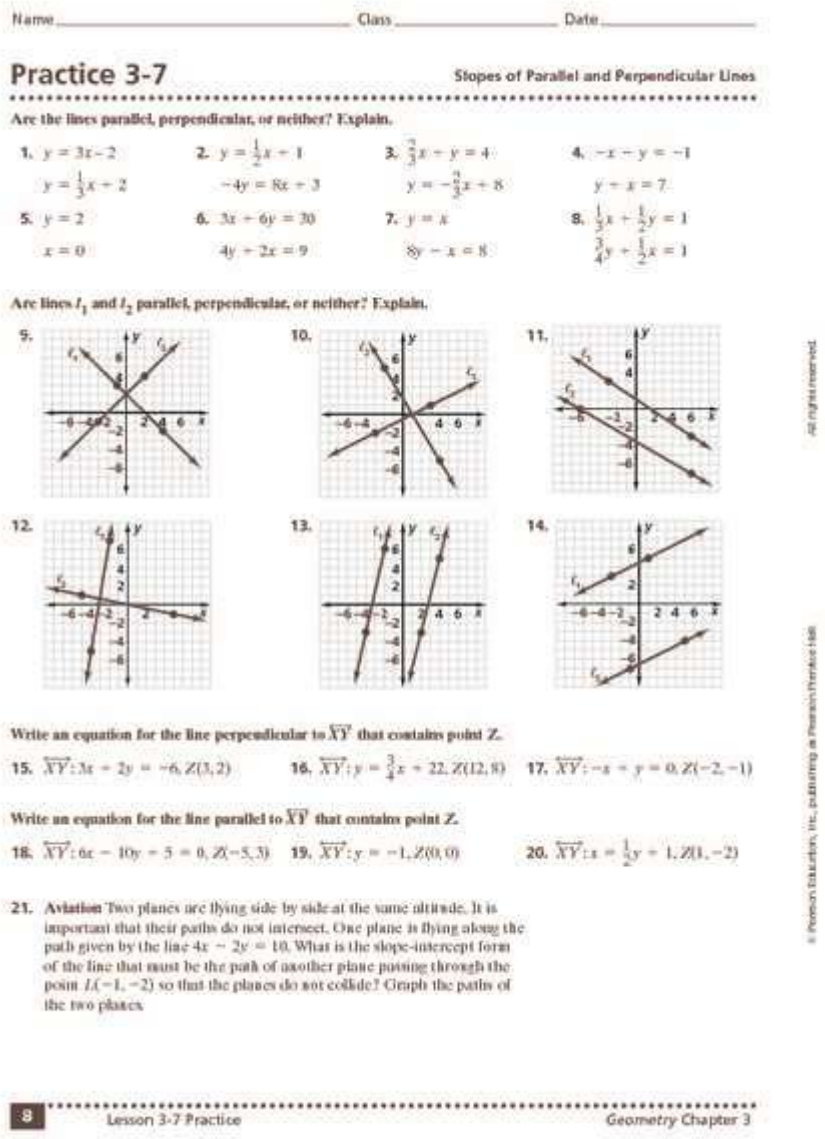
Equations Of Parallel And Perpendicular Lines Answer Key



Name _____ Class _____ Date _____

Practice 3-7 — Slopes of Parallel and Perpendicular Lines

Are the lines parallel, perpendicular, or neither? Explain.

1. $y = 3x - 2$; $y = \frac{1}{3}x + 2$
2. $y = \frac{1}{2}x + 1$; $-4y = 8x + 3$
3. $\frac{2}{3}x + y = 4$; $y = -\frac{2}{3}x + 8$
4. $-x - y = -1$; $y + x = 7$
5. $y = 2$; $x = 0$
6. $3x + 6y = 30$; $4y + 2x = 9$
7. $y = x$; $8y - x = 8$
8. $\frac{1}{3}x + \frac{1}{2}y = 1$; $\frac{2}{4}y + \frac{1}{2}x = 1$

Are lines l_1 and l_2 parallel, perpendicular, or neither? Explain.

9.
10.
11.
12.
13.
14.

Write an equation for the line perpendicular to $\overline{XY}$ that contains point Z.

15. $\overline{XY}$: $3x + 2y = -6$, $Z(3, 2)$
16. $\overline{XY}$: $y = \frac{3}{4}x + 22$, $Z(12, 8)$
17. $\overline{XY}$: $-x + y = 0$, $Z(-2, -1)$

Write an equation for the line parallel to $\overline{XY}$ that contains point Z.

18. $\overline{XY}$: $6x - 10y + 5 = 0$, $Z(-5, 3)$
19. $\overline{XY}$: $y = -1$, $Z(0, 0)$
20. $\overline{XY}$: $x = \frac{1}{2}y + 1$, $Z(1, -2)$

21. **Aviation** Two planes are flying side by side at the same altitude. It is important that their paths do not intersect. One plane is flying along the path given by the line $4x - 2y = 10$. What is the slope-intercept form of the line that must be the path of another plane passing through the point $A(-1, -2)$ so that the planes do not collide? Graph the paths of the two planes.

Equations of Parallel and Perpendicular Lines Answer Key

Understanding the equations of parallel and perpendicular lines is a fundamental aspect of coordinate geometry. These concepts not only help in solving mathematical problems but also play a crucial role in real-world applications, such as engineering, architecture, and computer graphics. This article will explore the properties of parallel and perpendicular lines, how to derive their equations, and provide an answer key to common questions and problems related to this topic.

Basic Concepts of Lines in Geometry

Before delving into the intricacies of parallel and perpendicular lines, it is essential to understand the foundational concepts of lines in a Cartesian coordinate system.

1. Slope of a Line

The slope of a line is a measure of its steepness and is calculated as the ratio of the vertical change (rise) to the horizontal change (run) between two points on the line. The formula for calculating the slope (m) between two points (x_1, y_1) and (x_2, y_2) is:

$$
m = \frac{y_2 - y_1}{x_2 - x_1}
$$

2. Slope-Intercept Form

The most common way to express the equation of a line is in the slope-intercept form:

$$
y = mx + b
$$

Where:
- y is the dependent variable,
- m is the slope of the line,
- x is the independent variable,
- b is the y-intercept (the value of y when $x = 0$).

Parallel Lines

Parallel lines are lines in the same plane that never intersect. They have the same slope but different y-intercepts.

1. Characteristics of Parallel Lines

- Same Slope: The slopes of parallel lines are equal. If line 1 has a slope m_1 and line 2 has a slope m_2, then $m_1 = m_2$.
- Different Y-Intercepts: Although parallel lines have the same slope, their y-intercepts will differ, ensuring they do not meet.

2. Equation of a Parallel Line

To find the equation of a line parallel to a given line, you need the slope of the original line. For example, consider the line given by the equation:

$$
y = 3x + 2
$$

To find a line parallel to this line and passing through the point $(1, 4)$, follow these steps:

1. Identify the slope of the given line: $m = 3$.
2. Use the point-slope form of a line equation:

$$
y - y_1 = m(x - x_1)
$$

Substituting in the slope and the point:

$$
y - 4 = 3(x - 1)
$$

3. Simplifying yields:

$$
y - 4 = 3x - 3
$$
$$
y = 3x + 1
$$

Thus, the equation of the parallel line is $y = 3x + 1$.

Perpendicular Lines

Perpendicular lines intersect at a right angle (90 degrees). The slopes of two perpendicular lines are negative reciprocals of each other.

1. Characteristics of Perpendicular Lines

- Negative Reciprocals: If one line has a slope of m_1, the slope of a line that is perpendicular to it, m_2, will satisfy the equation:

$$
m_1 \cdot m_2 = -1
$$

Thus, $m_2 = -\frac{1}{m_1}$.

2. Equation of a Perpendicular Line

To find the equation of a line perpendicular to a given line, determine the negative reciprocal of the original line's slope. For example, consider the line given by the equation:

$$
y = 2x + 3
$$

To find a line perpendicular to this line and passing through the point $(2, 1)$:

1. Identify the slope of the given line: $m = 2$.
2. Find the slope of the perpendicular line:

$$
m_{\text{perpendicular}} = -\frac{1}{2}
$$

3. Use the point-slope form:

$$
y - 1 = -\frac{1}{2}(x - 2)
$$

4. Simplifying yields:

$$
y - 1 = -\frac{1}{2}x + 1
$$
$$
y = -\frac{1}{2}x + 2
$$

Thus, the equation of the perpendicular line is $y = -\frac{1}{2}x + 2$.

Answer Key for Parallel and Perpendicular Lines

This section provides solutions to a series of problems related to parallel and perpendicular lines.

Problem Set

1. Find the equation of a line parallel to $y = -4x + 5$ that passes through the point $(3, 2)$.
- Solution: The slope is -4.

- Using point-slope form:
$$
y - 2 = -4(x - 3)
$$
$$
y - 2 = -4x + 12
$$
$$
y = -4x + 14
$$

2. Find the equation of a line perpendicular to $y = \frac{1}{3}x - 2$ that passes through the point $(6, 4)$.
- Solution: The slope is $\frac{1}{3}$, so the perpendicular slope is -3.
- Using point-slope form:
$$
y - 4 = -3(x - 6)
$$
$$
y - 4 = -3x + 18
$$
$$
y = -3x + 22
$$

3. Determine if the lines $3x - 4y = 12$ and $6x + 8y = 24$ are parallel.
- Solution: Convert to slope-intercept form:
- Line 1: $y = \frac{3}{4}x - 3$ (slope = $\frac{3}{4}$)
- Line 2: $y = -\frac{3}{2}x + 3$ (slope = $-\frac{3}{2}$)
- Since the slopes are not equal, the lines are not parallel.

4. Find the intersection point of the lines $y = 2x + 1$ and $y = -\frac{1}{2}x + 3$.
- Solution: Set equations equal:
$$
2x + 1 = -\frac{1}{2}x + 3
$$
$$
\frac{5}{2}x = 2 \Rightarrow x = \frac{4}{5}
$$
- Substitute back to find y:
$$
y = 2\left(\frac{4}{5}\right) + 1 = \frac{13}{5}
$$
- Intersection point is $\left(\frac{4}{5}, \frac{13}{5}\right)$.

Conclusion

Understanding the equations of parallel and perpendicular lines is essential for mastering coordinate geometry. By recognizing the relationship between slopes and utilizing the point-slope

form, one can easily derive the equations of lines that meet these criteria. The skills developed through these concepts are invaluable not only in mathematics but also in various practical applications. The answer key provided here serves as a resource to verify understanding and solve problems related to parallel and perpendicular lines effectively.

Frequently Asked Questions

What is the slope of a line parallel to the line represented by the equation y = 2x + 3?

The slope of a line parallel to this line is also 2, since parallel lines have the same slope.

How do you find the equation of a line perpendicular to y = -1/3x + 5?

To find the equation of a perpendicular line, first determine the negative reciprocal of the slope. The slope of the given line is -1/3, so the perpendicular slope is 3. Using the point-slope form, you can write the equation as y - y1 = 3(x - x1).

If two lines are parallel, what can you say about their slopes?

If two lines are parallel, their slopes are equal.

What is the relationship between the slopes of two perpendicular lines?

The slopes of two perpendicular lines are negative reciprocals of each other. If one line has a slope m, the other line's slope will be -1/m.

How do you convert the equation of a line from standard form to slope-intercept form?

To convert from standard form Ax + By = C to slope-intercept form y = mx + b, solve for y by isolating it on one side of the equation.

Given the line 3x + 4y = 12, what is the slope of a line parallel to it?

First, convert the equation to slope-intercept form: 4y = -3x + 12, which gives y = -3/4x + 3. The slope of a parallel line is -3/4.

If the slope of a line is 5, what is the slope of a line perpendicular to it?

The slope of a line perpendicular to a line with slope 5 is -1/5, which is the negative reciprocal of 5.

Find other PDF article:
https://soc.up.edu.ph/51-grid/Book?dataid=bHm97-4061&title=rudder-definition-ap-world-history.pdf

Equations Of Parallel And Perpendicular Lines Answer Key

Time.is - □□□□□□□□□
UTC GMT CET Pacific Time Mountain Time Central Time Eastern Time China Standard Time India Standard Time

Time.is - exact time, any time zone
1 day ago · Time.is displays exact, official atomic clock time for any time zone (more than 7 million locations) in 58 languages. What time is it? □□□□ □□□□ □□□ □□□ □□? ¿Qué hora es? Quelle …

□□□□□□□ - *Time.is*
□□□ UTC -5 / Eastern Standard Time (EST)□ □□□□□□ 02:00 □□ □□□□ 01:00□

Time.is - □□□□□□□□□□
UTC GMT CET Pacific Time Mountain Time Central Time Eastern Time China Standard Time India Standard Time

□□□□□□□ - Time.is
Time.is □ 58 □□□□□□□□□□□□□ 7,000,000 □□□□□□□□□□□□□□□ What time is it? □□□□ □□□□ □□□ □□□ □□? ¿Qué hora es? Quelle heure est-il ? □□□□□□ □□ □□□ □□□□ …

Time.is - Thời gian chính xác, bất kỳ múi giờ nào
Thời gian của bạn là chính xác! Độ chênh lệch so với Time.is là +0,130 giây (±0,172 giây).

□□□: 10:49 - Time.is
□□□ UTC -8 / Pacific Standard Time (PST)□ □□□□□□ 02:00 □□ □□□□ 01:00□

Time in United States now
4 days ago · Exact time now, time zone, time difference, sunrise/sunset time and key facts for United States.

□□ □□□□□□ - Time.is
Exact time now, time zone, time difference, sunrise/sunset time and key facts for □□.

□□□□ - Time.is
□□□□ Time.is □ 58 □□□□□□□□□□□□□ 7,000,000 □□□□□□□□□□□□□□□ What time is it? □□□□ □□□□ □□□ □□□ □□? ¿Qué hora es? Quelle heure est-il ? □□□□□□ □□ □□□ …

□□□□□□□□□□□ (□□□□□□□)/□□□□□□□□□□□□□□
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

残波ゴルフクラブ（沖縄県)のゴルフ場コースガイド - **Shot Navi**ゴルフ ...

残波ゴルフクラブ（沖縄県)のゴルフ場情報、レイアウト紹介。ショットナビゴルフ場ガイドでは、残波ゴルフクラブの各ホールの詳細なレイアウトや1時間毎のピンポイント天気予報が確 ...

残波ゴルフクラブ | 【楽天*GORA*】

残波ゴルフクラブのコース詳細情報。施設情報・プラン一覧・コースの特徴やクチコミ・天気予報・交通アクセスなど詳しい情報を確認できます。

残波ゴルフクラブ - ホームメイト・ゴルフ

沖縄県中頭郡読谷村にある「残波ゴルフクラブ」のゴルフ倶楽部情報をご案内します。こちらでは、地域の皆様から投稿された口コミ、写真、動画を掲載。

残波ゴルフクラブを予約する | **GDO**ゴルフ場予約

残波ゴルフクラブのGDOユーザーの平均スコアデータ・コースの特徴・施設情報・服装規定/ドレスコード・レンタル情報などプレーに役立つ情報を掲載。

残波ゴルフクラブ | 手ぶらでゴルフ！ 当日予約*OK* 琉球の風を感 ...

手ぶらでゴルフ！ 当日予約OK 琉球の風を感じてプレイ！ 広いティーグラウンドで開放感たっぷりのティーショット！ ロングコースにも劣らぬ爽快感！ 【ご注意】★大会が入り、一般の ...

残波ゴルフクラブ

残波ゴルフクラブ 残波の海を一望できる最高のロケーション！ 広いティーグランドで開放感たっぷりのティーショット！ 自慢のコース整備でロングコースにもひけを取りません！ コー ...

コースのご案内/株式会社残波ゴルフクラブ

残波ゴルフクラブのコースのご案内、様々なコースの特徴を解説しております。沖縄県読谷村のゴルフフルコース。コンペ、レストランで食事（中華・ランチ・貸し切り・日替わり)もお楽 ...

株式会社残波ゴルフクラブ | 沖縄観光情報*WEB*サイト おきなわ物語

世界遺産座喜味城跡の眼下に広がる残波岬に位置し、残波の海を一望できる最高のロケーション。コースは18ホール、パー58のショートコースです。乗用カートも完備。施設内には、レ ...

残波ゴルフクラブのコースレイアウト | **GDO**ゴルフ場予約

残波ゴルフクラブ［沖縄県／]のコースレイアウトを確認し、ホールの距離やバンカーの位置などを調べてコース攻略しましょう。

Unlock the secrets of equations of parallel and perpendicular lines with our comprehensive answer key. Discover how to master these concepts today!

Back to Home