

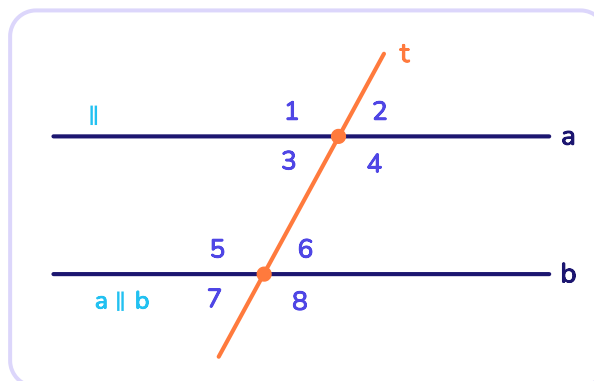
Parallel and Perpendicular Lines: math practice, Grade 10 – download the PDF

21 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Naming angle pairs

★ ★ ★

Use the figure, where $a \parallel b$ and t is a transversal.



Name the type of each pair: (a) $\angle 2$ and $\angle 6$; (b) $\angle 3$ and $\angle 6$; (c) $\angle 4$ and $\angle 6$; (d) $\angle 1$ and $\angle 8$.

2 Finding angles from one measure

★ ★ ★

In the figure of the previous exercise, $a \parallel b$ and $m\angle 3 = 65^\circ$. Find $m\angle 6$, $m\angle 7$, $m\angle 2$ and $m\angle 5$. Justify each answer.

3 Crossing lines



Two lines cross and one of the four angles measures 38° . Find the other three angles.

4 True or false?



Is this statement true or false? "When a transversal crosses two lines, the corresponding angles are always congruent." Explain.

5 Slope from two points



A line passes through $(0, 1)$ and $(4, 9)$. Find its slope, then the slope of (a) any parallel line and (b) any perpendicular line.

6 Parallel in disguise



Are the lines $y = 4x - 5$ and $8x - 2y = 7$ parallel? Explain.

7 Opposite reciprocals



Give the slope of a line perpendicular to a line with slope: (a) $-\frac{5}{3}$; (b) 4; (c) $\frac{1}{2}$.

8 Alternate interior angles and algebra



Two parallel lines are cut by a transversal. A pair of alternate interior angles measure $(4x + 7)^\circ$ and $(6x - 21)^\circ$. Find x and the two angle measures.

9 Same-side interior angles and algebra



Parallel lines are cut by a transversal. Same-side interior angles measure $(2x + 15)^\circ$ and $(3x + 25)^\circ$. Find x and both angles.

10 For which x are the lines parallel?



A transversal crosses lines p and q . Two corresponding angles measure $(5x + 8)^\circ$ and $(7x - 12)^\circ$. For what value of x are p and q parallel? What is then the angle measure?

11 Parallel, perpendicular, or neither?



Line A passes through $(1, 2)$ and $(5, 5)$. Line B passes through $(0, 0)$ and $(3, -4)$. Line C passes through $(-2, 1)$ and $(2, 4)$. Classify each pair of lines: A and B , A and C .

12 A parallel line in standard form



Write an equation of the line through $(4, -3)$ that is parallel to $2x + 5y = 10$.

13 A perpendicular line through a point



Find the equation of the line through $(6, 1)$ that is perpendicular to $y = -3x + 2$.

14 The sprinkler pipe



A garden is drawn on a coordinate grid where 1 unit equals 1 meter. A water pipe runs along the line $5x + 12y = 39$. A sprinkler is at the origin $(0, 0)$. What is the shortest distance from the sprinkler to the pipe, in meters and in feet ($1 \text{ m} \approx 3.28 \text{ ft}$)?

15 Perpendicular bisector equation

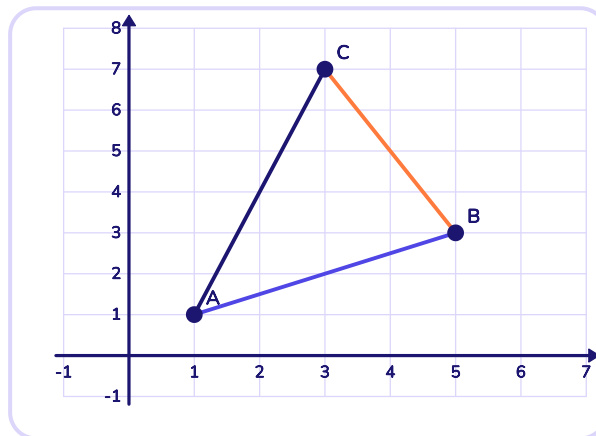
★★★

Find the equation of the perpendicular bisector of the segment with endpoints $A(-2, 3)$ and $B(4, 7)$.

16 Is the triangle a right triangle?

★★★

The vertices of triangle ABC are $A(1, 1)$, $B(5, 3)$ and $C(3, 7)$.

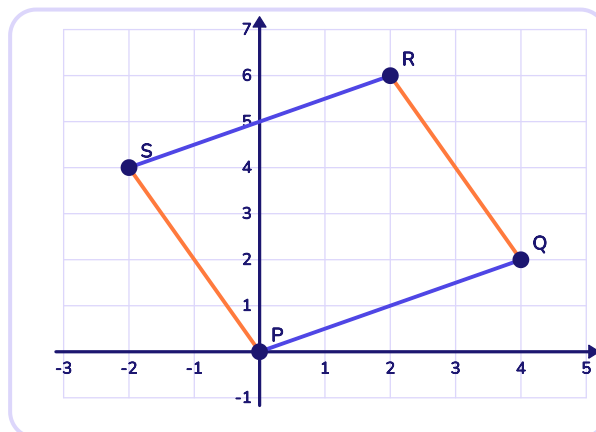


(a) Show that the triangle has a right angle. (b) Find its area.

17 Is PQRS a rectangle?

★★★

Points $P(0, 0)$, $Q(4, 2)$, $R(2, 6)$, $S(-2, 4)$ are joined in order.



Use slopes to show that $PQRS$ is a rectangle, then find its area.

18 Distance between parallel lines



Find the distance between the parallel lines $y = 2x + 3$ and $y = 2x - 7$. Give an exact value and a decimal rounded to hundredths.

19 Equidistant point on the x -axis



Find the point P on the x -axis that is equidistant from $A(1, 4)$ and $B(5, 2)$. Explain which theorem justifies why P lies on a particular line.

20 Two perpendiculars to a third line



In a plane, lines a and b are both perpendicular to a line c . Prove that $a \parallel b$ using angle pairs. Then explain the same result with slopes when c has slope $\frac{2}{5}$.

21 Foot of the perpendicular



Let ℓ be the line $y = 2x - 4$ and $P(0, 6)$. (a) Find the foot H of the perpendicular from P to ℓ . (b) Find PH and check it with the distance formula.



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