

DUE: August 8, 2022

This assignment is for students who have completed Geometry or Geometry Honors and are taking Algebra II Honors in the 2022-2023 school year.

Did you read the instructions? _____

What math are you taking in the 2022-2023 school year? _____

The expectation of the Math Department at Archbishop Hannan High School is that its students become Tenacious Problem Solvers! Thus, as you work on these problems be sure and document your strategies, your mathematical explanations, any drawings, tables or graphs that you use, and the best, complete answer you can find. We hope that you are challenged by these problems and enjoy them. We look forward to the discussion of these problems that we will have in the first weeks of school. Come prepared to defend your solution!

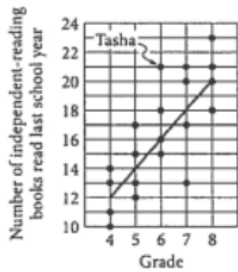
1. Two iron rails, each 50 feet long, are laid end to end with no space between them. During the summer, the heat causes each rail to increase in length by 0.04 percent. Although this is a small increase, the lack of space at the joint makes the joint buckle upward. What distance upward will the joint be forced to rise? [Assume that each rail remains straight, and that the other ends of the rails are anchored.]

2. The rectangle shown below has been broken into four smaller rectangles. The area of three of the smaller rectangles are shown in the diagram. Find the area of the fourth rectangle and justify your answer. [Think about shared dimensions.]

| | |
|-----|-----|
| 234 | 312 |
| 270 | |

3. Taylor recently purchased two boxes of ten-inch candles—one box from a discount store, and the other from an expensive boutique. It so happens that the inexpensive candles last only three hours each, while the expensive candles last five hours each. One evening, Taylor hosted a dinner party and lighted two candles — one from each box — at 7:30 pm. During dessert, a guest noticed that one candle was twice as long as the other. At what time was this observation made?

4.



Four students from each of the grade levels 4 through 8 at Wilson School were selected at random and surveyed about the number of books they read. The scatterplot above shows the number of complete independent-reading books, y , that each of the 20 students read during the last school year. A line of best fit for the data is also shown and has the equation $y = 2x + 4$, where x is the grade level of the student.

The mean number of independent-reading books read by the 4 eighth-grade students shown in the scatterplot is the same as the mean number of independent-reading books read by all 62 eighth-grade students in the school last year. In total, how many independent-reading books were read by all eighth-grade students at Wilson School during the last school year?

Essential Skills

The following problems represent the essential skills you need to be successful in Algebra 2 Honors.

Find the distance between each pair of points. Write your answer in simplified radical form.

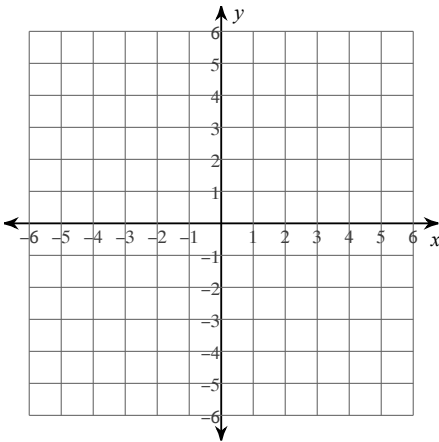
1) $(7, -7), (-2, -4)$

Find the midpoint of the line segment with the given endpoints.

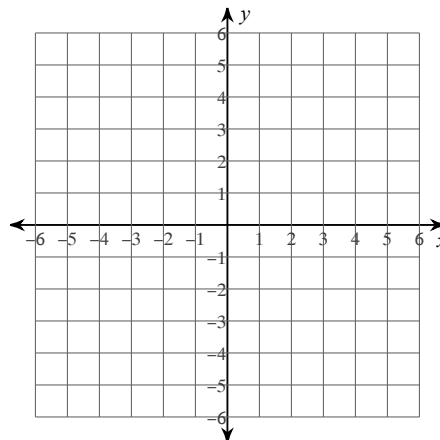
2) $(5, 9), (8, -3)$

Sketch the graph of each line.

3) $-27x = -3y - 12$

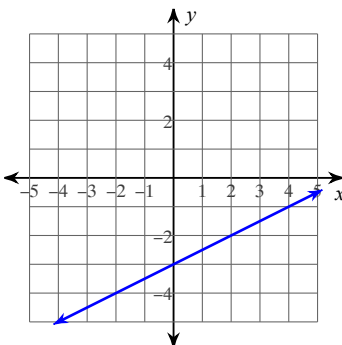


4) $0 = 1 - \frac{1}{3}y$

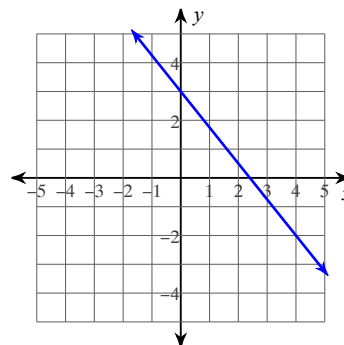


Write the slope-intercept form of the equation of each line.

5)



6)

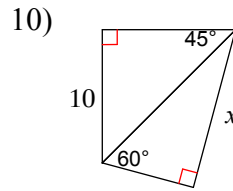
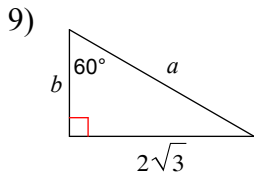


Write the slope-intercept form of the equation of the line described.

7) through: $(2, 3)$, parallel to $y = 3x + 4$

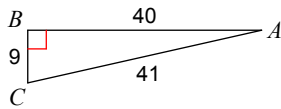
8) through: $(-3, 1)$, parallel to $y = 3$

Find the missing side lengths. Leave your answers as radicals in simplest form.

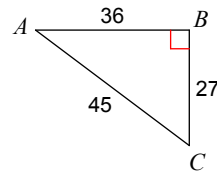


Find the value of each trigonometric ratio.

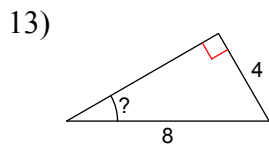
11) $\tan C$



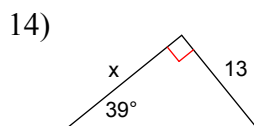
12) $\sin C$



Find the measure of the indicated angle to the nearest degree.



Find the missing side. Round to the nearest tenth.



Find the area of each.

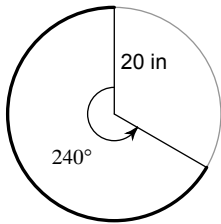
15) circumference = 8π ft

Find the circumference of each circle.

16) area = 25π cm²

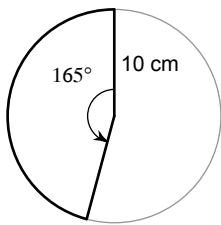
Find the length of each arc.

17)



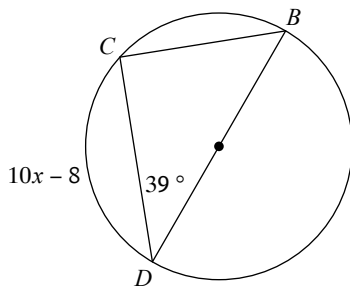
Find the area of each sector.

18)



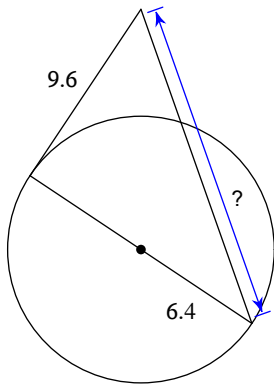
Solve for x .

19)



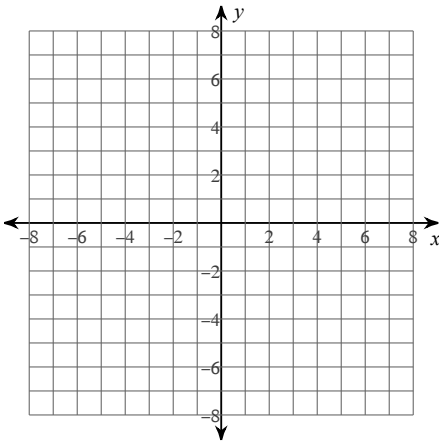
Find the segment length indicated. Assume that lines which appear to be tangent are tangent.

20)



Identify the center and radius of each. Then sketch the graph.

21) $(x + 2)^2 + (y - 1)^2 = 4$



Use the information provided to write the equation of each circle.

22) Ends of a diameter: $(4, 3)$ and $(8, 11)$

Find the probability.

23) A bag contains eight red marbles and five blue marbles. You randomly pick a marble and then return it to the bag before picking another marble. Both the first and second marbles are red.

24) There are six nickels and five dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. The first coin is a nickel and the second coin is a dime.

25) A box of chocolates contains five milk chocolates, three dark chocolates, and three white chocolates. You randomly select a chocolate. It is a milk chocolate or a dark chocolate.

26) A litter of kittens consists of two gray females, two gray males, one black female, and three black males. You randomly pick one kitten. The kitten is gray or male.

State if each scenario involves a permutation or a combination. Then find the number of possibilities.

27) A group of 18 people need to take an elevator to the top floor. They will go in groups of six. They are deciding who will take the elevator on its second trip.

28) There are 25 applicants for two jobs: computer programmer and software tester.

Find the probability of each event.

29) You are dealt five cards from a standard and shuffled deck of playing cards. Note that a standard deck has 52 cards and four of those are kings. What is the probability that you'll have exactly two kings in your hand?

30) A gambler places a bet on a horse race. To win, she must pick the top three finishers in order. Thirteen horses of equal ability are entered in the race. Assuming the horses finish in a random order, what is the probability that the gambler will win her bet?