Review Unit 8
Secondary III

Name: Answer Key
Date: ______ Class: ______

Write an explicit and recursive rule for the following

1. 9, 27, 81, 243,...

×3 ×3 ×3 $r=3$ $a=3$

Explicit: $f(n)=3(3)^n$

Recursive: $f(0)=3$
$f(n)=3\cdot f(n-1)$

2. 4, −3, −10, −17, ...

−7 −7 −7 $a=11$ $d=-7$

Explicit: $f(n)=-7n+11$

Recursive: $f(0)=11$
$f(n)=f(n-1)-7$

3. Find the equation that represents exponential decay

a. $y=13(2)^x$ b. $y=\frac{1}{2}(2)^x$ c. $y=2\left(\frac{1}{2}\right)^x$ d. $y=2\left(\frac{4}{2}\right)^x$

$2>1$ growth

$2>1$ growth

$\frac{1}{2}<1$ decay

$\frac{4}{2}=2>1$ growth

4. Find the range of $y=3(2)^{x+3}$ without a calculator.

- stretch by 3 (doesn't change range)
- Shift Left by 3 (doesn't change range)

$\boxed{(0,\infty)}$

Find the stated term for the following sequences

5. −3, −6, −12, −24, ...; 9th term

×2 ×2 ×2

$a=-3/2$ $r=2$ $-3/2(2)^{n\,\swarrow 9}=\boxed{-768}$

6. What is the y intercept of $y=6\left(\frac{1}{2}\right)^x$?

$f(0)=6\left(\frac{1}{2}\right)^0=6(1)=6$ $\boxed{(0,6)}$

Evaluate the following

7. $\sum_{n=1}^{5} 2n+1$

$(2(1)+1)+(2(2)+1)+(2(3)+1)+(2(4)+1)+(2(5)+1)$
$3+5+7+9+11=\boxed{35}$

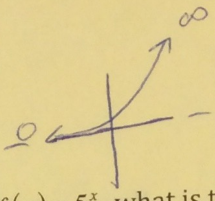
8. $\sum_{k=1}^{3} k^2-1$

$(1^2-1)+(2^2-1)+(3^2-1)$
$0+3+8=\boxed{11}$

9. A geometric sequence that has an first term 2, ends with -4374 and has a common ratio of -3, how many terms are in the sequence?

n	1	2	3	4	5	6	7	8
f(n)	2	-6	18	-54	162	-486	1458	-4374

$\boxed{8\ \text{terms}}$



10. For the function $f(x)=5^x$, what is the limit as $x \to \infty$?

A. $\lim_{x\to\infty} f(x)=\infty$ B. $\lim_{x\to\infty} f(x)=-\infty$ C. $\lim_{x\to\infty} f(x)=0$ D. $\lim_{x\to\infty} f(x)=1$

Find the domain, range, and y-intercept for the following functions without graphing. Also state whether the function represents growth or decay.

11. $f(x)=2(3)^{x-2}-1$ stretch by 2, Shift Down 1, Shift Right 2

Domain: $(-\infty,\infty)$
Range: $(-1,\infty)$
y-int: $(0,-7/9)$
Asymptote: $y=-1$

$2(3)^{0-2}-1$
$2(3)^{-2}-1$
$2(1/9)-1$
$\frac{2}{9}-1=\frac{2}{9}-\frac{9}{9}=-\frac{7}{9}$

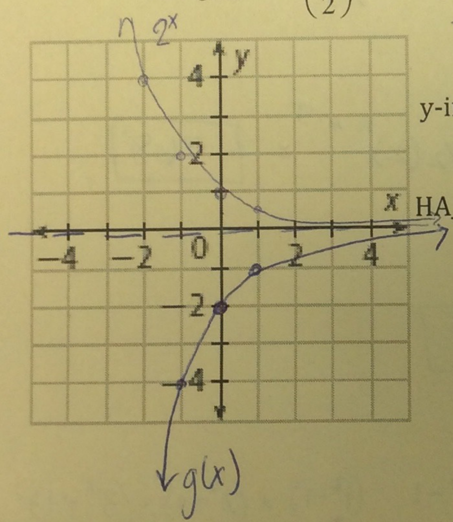
12. $f(x)=\left(\frac{1}{3}\right)^x+2$

Domain: $(-\infty,\infty)$
Range: $(2,\infty)$
y-int: $(0,3)$
Asymptote: $y=2$

$\left(\frac{1}{3}\right)^0+2=\ 1+2=3$

Graph the following and label any asymptotes or intercepts

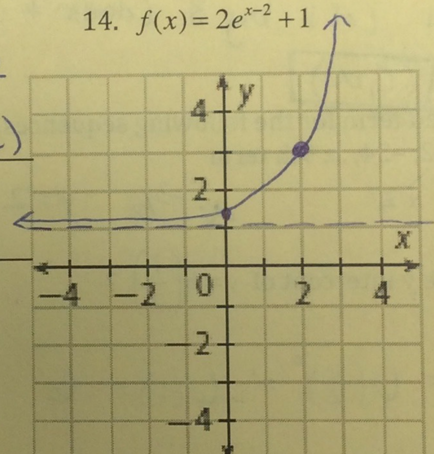
13. $g(x)=-2\left(\frac{1}{2}\right)^x$ $-2\left(\frac{1}{2}\right)^0=$ $-2(1)=-2$



y-int: $(0,-2)$

HA $y=0$

14. $f(x)=2e^{x-2}+1$



use a calc.

$2e^{0-2}+1=$
$2e^{-2}+1=$

y int $(0,1.27)$

HA $y=1$

15. If Jane invests \$4,200 at an 8% interest **compounded continuously**, how much money will there be after 10 years?

$A(t)=Pe^{rt}$

$P=4200$
$r=0.08$
$t=10$

$A(10)=4200e^{0.08(10)}=\boxed{\$9347.27}$

(16-18) Answer the following questions with the following: an investment of $2000 that earns 3.4% interest

P r

$A(t) = P(1+\frac{r}{n})^{nt}$

16. Write an equation to describe the value V(t) of the investment at time t if the interest is compounded annually.

$n=1$

$\boxed{V(t) = 2000(1+\frac{.034}{1})^{1\cdot t}} = 2000(1.034)^t$

17. What is the value of the investment after 10 years?

$A(t) = 2000(1+\frac{.034}{1})^{1\cdot 10} = \boxed{\$2,794.06}$

18. How long would it take for the investment to reach $10,000?

time

amount

$\underbrace{10000}_{y_2} = \underbrace{2000(1+\frac{.034}{1})^{1\cdot t}}_{y_1}$ $\boxed{t = 48.1 \text{ years}}$

19. A melting snowman is losing one-half of his weight each day. He originally weighed 128 pounds. Assuming that the outside temperature stays the same, how much does the snowman weigh after 5 days?

$a(1 \pm r)^t$

$f(t) = 128(1-\frac{1}{2})^t$

$128(\frac{1}{2})^5 = \boxed{4 \text{ days}}$

20. A car with a cost of $25,000 is decreasing in value at a rate of 10% each year. The function $\boxed{g(t) = 25{,}000(0.9)^t}$ gives the value of the car after t years. When will the value of the car be about $12,000?

amount

$\underbrace{12000}_{y_2} \doteq \underbrace{25000(0.9)^t}_{y_1}$ $\boxed{t = 6.96 \approx 7 \text{ years}}$

21. An online video game tournament begins with 4096 players. Four players play in each game. In each game there is only one winner, and only the winner advances to the next round. How many games will the winner play?

4096 players

$\boxed{6 \text{ games}}$

round	1	2	3	4	5	6
games	1024	256	64	16	4	1

$\times\frac{1}{4}$

winner!