Name: KEY

Topic: 8.3: The number *e* Date: _____

Summary:

Use a calculator to complete the table (round to the 3 decimal places)

n	10	10^2	10^3	10^4	10^5	10^6
$\left(1+\frac{1}{n}\right)^n$	2.594	2.705	2.717	2.718	2.718	2.718

As *n* gets larger, $\left(1+\frac{1}{n}\right)^n$ gets closer to 2.718281 8459.

This is the value of *e*

e is also known as natural base e; Euler number.

We can never forget the exponent properties!

$a^m \cdot a^n =$ a^{m+n}

$(a^m)^n =$ a^{mn}

$(ab)^m =$ $a^m b^m$

$a^{-m} =$ $\frac{1}{a^m}$

$\frac{a^m}{a^n} =$ a^{m-n}

$\left(\frac{a}{b}\right)^m =$ $\frac{a^m}{b^m}$

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These exponent rules are still applied when the base is e

Simplify the expression.

1. $e^3 \cdot e^4$

e^{3+4}

$\boxed{e^7}$

2. $\frac{10e^3}{5e^2}$ $2e^{3-2}$

$\boxed{2e}$

3. $(3e^{-4x})^2$

$3^2 e^{-4x(2)}$

$9e^{-8x}$

$\boxed{\frac{9}{e^{8x}}}$

4. $\frac{24e^8}{8e^5}$ $3e^{8-5}$

$\boxed{3e^3}$

5. $(2e^{-5x})^{-2}$

$\frac{1}{(2e^{-5x})^2} =$

$\frac{1}{2^2 e^{-5x(2)}} = \frac{1}{4e^{-10x}} = \boxed{\frac{e^{10x}}{4}}$

6. $e^{-2} \cdot e^8$ $e^{-2+8} = \boxed{e^6}$

7. $(2e^5)^3$

$2^3 e^{5(3)} =$

$\boxed{8e^{15}}$

8. $\frac{e^{-3}}{e^2}$

e^{-3-2}

e^{-5}

$\boxed{\frac{1}{e^5}}$

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9. $-3e \cdot (4e)^{-2}$

$\frac{-3e}{(4e)^2} = \frac{-3e}{4^2e^2} =$

$\frac{-3e}{16e^2} = \frac{-3e^{1-2}}{16} =$

$\frac{-3e^{-1}}{16} = \boxed{\frac{-3}{16e}}$

10. $2e^x \cdot e^{(x+3)}$

$2e^{x+(x+3)}$

$\boxed{2e^{2x+3}}$

11. $e^{2x} \cdot e^{1-2x}$

$e^{2x+(1-2x)}$

$\boxed{e}$

12. $\frac{e}{e^{(x+1)}}$

$e^{1-(x+1)}$

e^{1-x-1}

e^{-x}

$\boxed{\frac{1}{e^x}}$

13. $e^2(2e^4)^3$

$e^2 2^3 e^{4(3)}$

$e^2 8 e^{12}$

$\boxed{8e^{14}}$

14. $\left(\frac{e^2}{2}\right)^{-3}$

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

$e^{-6}2^3 =$

$\boxed{\frac{8}{e^6}}$