = -9$

$y = r^2 - 9r - 29$ • $(-9/2)^2 = \frac{81}{4}$

$y = r^2 - 9r + 81/4 - 81/4 - 29$

$y = (r - 9/2)^2 - 197/4$

22) $3x^2 + 20x + 36 = 4$

$y = 3x^2 + 20x + 32$ • $\frac{20/3}{2} = \frac{20}{6}$ • $\left(\frac{20}{6}\right)^2 = \frac{400}{36}$

$y = 3(x^2 + 20/3x) + 32$

$y = 3(x^2 + 20/3x + \frac{400}{36} - \frac{400}{36}) + 32$

$y = 3(x + 20/6)^2 - 48^2/36$

$y = 3(x + \frac{10}{3})^2 - \frac{4}{3}$

23) $x^2 + 7x - 45 = 7$

$y = x^2 + 7x - 52$ • $7/2$ • $(7/2)^2 = \frac{49}{4}$

$y = x^2 + 7x + 49/4 - 49/4 - 52$

$y = (x + 7/2)^2 - \frac{257}{4}$

24) $n^2 + 19n + 66 = 6$

$y = n^2 + 19n + 60$ • $\frac{19}{2}$

$y = n^2 + 19n + \frac{361}{4} - \frac{361}{4} + 60$ • $\left(\frac{19}{2}\right)^2 = \frac{361}{4}$

$y = (n + 19/2)^2 - \frac{121}{4}$