**Solving Exponential Equations**

1. Solve each of the following.

|  |  |  |
| --- | --- | --- |
| * 1.
 | * 1.
 | * 1.
 |

1. Find the root of each of the following.

|  |  |  |
| --- | --- | --- |
| * 1.
 | * 1.
 | * 1.
 |

What does 2a) mean geometrically? Demonstrate using a sketch.

1. Solve each of the following.

|  |  |
| --- | --- |
| * 1.
 | * 1.
 |
| * 1.
 | * 1.
 |

1. Find the roots of each of the following.

|  |  |
| --- | --- |
| * 1.
 | * 1.
 |
| * 1.
 | * 1.
 |
| * 1.
 |  |

1. Give an exact and approximate value for x in each of the following.

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| --- | --- |
| * 1.
 | * 1.
 |

**Answers:**

**1a.** -4**, b.** -2. **2a.** 9 **b**. 9, -1 **c.**  **3a**. 2,1 **b.** 1,2 **c.** 3,1 **d.** 8,-1

**4a**. 2 b. 9 **c.** 2 **d.**  **e.**  **5a.** 4.209 **b.** 13.44

**Basic Exponential Applications**

**EXPONENTIAL GROWTH & DECAY:** SITUATIONS FOLLOWING THIS TYPE OF CHANGE CAN BE MODELED USING THE FORMULA: $A=A\_{0}(B)^{t/p}$

Note:

P=Period for Growth to Occur

&

T=Elapsed Time

Must have the same units

A = Future Amount

$A\_{0}=$Initial Amount

B=Type of Growth

P=Period for Growth to Occur

T=Elapsed Time

**Example 1:** A bacterial culture doubles every 2 hours. If the culture started with 24000 bacteria, how many bacteria will be present in 5 hours.

**Example 2:** A bacterial culture triples ever P hours. If the culture started with 13000 bacteria, and there are 24000 after 2 hours, what is the value of P in hours?

1. 135765 **2.** 2.26 **3.** 4.29  **4**. 9

**Example 3:** The population of a town changes by an exponential growth factor b every 4 years. If 2350 people grows to 7000 in 3 years, what is the growth rate?

**Example 4:** A radioactive sample has a half-life of 3 days. How long will it take for only 1/8 of the sample to remain?

**Example 1:** Light passing through murky water retains ¾ of its intensity for every metre of water. At what depth will the light intensity be 60% of what it is at the surface?

**Example 2:** The population of a town halves every 15 years. In how many years will 20% of the population have fled?

**Example 3:** The crack in a window grows by 4.5% every hour? If the crack starts at a length of 3 cm, how long will it be in 3 hrs?

**b-Values**

If the rate is an increasing percent, add it to 1.

If the rate is a decreasing percent, subtract it from 1.

**Example 4:** Light passing through murky water loses 30% of its intensity for every metre of water. At what depth will the light intensity be half of what it is at the surface?

**Example 5:** A town loses 1.2% of its population every year? How many years will it take for a population of 10000 to drop under 9500?

1. 1.77 **2.** 4.83 **3.** 3.42  **4**. 1.94 **5.** 4.25

**Compound Interest:** The formula for compound interest is $A=A\_{0}(1+i)^{n}$

A = Future Amount

$A\_{0}=$Initial Amount

$i$=interest rate for compounding period [divide annual rate by period$(i=r/P)$]

$N$=Number of compounding periods [multiply years by period ($n=tP)]$

**Example 1**: Jillian invests $5000 into a bond that pays 6%/a compounded quarterly. How much will she have in four years? How much interest was made?

**Example 2:** $380 is invested at 5.4%/a compounded semi-annually. How many years does it have to stay in the bank for it to triple in value?

**Example 3:** Evan borrows $26000 to purchase a Honda Civic LX. It took him 8years to pay $33720 of monthly payments. What interest rate did Mark pay RBC?

**Example 4:** If he chose to pay back his car bi-weekly at the same rate for 8 years, how much did Evan pay for his car?

1. 6344.93 , 1344.93 **2.**20.623 **3.** 3.25%