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Exponents. Ex-1. level 1

2) i) $\left(\frac{5}{9}\right)^2 = \frac{9^2}{9^2} = \frac{25}{81}$

ii) $\left(\frac{4}{7}\right)^3 = \frac{4^3}{7^3} = \frac{64}{343}$

iii) $\left(\frac{-2}{3}\right)^7 = \frac{(-2)^7}{(3)^7}$

$= \frac{-128}{2187}$

iv) $\left(\frac{-5}{2}\right)^3 = \frac{(-5)^3}{(2)^3} = \frac{-125}{8}$

v) $\left(\frac{-1}{2}\right)^8 = \frac{(-1)^8}{2^8} = \frac{1}{256}$

3) i) $\frac{9}{64} = \left(\frac{3}{8}\right)^2$

ii) $\frac{49}{25} = \left(\frac{7}{5}\right)^2$

iii) $\frac{-8}{27} = \left(\frac{-2}{3}\right)^3$

iv) $\frac{-1}{216} = \left(\frac{-1}{6}\right)^3$

v) $\frac{-32}{243} = \left(\frac{-2}{3}\right)^5$

=

vi) $\frac{81}{625} = \left(\frac{3}{5}\right)^4$

4) i) $\left(\frac{1}{3}\right)^3 \times \left(\frac{3}{2}\right)^2$

$\frac{1}{3} \times \frac{1}{\cancel{3}} \times \frac{1}{\cancel{3}} \times \frac{\cancel{3}}{2} \times \frac{\cancel{3}}{2}$

$\frac{1}{12}$

v) $\left(\frac{-1}{3}\right)^5 \div \left(\frac{2}{3}\right)^2 = \left(\frac{-1}{3}\right)^2 \times \left(\frac{3}{2}\right)^2$

$\frac{-1}{3} \times \frac{-1}{3} \times -\frac{1}{3} \times \frac{-1}{\cancel{3}} \times \frac{-1}{\cancel{3}} \times \frac{\cancel{3}}{2} \times \frac{\cancel{3}}{2}$

$\frac{-1}{108}$

vi) $\left(\frac{-1}{5}\right)^3 \times (-1)^{85} \times \left(\frac{2}{5}\right)^2$

$\frac{1}{125} \times (-1) \times \frac{2}{5} \times \frac{2}{5}$

$\frac{4}{3125}$

vii) $\left(\frac{1}{2}\right)^4 \div \left(\frac{1}{3}\right)^4 + \left(\frac{-1}{2}\right)^3$

$\left(\frac{1}{2}\right)^4 \times \left(\frac{3}{1}\right)^4 + \left(\frac{-1}{2}\right)^3$

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times 3 \times 3 \times 3 + \left(\frac{-1}{8}\right)$

$\frac{27}{16} - \frac{1}{8} = \frac{27-2}{16}$

$= \frac{25}{16}$

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viii) $\left[\left(\frac{-3}{5}\right)^3 + \frac{7}{25}\right] \times \left(\frac{5}{2}\right)^3$

$\left[\frac{-27}{125} + \frac{7}{25}\right] \times \frac{125}{8}$

$\left(\frac{-27+35}{\cancel{125}}\right) \times \frac{\cancel{125}}{8}$

$8 \times \frac{1}{8}$

$= 1$

ix) $(12^2 - 5^3) \times \frac{(-1)^{40}}{19}$

$(144 - 125) \times \frac{1}{9}$

$19 \times \frac{1}{19} = 1$

Q7) $b^2 - 9(b-1)^2$
if $b = 1.1$

$(1.1)^2 - 9(1.1-1)^2$

$1.21 - 9(0.1)^2$

$1.21 - 9(0.01)$

$1.21 - 0.09$

1.12

8) 1) $5^{-1} = \frac{1}{5}$

2) $\left(\frac{1}{2}\right)^{-6} = (2)^6 = 64$

3) $\left(\frac{3}{4}\right)^{-4} = \left(\frac{4}{3}\right)^4 = \frac{256}{81}$

4) $\left(\frac{-4}{5}\right)^{-2} = \left(\frac{5}{-4}\right)^2 = \left(\frac{5}{4}\right)^2$

$= \frac{25}{16}$

5) $(-x)^{-1} = \frac{1}{(-x)} = \frac{-1}{x}$

9) i) $\left(\frac{4}{9}\right)^{-3} \times \left(\frac{4}{9}\right)^{11} \times \left(\frac{4}{9}\right)^{-10}$

$\left(\frac{9}{4}\right)^{3} \times \left(\frac{4}{9}\right)^{11} \times \left(\frac{9}{4}\right)^{10}$

$\frac{9^{3^2} \times \cancel{4^{11}} \times \cancel{9^{10}}}{4^{3^2} \times \cancel{9^{11}} \times \cancel{4^{10}}}$

$\frac{9^2}{4^2} = \frac{81}{16}$

9) ii) $\left(\frac{-7}{11}\right)^{-6} \div \left(\frac{-7}{11}\right)^{-2}$

$\left(\frac{11}{7}\right)^{6} \div \left(\frac{11}{7}\right)^{2}$

$\left(\frac{11}{7}\right)^{6} \times \left(\frac{7}{11}\right)^{2}$

$\frac{11^{6-4}}{7^{6-4}} \times \frac{\cancel{7^2}}{\cancel{11^2}}$

$\frac{11^4}{7^4} = \left(\frac{11}{7}\right)^4$

[illegible]

iii) $\left(\frac{-8}{3}\right)^{7} \div \left(\frac{-8}{3}\right)^{4}$

$\left(\frac{-8}{3}\right)^{7} \times \left(\frac{-3}{8}\right)^{4}$

$\frac{(-8)^{\cancel{7}3}}{3^{\cancel{7}3}} \times \frac{\cancel{3^4}}{\cancel{8^4}}$

$\frac{(-8)^3}{3^3} = \frac{-512}{27}$

iv) $\left[\left(\frac{9}{11}\right)^{-3} \times \left(\frac{9}{11}\right)^{-3}\right] \div \left(\frac{9}{11}\right)^{-3}$

$\left(\frac{9}{11}\right)^{-6} \times \left(\frac{9}{11}\right)^{3}$

$\left(\frac{9}{11}\right)^{-3}$

$\left(\frac{11}{9}\right)^{3}$

v) $\left[\left(\frac{3}{5}\right)^{-2}\right]^{-4}$

$\left[\left(\frac{5}{3}\right)^{2}\right]^{-4}$

$\left(\frac{5}{3}\right)^{-8}$

$\left(\frac{3}{5}\right)^{8}$

vi) $\left[\left\{\left(\frac{-2}{3}\right)^{-3}\right\}^{-4}\right]^{-2}$

$\left(\frac{-2}{3}\right)^{-3\times(-4)\times(-2)}$

$\left(\frac{-2}{3}\right)^{-24}$

$\left(\frac{-3}{2}\right)^{24}$

10) $\left(\frac{-3}{4}\right)^{-2} \times \left(\frac{-6}{5}\right)^{-2}$

$\left(\frac{-3}{4} \times \left(\frac{-6}{5}\right)\right)^{-2}$

$\left(\frac{18}{20}\right)^{-20} = \left(\frac{20}{18}\right)^{20}$

$= \left(\frac{10}{9}\right)^{20}$

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10 ii) $\left(\frac{11}{7}\right)^{-4} \times \left(\frac{7}{44}\right)^{-4}$

$= \left(\frac{7}{11}\right)^{4} \times \left(\frac{44}{7}\right)^{4}$

$\left(\frac{\cancel{7} \times \overset{4}{\cancel{44}}}{\cancel{11} \times \cancel{7}}\right)^{4}$

$(4)^{4} = 256$

10) iii) $(-16)^{-3} \times \left(\frac{1}{20}\right)^{-3}$

$= (-16)^{-3} \times (20)^{3}$

$= \left(\frac{20}{-16}\right)^{3}$

$= \left(\frac{5}{-4}\right)^{3}$

$= \frac{-125}{64}$

11) i) $(3^{-1} \div 4^{-1})^{2}$

$\left(\frac{1}{3} \div \frac{1}{4}\right)^{2}$

$\left(\frac{1}{3} \times \frac{4}{1}\right)^{2} = \frac{16}{9}$

11) ii) $(4^{-1} + 8^{-1}) \div \left(\frac{2}{3}\right)^{-1}$

$\left(\frac{1}{4} + \frac{1}{8}\right) \div \frac{3}{2}$

$\left(\frac{2+1}{8}\right) \times \frac{2}{3}$

$\frac{3}{8} \times \frac{2}{3} = \frac{1}{4}$

11) iii) $\left(\frac{2}{3}\right)^{-2} \times \left(\frac{3}{4}\right)^{-1} \times \left(\frac{-7}{8}\right)^{0}$

$\left(\frac{3}{2}\right)^{2} \times \left(\frac{4}{3}\right)^{1} \times 1$

$\frac{3 \times \cancel{3}}{\cancel{2} \times \cancel{2}} \times \frac{\cancel{4}}{\cancel{3}}$

$= 3$

11) iv) $\left(\frac{-1}{4}\right)^{-3} \div \left(\frac{3}{8}\right)^{-3}$

$(-4)^{3} \div \left(\frac{8}{3}\right)^{3}$

$(-4)^{3} \times \frac{3 \times 3 \times 3}{8 \times 8 \times 8}$

$\overset{-1}{\cancel{(-4)}} \times \overset{-1}{\cancel{(-4)}} \times \overset{-1}{\cancel{(-4)}} \times \frac{3 \times 3 \times 3}{\underset{2}{\cancel{8}} \times \underset{2}{\cancel{8}} \times \underset{2}{\cancel{8}}}$

$\frac{-27}{8}$

12) i) $\left(\frac{7}{4}\right)^{-3} \times \left(\frac{7}{4}\right)^{-5} = \left(\frac{7}{4}\right)^{x-2}$

$\left(\frac{7}{4}\right)^{-3-5} = \left(\frac{7}{4}\right)^{x-2}$

$-3-5 = x-2$

$-8+2 = x$

$\boxed{x = -6}$

12) ii) $\left(\frac{125}{8}\right)\left(\frac{125}{8}\right)^{x} = \left(\frac{5}{2}\right)^{18}$

$\left(\frac{125}{8}\right)^{x+1} = \left(\frac{5}{2}\right)^{18}$

$\left[\left(\frac{5}{2}\right)^{3}\right]^{x+1} = \left(\frac{5}{2}\right)^{18}$

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$$\left(\frac{5}{2}\right)^{3x+1} = \left(\frac{5}{2}\right)^{18}$$

$$3x+1 = 18$$

$$3x = 17$$

$$x = \frac{17}{3}$$

12) iii)
$$\left(\frac{35}{11}\right)^4 \times \left(\frac{11}{7}\right)^4 = 5^x$$

$$\left(\frac{\overset{5}{\cancel{35}}}{\cancel{11}} \times \frac{\cancel{11}}{\underset{1}{\cancel{7}}}\right)^4 = 5^x$$

$$(5)^4 = 5^x$$

$$\boxed{x = 4}$$

12) iv)
$$\left(\left(\frac{-3}{7}\right)^4 \times \left(\frac{-3}{7}\right)^8\right)^{-5} = \left(\left(\frac{-3}{7}\right) \times \left(\frac{-3}{7}\right)^5\right)^x$$

$$\left(\left(\frac{-3}{7}\right)^{12}\right)^{-5} = \left(\left(\frac{-3}{7}\right)^6\right)^x$$

$$\left(\frac{-3}{7}\right)^{-60} = \left(\frac{-3}{7}\right)^{6x}$$

$$6x = -60$$

$$\boxed{x = -10}$$

13)
$$x = \left[\left(\frac{2}{3}\right)^2\right]^3 \times \left(\frac{1}{3}\right)^{-2} \times 3^{-1} \times \frac{1}{6}$$

$$x = \left(\frac{2}{3}\right)^6 \times (3)^{\overset{1}{\cancel{2}}} \times \frac{1}{\cancel{3}} \times \frac{1}{\underset{2}{\cancel{6}}}$$

$$x = \frac{2^6}{3^6} \times \frac{1}{2} = \frac{2^5}{3^6}$$

~~Recipro~~
$$\frac{1}{x} = \frac{3^6}{2^5} = \frac{729}{32}$$

14)
$$\left(\frac{-3}{7}\right)^{-3} \div \left(\frac{-3}{7}\right)^{-4}$$

$$\left(\frac{-3}{7}\right)^{-3} \times \left(\frac{-7}{3}\right)^{-4}$$

$$\left(\frac{-7}{3}\right)^3 \times \left(\frac{-3}{7}\right)^4$$

$$\frac{\cancel{(-7)} \times \cancel{(-7)} \times \cancel{(-7)}}{\cancel{3} \times \cancel{3} \times \cancel{3}} \times \frac{\cancel{(-3)} \times \cancel{(-3)} \times \cancel{(-3)} \times (-3)}{\cancel{7} \times \cancel{7} \times \cancel{7} \times 7}$$

1 1

$$= -3$$

Reciprocal $= -\frac{1}{3}$

~~level 8~~

15)
$$\left(\frac{-3}{2}\right)^{-3} \times x = \left(\frac{9}{8}\right)^{-2}$$

$$\left(\frac{-2}{3}\right)^3 \times x = \left(\frac{8}{9}\right)^2$$

$$x = \frac{8 \times \cancel{8}}{\cancel{9} \times \cancel{9}} \times \frac{\cancel{3} \times \cancel{3} \times \cancel{3}}{\cancel{(-2)} \times \cancel{(-2)} \times \cancel{(-2)}}$$

$$\boxed{x = \frac{8}{-3}}$$

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16)

$$\frac{\left(\frac{5}{4}\right)^{-2}}{x} = \left(\frac{1}{2}\right)^{-3}$$

$$\frac{\left(\frac{5}{4}\right)^{-2}}{\left(\frac{1}{2}\right)^{-3}} = x$$

$$x = \left(\frac{1}{2}\right)^{3} \times \left(\frac{4}{5}\right)^{2}$$

$$= \frac{1}{\cancel{2\times2\times2}} \times \frac{\cancel{4}\times4^{2}}{5\times5}$$

$$\boxed{x = \frac{2}{25}}$$

17)

$$\left[\left\{\left(\frac{-2}{5}\right)^{-7}\times\left(\frac{-2}{5}\right)^{9}\right\}\div\left(\frac{-2}{5}\right)^{2}\right]$$

$$\left[\left\{\left(\frac{-5}{2}\right)^{7}\times\left(\frac{-2}{5}\right)^{9}\right\}\times\left(\frac{-5}{2}\right)^{2}\right]$$

$$\left[\frac{(-5)^{7}}{2^{7}}\times\frac{(-2)^{9}}{(5)^{9}}\times\frac{(-5)^{2}}{(2)^{2}}\right]$$

$$= \frac{-\cancel{(5)^{7}}}{\cancel{2^{7}}}\times\frac{-\cancel{(2)^{9}}}{\cancel{5^{9}}_{2}}\times\frac{\cancel{5^{2}}}{\cancel{2^{2}}}$$

$$= (-1)\times(-1)$$

$$= 1$$

$$= 5^{0}$$

18)

$$\left[\left(\frac{-1}{3}\right)^{8}\div\left(\frac{-1}{3}\right)^{5}\right]-\left[\left(\frac{-1}{3}\right)^{5}\div\left(\frac{-1}{3}\right)^{3}\right]$$

$$\left[\left(\frac{1}{3}\right)^{8}\times(-3)^{5}\right]-\left[\left(\frac{-1}{3}\right)^{5}\times(-3)^{3}\right]$$

$$\left[\frac{1}{3^{\cancel{8}\,3}}\times\overset{-1}{\cancel{(-3)^{5}}}\right]-\left[\frac{-1}{3^{\cancel{5}\,2}}\times-\cancel{(3)^{3}}\right]$$

$$\left(\frac{-1}{3^{3}}\right)-\left(\frac{1}{3^{2}}\right)$$

$$-\left[\frac{1}{27}+\frac{1}{9}\right]$$

$$-\left[\frac{1+3}{27}\right] = \frac{-4}{27}$$

19)

$$\left(2^{-1}\div5^{-1}\right)^{2}\times\left(\frac{-5}{8}\right)^{-2}$$

$$\left(\frac{1}{2}\div\frac{1}{5}\right)^{2}\times\left(\frac{-8}{5}\right)^{2}$$

$$\left(\frac{1}{2}\times\frac{5}{1}\right)^{2}\times\left(\frac{-8}{5}\right)^{2}$$

$$\frac{\cancel{5^{2}}}{2^{2}}\times\frac{8^{2}}{\cancel{5^{2}}} = \frac{2^{6}}{2^{2}}$$

$$= 2^{4}$$

$$= 16$$

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20) $\left[\left\{\left(\frac{1}{3}\right)^{-3} - \left(\frac{1}{2}\right)^{-3}\right\} \div \left(\frac{1}{4}\right)^{-3}\right]$

$\left[\left\{(3)^3 - 2^3\right\} \div (4)^3\right]$

$\left[(27-8) \times \frac{1}{4^3}\right]$

$\left[\frac{19}{64}\right]$ //

21) $x = \left(\frac{5}{8}\right)^{-2} \times \left(\frac{12}{15}\right)^{-2}$

$= \left(\frac{8}{5}\right)^2 \times \left(\frac{15}{12}\right)^2$

$= \frac{8^2}{5^2} \times \frac{(15)^2}{(12)^2}$

$= \frac{\cancel{64}}{\cancel{25}} \times \frac{\cancel{225}}{\cancel{144}}$

$x = 4$

$x^{-3} = (4)^{-3} = \frac{1}{4^3} = \frac{1}{64}$

Ex-2, Level-1

1) $5^0 \times 6^0 \times 7^0 = 1 \times 1 \times 1 = 1$

2) $\left[\frac{7}{5}\right]^{-4} = \left(\frac{5}{7}\right)^4$ //

3) $(64)^{\frac{2}{3}} \times (64)^{\frac{1}{3}} \times (64)^{\frac{-5}{3}}$

$\left[(4)^3\right]^{\frac{2}{3}} \times (4^3)^{\frac{1}{3}} \times (4^3)^{\frac{-5}{3}}$

$(4)^2 \times 4 \times 4^{-5} = 4^{3-5} = 4^{-2}$

$= \frac{1}{16}$

4) $\frac{x}{y} = \left(\frac{3}{5}\right)^{-3} \div \left(\frac{9}{10}\right)^0$

$= \left(\frac{3}{5}\right)^{-3} \div 1$

$= \left(\frac{5}{3}\right)^3$

$\frac{x}{y} = \left(\frac{5}{3}\right)^3$

$\left(\frac{x}{y}\right)^{\frac{1}{3}} = \left[\left(\frac{5}{3}\right)^3\right]^{\frac{1}{3}}$

$= \left(\frac{5}{3}\right)$ //

5) $(6^{-1} - 8^{-1}) + (2^{-1} - 3^{-1})$

$\left(\frac{1}{6} - \frac{1}{8}\right) + \left(\frac{1}{2} - \frac{1}{3}\right)$

$\left(\frac{4-3}{24}\right) + \left(\frac{3-2}{6}\right)$

$\frac{1}{24} + \frac{1}{6} = \frac{1+4}{24}$

$= \frac{5}{24}$

6) $\left(\frac{3}{4}\right)^{-2} \div \left(\frac{2}{9}\right)^3$

$\left(\frac{4}{3}\right)^2 \times \left(\frac{9}{2}\right)^3$

$\frac{{}^{2}\cancel{4} \times \cancel{4}}{\cancel{3} \times \cancel{3}} \times \frac{\cancel{9} \times 9 \times 9}{8 \times 8 \times 8}$

$2 \times 9 \times 9 = (9)^2 \times (\sqrt{2})^2$

$= (9\sqrt{2})^2$

7) $\left(\frac{-2}{3}\right)^4 \div \left(\frac{3}{2}\right)^{-3} = \left(\frac{2}{3}\right)^4 \times \left(\frac{2}{3}\right)^{-3}$

$= \left(\frac{2}{3}\right)^4 \times \left(\frac{3}{2}\right)^3$

$= \frac{2^{\cancel{4}}}{3^{\cancel{4}}} \times \frac{\cancel{3^3}}{\cancel{2^3}} = \frac{2}{3}$

$= -2\left(\frac{-1}{3}\right)$ //

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15)
$$\frac{(81)^{9/2} \times (81)^{5/2}}{(81)^{3/2}}$$

$$\frac{(81)^{\frac{9}{2}+\frac{5}{2}}}{(81)^{3/2}} = \frac{(81)^7}{(81)^{3/2}}$$

$$= (81)^{7-\frac{3}{2}}$$

$$= (81)^{\frac{11}{2}}$$

$$= \left[(81)^{\frac{1}{2}}\right]^{11}$$

$$= (9)^{11}$$

16)
$$\left(21^2 - 15^2\right)^{\frac{4}{3}}$$

$$\left[(21-15)(21+15)\right]^{\frac{4}{3}} = \left[6 \times 36\right]^{\frac{4}{3}}$$

$$= \left[6^3\right]^{\frac{4}{3}}$$

$$= 6^4 = 1296$$

$=$ [illegible]

17)
$$\left(61^2 - 11^2\right)^{\frac{3}{2}} = \left[(61-11)(61+11)\right]^{\frac{3}{2}}$$

$$= \left(50 \times (72)\right]^{\frac{3}{2}}$$

$$= \left(5 \times 5 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3\right)^{\frac{3}{2}}$$

$$= \left(5^2 \times 2^4 \times 3^2\right)^{\frac{3}{2}}$$

$$= 5^{2 \times \frac{3}{2}} \times 2^{4 \times \frac{3}{2}} \times 3^{2 \times \frac{3}{2}}$$

$$= 5^3 \times 2^6 \times 3^3$$

$$= 216000$$

level 2)

1) $\left(21^2 - 15^2\right)^0 = 1$

2)
$$\left[\frac{169^{-3}}{(196)^{-8}}\right]^{\frac{1}{48}}$$

$$\left[\frac{(196)^8}{(169)^3}\right]^{\frac{1}{48}}$$

$$= \frac{(196)^{8 \times \frac{1}{48}}}{(169)^{3 \times \frac{1}{48}}}$$

$$= \frac{(196)^{\frac{1}{6}}}{(169)^{\frac{1}{16}}}$$

$$= \frac{(14)^{2 \times \frac{1}{6}}}{(13)^{2 \times \frac{1}{16}}}$$

$$= \frac{(14)^{\frac{1}{3}}}{(13)^{\frac{1}{8}}}$$

3)
$$x = \left(8^{\frac{2}{3}} \times 32^{\frac{-2}{5}}\right)$$

$$= \left(2^3\right)^{\frac{2}{3}} \times \left(2^5\right)^{\frac{-2}{5}}$$

$$= 2^2 \times 2^{-2}$$

$$= 2^0$$

$$\boxed{x = 1}$$

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8) $5\sqrt{5} \times 5^3 \div 5^{-3/2} = 5^{a+2}$

$$\frac{5^1 \times 5^{\frac{1}{2}} \times 5^3}{5^{-3/2}} = 5^{a+2}$$

$$\frac{5^{1+\frac{1}{2}+3}}{5^{-3/2}} = 5^{a+2}$$

$$5^{\frac{9}{2}} \times 5^{\frac{3}{2}} = 5^{a+2}$$

$$5^{\frac{9}{2}+\frac{3}{2}} = 5^{a+2}$$

$$5^6 = 5^{a+2}$$

$$a+2 = 6$$

$$\boxed{a=4}$$

9) $\left[3^{-1} \div 4^{-1}\right] \times \frac{3}{4} = \left(\frac{1}{3} \div \frac{1}{4}\right) \times \frac{3}{4}$

$$= \left(\frac{1}{\cancel{3}} \times \frac{\cancel{4}}{1}\right) \times \frac{\cancel{3}}{\cancel{4}}$$

$$= 1$$

10) $\left[\frac{3}{5}\right]^{-5} \times \left(\frac{3}{5}\right)^{-7} = \left(\frac{3}{5}\right)^{6x}$

$$\left(\frac{3}{5}\right)^{-12} = \left(\frac{3}{5}\right)^{6x}$$

$$-12 = 6x$$

$$\boxed{x=-2}$$

11) $(-5)^{11} \div (-5)^{16}$

$$= \frac{(-5)^{11}}{(-5)^{16}}$$

$$= (-5)^{11-16}$$

$$= (-5)^{-5}$$

$$= \left(\frac{-1}{5}\right)^5$$

12) $5^{-6} \times 5^{-8} = 5^{-7a}$

$$5^{-6-8} = 5^{-7a}$$

$$-14 = -7a$$

$$14 = 7a$$

$$\boxed{a=2}$$

13) $(-4)^{11} \div (-4)^{18} = \left[\frac{1}{-4}\right]^x$

$$\frac{(-4)^{11}}{(-4)^{18}} = \left(\frac{1}{-4}\right)^x$$

$$\left(\frac{1}{-4}\right)^7 = \left(\frac{1}{-4}\right)^x$$

$$\boxed{x=7}$$

14) $\sqrt{x^{-1} \times y} \times \sqrt{y^{-1} z} \times \sqrt{z^{-1} \times x}$

$$\sqrt{\frac{y}{x}} \times \sqrt{\frac{z}{y}} \times \sqrt{\frac{x}{z}}$$

$$\sqrt{\frac{\cancel{y}}{\cancel{x}} \times \frac{\cancel{z}}{\cancel{y}} \times \frac{\cancel{x}}{\cancel{z}}} = \sqrt{1}$$

$$= 1$$

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4) $\left[(8^0-7^0)(8^0+7^0)\right]^{0^{7^8}}$

$(1)^{0^{7^8}}$

1

5) $\left(\frac{125}{343}\right)^{\frac{2}{3}}$

$\left(\frac{5^3}{7^3}\right)^{\frac{2}{3}}$

$\frac{5^{3\times\frac{2}{3}}}{7^{3\times\frac{2}{3}}}$

$\frac{5^2}{7^2} = \frac{25}{49}$

6) $(6561)^{0.125} + (3125)^{0.2}$

$\left(3^8\right)^{\frac{125}{1000}} + \left(5^5\right)^{\frac{2}{10}}$

$3^{\overset{1}{\cancel{8}}\times\frac{\cancel{125}}{\underset{\cancel{8}}{\cancel{1000}}}} + 5^{\overset{1}{\cancel{5}}\times\frac{\cancel{2}}{\underset{2}{\cancel{10}}}}$

$3+5 = 8.$

7) $4^{2^{2^{1^{56}}}}$

$4^{2^{2^1}} = 4^4$

$= 2^8$

8) $5^{n-3} = 625$

$5^{n-3} = 5^4$

$n-3 = 4$

$\boxed{n=7}$

$5^{n+3} = 5^{7+3}$

$= 5^{10}$

9) $\left[10^{150} \div 10^{146}\right]$

$\frac{10^{150}}{10^{146}} = 10^{150-146} = 10^4$

10) $7^{2^{0^{16}}}$

$= 7^{2^1} = 49$

11) $\left(\frac{1}{2}\right)^x = 32$

$\frac{(1)^x}{(2)^x} = 32$

$1 = 32\times2^x$

$\frac{1}{32} = 2^x$

$2^x = 2^{-5}$

$\boxed{x=-5}$

$2\times x = 2\times(-5) = -10$

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