



TOPIC OVERVIEW

Topic D — Introduction to Slope

Slope, Rate of Change, and the y-Intercept



This overview guide contains...

The topic calendar — every objective and scheduled assessment across this part of the unit

Vocabulary — the terms you must build into your artifacts

Check Your Understanding problem sets — an extra tool to monitor your progress. Completing all questions is not required, but a guide kept up with, completed in full, and turned in at the end of the quarter raises your Standards Mastery Check score by **5%**. Answer keys for every question are posted on the class website.

Since this guide contains so much foundational information vital to success in this course, it is **essential** to keep up with it. It's THE **most important document** needed for success.

Topic Calendar

Monday, September 21st – Friday, October 2nd

ARTIFACT 11 · Slope and Similar Triangles

WEEK 7 SEPTEMBER 21–25

BLOCK 1

MON–TUE, SEP 21–22

I can complete a statement comparing the slopes of segments formed by points on the same line using similar right triangles shown on a coordinate plane and justify the comparison. **8.4A**

I can create a proportion comparing side lengths of segments to show that the slopes of segments formed by points on the same line are equal, given similar right triangles shown on a coordinate plane. **8.4A**

I can create a graph of a proportional relationship with a unit rate for which an equivalent rate must be calculated using the given fractional rate values. **8.4B**

ARTIFACT 12 · Calculating Slope and Rate of Change

BLOCK 2

WED–THU, SEP 23–24

I can calculate a slope given a graph with an integral rate of change. **8.4C**

I can determine the rate of change given a table where the change in the independent variable is not constant. **8.4C**

Performance Task 1.4 · Angle Relationships

in class Wed–Thu, Sep 23–24 · revisions due Friday, Oct 2

Public Presentations · Improve Dallas

Friday, Sep 25 through Friday, Oct 2

ARTIFACT 13 · Slope and y-Intercept

WEEK 8 SEPTEMBER 28–OCTOBER 2

SMC 1 review begins

BLOCK 3

MON–TUE, SEP 28–29

I can determine slope and y-intercept given a graph or table of a real-world linear function, and explain its meaning. **8.4C**

REVIEW

WED–THU

Flex days: review for SMC 1.

SEP 30–OCT 1

Performance Task 1.5 · Connecting Similar Triangles to Slope & Slope/y-Intercept

in class Wed–Thu, Sep 30–Oct 1

Friday, Oct 2 · SMC 1 review

due this day: Performance Task 1.4 revisions · Mid-Unit Assessment revisions · Q1 Mathematical Process, Weeks 7–9 · Q1 Mathia End-of-Quarter Check

WEEK 9 OCTOBER 5–9**Q1 Standards Mastery Check — Mathematics**

Tuesday, Oct 6 · no new math content this week · Friday, Oct 9: Fall Break

Vocabulary

All of these terms must be eventually added to at least one artifact (Artifact 11, 12, and/or 13!)

slope	the steepness of a line; the rate comparing the change in y to the change in x
rise	the vertical change between two points on a line
run	the horizontal change between two points on a line
rise over run	the slope written as a fraction, $\frac{\text{rise}}{\text{run}}$
rate of change	how much one quantity changes per unit change in another; the slope of a line
unit rate	a rate written for one unit of the second quantity (e.g. miles per 1 hour)
equivalent rate	a rate written in a different but equal form (e.g. $\frac{2}{5} = \frac{4}{10}$)
proportional relationship	a relationship with a constant rate whose graph is a straight line through the origin
proportion	an equation stating that two ratios are equal
ratio	a comparison of two quantities by division
similar right triangles	right triangles with equal angles and proportional sides; slope triangles on the same line are similar
slope triangle	a right triangle drawn between two points on a line, with legs equal to the rise and the run
y-intercept	the y -value where a line crosses the y -axis (where $x = 0$); the starting value
linear function	a relationship whose graph is a straight line
$y = mx + b$	slope-intercept form: m is the slope and b is the y -intercept

constant rate of change	a rate that stays the same between any two points, making a straight line
initial value	the value when $x = 0$; the y -intercept
origin	the point $(0, 0)$; the line of a proportional relationship passes through it
coordinate plane	a four-quadrant grid with two axes (x -values and y -values) on which lines are graphed
break-even point	on a graph of cost and revenue, the point where the two lines meet (cost equals revenue)

Check Your Understanding

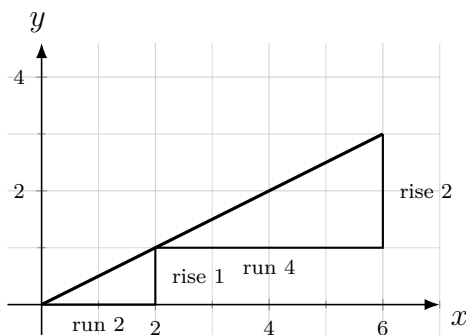
Topic D – Introduction to Slope

Slope, Rate of Change, and the y -Intercept

Questions 1-9 cover Artifact 11 (Slope and Similar Triangles)

1. Define the **slope** of a line using the words rise and run.

2. A line is shown with two slope triangles drawn beneath it.



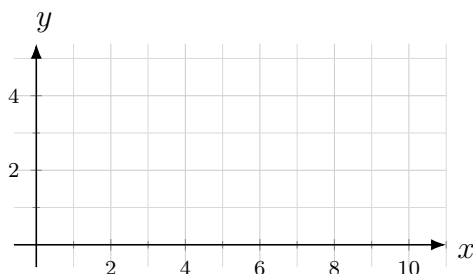
Write a proportion using the rise and run of the two triangles that shows they give the same slope, then state the slope.

3. A slope triangle on a line has a rise of 3 and a run of 4. What is the slope of the line?

4. Two slope triangles are drawn on the same line. The small triangle has a rise of 2 and a run of 3. The large triangle has a run of 9. Write a proportion and solve for the rise of the large triangle.

5. Two slope triangles are drawn on the same line. The small triangle has a rise of 4 and a run of 6. The large triangle has a rise of 10. Write a proportion and solve for the run of the large triangle.

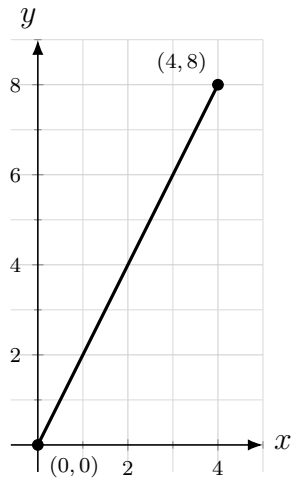
6. A ramp rises 2 ft for every 5 ft of run. On the grid, plot the point for a run of 5 ft, the point for a run of 10 ft, and draw the line through the origin.



7. A line passes through the origin with a slope of $\frac{3}{4}$. Using this rate, find the value of y when $x = 8$. Show your work.
8. Explain why any two slope triangles drawn on the same line must be similar, and what that tells you about the slope of the line.
9. A line passes through the origin and the point $(6, 4)$. Find the slope, write it as a proportion, and use it to find the value of y when $x = 9$.

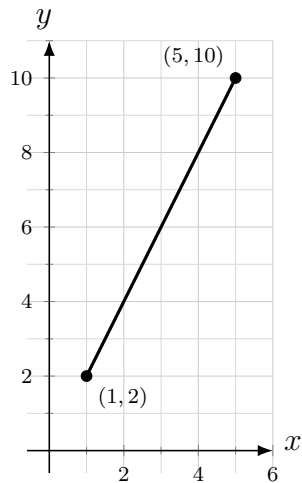
Questions 10-18 cover Artifact 12 (Calculating Slope and Rate of Change)

10. Find the slope of the line shown.



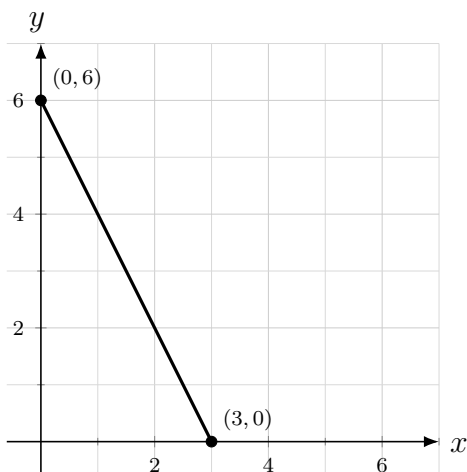
Calculate the slope from the graph. Show the rise and the run you used.

11. Find the slope of the line shown.



Calculate the slope from the graph.

12. Find the slope of the line shown.



Calculate the slope from the graph. Be careful with the sign.

13. Find the rate of change from the table.

x	1	2	3	4
y	5	8	11	14

14. The table lists a bamboo shoot's height on days that are *not* evenly spaced. Find the growth rate (the slope).

Day	7	12	16	20
Height (ft)	14	24	32	40

15. The table shows a taxi's total fare for trips of different lengths. The distances are *not* evenly spaced. Find the cost per mile (the rate of change).

Distance (mi)	2	5	6	9
Total fare	\$8.60	\$17.00	\$19.80	\$28.20

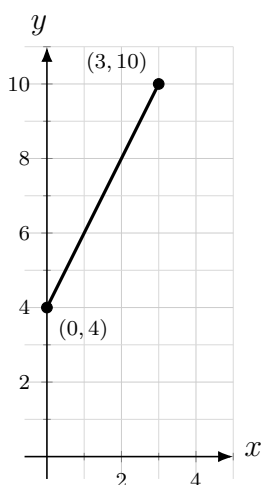
16. A line passes through the points $(2, 3)$ and $(6, 11)$. Calculate the slope.

17. Using the table from Question 14, show that two *different* pairs of days give the same growth rate, which confirms the heights lie on one straight line.

18. Explain how to find a rate of change from a table when the x -values are not evenly spaced.

Questions 19-27 cover Artifact 13 (Slope and y -Intercept)

19. Find the slope and the y -intercept of the line shown, then write its equation in the form $y = mx + b$.



Write the slope, the y -intercept, and the equation $y = mx + b$.

20. Find the slope and the y -intercept from the table, then write the equation $y = mx + b$.

x	0	1	2	3
y	2	5	8	11

21. The table shows the total cost of making stickers. Find the slope and the y -intercept. (The table does not start at 0, so work back to the y -intercept.)

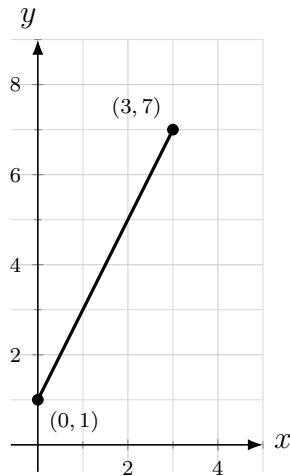
Stickers made	2	4	6	8
Total cost (\$)	5	6	7	8

22. The table shows a taxi fare by distance. Find the slope and the y -intercept, and state what each one means for a real taxi ride.

Distance (mi)	1	2	3	4
Fare (\$)	5.50	8.00	10.50	13.00

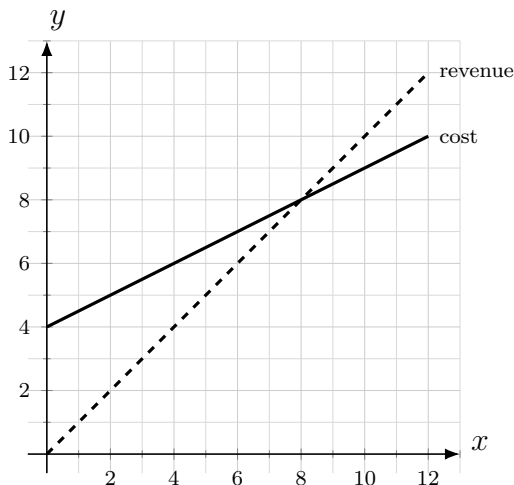
23. A linear function has the equation $y = 3x + 5$. Find the value of y when $x = 10$.

24. Write the equation of the line shown in the form $y = mx + b$.



Find the slope and y -intercept, then write $y = mx + b$.

25. The graph shows a small business's total cost and its revenue. Find the break-even point, where the two lines meet.



Give the coordinates of the break-even point, and explain what it means.

26. A line has a slope of 3 and passes through the point $(2, 11)$. Find its y -intercept, then write the equation $y = mx + b$.

27. Explain what the slope and the y -intercept each mean for a real-world linear function, such as the total cost of a service.