

Simplify. Your answer should contain only positive exponents.

1)  $3x^{-4} \cdot 4xy^4$   
 $12x^{-3}y^4 = \frac{12y^4}{x^3}$

2)  $(2xy^4)^4 \cdot (2xy^4)^{-1}$   
 $16x^4y^{16} \cdot 2^{-1}x^{-1}y^{-4}$   
 $8x^3y^{12}$

3)  $(4u^4)^3$   
 $64u^{12}$

4)  $\frac{(a^{-3}b^4)^2}{a^4b^{-2}} \cdot \frac{a^{-6}b^8}{a^4b^{-2}} \cdot \frac{b^8b^2}{a^4a^6}$   
 $\frac{b^{10}}{a^{10}}$

5)  $\frac{3x^3y^3y^3}{4x^2y^{-3}}$   
 $\frac{3xy^6}{4}$

6)  $\left(\frac{m^1 2n^2 n^3}{2m^{-1}n^2 \cdot 2mn^{-3}}\right)^{-2}$   
 $\left(\frac{m^1 n^3}{2n^3 m}\right)^{-2} = \frac{m^{-2} n^{-6}}{2^{-2} n^{-3} m^{-2}} = \frac{4n^3 m^2}{m^2 n^6} = \frac{4}{n^3}$

Simplify.

7)  $\sqrt{8}$   
 $\pm 2.83$

8)  $\sqrt{288}$   
 $\pm 16.97$

9)  $\sqrt[4]{32}$   
 $\pm 2.38$

10)  $\sqrt{-512}$   
 $-2.44$

11)  $\sqrt[3]{1000}$   
 $10$

12)  $\sqrt[5]{256}$   
 $3.03$

Write each expression in exponential form.

13)  $(\sqrt{3})^5$   
 $3^{\frac{5}{2}}$

14)  $(\sqrt[3]{2})^5$   
 $2^{\frac{5}{3}}$

Write each expression in radical form.

15)  $5^{\frac{7}{4}}$

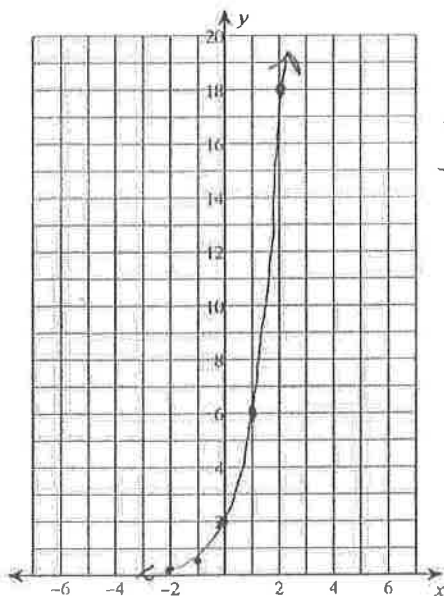
$(\sqrt[4]{5})^7$

16)  $7^{\frac{1}{2}}$

$(\sqrt{7})^1$

Determine if the function represents exponential growth or decay. Then sketch the graph of each function.

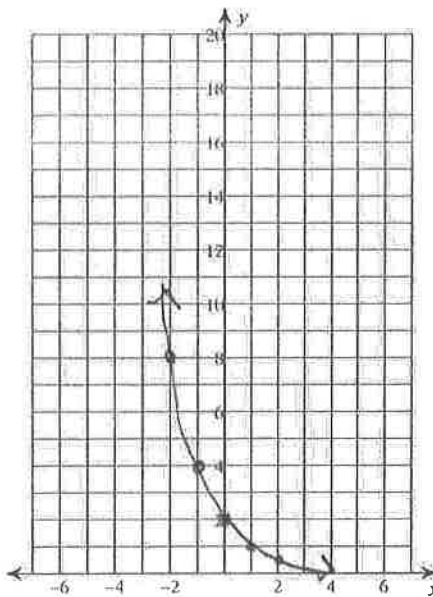
17)  $y = 2 \cdot 3^x$



x	y
-2	0.22
-1	0.67
0	2
1	6
2	18

growth

18)  $y = 2 \cdot \left(\frac{1}{2}\right)^x$



x	y
-2	8
-1	4
0	2
1	1
2	0.5

Decay

19) If you invest \$25,000 in an account that gets 12% annual interest compounded quarterly, how much would you have in 10 years.

$$25,000 \left(1 + \frac{.12}{4}\right)^{(4 \cdot 10)}$$

$\$81,550.94$

20) If you invested a penny on Jan 1, 1998 at 10% interest compounded daily, how much would you have on Jan 1, 2020?

$$0.01 \left(1 + \frac{.1}{365}\right)^{(365 \cdot 22)}$$

$\$0.09$

**Invest for**

21) How much would you need to invest to get \$20,000 in 5 years at an annual interest rate of 8.5% compounded monthly?

$$20,000 \left(1 + \frac{0.085}{12}\right)^{(12 \cdot 5)}$$

$$\boxed{\$30,546.01}$$

22) An initial population of 5 squirrels increases by 9% each year for 10 years. Using x for years and y for the number of squirrels, write the equation that models this situation. How many squirrels will there be in 10 years?

$$y = 5(1 + 0.09)^x$$

$$= 5(1 + 0.09)^{10}$$

$$\boxed{11.8 \text{ squirrels}}$$

23) A car purchased for \$34,000 is expected to lose value, or depreciate, at a rate of 6% per year. Using x for years and y for the value of the car, write the equation that models this situation. After how many years is the car first worth less than \$21,500?

$$y = 34,000(1 - 0.06)^x$$

$$21,500 = 34,000(1 - 0.06)^x$$

guess and check

$$\boxed{8 \text{ yrs}}$$

**Solve each equation.**

24)  $x^{3n+1} = x^3$

$$3n + 1 = 3$$

$$3n = 2$$

$$\boxed{n = \frac{2}{3}}$$

25)  $5^{-2n} = 5^{3n}$

$$-2n = 3n$$

$$-3n \quad -3n$$

$$\frac{-5n}{-5} = \frac{0}{-5}$$

$$\boxed{n = 0}$$

26)  $2^{3x-2} = \frac{1}{16}$

$$2^{3x-2} = 16^{-1}$$

$$\begin{array}{r} 3x - 2 = -4 \\ +2 \quad +2 \end{array}$$

$$2^{3x-2} = 2^{-4}$$

$$\frac{3x}{3} = \frac{-2}{3}$$

$$\boxed{x = -\frac{2}{3}}$$

27)  $6^{-v} = 36$

$$-v = 2$$

$$\frac{-v}{-1} = \frac{2}{-1}$$

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

28)  $2^{-3x} = 16$

$$2^{-3x} = 2^4$$

$$\frac{-3x}{-3} = \frac{4}{-3}$$

$$\boxed{x = -\frac{4}{3}}$$

29)  $5^{-3n-2} = \frac{1}{625}$

$$5^{-3n-2} = 625^{-1}$$

$$5^{-3n-2} = 5^{-4}$$

$$\begin{array}{r} -3n - 2 = -4 \\ +2 \quad +2 \end{array}$$

$$\frac{-3n}{-3} = \frac{-2}{-3}$$

$$\boxed{n = \frac{2}{3}}$$

30)  $7^{3k} = 343$

$$7^{3k} = 7^3$$

$$\frac{3k}{3} = \frac{3}{3}$$

$$\boxed{k = 1}$$

31)  $5^{-2x} = 125$

$$5^{-2x} = 5^3$$

$$\frac{-2x}{-2} = \frac{3}{-2}$$

$$\boxed{x = -\frac{3}{2}}$$