

1. Alavertz rents cars for \$48 a day and \$0.24 per mile driven. Tom rented a car for 3 days at a total cost of \$210. How many miles did Tom drive?
2. Find the remainder when  $P(x) = 2x^3 - 21x^2 + 19x - (ANS)$  is divided by  $(x - 11)$ .
3. If  $x$  represents a positive integer, find the smallest possible value for  $x$  such that  $\log(x + ANS) > 2.06$ .
4. The  $2\frac{3}{4}$  National Bank chartered buses with maximum capacity of 120 riders to take customers to a dinner and show in Milwaukee.  $ANS$  customers signed up and the price was set at \$150 per ticket. The bank agreed to reduce the price for every customer by \$1 per ticket for each additional ticket sold. How many total tickets should be sold to maximize the revenue for this trip?

ANSWERS

1. 275 (Miles optional.)
2. 55
3. 60
4. 105 (Tickets optional.)

1. Find the value of  $\frac{\frac{2}{3} + \frac{1}{2}}{\frac{5}{15} - \frac{2}{10}}$ .
2. Pizza Party Palace offers two options for its customers. On the regular plan, a customer pays a \$5 fee and \$0.50 per game played. Or the customer can pay (\$*ANS*) as a fee and only \$0.25 per game played. What is the least number of games a customer must play to make the second plan less expensive than the regular plan?
3. Find the perimeter of a regular nonagon inscribed in a circle with radius of length *ANS*. Round your answer to the nearest hundredth of a unit.
4. *ANS* should be a decimal in the form  $k.w$  where  $k$  represents the integer part of the decimal and  $w$  is the integer formed by the digits after the decimal point.  
 $P(x) = x^2 + bx + c$  is a quadratic polynomial with integer coefficients whose zeroes sum to  $w$  and have product  $k$ .  $Q(x) = x^2 + Bx + C$  is also a quadratic polynomial with integer coefficients whose zeroes are each double the zeroes of  $P(x)$ . Find the sum  $(B + C)$ .

ANSWERS

1. 9
2. 17 (Games optional.)
3. 104.66 (Must be this decimal, units optional.)
4. 284

1. Solve for  $x$  if  $\frac{1}{x+3} + \frac{5}{x^2-9} = \frac{2}{x-3}$ .
2. The harmonic mean of some terms is found by dividing the number of terms by the sum of the reciprocals of the terms. For example, the harmonic mean of 2, 3 and  $\frac{1}{12}$  is  $\frac{18}{77}$  because  $\frac{3}{\frac{1}{2} + \frac{1}{3} + 12} = \frac{18}{77}$ . For your problem, find the harmonic mean of  $\frac{44}{3}$  and  $ANS$ .
3. Let  $ANS = k$ . Points  $R$ ,  $S$ , and  $P$  have coordinates  $R(-1,6)$ ,  $S(-4,2)$ , and  $P(x,y)$ . In vector notation,  $\overline{RP} = k\overline{RS}$ . Find the value of  $x$ , the x-coordinate of point  $P$ .
4. Let  $ANS = y^2 - 6x + 2y + 45$ . The graph of this equation is a parabola with focus  $(k, w)$ . Find the sum  $(k + w)$ .

ANSWERS

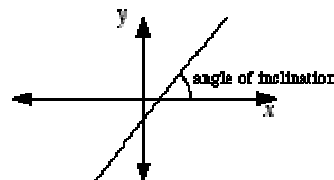
1. -4
2. -11
3. 32
4. 2.5 or  $\frac{5}{2}$  or  $2\frac{1}{2}$

1. A father is 4 times as old as his daughter. In six years, he will be 3 times as old as she is then. How old will the daughter be in six years? (Assume all ages are whole numbers of years.)
2. How many integral solutions exist such that  $3|x-7|+6 \leq ANS$  ?
3.  $ANS = x^2 + 2xy + y^2$ . Find the exact distance between the two branches of the graph of this relation.
4. (Notation:  $f(x) = \text{Arc tan } x$  represents the inverse tangent function.) Let  $k = ANS$ . Find the value of  $\cos(2\text{Arc tan } k)$ . Write your answer as a reduced common fraction.

ANSWERS

1. 18 (Years optional)
2. 9
3.  $3\sqrt{2}$  (Must be this exact radical.)
4.  $-\frac{17}{19}$  or  $\frac{-17}{19}$  or  $\frac{17}{-19}$  (Must be a reduced common fraction.)

1. In this problem,  $i = \sqrt{-1}$ .  $\frac{7+3i}{4i}$  can be simplified to a complex number of the form  $k + wi$ . Find the sum  $(k + w)$ .
2. For all real numbers  $x$ ,  $f(x+1) = (ANS)f(x) + 1$  and  $f(0) = 6$ . Find the value of  $f(5)$ .
3. Let  $k = ANS$ .  $f(x) = 3\sin x + k\cos x$  with  $x$  measured in degrees. Find the least positive angle such that  $f(x) = 0$ . Round your answer to the nearest degree.
4. The angle of inclination for a line is the angle  $\alpha$ ,  $0^\circ \leq \alpha < 180^\circ$ , measured counterclockwise from the part of the  $x$ -axis in the positive direction from the line. Let  $ANS$  be the angle of inclination, in degrees, for a line that passes through the point  $(5, 4)$ . This line crosses the  $x$ -axis at  $(k, 0)$ . Find the value of  $k$  as a decimal rounded to the nearest hundredth of a unit.



ANSWERS

1. -1
2. -5
3. 59 (Degrees optional.)
4. 2.60 (Must be this decimal, last "0" is significant, no ordered pair.)