**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U4 CWK #1** *Building Stairs and Ramps*

In the previous section you saw that a constant rate of change is an attribute of a linear relationship. When a linear relationship is graphed on a line you call the constant rate of change of the line the **slope** of the line.

The **slope** of a line describes how steep it is.

It describes the change in *y* values compared to the change in the *x* values.

The following investigation will examine how slope is measured.

On properly built staircases all of the stairs have the same measurements. When building a staircase these measurements are chosen carefully to prevent the stairs from being too steep, and to get you to where you need to go. The important measurements on a stair are what we call the *rise* and the *run*.

One step from three different staircases is shown below.

 The **vertical** measurement is the “**rise**”. The **horizontal** measurement is the “**run**”.

 ***Staircase #1 Staircase #2 Staircase #3***



State the rise and run for each staircase.

|  |  |  |
| --- | --- | --- |
| ***Staircase #1*** **rise = \_\_\_\_run = \_\_\_\_\_** | ***Staircase #2*** **rise = \_\_\_\_\_\_run = \_\_\_\_** | ***Staircase #3*** **rise = \_\_\_\_\_run = \_\_\_\_** |

Using the run and rise for each step, graph the height a person will be at after each step for the first 5 steps. Do this for each staircase. Use a different color and label each staircase.



**Height (rise) y**

**Horizontal Distance (run) x**

Which staircase is the steepest? \_\_\_\_\_\_\_\_\_\_ Justify your answer below.

Just like staircases, the measurement of the steepness of a line is also very important information. On the graph on the previous page draw a connecting line from the origin(0,0) through the tip of each stair step.

Find the slope of each line representing a staircase using the ratio: $\frac{rise}{run} or \frac{y}{x}$**,** and by simplifying this fraction.

1. Calculate the slope ratio for each staircase.

|  |  |  |
| --- | --- | --- |
| 1. Staircase #1: \_\_\_\_\_\_
 | 1. Staircase #2: \_\_\_\_\_\_
 | 1. Staircase #3: \_\_\_\_\_\_
 |

1. If you didn’t have the graph to look at, only the ratios you just calculated, how would you know which staircase would be the steepest?
2. Calculate the slope for climbing 1, 2, & 3 steps on each of the staircases.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Staircase #1** | **Staircase #2** | **Staircase #3** |
|  | Total Rise | Total Run | Slope (rise/run) | Total Rise | Total Run | Slope (rise/run) | Total Rise | Total Run | Slope (rise/run) |
| 1 step |  |  |  |  |  |  |  |  |  |
| 2 steps |  |  |  |  |  |  |  |  |  |
| 3 steps |  |  |  |  |  |  |  |  |  |

1. Does the slope of the staircase change as you climb each step?
2. Using your knowledge of how slope is calculated, see if you can figure out the slope of a ramp found at your school. Take measurements at two locations on the ramp. Use the table below to help you.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Rise | Run | Slope |
| 1st measurement |  |  |  |
| 2nd measurement |  |  |  |