

12.6* 5, 9, 13, 17, 23, 25, 27, 29, 31, 35, 39 341

5) $(x+y)^6$

7th Row: 1 6 15 20 15 6 1

$$(x+y)^6 = 1x^6y^0 + 6x^5y^1 + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + 1x^0y^6$$

$$= x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$$

9) $(x-1)^5$

6th Row: 1 5 10 10 5 1

$$(x-1)^5 = 1x^5(-1)^0 + 5x^4(-1)^1 + 10x^3(-1)^2 + 10x^2(-1)^3 + 5x^1(-1)^4 + 1x^0(-1)^5$$

$$= x^5 - 5x^4 + 10x^3 - 10x^2 + 5x - 1$$

13) $(2x-3y)^3$

4th Row: 1 3 3 1

$$(2x-3y)^3 = 1(2x)^3(-3y)^0 + 3(2x)^2(-3y)^1 + 3(2x)^1(-3y)^2 + 1(2x)^0(-3y)^3$$

$$= 8x^3 - 36x^2y + 54xy^2 - 27y^3$$

17) $\binom{6}{4} = \frac{6!}{4!(6-4)!} = \frac{6 \cdot 5}{2!} = \frac{30}{2} = 15$

23) $\binom{5}{0} + \binom{5}{1} + \binom{5}{2} + \binom{5}{3} + \binom{5}{4} + \binom{5}{5}$

$$= 1 + \frac{5!}{1!(5-1)!} + \frac{5!}{2!(5-2)!} + \frac{5!}{3!(5-3)!} + \frac{5!}{4!(5-4)!} + 1$$

$$= 1 + 5 + 10 + 10 + 5 + 1$$

$$= 32$$

25) $(x+2y)^4 = \binom{4}{0}(x)^4(2y)^0 + \binom{4}{1}(x)^3(2y)^1 + \binom{4}{2}(x)^2(2y)^2 + \binom{4}{3}(x)(2y)^3 + \binom{4}{4}(x)^0(2y)^4$

$$= x^4 + 8x^3y + 24x^2y^2 + 32xy^3 + 16y^4$$

27) $(1+\frac{1}{x})^6$

$$= (1+x^{-1})^6$$

$$= \binom{6}{0}(1)^6(x^{-1})^0 + \binom{6}{1}(1)^5(x^{-1})^1 + \binom{6}{2}(1)^4(x^{-1})^2 + \binom{6}{3}(1)^3(x^{-1})^3 + \binom{6}{4}(1)^2(x^{-1})^4 + \binom{6}{5}(1)^1(x^{-1})^5 + \binom{6}{6}(1)^0(x^{-1})^6$$

$$= 1 + 6x^{-1} + 15x^{-2} + 20x^{-3} + 15x^{-4} + 6x^{-5} + x^{-6} = 1 + \frac{6}{x} + \frac{15}{x^2} + \frac{20}{x^3} + \frac{15}{x^4} + \frac{6}{x^5} + \frac{1}{x^6}$$

29) $(x+2y)^{20}$

1st Term: $\binom{20}{0}(x)^{20}(2y)^0 = x^{20}$

2nd Term: $\binom{20}{1}(x)^{19}(2y)^1 = 40x^{19}y$

3rd Term: $\binom{20}{2}(x)^{18}(2y)^2 = 760x^{18}y^2$

31) $(a^{2/3} + a^{1/3})^{25}$

24th Term: $\binom{25}{24}(a^{2/3})^1(a^{1/3})^{24} = 25a^{2/3}a^{24/3} = 25a^{26/3}$

25th Term: $\binom{25}{25}(a^{2/3})^0(a^{1/3})^{25} = a^{25/3}$

14, 18, 25, 35, 45, 55, 65, 75, 85, 95, 105, 115, 125, 135, 145, 155, 165, 175, 185, 195, 205, 215, 225, 235, 245, 255, 265, 275, 285, 295, 305, 315, 325, 335, 345, 355, 365, 375, 385, 395, 405, 415, 425, 435, 445, 455, 465, 475, 485, 495, 505, 515, 525, 535, 545, 555, 565, 575, 585, 595, 605, 615, 625, 635, 645, 655, 665, 675, 685, 695, 705, 715, 725, 735, 745, 755, 765, 775, 785, 795, 805, 815, 825, 835, 845, 855, 865, 875, 885, 895, 905, 915, 925, 935, 945, 955, 965, 975, 985, 995

$$35) (a+b)^{25}$$

$$24^{\text{th}} \text{ Term} \cdot \binom{25}{23} (a)^2 (b)^3 = 300 a^2 b^3$$

$$39) (x+2y)^{10}$$

$$n=10$$

$$r=4$$

$$a=x$$

$$b=2y$$

$$\binom{10}{4} x^4 (2y)^6$$

$$= 13440 x^4 y^6$$

$$41) (a+b^2)^{12}$$

$$n=12$$

$$r=4$$

$$\binom{12}{4} a^8 (b^2)^4$$

$$495 a^8 b^8$$