



HSML Math 9 Honors Course Placement Test

High School Math Live wants your student to be placed in the appropriate course so that they will be successful and challenged while learning the beauty of mathematics. The questions below will be a good indicator as to whether your student is ready for Math 9 Honors, but it is not expected that the student will answer all questions correctly. It is very important that the student show work clearly so that not only the answer but also the thinking process can be evaluated. Each problem should be attempted, work shown, and answer boxed at the end.

After completion, please scan the student's pages in a single PDF and email them to support@highschoolmathlive.com.

Again, this test is meant to be challenging and a student who does not feel confident about all of the questions may still be prepared for this course. This test is designed to see how the student reasons through questions and to what level a variety of skills have been mastered. Please do not hesitate to send in the test, even if the student feels very unsure about the answers.

No calculators allowed unless indicated otherwise.

Part 1. Find the indicated value, calculator may be used, if needed, round answers to 2 decimal places.

1. Find the distance between the points $(-2, -7)$ and $(-1, 8)$.
2. The regular price of a chair is \$895. If you purchase the chair at a 25% discount and then pay 6% sales tax, what is the final cost of the chair?
3. The amount of water emptied by a pipe varies directly as the square of the diameter of the pipe. For a certain constant water flow, a pipe, with a diameter of 6 inches, empties 200 gal of water per hour into a canal. How much water would a 12 in pipe empty into the canal in an hour?
4. If a and b are positive numbers and it is given that a is inversely proportional to b , and $a = 1$ when $b = 4$:
 - a. Find the value of b when $a = 25$.
 - b. Find the value of a when $b = 10$.

5. According to www.accuweather.com, the daily low temperatures (in Fahrenheit) in Houston, TX during the first week of February 2020 are as follows: 46, 52, 57, 68, 41, 36, 38.

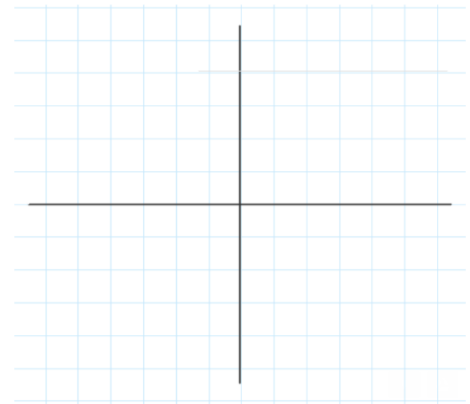
For the set of data above, find the following:

- The mean temperature
 - The median temperature
6. A cabinet contains a set of solid-colored mugs. Some are red, some are white, the rest are blue. The probability of randomly choosing a red mug is $1:3$ and the probability of choosing a blue mug is $1:6$. There are 15 white mugs. How many red mugs are there in the cabinet?

Part 2. Solve $3 - \frac{1}{4}x < 4$. Show your answer as a graph on a number line and in interval notation.

Part 3. Given the equation $3x - y = -2$, find the following:

- Write the equation in slope-intercept form.
- The x-intercept of the line is (,)
- Find the y-intercept of the line (,)
- Find another point on the line (,)
- Find the slope of the line.
- Graph the line, labeling three points.



Part 4. Rewrite the equation $y = \frac{x+z}{a-x}$ so that it is in the form $x = \underline{\hspace{2cm}}$

Part 5. Simplify the following.

1. $(3a^2b^{-3})^{-2}(6ab^{-4})^3$. Write the answer with only positive exponents.

2. $\frac{x^2 - 9}{x^2 - 5x + 6} \cdot \frac{(x-2)^2}{3x^2 + 9x}$

3. $\frac{9x^2 + 46x + 5}{3x^2 - 2x - 1} \div \frac{x^2 + 11x + 30}{x^3 + 5x^2 - 6x}$

Part 6. Solve the following equations. Use a calculator and round answers to three significant figures as needed.

1. $2x^2 + 16x + 15 = 0$ (Solve by completing the square.)

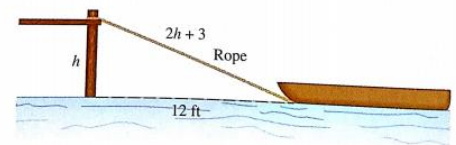
2. $6x^2 - 7x - 5 = 0$ (Solve by the quadratic formula.)

3. $\frac{2}{y+1} - \frac{3}{y^2 - y - 2} = \frac{3}{y-2}$

Part 7. For each of the following word problems,

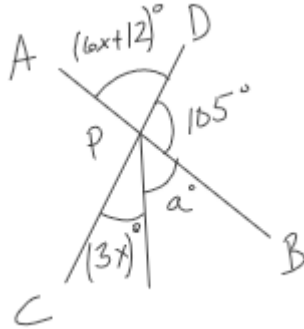
- Write an equation that represents the given information
- Solve to find the indicated value(s). Use a calculator and round to three significant figures as needed.

- The perimeter of a triangle is 59 inches. The longest side is 11 inches longer than the medium side, and the medium side is 3 inches more than the shortest side. Find the length of the longest side of the triangle.
- The length of a rectangle is three times as long as its width. Its area is 675 square feet. Find the dimensions of the rectangle.
- Two cars start 400 miles apart and meet in 4 hours. One is travelling 20 mph faster than the other. Find the speed of the slower car.
- Naiya and Madelyn are traveling to a business conference. The trip takes 2 hours for Naiya and 2.5 hours for Madelyn since she lives 40 miles farther away. Madelyn travels 5 mph faster than Naiya. Find Naiya's rate.
- Bryce rode his bike downhill 12 miles on the river trail from his house to the ocean and then rode uphill to return home. His uphill speed was 8 mph slower than his downhill speed. It took him 2 hours longer to get home than it took to get to the ocean. Find Bryce's downhill speed.
- Joanne is pulling a boat to the dock with a rope attached to the boat at water level (see diagram.) When the boat is 12 feet from the dock, the length of the rope from the boat to the dock is 3 feet longer than twice the height of the dock above water. Find the length of the rope.



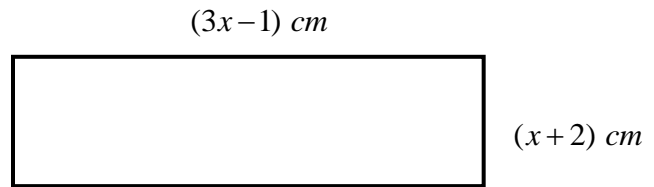
Part 8.

1. Solve for p :
 - a. Angle $(p - 5)^\circ$ is supplementary to a 43° angle.
 - b. The angles $(2p - 6)^\circ$ and $(3p + 11)^\circ$ are complementary.
2. AB and CD are straight lines that intersect at P , find the values of a and x .

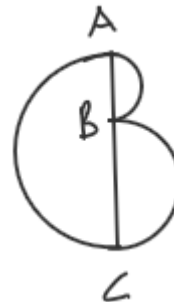


Part 9.

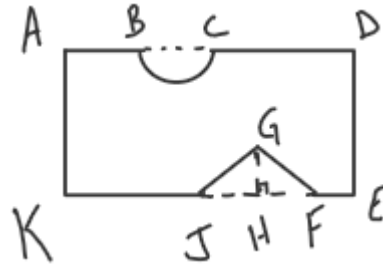
1. Given the following figure, find:
 - a. The perimeter in terms of x
 - b. The area in terms of x



2. Given the following figure made of three semi-circles, where AB is 4 cm and AC is 12 cm, find:
 - a. The perimeter of the figure (in terms of π)
 - b. The area of the figure (in terms of π)

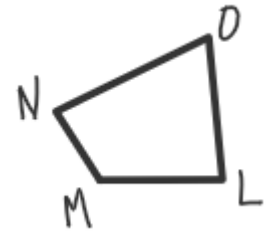
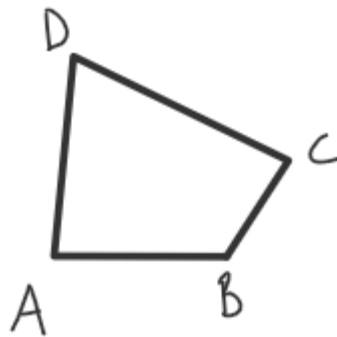


3. Calculator active question: Given that ADEK is a rectangle, BC is a diameter of a circle, FGJ is an equilateral triangle, GH is perpendicular to JF, JH = 3 cm, BC = 4 cm, AD = 15 cm, AK = 7 cm, and GH = 5.2 cm, find the following to three significant digits:
- The perimeter of the figure.
 - The area of the figure.

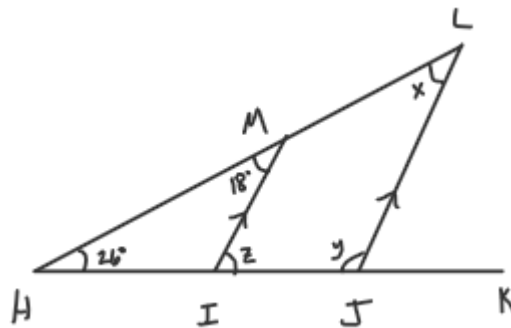


Part 10:

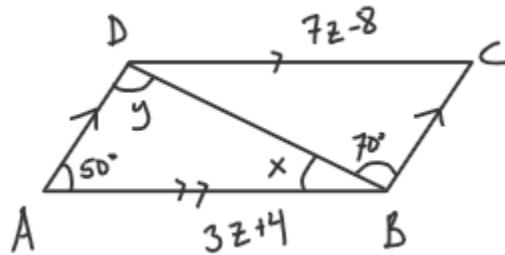
1. Given that quadrilaterals ABCD and LMNO are similar, AD = 15 cm, AB is 12 cm, OL is 10 cm, $m\angle A = 85^\circ$, $m\angle D = 60^\circ$, $m\angle M = 135^\circ$, find:
- $m\angle O$
 - $m\angle N$
 - Length of ML



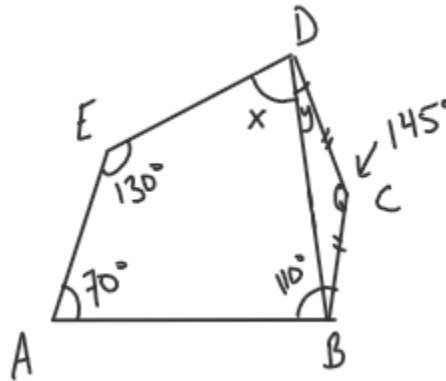
2. In the figure, HL and HK are straight lines. IM is parallel to JL. The measure of angle IHM is 26° , the measure of angle HMI is 18° . Find the measure of angles x, y, and z.



3. In the figure, $CD = (7z-8)$ cm and $AB = (3z+4)$ cm. AD is parallel to BC and AB is parallel to DC . The measure of angle BAD is 50° and the measure of angle DBC is 70° . Find the measures of angles x and y , and find the value of z .



4. In the figure, $DC = BC$. The measure of angle BCD is 145° , the measure of angle BAE is 70° , the measure of angle ABC is 110° , and the measure of angle AED is 130° . Find the measure of angles x and y . (Angle $y =$ angle CDB)



Part 11. Solve to find the indicated value(s). Use a calculator and round to three significant figures as needed.

1. A rectangular chocolate bar measuring 9 inches by 12 inches by 2 inches is melted and recast into a chocolate tower with a 4-inch square base. Find the height of the chocolate tower.
2. The base of a pyramid is square with sides of 6 cm. The slant-edge of the pyramid is 9 cm. Find the surface area of the pyramid.
3. A cylinder with a radius of 8 cm and a height of 30 cm is full of water. When the water is poured into a cone of radius 12 cm, it completely fills the cone. Find the height of the cone.
4. A rubber ball is hollow in the middle. The external diameter of the ball is 15 inches, the rubber is 0.25 inches thick. Find the volume of the rubber in the ball.

Part 12. On a coordinate plane, $\triangle ABC$ has vertices A (-1, 4), B (1, 2), C (3, 5).

1. Plot and label $\triangle ABC$.
2. A reflection in the x-axis maps $\triangle ABC$ to $\triangle DEF$. Draw and label $\triangle DEF$.
3. A translation of -4 units in the x-direction and 2 units in the y-direction maps $\triangle ABC$ to $\triangle MNP$. Draw and label $\triangle MNP$.

