

Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Product Rule**

Use product rule and rewrite each expression as single exponent.

1)  $20^{-9} \times 20^{-9} \times 20^5$

2)  $19^9 \times 19^5 \times 19^4$

3)  $(-17)^7 \times (-17)^{-6}$

4)  $19^{-10} \times 19^{-6}$

5)  $\left(\frac{2}{5}\right)^{-7} \times \left(\frac{2}{5}\right)^{-8} \times \left(\frac{2}{5}\right)^4$

6)  $(-9)^5 \times (-9)^{-8}$

7)  $\left(-\frac{7}{8}\right)^9 \times \left(-\frac{7}{8}\right)^{-2}$

8)  $(-8)^6 \times (-8)^2 \times (-8)^5$

9)  $\left(\frac{8}{3}\right)^{-2} \times \left(\frac{8}{3}\right)^{-5} \times \left(\frac{8}{3}\right)^{-7}$

10)  $12^{-7} \times 12^4 \times 12^{-2}$

11)  $4^{-8} \times 4^{10} \times 4^9 \times 4^{10}$

12)  $16^{-7} \times 16^4 \times 16^6 \times 16^5$

13)  $\left(-\frac{1}{9}\right)^3 \times \left(-\frac{1}{9}\right)^6$

14)  $3^{-3} \times 3^9 \times 3^{-10} \times 3^9$

15)  $5^{-5} \times 5^{-7} \times 5^{-8} \times 5^{-8}$

16)  $5^7 \times 5^{-8} \times 5^3$

17)  $(-2)^{-10} \times (-2)^2$

18)  $(-15)^8 \times (-15)^4$

19)  $10^{-3} \times 10^4 \times 10^{10}$

20)  $18^9 \times 18^8 \times 18^5 \times 18^{-7}$

21)  $(-13)^8 \times (-13)^2$

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**Answers**

1)  $20^{-9} \times 20^{-9} \times 20^5$

$$= 20^{-13} \text{ or } \frac{1}{20^{13}}$$

2)  $19^9 \times 19^5 \times 19^4$

$$= 19^{18}$$

3)  $(-17)^7 \times (-17)^{-6}$

$$= (-17)^1$$

4)  $19^{-10} \times 19^{-6}$

$$= 19^{-16} \text{ or } \frac{1}{19^{16}}$$

5)  $\left(\frac{2}{5}\right)^{-7} \times \left(\frac{2}{5}\right)^{-8} \times \left(\frac{2}{5}\right)^4$

$$= \left(\frac{5}{2}\right)^{11}$$

6)  $(-9)^5 \times (-9)^{-8}$

$$= (-9)^{-3} \text{ or } \frac{1}{(-9)^3}$$

7)  $\left(-\frac{7}{8}\right)^9 \times \left(-\frac{7}{8}\right)^{-2}$

$$= \left(-\frac{7}{8}\right)^7$$

8)  $(-8)^6 \times (-8)^2 \times (-8)^5$

$$= (-8)^{13}$$

9)  $\left(\frac{8}{3}\right)^{-2} \times \left(\frac{8}{3}\right)^{-5} \times \left(\frac{8}{3}\right)^{-7}$

$$= \left(\frac{3}{8}\right)^{14}$$

10)  $12^{-7} \times 12^4 \times 12^{-2}$

$$= 12^{-5} \text{ or } \frac{1}{12^5}$$

11)  $4^{-8} \times 4^{10} \times 4^9 \times 4^{10}$

$$= 4^{21}$$

12)  $16^{-7} \times 16^4 \times 16^6 \times 16^5$

$$= 16^8$$

13)  $\left(-\frac{1}{9}\right)^3 \times \left(-\frac{1}{9}\right)^6$

$$= \left(-\frac{1}{9}\right)^9$$

14)  $3^{-3} \times 3^9 \times 3^{-10} \times 3^9$

$$= 3^5$$

15)  $5^{-5} \times 5^{-7} \times 5^{-8} \times 5^{-8}$

$$= 5^{-28} \text{ or } \frac{1}{5^{28}}$$

16)  $5^7 \times 5^{-8} \times 5^3$

$$= 5^2$$

17)  $(-2)^{-10} \times (-2)^2$

$$= (-2)^{-8} \text{ or } \frac{1}{(-2)^8}$$

18)  $(-15)^8 \times (-15)^4$

$$= (-15)^{12}$$

19)  $10^{-3} \times 10^4 \times 10^{10}$

$$= 10^{11}$$

20)  $18^9 \times 18^8 \times 18^5 \times 18^{-7}$

$$= 18^{15}$$

21)  $(-13)^8 \times (-13)^2$

$$= (-13)^{10}$$