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## Graded Assignment

### Checkup: Exponential Functions

Answer the following questions using what you've learned from this unit. Write your responses in the space provided, and turn the assignment in to your instructor.

1. Calculate  $30^6 \times 30^{-6}$ .

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2. Simplify the following expression:  $(a^3b^5c^{-2}) \times (a^2b^0c^5)^3$

$A^9b^5c^{13}$

3. Calculate  $8^{\frac{2}{3}}$ . Do not use your calculator, and explain your reasoning.

4. Cube root of 8 is 2. Multiply that by 2 is 4.

5. If  $28^3 \times 32^n = 28^3$ , what is  $n$ ? How do you know?

$n$  is 0 because  $32^n$  has to be 1 for the equation to work out.

6. If  $30^x \times 30^5 = 30^{20}$ , what is  $x$ ? How do you know?

$30^{15}$ , because  $30^{20}/30^5$

7. If  $a^m \times a^3 = \frac{1}{a^2}$ , what is  $m$ ? How do you know?

$A^{-5}$  because it has to equal  $a^{-2}$ . You re-write the exponent as a fraction.

8. True or false: If  $a$  is any positive real number, the graph of  $y = a^x$  will go through the point  $(0,1)$ . Explain your answer.

True. If you plug anything positive real number it will happen, because anything to the power of 0 the output will always be 1.

For problems 8 – 10, three students responded to a question on a homework assignment that was to be graded. Consider each of the students' responses.

9. One student wrote  $3^5 \times 3^7 = 9^{12}$ . Is this correct? Explain your answer.

No, it has the same base, although you don't multiply them.

10. Another student wrote  $3^5 \times 3^7 = 3^{35}$ . Is this correct? Explain your answer.

No, you don't multiply the exponents, you add them when they have the same base.

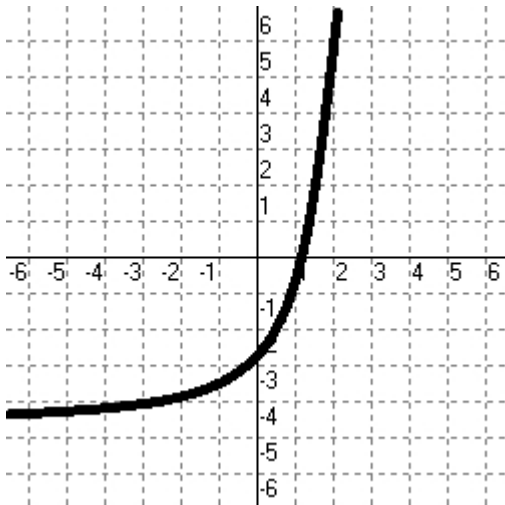
11. A third student couldn't remember the rule for multiplying with exponents, but she used the meaning of the exponent to figure it out. The student wrote  $3^5 \times 3^7 = 3^{12}$ . Is this correct? Explain what you think the student did to figure out her answer without using the rule for multiplying with exponents.

Yes, she is correct. I think she just wrote it out and found how many times 3 was multiplied.

12. Sketch the graph of  $y = 3^x - 4$  and state its domain and range.

Domain:  $-\infty, \infty$

Range:  $-\infty, \infty$

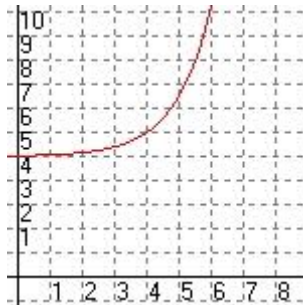


13. The table below gives the values for  $f(x)$  and  $g(x)$ . One of these functions is linear, and one is exponential. State which is which, and tell how you know.

$x$	0	1	2	3	4	5	6	7	8
$f(x)$	25	37.5	56.25	84.38	126.56	189.84	284.77	427.15	640.72
$g(x)$	25	42	59	76	93	110	127	144	161

$f(x)$  is exponential because it is growing at a faster rate.  $G(x)$  is linear because it is growing at a slower and constant rate.

For problems 13 – 15, use the graph below. The function shown on the graph follows the form  $y = a^{x+b} + c$ .



14. What do you know about the value  $a$ ?

That it is greater than 0

15. What do you know about the value  $b$ ?

That it is less than 0

16. What do you know about the value  $c$ ?

That it has a value of 4.

17. If you deposit \$5,000 in an account that pays 5% interest compounded annually, how much money will you have in your account at the end of 15 years? Write an exponential function that represents this situation.

$$5000(1.05)^{15}$$

=

$$\$10,394.64$$

18. True or false:  $f(x) = x^3 + 2x^2$  is an exponential equation because it contains exponents. Explain your answer.

True. It has the same base and the exponent is on one variable.

19. Give an example of an exponential function that goes through the point (0,4).

$$-3^x + 4$$

20. Give an example of an exponential function that goes through the point (-3,1).

$$-3^{(x+3)} + 1$$

21. Give an example of an exponential function that has a range  $(3, \infty)$ .

$$3^{(x-3)} + 1$$