$A=P(1\pm r)^{\frac{t}{h}}$ $A=P(\frac{1}{2})^{\frac{t}{h}}$

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Algebra II

Irregular Time (Half Life)

1. The half-life of mendelevium-258 is 51.5 days. Write an equation for the amount of mendelevium-258 remaining from an initial amount of 4000 grams after d days. To the *nearest hundredth of a gram*, how much mendelevium-258 will remain after 12 days?

$A=A$
$P=4000$
$t=d$
$h=51.5$

$A=4000(\frac{1}{2})^{\frac{d}{51.5}}$ $A=P(\frac{1}{2})^{\frac{t}{h}}$

$A=4000(\frac{1}{2})^{\frac{12}{51.5}}=3403.43$

2. The amount of ants in a colony doubles every 8 days. If there are initially 275 ants, write an equation for $a(t)$, the amount of ants in the colony after t days. How many ants, to the nearest ant, will be in the colony after 30 days?

$A=a(t)$
$P=275$
$t=t$
$h=8$

$a(t)=275(2)^{\frac{t}{8}}$ $A=P(2)^{\frac{t}{h}}$

$a(30)=275(2)^{\frac{30}{8}}$

$a(30)=3700$ ants

3. Phil is trying to get himself back into shape and wants to ease his way back into distance running. He will start by running 2 miles each day but every four days, he will increase his distance by 60%. Create an equation to represents how many m miles Phil will be running after d days. How many miles will Phil be running after 10 days rounded to the *nearest mile*?

$A=m$
$P=2$
$r=.6$
$t=d$
$h=4$

$A=P(1\pm r)^{\frac{t}{h}}$

$m=2(1+.6)^{\frac{d}{4}}$
$m=2(1.6)^{\frac{d}{4}}$
$m=2(1.6)^{\frac{10}{4}}$
$m=6$ miles

4. The half life of an element is 27 hours. If there were initially 4.2 kg of the substance, how much will remain after 2 days? Round your answer to the nearest hundredth of a kg.

Convert to hours

$A=A$
$P=4.2$
$t=2(24)=48$
$h=27$

$A=P(\frac{1}{2})^{\frac{t}{h}}$

$A=4.2(\frac{1}{2})^{\frac{48}{27}}$

$A=1.22$ kg

5. Jabba went to the movies on Friday night and bought a large popcorn. Every 20 minutes, Jabba eats 40% of the remaining amount of popcorn in his bucket. If there were 967 pieces of popcorn initially in Jabba's bucket, write an equation for $a(t)$, the amount of popcorn left in Jabba's bucket after t minutes. How many pieces of popcorn, to the *nearest piece of popcorn*, will be left an hour and a half into the movie?

$A = a(t)$
$P = 967$
$r = .4$
$t = t$
$h = 20$

90 min

$A = P(1 \pm r)^{\frac{t}{h}}$

$a(t) = 967(1 - .4)^{\frac{t}{20}}$

$a(t) = 967(.6)^{\frac{t}{20}}$

$a(90) = 967(.6)^{\frac{90}{20}}$

$a(90) = 97$

6. The amount of views of a YouTube video triples every 5 days. If it currently has 1120 views, how many full views will the video have two weeks from now?

$A = A$
$P = 1120$
$t = 14$
$h = 5$

14 days

$A = P(3)^{\frac{t}{h}}$

$A = 1120(3)^{\frac{14}{5}}$

$A = 24275$ views

7. A payday loan company makes loans between \$100 and \$1000 available to customers. Every 14 days, customers are charged 30% interest with compounding. In 2013, Remi took out a \$300 payday loan. Which expression can be used to calculate the amount she would owe, in dollars, after one year if she did not make payments?

365 days

1) $300(.30)^{\frac{14}{365}}$ 2) $300(1.30)^{\frac{14}{365}}$ 3) $300(.30)^{\frac{365}{14}}$ 4) $300(1.30)^{\frac{365}{14}}$

$A = A$
$P = 300$
$r = .3$
$t = 365$
$h = 14$

$A = P(1 \pm r)^{\frac{t}{h}}$

$A = 300(1 + .3)^{\frac{365}{14}}$

8. Jay borrowed \$50,000 from Aaron and they came to an agreement regarding how the interest will be paid. Every week, the loan will accumulate 2% interest. If Jay repays the loan after 21 days, how much money will he have to repay Aaron rounded to the *nearest cent*?

$A = A$
$P = 50{,}000$
$r = .02$
$t = 21$
$h = 7$

7 days

$A = P(1 \pm r)^{\frac{t}{h}}$

$A = 50{,}000(1 + .02)^{\frac{21}{7}}$

$A = 50{,}000(1.02)^3$

$A = \$53{,}060.40$