

1. If gasoline costs \$3.80 per gallon and your car has a 16-gallon tank that is $\frac{3}{4}$ empty, how much will it cost to fill the tank?	1. \$ 45.60
2. From 7:45 pm to 9:30 pm, Jim drove a distance of 84 miles at a constant speed. What was his speed in miles per hour?	2. 48 mph
3. Margaret has a farm with pigs and chickens. She counts 30 feet and 9 heads at her farm. How many of each animal does she have? (There are <i>no</i> two-headed chickens!)	3. <u>6</u> pigs <u>3</u> chickens
4. If you earn a commission of 2.5% on each sale, how much would you earn on a sale of \$125,000.00?	4. \$ 3125
5. Simplify $\left(\frac{25}{9}\right)^{-\frac{3}{2}}$ and express your answer as a common fraction.	5. $\frac{27}{125}$
6. Find the length of segment AC in right triangle ABC. Figure not drawn to scale. Give your answer in simplest radical form.	6. $4\sqrt{3}$
7. Simplify: $\frac{2^{-1}+3^{-1}}{6^{-1}}$ . Express your answer as a common fraction or integer.	7. 5
8. The <b>harmonic mean</b> , $m$ , of $a$ and $b$ is given by $m = \frac{ab}{a+b}$ . What is the harmonic mean of 3 and 6?	8. 4
9. Superman and Batman are balanced at opposite ends of a seesaw. Superman weighs 220 pounds and is 9 feet from the fulcrum. If Batman is 10 feet from the fulcrum, how many pounds does Batman weigh?	9. 198 pounds
10. Tim is twice as old as Zack, but Zack is three times as old as Mary was three years ago. Mary is eight years old. How old is Tim?	10. 30 years old
11. If $x-3y=7$ , what is the value of $3x-9y$ ?	11. $9y+21$
12. If $n$ is a positive number and $\frac{1}{n} - \frac{1}{n} = \frac{1}{56}$ , what is the value of $n$ ?	12. 7
13. Given $\langle a b \rangle = ab - a - b$ , find the value of $b$ in the equation $\langle 3 b \rangle = 5$ .	13. 4
14. Three positive integers are in the ratio 1:3:4 and have a sum of 72. What is the smallest of the three integers?	14. 9
15. Given $f(x) = x^2 - x - 1$ , find $f(-x)$	15. $x^2 + x - 1$

16. . If $x = \frac{7}{10}$ is a solution for $ax + \frac{1}{2} = \frac{5}{3}$ , then $a = ?$ Give your answer as a common fraction.	16. $\frac{5}{3}$
17. A piece of wire 36 inches long is cut into 12 pieces that are soldered together to form the frame of a cube (all edges). What is the volume of the largest cube that can be formed with the wire?	17. 27 cubic units
18. What reduced common fraction is equivalent to $20\frac{5}{6}$ ?	18. $\frac{5}{24}$
19. If $n! = (n)(n-1)(n-2)\cdots(3)(2)(1)$ , for what value of $n$ will $(7!)(5!)(3!)(1!) = n!$ ?	19. 10
20. For the equation $2x^2 - x - 6 = 0$ , what is the sum of the two solutions?	20. $\frac{1}{2}$
21. What is the least common multiple of 45, 60, and 75?	21. 900
22. Find the positive difference between the two solutions for $ x+3  = 6$ .	22. 12
23. Let the function $f$ be defined as: $f(a) = a^2 + b$ . Evaluate $3f(5f(6))$ .	23. 16
24. Daniel reads 45 pages of his book on the first day. The next day, he reads 47 pages. On the third day, he reads 49 pages. At this rate, how many pages will he have read by the end of the fifth day?	24. 245 pages
25. Two lines are drawn on a Cartesian coordinate system with equations $2x + y = 3$ and $10x + 5y = 17$ . How many points of intersection do these two lines have?	25. 0 points
26. Given rectangle WXYZ, if the area of $\triangle WYZ$ is 6.8, what is the area of $\triangle ZXV$ ? Figure not drawn to scale.	26. 13.6
27. A climber's altitude changes from 11,000 feet to 660 feet. Find the percent of change in the climber's altitude to the nearest tenth of a percent.	27. 5.5 %
28. When the repeating decimal $0.4\overline{6}$ is expressed as a fraction in lowest terms, what is the sum of its numerator and denominator?	28. 22
29. If $x^y = (x^y)^x$ , what is the units digit of $x^y$ ?	29. 4
30. How many cubic centimeters are in the volume of a cone having a diameter of 10 cm and a height of 6 cm? Express your answer in terms of $\pi$ .	30. $50\pi \text{ cm}^3$

Tie-breaker: On the back of this paper, show that if  $n$  is a positive, odd integer,  $n^2$  must be odd. If  $n$  is odd, it may be written as  $(2k+1)$ .  $(2k+1)^2 = 4k^2 + 4k + 1$ . But  $4k^2 + 4k$  is even because it is divisible by 2, so  $2(2k^2 + 2k) + 1$  is odd.