Solving Equations
Applications

1. At the Blue Moon Entertainment Park there is a $35 entry fee (includes free drinks and three rides). There is a $5 charge for every additional ride. Pauline goes to the park and decides to go on more than the three free rides. If she paid $75 for the ticket, how many rides did she go in all?

$c = 75$

c: cost r: ride

$$C = 35 + 5(r-3)$$
$$75 = 35 + 5(r-3)$$
$$75 = 35 + 5r - 15 \quad \text{— CLT}$$
$$75 = 20 + 5r$$
$$\frac{75 = 20 + 5r}{-20 \quad -20}$$
$$\frac{55}{5} = \frac{5r}{5}$$
$$11 = r$$

11 rides

2. A common heuristic for calculating the temperature in Fahrenheit is to count the number of chirps of the tree cricket per minute, divide that number by 4 and then add 40 to the result. According to this, if C represents the number of chirps per minute, what is the temperature in degrees Fahrenheit F, in terms of c?
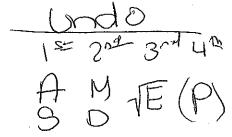
F: temp, F c: chirps

$$F = \frac{c}{4} + 40$$

3. In Collin County, there is a $40 base charge for a speeding ticket. For every mile per hour the driver travels above the speed limit there is an additional $6 charge. If the speed limit is 30 miles per hour and David was charged $130 for a speeding ticket, how fast, in miles per hour, was David driving?

c: cost S: speed $c = 130$

$$C = 40 + 6(S-30)$$
$$130 = 40 + 6(S-30)$$

S	-30
6	$6S$	-180

$$130 = 40 + (6S - 180) \quad \text{—) CLT}$$
$$130 = 6S - 140$$
$$\frac{130 = 6S - 140}{+140 \qquad +140}$$
$$\frac{270}{6} = \frac{6S}{6}$$
$$45 = S$$

45 mph

4. Coach Underwood wants to purchase football t-shirts for his team. The printing company charges $400 dollars for the first 40 t-shirts. The charge for additional shirts is eight times the difference between the number of shirts and 40. Write an equation that Coach Underwood can use to determine t, the number of shirts he can buy if he spends c dollars.

c: cost t: t-shirts

$$C = 400 + 8(t-40)$$

5. Kathy rented a moving truck from Best Rentals. The total rental cost included a one-time fee of $55 and $1.20 for each mile driven.

a. Write an equation to represent t, the total cost of renting the truck that was driven for m miles.

$$T = 55 + 1.20m$$

b. How many miles did Kathy drive if charge was $337?

with Algebraic method

$$T = 55 + 1.20m$$
$$337 = 55 + 1.20m$$
$$-55 \quad -55$$
$$\frac{282}{1.20} = \frac{1.20m}{1.20}$$
$$235 = m \quad \boxed{235 \text{ miles}}$$

6. The speed of sound in air, S, in meters per second, can be modeled using the equation $S(t) = 331.3 + 0.61t$ where t is the temperature in degrees Celsius. According to the model, for what value of t in Celsius is the speed of sound 352.65 meters per second?

$$S(t) = 331.3 + 0.61t$$

$$352.65 = 331.3 + 0.61t$$
$$-331.30 \quad -331.3$$
$$\frac{21.35}{0.61} = \frac{0.61t}{0.61}$$
$$35 = t$$

$$\boxed{35°C}$$

7. Find the solution of the equation

$$17 = \frac{2}{3}n + 3$$
$$-3 \qquad -3$$

$$14 \div \frac{2}{3} = $$

$$14\left(\frac{3}{2}\right)$$

$$14 = \frac{2}{3}n$$
$$\frac{2}{3} \quad \frac{2}{3}$$

$$\boxed{21 = n}$$

8. What value of x satisfies this equation?

$$-4(x-3) = -6x - 6$$

$$-4x + 12 = -6x - 6$$
$$-12 \qquad -12$$
$$-4x = -6x - 18$$
$$+6x \quad +6x$$
$$\frac{2x}{2} = \frac{-18}{2}$$

$$\boxed{x = -9}$$

9. The length of the base of an equilateral triangle is 8 centimeters less than three times a number, n. If the perimeter is 75 centimeters, find the value of the number, n.

→ All sides same measure

b: base length

$$b = 3n - 8$$
Perimeter $= S + S + S$

$$P = (3n-8) + (3n-8) + (3n-8)$$
$$75 = (3n-8) + (3n-8) + (3n-8)$$
combine Like Terms

$$75 = 9n - 24$$
$$+24 \qquad +24$$
$$\frac{99}{9} = \frac{9n}{9}$$
$$11 = n$$

$$\boxed{n = 11}$$