Algebra

$f(a) = (57x^3 + 29x^2 + 17x + 42) \div (x + a)$

$x + a = 0 \quad x = -a$

$57(-a)^3 + 29(-a)^2 + 17(-a) + 42 = R$ — remainder theorem

$x - a = a \;\&\; x = a \quad (ax + b) = 0 \quad x = -b/a$

absolutely, completely, exactly divided means $\boxed{R = 0}$

Q1.) $4x^3 + 13x^2 - 5x + 1 \div x + 4$. find remainder

$x + 4 = 0 \quad x = -4$

$4(-4)^3 + 13(-4)^2 - 5(-4) + 1$

$101 = R$

2.) $5x^3 - 3x^2 + cx + 2 \div x + 3$ find the value of c if the remainder is 5

$x = -3$

$5(-3)^3 - 3(9) + c(-3) + 2 = 5$

$-165 = 3c$

$c = -55$

3.) $(x^{529} - 1) \div (x - 1)$. find remainder

$x = 1$

$1 - 1 = 0$

4.) $(3x^3 + bx^2 + 4a) \div (x^2 - 4)$ leaves out remainder $12x$.
find the value of a in expression

$12x + 24 + 4a = 12x$

$4a = -24$

$a = -6$

5.) $x^{1001} + 5x^{999}$
find value
$-1 + 5(-1)$
$a =$

6.) if $5^x - 5^{x-1}$

7.) Express
Take
$\frac{2(}{3}$

8.)

5.) $x^{1001} + 5x^{999} + a$ is completely divisible by $(x+1)$.
find value of 'a'.

$-1 + 5(-1) + a = 0$

$a = 6$

6.) if $5^x - 5^{x-1} = 500$. find value of x^x

$5^{x-1}(5-1) = 500$

$5^{x-1} = \frac{500}{4} = 5^3$

$x - 1 = 3$

$x = 4$

$x^x = 4^4 = 256$

See Assume a value that Denominator is not zero

7.) Express the following in rational $\frac{2(x+7)}{3(x-2)} - \frac{2(x+1)}{3(x-3)}$

Take $x = 0$

$\frac{2(7)}{3(-2)} - \frac{2(1)}{3(-3)} = \frac{-14+7}{9} = \frac{-7}{9}$

assume same $x=0$ in all those option

option d

$\frac{2(-7)}{3(-3)(-2)} = \frac{-7}{9}$ ✓

8.) $\frac{a+1}{a-1} + \frac{a-1}{a+1}$ is same as

$a-1$, $a=1$

$\frac{1}{-1} + \frac{-1}{1} = -2$ iv.) $\frac{2(1)}{-1} = -2$

9.) find the sum of $\frac{3x^2+4y}{x-4}$ and its reciprocal if $x+y=1$, $x=1$

$$\frac{3+0}{1-4} + \frac{1-4}{3+0} = -2$$

10.) if $x+5y+3=0$; find the value of $x^3+5y^3+12xy+17$

(assume $y=0$

$x=-3$

x^3+27

$(-3)^3+27=0$

11.) if $a+b+c=25$ and $a^2+b^2+c^2=225$. find $4a^2b^2+((a-b)$

$a+b+c=25$

$a^2+b^2+c^2=225$

$a+b=15$ $\quad c=0$

$a^2+b^2=225$ $\quad 4a^2b^2$

$(a+b)^2=a^2+b^2+2ab=625$

$225+2ab=625$

$2ab=400$

$4a^2b^2=(400)^2=160000$

12.) $x = (a+2/a)$; $y = (2a - 2/a)$. find $\frac{(x^2-y^2)(y^2+3)}{x^2-6}$

$x = a + \frac{2}{a}$, $y = 2a - \frac{2}{a}$

$x = 1 + \frac{2}{1} = 3$ $\quad y = 2 - 1 = 1$

$\frac{(a^2-y^2)(y^2+3)}{x^2+6} = \frac{[(3)^2 - 1][1+3]}{9-6} = 9$ //

13.) $x+1/x = a \rightarrow x^2+1/x^2 = ?$

$\left(x + \frac{1}{x}\right)^2 = a^2 \Rightarrow x^2 + \frac{1}{x^2} + 2\frac{x}{x} = a^2 \Rightarrow x^2 + \frac{1}{x^2} = a^2 - 2$

$x + \frac{1}{x} = 7 \Rightarrow 49 - 2 = 47$ //

14.) $x^2+1/x^2 = a \rightarrow x+1/x$ Is square it

$\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2 \Rightarrow x + \frac{1}{x} = \sqrt{a+2}$ //

$x^2 + \frac{1}{x^2} = 62$; $x + \frac{1}{x} = \sqrt{62+2} = 8$ //

for $x^2+1/x^2 = a \Rightarrow x-1/x = \sqrt{a-2}$ //

15.) $x^8 + \frac{1}{x^8}$; if $x+1/x = \sqrt{6}$

$x + \frac{1}{x} = \sqrt{6} \Rightarrow x^2 + \frac{1}{x^2} = 6 - 2 = 4 \Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = 16 \Rightarrow x^4 + \frac{1}{x^4} = 16 - 2 = 14$

$\left(x^4 + \frac{1}{x^4}\right)^2 = 196$ $\quad x^8 + \frac{1}{x^8} = 194$ //

14.) $x+1/x = 7$ find $\sqrt{x}+1/\sqrt{x}$

$\sqrt{x}=a$; $x=a^2$

$a^2+\frac{1}{a^2}=7$; $a+\frac{1}{a}=?$

$\left(a+\frac{1}{a}\right)^2 = 7+2$

$a+\frac{1}{a} = \sqrt{9} = 3$

$\sqrt{x}+\frac{1}{\sqrt{x}} = 3$ //

$x^2+1/x^2=23$ find $\sqrt{x}+1/\sqrt{x}$

$\sqrt{x}=a$, $x^2=a^4$

$a^4+\frac{1}{a^4}=23$, $a+\frac{1}{a}=?$

$\left(a^2+\frac{1}{a^2}\right)^2 = a^4+\frac{1}{a^4}+2$

$23+2=25$

$a^2+\frac{1}{a^2}=5$ — ①

$\left(a+\frac{1}{a}\right)^2 = 5+2=7$ $a+\frac{1}{a}=\sqrt{7}$ //

15.) if $x-1/x=5$ find x^2+1/x^2

$\left(x-\frac{1}{x}\right)^2 = 25 = x^2+\frac{1}{x^2}+2$

$x^2+\frac{1}{x^2} = 23$ //

if $x-1/x=3$; find $x^4+\frac{1}{x^4}$ ①

$x-\frac{1}{x}=3 \Rightarrow x^2+\frac{1}{x^2} = 9+2=11$

$\left(x^2+\frac{1}{x^2}\right)^2 = a^4+\frac{1}{x^4}+2$

$121-2 = x^4+\frac{1}{x^4}$

(-) fine

119

16.)

$x+\frac{1}{x}$, $x^3+\frac{1}{x^3}$

$\left(x+\frac{1}{x}\right)^3 = a^3 = x^3+\frac{1}{x^3}+3x\frac{1}{x}\left(x+\frac{1}{x}\right)$

$x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)$

$\left[x^3+\frac{1}{x^3}\right.$

if $x+1/x$

a.) if

b.) if

18.)

$\boxed{x^3 + \frac{1}{x^3} = a^3 - 3a}$ — $\left(x+\frac{1}{x}\right)^3 - 3\left(x+\frac{1}{x}\right)$

if $x + 1/x = 3\sqrt{2}$ find $x^3 + 1/x^3$

$(3\sqrt{2})^3 - 3(3\sqrt{2})$

$45\sqrt{2}$

if value diff = 1 change the sign

a.) if $x = 5+2\sqrt{6}$ find $1/x$

$x = 5+2\sqrt{6}$; $\frac{1}{x} = \frac{1}{5+2\sqrt{6}}$

$\frac{1}{5+2\sqrt{6}} \times \frac{5-2\sqrt{6}}{5-2\sqrt{6}} = \frac{5-2\sqrt{6}}{1}$ $x = 5+2\sqrt{6}$ $\frac{1}{x} = 5-2\sqrt{6}$

only if diff = 1

b.) if $x^{133} = 4+\sqrt{15}$ find $1/x^{133}$

$y = 4+\sqrt{15}$, $\frac{1}{y}$ $4^2 - \sqrt{15}^2 = 1$

$\frac{1}{y} = 4-\sqrt{15}$

18.) if $x = 5+2\sqrt{6}$, find $x+1/x$

$\frac{1}{x} = 5-2\sqrt{6}$

$x + 1/x = 10$

b) if $x = 5+2\sqrt{6}$ find $x - 1/x$

$$\frac{1}{x} = 5-2\sqrt{6}$$

$$x - \frac{1}{x} = 4\sqrt{6} \quad \text{2 (smaller term)}$$

19.) if $x = 13+3\sqrt{2}$ find $1/x$

$$\frac{1}{x} = \frac{1}{13+3\sqrt{2}} \times \frac{13-3\sqrt{2}}{13-3\sqrt{2}}$$

$$\frac{13-3\sqrt{2}}{151} \quad \therefore \quad \frac{1}{x} = \frac{13-3\sqrt{2}}{13^2-(3\sqrt{2})^2}$$

b.) if $x^{45} = 12+3\sqrt{7}$ find $1/x^{45}$

$$144-63 \neq 1$$

$$\frac{1}{y} = \frac{12-3\sqrt{7}}{144-63} \quad \therefore = \frac{12-3\sqrt{7}}{81}$$