Lesson 11.1 • Parallel and Perpendicular

1. Find the slope of each line.
   a. \( y = -4x + 7 \)  
   b. \( y - 2x + 7 = 0 \)
   c. \( 3x - y = -4 \)  
   d. \( 2x + 3y = 11 \)
   e. \( y = \frac{4}{3}(x + 1) - 5 \)  
   f. \( \frac{1}{3}x + \frac{3}{4}y + \frac{1}{2} = 0 \)
   g. \( 1.2x - 4.8y = 7.3 \)  
   h. \( y = -x \)
   i. \( y = \frac{x}{2} \)

2. Plot each set of points on graph paper and connect them to form a polygon. Classify each polygon using the most specific term that describes it. Justify your answers by finding the slopes of the sides of the polygon.
   a. \( A(1, 10), B(-6, 3), C(4, -17), D(9, -12) \)
   b. \( P(2, 4), Q(10, 6), R(14, -10), S(6, -12) \)
   c. \( W(-5, 4), X(7, 7), Y(15, -5), Z(3, -8) \)

3. Write an equation of a line parallel to each line.
   a. \( y = \frac{2}{3}x - 4 \)  
   b. \( 3x + 5y = 7 \)
   c. \( -\frac{1}{3}x + \frac{1}{2}y - \frac{2}{3} = 0 \)
   d. \( 0.2x - 0.5y = 4 \)  
   e. \( y = 2.8x \)
   f. \( 3y - 5x = 10 \)

4. Write an equation of a line perpendicular to each line.
   a. \( y = \frac{2}{3}x - 4 \)  
   b. \( 3x + 5y = 7 \)
   c. \( -\frac{1}{3}x + \frac{1}{2}y - \frac{2}{3} = 0 \)
   d. \( 0.2x - 0.5y = 4 \)  
   e. \( y = 2.8x \)
   f. \( 3y - 5x = 10 \)

5. Write the equation of the line through the point \((-4, 2)\) and
   a. Parallel to the line with equation \(2x - 5y = -9\)
   b. Perpendicular to the line with equation \(2x - 5y = -9\)
Lesson 11.2 • Finding the Midpoint

1. Find the midpoint of the segment between each pair of points.
   a. (6, 9) and (−2, 1)
   b. (−7, 10) and (−12, −4)
   c. (11, −2) and (5, 3)
   d. (4.5, −2) and (−3, 6.6)
   e. (0, 5) and (7, 2)
   f. (13.5, 12) and (−10.5, 8)

2. Find the equation of the line that satisfies each set of conditions. Write each equation in slope-intercept form.
   a. Slope −2 and y-intercept (0, 5)
   b. Slope 2 going through the origin
   c. Slope 4 going through the point (1, 7)
   d. x-intercept (−3, 0) and y-intercept (0, −1)
   e. Goes through the points (−6, 1) and (3, 7)
   f. Goes through the points (5, −5) and (−4, 4)

3. Write the equation of the perpendicular bisector of the line segment that goes through each pair of points. Write the equation in point-slope form if possible.
   a. (3, 2) and (−1, 4)
   b. (17, 8) and (−2, −5)
   c. (−5, 2) and (−1, −5)
   d. (0, 4) and (0, −6)

4. Given triangle ABC with A(1, −6), B(−6, 4), and C(10, 10), write the equation of each of the following lines in point-slope form:
   a. The line containing the median through A
   b. The line that is the perpendicular bisector of AB
   c. The line that passes through the midpoints of BC and AC

5. Quadrilateral ABCD has vertices A(−4, −5), B(8, 9), C(13, −1), and D(0, −14).
   a. Find the most specific term to describe quadrilateral ABCD. Justify your answer.
   b. Find the midpoint of each diagonal.
   c. Make an observation based on your answer to 5b.
Lesson 11.3 • Squares, Right Triangles, and Areas

1. Find an exact solution for each quadratic equation.
   a. \(x^2 = 18\)          b. \(x^2 - 30 = 0\)          c. \((x - 5)^2 = 14\)
   d. \((x + 1)^2 + 3 = 7\)  e. \((x + 1)^2 + 3 = 8\)          f. \((x - 2)^2 + 4 = 1\)

2. Calculate decimal approximations for your solutions to Exercise 1. Round your answers to the nearest ten-thousandth. Check each answer by substituting it into the original equation.

3. Find the area of each figure.

4. Find the exact length of each side of these figures from Exercise 3.
   a. Figure c          b. Figure d          c. Figure f

5. On grid paper, construct a square with each area, using only a straightedge.
   a. 1 square unit      b. 2 square units      c. 4 square units      d. 5 square units
Lesson 11.4 • The Pythagorean Theorem

1. Find the exact solutions of each equation.
   a. \(5^2 + 12^2 = a^2\)  
b. \(4^2 + b^2 = 5^2\)  
c. \(2^2 + 5^2 = c^2\)  
d. \(6^2 = d^2 + 5^2\)  
e. \((2\sqrt{5})^2 + 6^2 = e^2\)  
f. \((\sqrt{37})^2 + f^2 = (6\sqrt{11})^2\)

2. Find the value of each missing side, given the lengths of the other two sides. Give your answers in exact form and rounded to the nearest tenth.
   a. \(x = 7, y = 8\)
   b. \(y = 24, z = 25\)
   c. \(x = 13, z = 19\)
   d. \(x = 7.8, y = 13.1\)
   e. \(y = 31, z = 50\)
   f. \(x = 10, y = 10\)

3. Find the exact area of each triangle. Then give the approximate area rounded to the nearest tenth.
   a. \(\triangle A\) with sides 16 cm and 20 cm
   b. \(\triangle B\) with sides 9 in. and 4 in.
   c. \(\triangle C\) with sides 3 mm and 6 mm

4. Determine whether \(\triangle ABC\) is a right triangle for each set of side lengths. Show your work. Measurements are in centimeters.
   a. \(a = 7, b = 8, c = 11\)
   b. \(a = 15, b = 36, c = 39\)
   c. \(a = \sqrt{14}, b = \sqrt{21}, c = \sqrt{35}\)
   d. \(a = 2\sqrt{13}, b = \sqrt{29}, c = 9\)

5. Claudine wants to find the height of a tree at school. She measures the shadow, and finds it to be 11 m long. When Claudine measures her own shadow, it is 90 cm long. Claudine is 150 cm tall. How tall is the tree?
Lesson 11.5 • Operations with Roots

1. Rewrite each expression with as few square root symbols as possible and no parentheses.
   a. \( \sqrt{3} + \sqrt{3} + \sqrt{3} \)  
   b. \((3\sqrt{2})(2\sqrt{2})\)  
   c. \(3\sqrt{2} + 4\sqrt{3} - \sqrt{2} + 2\sqrt{3}\)  
   d. \((3\sqrt{2})^2\)  
   e. \(\sqrt{3}(2\sqrt{3} - 1)\)  
   f. \(\frac{\sqrt{20}}{\sqrt{5}}\)  
   g. \(\frac{6\sqrt{15}}{\sqrt{3}}\)  
   h. \(\sqrt{5}(1 - 3\sqrt{5})\)  
   i. \(7\sqrt{5} + (\sqrt{2})(\sqrt{3}) - \sqrt{5}\)

2. Evaluate each expression.
   a. \((\sqrt{19})^2\)  
   b. \((2\sqrt{3})^2\)  
   c. \((\sqrt{29})^2 + 4^2\)  
   d. \((2\sqrt{7})^2 - (\sqrt{11})^2\)

3. Find the exact length of the third side of each right triangle. All measurements are in centimeters.
   a. \(\triangle\) with sides 8, 12, and \(a\)  
   b. \(\triangle\) with sides 5, \(b\), and \(\sqrt{11}\)  
   c. \(\triangle\) with sides 10\(\sqrt{2}\), 4\(\sqrt{7}\), and \(c\)

4. Write the equation for each parabola in general form. Use your calculator to check that both forms give the same graph or table.
   a. \(y = (x + \sqrt{2})(x - \sqrt{2})\)  
   b. \(y = (x + 2\sqrt{5})^2\)

5. Name the \(x\)-intercepts for each parabola in Exercise 4. Give both the exact value and a decimal approximation to the nearest thousandth for each \(x\)-intercept.

6. Name the vertex for each parabola in Exercise 4. Give both the exact values and decimal approximations to the nearest thousandth for the coordinates of each vertex.

7. Rewrite each radical expression without a coefficient.
   a. \(5\sqrt{3}\)  
   b. \(2\sqrt{2}\)  
   c. \(3\sqrt{15}\)  
   d. \(6\sqrt{10}\)

8. Rewrite each radical expression so that the value under the radical does not contain perfect-square factors.
   a. \(\sqrt{12}\)  
   b. \(\sqrt{48}\)  
   c. \(\sqrt{96}\)  
   d. \(\sqrt{500}\)
Lesson 11.6 • A Distance Formula

1. Find the exact distances and lengths.

   ![Graph with points A, B, C, D, E]

   a. $A$ to $B$  
   b. $B$ to $C$  
   c. $CD$  
   d. $DE$  
   e. $E$ to the origin

2. Quadrilateral $MNOP$ has vertices $M(0, -5)$, $N(5, -3)$, $O(7, -8)$, and $P(2, -10)$.
   a. Find the slope of each side.
   b. Find the length of each side.
   c. What kind of polygon is $MNOP$?

3. Triangle $DEF$ has vertices $D(-4, 10)$, $E(2, 6)$, and $F(6, 12)$.
   a. Find the slope of each side.
   b. Find the length of each side.
   c. What kind of triangle is $DEF$?

4. Solve each equation. Check each solution.

   a. $\sqrt{30} + x = x$  
   b. $x = \sqrt{x - \frac{1}{4}}$  
   c. $\sqrt{3x + 18} = x$  
   d. $2x = \sqrt{8x + 5}$  
   e. $x = \sqrt{-4x + 3}$  
   f. $\sqrt{2x + 3} = -x$
Lesson 11.7 • Similar Triangles and Trigonometric Functions

1. Solve each equation for $x$.
   a. $\frac{9}{14} = \frac{27}{x}$
   b. $\frac{\sqrt{6}}{x} = \frac{3}{\sqrt{6}}$
   c. $\frac{2}{x} = \frac{x}{32}$
   d. $\frac{16}{\sqrt{2}} = \frac{\sqrt{32}}{x}$

2. On a map, 2 cm represents 0.5 km.
   a. What is the actual distance between two cities that are 7.25 cm apart on the map?
   b. What is the map distance between two cities that are actually 7.7 km apart?

3. Refer to the triangle at right to answer the questions.
   a. Name the hypotenuse.
   b. With respect to angle $P$, name the opposite side and the adjacent side.
   c. With respect to angle $Q$, name the opposite side and the adjacent side.
   d. What trigonometric function of angle $P$ is the same as $\frac{q}{r}$?
   e. What trigonometric function of angle $Q$ is the same as $\frac{p}{q}$?
   f. What ratio is the same as $\sin Q$?

4. Write a proportion and find the value of the variable for each pair of similar triangles.
   a. 
   
   b. 
   
   c. 
   
   d. 

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Lesson 11.8 • Trigonometry

Name ____________________________ Period __________ Date __________

1. Use the triangle at right for Exercise 1a–f. Fill in the correct angle or ratio to make each statement true.
   a. \( \sin A = \square \)
   b. \( \cos \square = \frac{a}{c} \)
   c. \( \tan^{-1} \square = A \)
   d. \( \cos^{-1} \frac{a}{c} = \square \)
   e. \( \cos A = \square \)
   f. \( \tan \square = \frac{a}{b} \)

2. Write a trigonometric equation and solve for the indicated side length or angle measure.
   a. Find \( x \).
   b. Find \( y \).
   c. Find angle \( P \).

3. Find the measure of each angle. Round your answer to the nearest tenth of a degree.
   a. \( \sin A = \frac{3}{4} \)
   b. \( \cos B = \frac{\sqrt{2}}{2} \)
   c. \( \tan C = \sqrt{3} \)
   d. \( \sin E = \frac{2\sqrt{3}}{9} \)

4. Find the measure of angle \( A \) for each figure. Round your answer to the nearest tenth of a degree.
   a. 
   b. 
   c. 
   d. 

5. Find the area of triangle \( KLM \) to the nearest 0.1 cm\(^2\). Show your work including any trigonometric equations you use.