

Exercise Solutions

Exercise 1

$$1. \quad x + 5 - 5 = 27 - 5 \\ x = 22$$

$$2. \quad x - 3 + 3 = 19 + 3 \\ = 2$$

$$3. \quad 33 - 3 = x + 3 - 3 \\ 30 = x$$

$$4. \quad 14 + 7 = x - 7 + 7 \\ 21 = x$$

Exercise 2

$$1. \quad 23 + 4 = x + 5 + 11 \\ 27 - 16 = x + 16 - 16 \\ 11 = x$$

$$2. \quad 16 - 3 = x - 10 + 7 \\ 13 + 3 = x - 3 + 3 \\ 16 = x$$

$$3. \quad x - 31 - 12 = 15 - 13 \\ x - 43 + 43 = 2 + 43 \\ x = 45$$

$$4. \quad x + 20 - 36 = 19 - 14 \\ x - 16 + 16 = 5 + 16 \\ x = 21$$

Exercise 3

$$1. \quad \frac{2x}{2} = \frac{14}{2} \\ x = 7$$

$$2. \quad \frac{x}{9} \times 9 = 6 \times 9 \\ x = 54$$

$$3. \quad \frac{110}{11} = \frac{11x}{11} \\ 10 = x$$

$$4. 12 \times 7 = \frac{x}{7} \times 7$$

$$84 = x$$

Exercise 4

$$1. 10x = (4)(5)$$

$$\frac{10x}{10} = \frac{20}{10}$$

$$x = 2$$

$$2. \frac{x}{3} = \frac{63}{9}$$

$$\frac{x}{3} \times 3 = 7 \times 3$$

$$x = 21$$

$$3. (14)(2) = 7x$$

$$\frac{28}{7} = \frac{7x}{7}$$

$$4 = x$$

$$4. \frac{48}{4} = \frac{x}{5}$$

$$12 \times 5 = \frac{x}{5} \times 5$$

$$60 = x$$

Problem Set Solutions

$$1. a) x + 4 - 4 = 12 - 4$$

$$x = 8$$

$$b) 19 + 11 = x - 11 + 11$$

$$30 = x$$

$$c) -27 = x - 15 - 34$$

$$-27 + 49 = x - 49 + 49$$

$$22 = x$$

$$d) 71 - 36 = x + 15 + 8$$

$$35 - 23 = x + 23 - 23$$

$$12 = x$$

$$\begin{aligned} \text{e) } -126 + 14 + x &= 6 - 20 \\ -112 + x + 112 &= -14 + 112 \\ x &= 98 \end{aligned}$$

$$\begin{aligned} \text{f) } 47 - 21 + 8 &= 16 + x - 58 \\ 34 + 42 &= x - 42 + 42 \\ 76 &= x \end{aligned}$$

$$\begin{aligned} 2. \text{ a) } \frac{6x}{6} &= \frac{48}{6} \\ x &= 8 \end{aligned}$$

$$\begin{aligned} \text{b) } 4 \times 8 &= \frac{x}{8} \times 8 \\ 32 &= x \end{aligned}$$

$$\begin{aligned} \text{c) } 6x &= (12)(3) \\ \frac{6x}{6} &= \frac{36}{6} \\ x &= 6 \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{27}{3} &= \frac{x}{9} \\ 9 \times 9 &= \frac{x}{9} \times 9 \\ 81 &= x \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{(10)(6)}{5} - 3^2 &= \frac{x}{4} \\ (12 - 9) \times 4 &= \frac{x}{4} \times 4 \\ 12 &= x \end{aligned}$$

$$\begin{aligned} \text{f) } (6)(3) - \frac{(7)(12)}{4} &= \frac{x}{8} - (5)(2) \\ 18 - 21 + 10 &= \frac{x}{8} - 10 + 10 \\ 7 \times 8 &= \frac{x}{8} \times 8 \\ 56 &= x \end{aligned}$$

3. Let x be Linlin's present age

$$\begin{aligned} x - 17 &= 8 \\ x - 17 + 17 &= 8 + 17 \\ x &= 25 \end{aligned}$$

\therefore Linlin is now 25.

4. Let x be the amount of bridge that Jon must build.

$$\begin{aligned}x + 3 &= 17 \\x + 3 - 3 &= 17 - 3 \\x &= 14\end{aligned}$$

\therefore Jon must build 14 metres more of the bridge.

5. Let x be the number of green shoes.

$$\begin{aligned}x + 2 + 3 + 1 &= 9 \\x + 6 - 6 &= 9 - 6 \\x &= 3\end{aligned}$$

\therefore 3 pairs of shoes are green.

6. Let x be the amount of change that Gary received.

$$\begin{aligned}x + 56.95 &= 2(50) \\x + 56.95 - 56.95 &= 100 - 56.95 \\x &= 43.05\end{aligned}$$

\therefore Gary received \$43.05

7. Let x be the number of hockey cards Matt bought.

$$\begin{aligned}8x &= 96 \\ \frac{8x}{8} &= \frac{96}{8} \\ x &= 12\end{aligned}$$

\therefore Matt bought 12 cards.

8. Let x be the time Gabby took to finish her training.

$$\begin{aligned}\frac{60}{15} &= \frac{x}{25} \\ 4 \times 25 &= \frac{x}{25} \times 25 \\ 100 &= x\end{aligned}$$

\therefore It took 100 minutes to finish the training.

9. Let x be the number of gum balls Sarah bought

$$\begin{aligned}25 - 3x &= 16 \\ 25 - 3x - 25 &= 16 - 25 \\ \frac{-3x}{-3} &= \frac{-9}{-3} \\ x &= 3\end{aligned}$$

\therefore Sarah bought 3 gum balls.

10. Let x be the other number.

$$\begin{aligned} -36 + x &= 32 \\ -36 + x + 36 &= 32 + 36 \\ x &= 68 \end{aligned}$$

\therefore The other number is 68.

11. Let x be the number as described in the question

$$\begin{aligned} \frac{1}{3}x &= 30 \\ \frac{1}{3}x \times 3 &= 30 \times 3 \\ x \times 3 &= 90 \times 3 \\ 3x &= 270 \end{aligned}$$

\therefore $3x$ is 270

12. Let x be the number

$$\begin{aligned} 59 &= 9x + 5 \\ 59 - 5 &= 9x + 5 - 5 \\ \frac{54}{9} &= \frac{9x}{9} \\ 6 &= x \end{aligned}$$

13. Let a be as described in the question

$$\begin{aligned} b + c &= 18 \\ b + 12 &= 18 \\ b + 12 - 12 &= 18 - 12 \\ b &= 6 \end{aligned}$$

$$\begin{aligned} a + b &= 33 \\ a + 6 &= 33 \\ a + 6 - 6 &= 33 - 6a &= 27 \end{aligned}$$

\therefore a is 27

14. Let s , k , and b be the prices of the soccer ball, basketball and baseball respectively.

$$s + k + b = 75 \tag{1}$$

$$s + 3k + b = 129 \tag{2}$$

$$s + k + 4b = 117 \tag{3}$$

$$\begin{array}{rcl}
 (3) - (1) = 117 - 75 & & (2) - (1) = 129 - 75 \\
 s + k + 4b - (s + k + b) = 42 & & s + 3k + b - (s + k + b) = 54 \\
 s + k + 4b - s - k - b = 42 & & s + 3k + b - s - k - b = 54 \\
 \frac{3b}{3} = \frac{42}{3} & & \frac{2k}{2} = \frac{54}{2} \\
 b = 14 & & k = 27
 \end{array}$$

Going back to equation (1), we have

$$\begin{array}{r}
 s + k + b = 75 \\
 s + 27 + 14 = 75 \\
 s + 41 - 41 = 75 - 41 \\
 s = 34
 \end{array}$$

\therefore Soccer balls cost \$34 each.

15. Let x be the amount of dough (in grams) needed.

$$\begin{array}{r}
 \frac{10}{15} = \frac{x}{120} \\
 \frac{2}{3} \times 120 = \frac{x}{120} \times 120 \\
 80 = x
 \end{array}$$

\therefore 80 grams of dough is needed.

16. Let x be the cost to rent the building for a month.

$$\begin{array}{r}
 (15)(20) - x = 150 \\
 300 - x - 300 = 150 - 300 \\
 -x = -150 \\
 x = 150
 \end{array}$$

\therefore It costs \$150 to rent the building for a month.

17. Let j and m be Jessica's age and her mother's age respectively.

$$\begin{array}{r}
 j \times 10 = \frac{1}{10}m \times 10 \\
 10j = m \tag{1} \\
 7(j + 1) = m + 1 \tag{2}
 \end{array}$$

Using substitution, we get

$$\begin{aligned}
 7(j+1) &= (10j) + 1 \\
 7j + 7 &= 10j + 1 \\
 7j + 7 - 7j &= 10j + 1 - 7j \\
 7 - 1 &= 3j + 1 - 1 \\
 \frac{6}{3} &= \frac{3j}{3} \\
 2 = j &\Rightarrow m = 20
 \end{aligned}$$

\therefore The difference in their ages is 18 years

18. Let x be the number of shovels of concrete needed.

$$\begin{aligned}
 \frac{4}{1} &= \frac{x}{350} \\
 4 \times 350 &= \frac{x}{350} \times 350 \\
 1400 &= x
 \end{aligned}$$

\therefore 1400 shovels of stone is required.

19. Let l , s , and t be the largest, smallest and third angles respectively.

$$l = 35 + s \tag{1}$$

$$t = s + 10 \tag{2}$$

$$180 = l + s + t \tag{3}$$

Substituting equations (1) and (2) into equation (3), we have

$$\begin{aligned}
 180 &= (35 + s) + s + (s + 10) \\
 180 - 45 &= 3s + 45 - 45 \\
 \frac{135}{3} &= \frac{3s}{3} \\
 45 &= s
 \end{aligned}$$

\therefore The number of degrees of the smallest angle is 45.

20. a) x

b) x^2

c) $x^2 + x$

d) $\frac{x^2 + x}{x} = x + 1$

e) $x + 1 + 20 = x + 21$

$$\text{f) } x + 21 - x = 21$$

$$\text{g) } \frac{21}{7} = 3$$