**Words to Know**

*Fill in this table as you work through the lesson. You may also use the glossary to help you.*

# **Warm-Up** Rate of Change and Introduction to Slope



**?**

**W2K**

**Lesson Question**

in

different real-world scenarios.

and graphs.

**Determine** positive

slopes.

**Compare**

**Examine**

**Lesson Goals**

|  |  |
| --- | --- |
|  | a visual representation of data |
|  | in a function, the ratio of the change in the dependent value with respect to the change in the independent value |
|  | the ratio of the change in the dependent values (outputs) to the change in the independent values (inputs) between two points on a line |
|  | to infer; to draw a conclusion |

**Slide**



**Check**

**Strategy**

**Question**

**The Problem Solving Process**



Is she traveling at a constant rate of change?

**Time (hr)**

mi

 10 hr

Run  3

6

4

Rise 30

*x*

(1, 10)

2

* Find the rate of change from 1 hour to 4 hours.

)

(2,

20

mi

hr



Run  1

Rise 10

(4, 40)

40

* Find the rate of change from 1 hour to 2 hours.

60

*y*

**Rate of Change**

**EXAMPLE**

The **graph** shows the distance Andrea bicycled over time. Is she traveling at a constant **rate of change**?

**Distance (mi)**

**2**

**Slide**

## Rate of Change

What would you deduce Andrea’s rate of change to be from 4 hours to 7 hours?

mi

1−2 hours: ROC = 10 hr

mi

1−4 hours: ROC = 10 hr

4−7 hours:

rise run

30 mi

 3  hr

*y*

( , )

**4**



60

40

40)

(4,

**Distance (mi)**

20

*x*

6

4

2

### Time (hr)

Does it matter what interval you use when finding the rate of change of a linear equation?

it does not matter the interval you use because the rate of change is

constant.

**Slide**



2 1

*y*  *y*

 2 1

run *x*  *x*

rise

Slope 

4

2

(*x*1, *y*1)

4

*x*

(*x*2, *y*2)

2

*x*2  *x*1 2

*y*2  *y*1

4 2

the change in *y*-values (rise) for a segment of the graph to the corresponding change in *x*-values (run).

of

The slope of a line is the

*y*

4

is

**Slope** = **Rise / Run**

The constant rate of

called the **slope** of the line.

**7**



Slope 

4

2

 1

4

0 

(4, 0)

4

2

 0

rise 

run

4

*x*

(*x*2, *y*2)

(0, 1)

2

(*x*1, *y*1)

2

2 1

*x*  *x*

*y*  *y*

2 1



rise

Slope 

•

*y*

4

**Finding Slope from a Graph**

**EXAMPLE**

Find the slope of the line.

**Slide**

## Finding Slope from a Table

**EXAMPLE**

Find the slope of the line that runs through the points given in the table.

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| −1 | 6 |
| −3 | 0 |

*y*  *y*

Slope  2 1

* *x*

*x*

2 1

(−1, 6) (−3, 0)

(*x*1, *y*1) (*x*2, *y*2)

*m*  *y*2  *y*1

   6

 6 

*x*2  *x*1

Slope = 3

# 3 

2

You can choose either point for (*x*1, *y*1), but you must use the same order in the numerator and denominator.

**9**

Positive slope means that this line is increasing as we go from left to right.

**Slide**

## Using Slope to Find How Fast a Car Is Going

The graph represents the linear relationship between Car 1’s time and distance. What do you notice about the speed of the car?

*y*

8

6

4)

**Distance (mi)**

4

(4,

2

*x*

2

4

6

8

### m

**)**

**in**

**e (**

**im**

**T**

, 1)

(1

* Constant speed
  + Straight line on the graph
  + Distance on *y*-axis / Time on *x-*axis

*m*  *y*2  *y*1  4 3 mi

*x*2  *x*1

1  3 

min

**12**



mi

The speed of the car is 1 min .

**Slide**

## Using Slope to Find How Fast a Car is Going

This table represents the linear relationship between Car 2’s time and distance. What do you notice about the speed of the car?

* Constant speed

|  |  |
| --- | --- |
| **Time Gone By (min) (*x*)** | **Distance Traveled (miles) (*y*)** |
| 1 | 1  2 |
| 2 | 1 |
| 4 | 2 |
| 7 | 31  2 |

* + Slope 

2 1

*y*  *y*

 1

2 1

 1

* *x*

*x*

 1, 2

 7, 32

(*x* , *y* ) (*x* , *y* )

1 1 2 2

# 31  1

*y*  *y*

# 2 2 3

1 mi

*m*  2 1

|  |  |  |
| --- | --- | --- |
|  |  |  |

*x*2  *x*1

  6 

2 min

1 mi

The speed of the car is

**12**

2 min.

**Slide**

## Comparing Slopes on a Graph

This graph represents the linear relationship between time and distance for both Car 1 and Car 2.

**14**



Slope of Car 1 = 1 *y*

mi

Speed of Car 1 = 1 min 8

1

Slope of Car 2 = 2 6

**Distance (mi)**

1. mi

4

Speed of Car 2 =

1. min

*x*

8

6

4

2

2

### m

**)**

**in**

**e (**

**im**

**T**

How can you determine by looking at the graph which car is moving at a faster rate? The the line, the the slope.

Car 1 is moving at a speed than car 2.



# **Summary** Rate of Change and Introduction to Slope

**?**

How can you find the slope of a line and use it to solve problems?

**Lesson Question**

**Answer**

*Use this space to write any questions or thoughts about this lesson.*