

201. 16 cm A rectangular prism has a volume of 720 cm^3 and a surface area of 666 cm^2 . If the lengths of all its edges are integers, what is the length of the longest edge?

$V = 720$
 $24 \cdot 3 \cdot 5^1$
 $5 \cdot 3 \cdot 2 = 30$ factors
 so a lot of possible sets of 3 integers for side lengths $a, b,$ and c

$SA = 2ab + 2ac + 2bc$
 $666 = \frac{2ab + 2ac + 2bc}{2}$



$333 = ab + ac + bc$
 Select values from prime factors of 720

Since 333 is odd, one of the products $ab, ac,$ or bc is odd which means 2 of the 3 sides are odd so try triplets like

3-5-48, 5-9-16, 3-5-16

It turns out that 3-5-16 work so 16 is longest length

202. 96 Marco's average score for all 14 quizzes this semester was 81. If Marco had an average score of 75 for his first 10 quizzes this semester, what was the average score for his last 4 quizzes?

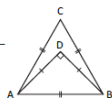
$$\begin{array}{r} 81 \\ \times 14 \\ \hline 1134 \end{array}$$

$$\begin{array}{r} 75 \\ \times 10 \\ \hline 750 \end{array}$$

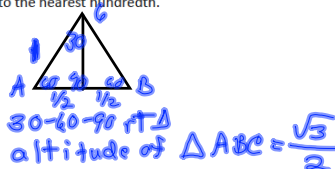
$$\begin{array}{r} 1134 \\ - 750 \\ \hline 384 \end{array}$$

$$4 \overline{) 384} = 96$$

203. .73 Point D is located in the interior of $\triangle ABC$, as shown. What is the ratio of the area of quadrilateral ACBD to the area of $\triangle ABD$? Express your answer as a decimal to the nearest hundredth.

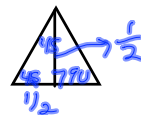


Let $AB = 1$



Area = $\frac{1}{2} (1) \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$

$\triangle ABD = 45-45-90$ rt \triangle
 $A = \frac{1}{2} (1) \frac{1}{2} = \frac{1}{4}$



Area of quad ACBD is difference of these 2 areas

$\frac{\sqrt{3}}{4} - \frac{1}{4} = \frac{\sqrt{3}-1}{4}$

Ratio = $\frac{\frac{\sqrt{3}-1}{4}}{\frac{1}{4}} = \frac{\sqrt{3}-1}{1} = \sqrt{3}-1 = .73$

204. 4.6 The endpoints of a diameter of a circle are $(-3, -2)$ and $(11, -10)$. What are the coordinates of the center of the circle?

$$\begin{array}{r} \overset{x}{(-3)} , \overset{y}{-2} \quad \overset{x}{(11)} , \overset{y}{-10} \\ \frac{-3+11}{2} , \frac{-2-10}{2} \\ \frac{8}{2} , \frac{-12}{2} \\ (4, -6) \end{array}$$

center of circle is midpoint
Find average of x and y coordinates to get midpoint


205. 16 Letters have been substituted for digits in the equation $ATE + AT = ROYS$. Each distinct letter represents a unique digit. No two distinct letters represent the same digit. If T is odd, S is prime and $E > T$, what is the value of the sum $A + T + E + O$?

$$\begin{array}{r} \textcircled{9} \textcircled{3} \\ ATE \rightarrow 4 \\ + AT \rightarrow 3 \\ \hline ROYS \rightarrow 7 \end{array}$$

A has to be 9 to carry for
R has to be 1
O has to be 0
E & T has to be prime
 $E > T$ & also even since S is prime & all primes are odd after 2

T = odd #
S = prime #
 $E > T$
 $A + T + E + O$
 $9 + 3 + 4 + 0 = 16$

206. 80 ^{ninth-graders} In a survey of ninth-graders, 8 students reported that they have attempted a marathon. Of those 8 students, 2 reported that they actually completed a marathon. If 2.5% of the ninth-graders surveyed completed a marathon, how many ninth-graders were surveyed?

X = # of 9th graders surveyed 

$$2 = 2.5\% \text{ of } X$$

$$\frac{2}{.025} = \frac{.025X}{.025} \quad (80)$$

207. The line $y = kx$ intersects the line that passes through points $A(5, 0)$ and $B(0, 2)$ at a point P such that $AP:PB = 1:2$. What is the value of k ? Express your answer as a common fraction.

point $P = 1/3$ of distance from A to B

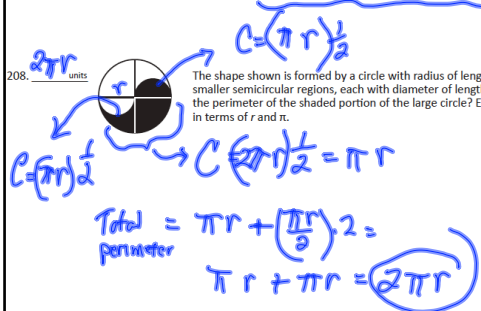
$$x\text{-coordinate} = 5 - \left(\frac{1}{3} \cdot 5\right) = \frac{10}{3}$$

$$y\text{-coordinate} = 0 + \left(\frac{1}{3} \cdot 2\right) = \frac{2}{3}$$

$$P = \left(\frac{10}{3}, \frac{2}{3}\right)$$

$$y = kx \rightarrow \frac{2}{3} = k \cdot \frac{10}{3} \rightarrow k = \frac{2}{10} = \frac{1}{5}$$

208. The shape shown is formed by a circle with radius of length r units and two smaller semicircular regions, each with diameter of length r units. What is the perimeter of the shaded portion of the large circle? Express your answer in terms of r and π .



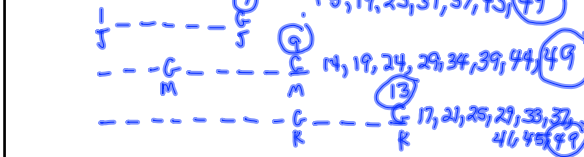
209. At the first store Arlene visited, she spent 40% of her money plus \$4. At the second store she spent 50% of her remaining money plus \$5. At the third store Arlene spent 60% of her remaining money plus \$6. When Arlene finished shopping at the three stores, she had \$2 left over. How many dollars did she have when she started shopping?

90

Work backwards: \$2 left
 So before she spent \$6 - she had \$8
 \$8 = 40% left after spending 60% so $8 \div .4 = \$20$ left after store 2.

Before spending \$5 - she had \$25.
 This \$25 was the other 50% left after spending 50%
 So she had $\$25 \div .5 = \50 after leaving store 1.
 Before she left store 1 she must have had \$54.
 This \$54 was 60% of what left after spending 40%
 So she must have started with $\$54 \div .6 = 90$

6. Judith received a gift on the first day of the year and every sixth day after that. Mort received a gift on the fourth day of the year and every fifth day after that. Kale received a gift on the ninth day of the year and every fourth day after that. On how many days during the year did all three receive a gift on the same day?



First time = 49

LCM of 4, 5, 6 = 60 so every 60 days they will receive a gift on the same day

$$\begin{array}{r} 365 \\ - 49 \\ \hline 316 \end{array}$$

$$\begin{array}{r} 60 \overline{) 316} \\ \underline{300} \\ 16 \end{array}$$

5 + 1 = 6 days