|  |
| --- |
|  **Movie Night**There are two payment options for downloading movies from a Web site:**Option A:** Pay $10 for a membership and $2 per movie downloaded.**Option B:** Pay $4 per movie download. |

a) Fill out the chart below then graph each option on the Cartesian plane.

**# of movies**

0 2 4 6 8 10 12 14 16

 4 8 12 16 20 24 28 32 36

**COST ($)**

|  |  |  |
| --- | --- | --- |
|  | **OPTION A** | **OPTION B** |
| **# of MOVIES** | **COST ($)** | **COST ($)** |
| 0 | = 10 + 2 x 0= $10 | = 4 x 0= $0 |
| 2 |  |  |
| 4 |  |  |
| 6 |  |  |
| 8 |  |  |
| 10 |  |  |
| 12 |  |  |

b) Determine the equation for each option in y = mx + b form.

m = slope (rate per movie) b = initial cost (where graph starts on y-axis)

|  |  |
| --- | --- |
| **OPTION A** | **OPTION B** |

c) Determine **under which conditions** a person should select Option A and under which conditions a person should select Option B.

**LINEAR MODELS**

|  |
| --- |
| Tables, graphs and equations are all examples of **mathematical models.****KEY WORDS**ConstantEqualFirst differencesStraight liney = mx + bslopeverticalconstantinitialrate of changeRepresent quantities that increase or decrease by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ amount over \_\_\_\_\_\_\_\_\_\_\_ intervals* In a table of values, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are equal.
* The graph is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The equation of the line can be written in the form \_\_\_\_\_\_\_\_\_, where m is the \_\_\_\_\_\_\_\_ and b is the \_\_\_\_\_\_\_\_\_\_ intercept (y-intercept)
* The rate of change (slope) is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The vertical intercept represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ value of the ***dependent*** variable
* The slope represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the ***dependent*** variable with respect to the ***independent*** variable
 |

***EXAMPLE 1*** Which models represent linear relations?

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |

|  |  |
| --- | --- |
| **Time (s)** | **Height (m)** |
| 0 | 60 |
| 1 | 55 |
| 2 | 40 |
| 3 | 15 |

\* *Find 1st differences* |  |

|  |  |
| --- | --- |
| **Time (h)** | **Earnings ($)** |
| 0 | 0 |
| 5 | 40 |
| 10 | 80 |
| 15 | 120 |

 |
|  |  |  |  |
|  |  |  |  |

***![C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\MK0D7N5K\MC900239561[1].wmf]()EXAMPLE 2:*** A cup of coffee is reheated in a microwave. The temperature, *C* degrees Celsius, of the coffee after *t* seconds can be modelled by the following linear equations. Explain what the numbers in the equations represent. How do the two equations compare to each other?

 ***500 W microwave:  1000 W microwave: ***