2.6 SIMPLE EQUATIONS

PART A

1) State the operation that would be applied to both sides of the equation to solve for the unknown.

   a) $x+5=12$ b) $y-4=5$ c) $10+x=14$ d) $t+(-2)=6$ e) $-8=x-6$

2) State the operation that would be applied to both sides of the equation to solve for the unknown.

   a) $2x=16$ b) $3y=27$ c) $-5x=20$ d) $-9n=-45$ e) $32=8x$ f) $-10=-15k$

3) Solve (determine the value of the unknown).

   a) $x+6=10$ b) $y-7=8$ c) $x-7=-7$ d) $5+m=-6$ e) $-9+t=-15$

4) Solve.

   a) $2x=14$ b) $3x=18$ c) $5n=-20$ d) $-2p=10$ e) $-10x=-80$

5) Solve.

a) $3y-7=8$ b) $6x+2=-10$ c) $2w+17=53$ d) $5x+5=-10$

PART B

6) Solve.

   a) $x+9=15$ b) $p-10=13$ c) $24=8x$ d) $6y=-30$

   e) $-9=k+7$ f) $-4h=28$ g) $x+(-3)=9$ h) $-4x=-32$

   i) $-8=27-5x$ j) $15=2m-9$ k) $-40=8-6s$ l) $-44=-3k-2$

   m) $29=-8t-3$ n) $-13x-19=-6$ o) $-4-8y=36$ p) $7-5u=-43$

7) Solve.

   a) $3x=14+19$ b) $9x-4x=20$ c) $24-38=7t$ d)
$3x+2x+3=13$

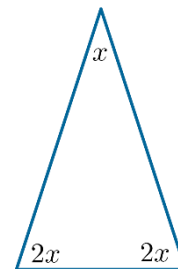   e) $3y-8+2y=-12-6$ f) $3x-7x=0$ g) $3r+r+2r-6=11+2-7$

   h) $10x-15x=43+32$ i) $16+(-52)=-8b+4b$ j) $14x-(-2x)=-25-23$

8) At a school coffee house event, a cookie costs $0.95. Kirra spent a total of $12.35 on cookies for her and her friends.
   a) Write an equation to model the number of cookies that Kirra purchased.
          b) Solve your equation to determine the number of cookies that Kirra bought.

9) A triangle has angles of x, $2x$ and $2x$, as shown on the right.
   a) Create an equation that could be used to determine the value of x.
   b) Solve your equation to find the value of x.

10) After solving an equation, we can check our solution by comparing the left and right sides of the original equation with the solution value substituted for the variable. Consider the following example:

Solve $3x - x = -19 + 11$

Solution:
$$3x - x = -19 + 11$$
$$2x = -8$$
$$x = \frac{-8}{2}$$
$$x = -4$$

Check:

Left Side	Right Side
$3x - x$	$-19 + 11$
$= 3(-4) - (-4)$	$= -8$
$= -12 - (-4)$	
$= -8$	

$\therefore$ left side = right side
$\therefore$ the solution $x = -4$ is correct

Solve each of the following equations and check your answers.

   a) $8x + 2x = 65 - 35$
   b) $4x - 6x = -9 + (-15)$
   c) $1.2 - 8.7 = 3x$

11) At his summer job, Alan earns x dollars per hour. Rawan earns double Alan's hourly wage and Mikayla earns double Rawan's hourly wage. If all three students work one hour, their combined earnings equal $99.75.
   a) Create an equation that could be used to determine the value of x.
   b) Solve your equation to find the value of x.
   c) Determine each student's hourly wage.

12) **Root of an Equation:** A solution of an equation is commonly referred to as a **root** of the equation. Find the root of each of the following equations. Express each answer as a fraction in simplest (reduced) form.

   a) $9x = 6$
   b) $-3n = -1$
   c) $26x - 12x = -7$
   d) $-3 + 38 = 15y$
   e) $-8x - 7x = 15 + 9$

PART C

13) Explain why the equation $0x = 5$ does not have a solution.

14) Explain why the equation $0x = 0$ has infinitely many solutions.

15) Solve.

   a) $3x - 3x = 15 + 13$
   b) $3x + 4x - 7x = 4 - 15$
   c) $-8x - 2x + 10x = -3 + 15 - 12$
   d) $8x + 9x - 10x = -90 + 120 - 30$

16) Sabrina has an identical number of quarters, dimes and nickels. In total, she has $11.20.
   a) Create an equation to model the number of coins that Sabrina has.
   b) Solve your equation to determine how many of each coin she has.

ANSWERS

1) a) subtract 5   b) add 4   c) subtract 10   d) subtract -2 (or add 2)   e) add 6

2) a) divide by 2   b) divide by 3   c) divide by -5 d) divide by -9 e) divide by 8

f) divide by -15

3) a) $x = 4$ b) $y = 15$ c) $x = 0$ d) $m = -11$ e) $t = -6$

4) a) $x = 7$ b) $x = 6$ c) $n = -4$ d) $p = -5$ e) $x = 8$

5) a) y=5 b) x=-2 c) w=18 d) x=-3

6) a) $x = 6$ b) $p = 23$ c) $x = 3$ d) $y = -5$ e) $k = -16$ f) $h = -7$ g) $x = 12$

h) $x = 8$ i) $x = 7$ j) $m = 12$ k) $s = 8$ l) $k = 14$ m) $t = -4$ n) $x = -1$

o) $y = -5$ p) $u = 10$

7) a) $x = 11$ b) $x = 4$ c) $t = -2$ d) x=2   e) y= -2   f) $x = 0$ g) r=2

h) $x = -15$ i) $b = 9$ j) $x = -3$

8) a) $0.95x = 12.35$, where x represents the number of cookies purchased   b) 13 cookies

9) a) Answers may vary. For example, $x + 2x + 2x = 180°$ or $5x = 180°$ b) $x = 36°$

10) a) $x = 3$ (both sides equal 30)   b) $x = 12$ (both sides equal -24)

c) $x = -2.5$ (both sides equal -7.5) width = 21 cm, length = 63 cm

11) a) Answers may vary. For example, $x + 2x + 4x = 99.75$ or $7x = 99.75$ b) $x = 14.25$

c) Alan earns \$14.25/h, Rawan earns \$28.50/h and Mikayla earns \$57.00/h.

12) a) $x = \dfrac{2}{3}$ b) $n = \dfrac{1}{3}$ c) $x = -\dfrac{1}{2}$ d) $y = \dfrac{7}{3}$ $\left(\text{or } 2\dfrac{1}{3}\right)$ e) $x = -\dfrac{8}{5}$ $\left(\text{or } -1\dfrac{3}{5}\right)$

13) $0x = 5$ means that 0 multiplied by x equals 5, which is impossible since the result of 0 multiplied by anything is 0. Therefore, the equation has no solutions.

14) $0x = 0$ means that 0 multiplied by x equals 0, which is true for any value of x. Therefore, the equation has infinitely many solutions.

15) a) no solution   b) no solution   c) infinitely many solutions   d) $x = 0$

16) a) Answers may vary. For example, $0.25x + 0.10x + 0.05x = 11.20$ or $0.4x = 11.20$, where x represents the number of each coin.   b) 28 of each coin