

Expressions

$$\Rightarrow 3y, 2x + 1, \frac{9}{4}$$

Equation (solvable)

$$\Rightarrow 3x + 2 = 14$$

Formulae (more than one variable)

$$\Rightarrow \begin{aligned} v &= u + at \\ s &= \frac{d}{t} \end{aligned} \left[\begin{array}{l} \text{solvable} \\ \text{if we} \\ \text{know the} \\ \text{value of} \\ \text{some of the} \\ \text{variables} \end{array} \right]$$

Solving Equations

\Rightarrow Use SAMDEB!

Unwrap the variable by using opposite operations.

Example: solve and verify

$$4x - 3 = 15$$

$$4x - 3 + 3 = 15 + 3$$

$$\frac{4x}{4} = \frac{18}{4}$$

$$x = 4.5$$

Check (verify)

$$4(4.5) - 3 = 15$$

$$18 - 3 = 15 \checkmark$$

Smudger cuts grass and charges \$6.50 per hour plus \$4 for showing up.

a) Create a formula to model this.

Define the variables!

P = Price he charges.

n = # of hours worked.

$$\Rightarrow P = 6.5n + 4$$

| n | P |
|-----|-----------------------|
| 0 | $0(6.50) + 4 = 4$ |
| 1 | $6.50 + 4 = 10.50$ |
| 2 | $2(6.50) + 4 = 17$ |
| 3 | $3(6.50) + 4 = 23.50$ |

charge per hour showing up charge

+6.50
+6.50

b) How much does he charge for 6 hours work?

sub in $n = 6$

$$\Rightarrow P = 6.5(6) + 4$$

$$P = 39 + 4 \Rightarrow \text{Charges } \$43$$

$$P = 43$$

c) How many hours did he work if he earned \$62.50

sub in $P = 62.50$

$$\Rightarrow 62.50 = 6.5n + 4$$

$$62.50 - 4 = 6.5n + 4 - 4$$

$$\frac{58.50}{6.5} = \frac{6.5n}{6.5}$$

$$9 = n \Rightarrow 9 \text{ hours}$$

Inequalities

$$3 > 1 \quad [3 \text{ is greater than } 1]$$

$$2 < 6 \quad [2 \text{ is less than } 6]$$

$$x \geq 2 \quad [x \text{ is greater than or equal to } 2]$$

$$y \leq 4 \quad [y \text{ is less than or equal to } 4]$$

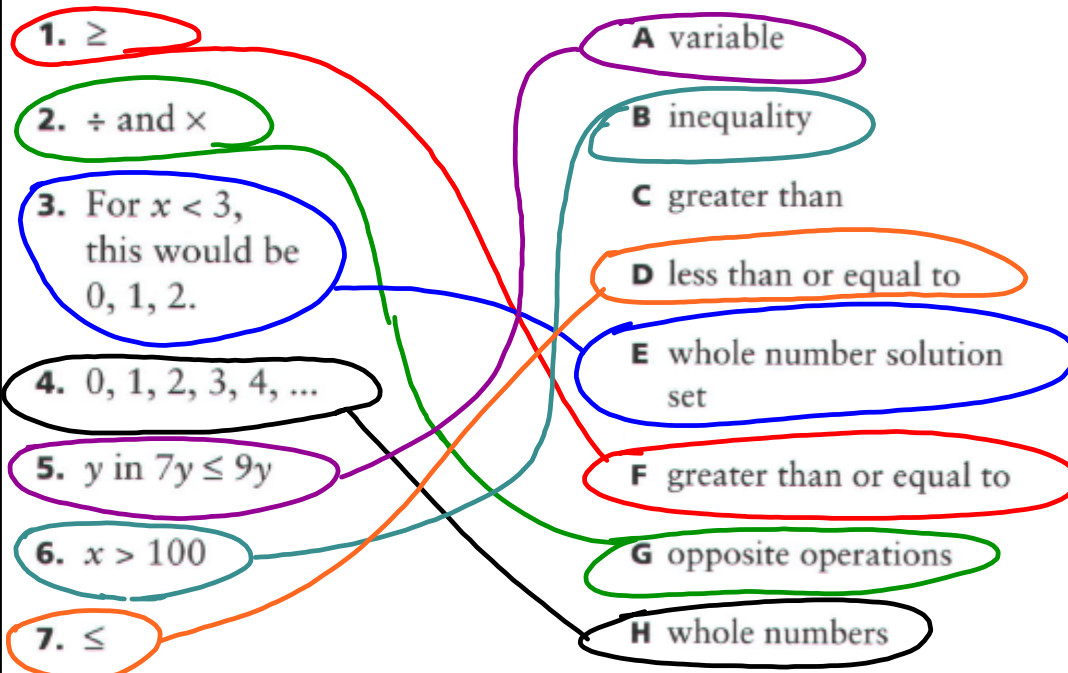
Patterning and Equations Review

Page 412 #s 1 - 22 NOT 8, 11, 13, 19

Solutions

Key Words

Match each example with the correct term.



9. Model each equation. Then, solve using the opposite operation.

a) $w + 9 = 15$

b) $26 = 4x$

a) $w + 9 = 15$
 $w + 9 - 9 = 15 - 9$
 $w = 6$

b) $\frac{26}{4} = \frac{4x}{4}$
 $6.5 = x$

c) $40 = y \div 5$

d) $1 = z - 4$

c) $40 = y \div 5$
 $40 \times 5 = y \div 5 \times 5$
 $200 = y$

d) $1 = z - 4$
 $1 + 4 = z - 4 + 4$
 $5 = z$

10. Solve each equation. Verify your solution.

a) $2m = 62$

c) $16.5 = 8.25y$

e) $9 = 4 + k$

b) $c \div 3 = 7$

d) $d - 10 = 15$

f) $6.3 = x \div 4$

a) $\frac{2m}{2} = \frac{62}{2}$

$m = 31$

Check
 $2(31) = 62 \checkmark$

c) $\frac{16.5}{8.25} = \frac{8.25y}{8.25}$

$2 = y$

Check
 $16.5 = 8.25(2) \checkmark$

e) $9 = 4 + k$

$9 - 4 = 4 + k - 4$

$5 = k$

Check
 $9 = 4 + 5 \checkmark$

b) $c \div 3 = 7$
 $c \div 3 \times 3 = 7 \times 3$
 $c = 21$

Check
 $21 \div 3 = 7 \checkmark$

d) $d - 10 = 15$
 $d - 10 + 10 = 15 + 10$
 $d = 25$

Check
 $25 - 10 = 15 \checkmark$

f) $6.3 = x \div 4$
 $6.3 \times 4 = x \div 4 \times 4$
 $25.2 = x$

Check
 $6.3 = 25.2 \div 4$

12. A photocopy company charges 3.4¢ per copy. A recent bill for a large customer came to \$40 851. This can be modelled using the equation $3.4p = 40\ 851$, where p represents the number of photocopies. How many photocopies were made?

$$3.4¢ = \$0.034$$

Formula should be

$$0.034p = 40851$$

$$\frac{0.034p}{0.034} = \frac{40851}{0.034}$$

$$p = 1,201,500 \text{ copies.}$$

14. For each equation, what operation will you undo first? Why?

a) $2k + 5 = 19$

b) $20.9 = 3y - 1$

c) $16 = 1 + 6n$

d) $12x - 7 = 29$

Use SAMDEB

a) Add 5

b) Subtract 1

c) Add 1

d) Subtract 7

15. Solve each equation in question 14.

Verify your solution.

a) $2k + 5 = 19$

b) $20.9 = 3y - 1$

c) $16 = 1 + 6n$

d) $12x - 7 = 29$

$$\begin{aligned} \text{a) } 2k + 5 &= 19 \\ 2k + 5 - 5 &= 19 - 5 \\ 2k &= \frac{14}{2} \\ k &= 7 \\ \text{Check: } 2(7) + 5 &= 19 \\ 14 + 5 &= 19 \checkmark \end{aligned}$$

$$\begin{aligned} \text{b) } 20.9 &= 3y - 1 \\ 20.9 + 1 &= 3y - 1 + 1 \\ 21.9 &= \frac{3y}{3} \\ 7.3 &= y \\ \text{Check: } 20.9 &= 3(7.3) - 1 \\ 20.9 &= 21.9 - 1 \checkmark \end{aligned}$$

$$\begin{aligned} \text{c) } 16 &= 1 + 6n \\ 16 - 1 &= 1 + 6n - 1 \\ 15 &= \frac{6n}{6} \\ 2.5 &= n \\ \text{Check: } 16 &= 1 + 6(2.5) \\ 16 &= 1 + 15 \checkmark \end{aligned}$$

$$\begin{aligned} \text{d) } 12x - 7 &= 29 \\ 12x - 7 + 7 &= 29 + 7 \\ 12x &= \frac{36}{12} \\ x &= 3 \\ \text{Check: } 12(3) - 7 &= 29 \\ 36 - 7 &= 29 \checkmark \end{aligned}$$

16. A hawk is hunting its prey. It begins its descent from a height of 63 m. This can be modelled using the formula $63 - h = 5.4t$, where t represents the time, in seconds, and h represents the height, in metres, above the ground. After how many seconds will the hawk reach a height of 5 m? Round your answer to the nearest 0.1 s.

$$\begin{aligned} 63 - h &= 5.4t \\ \text{Sub in } h &= 5 \\ 63 - 5 &= 5.4t \\ 58 &= \frac{5.4t}{5.4} \\ 10.74 &= t \end{aligned}$$

⇒ After 10.7 seconds.

17. Annie charges \$35 per month plus \$9.50 per hour to cut grass. Annie charges one customer \$63.50 for July.

- a) Write an equation to model this situation. Define your variables.
b) How many hours did Annie spend cutting grass in July for this customer?

$$C = \text{cost}$$

$$n = \# \text{ of hours}$$

$$C = 9.50n + 35$$

charge per hour fixed charge

| # hours | cost |
|---------|-------|
| 1 | 44.50 |
| 2 | 54.00 |
| 3 | 63.50 |

+ 9.50
+ 9.50

$$b) C = 9.50n + 35$$

$$63.50 = 9.50n + 35$$

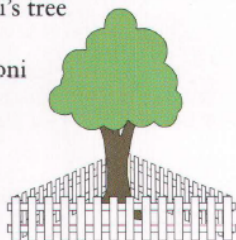
$$63.50 - 35 = 9.50n + 35 - 35$$

$$\frac{28.50}{9.50} = \frac{9.50n}{9.50}$$

$$3 = n$$

⇒ Annie spent 3 hours cutting grass.

18. The fence around Toni's tree is in the shape of an equilateral triangle. Toni wants to increase the length of each side by 5 cm. The perimeter of her new fence will be 66 cm. What is the original perimeter?



Yes, it must be a very small tree!

$$P = \text{perimeter}$$

$$x = \text{side length}$$

$$\text{original side length} = 22 - 5$$

$$= 17 \text{ cm}$$

$$P_{\text{OLD}} = 3(17)$$

$$= 51 \text{ cm}$$

⇒ old perimeter is 51 cm

$$\Rightarrow P = 3x$$

$$P_{\text{NEW}} = 3x$$

$$\frac{66}{3} = \frac{3x}{3}$$

$$22 = x$$

⇒ new side length = 22 cm

20. Model each situation using an inequality.

- a) There are fewer than 20 horses on the farm.
 b) He invites up to four people to his cottage.
 c) At least 35% of the music played on the radio is by a Canadian.

$$\begin{aligned} \text{a) } n &= \# \text{ horses} \\ \Rightarrow n &< 20 \end{aligned}$$

$$\begin{aligned} \text{b) } x &= \# \text{ people} \\ \Rightarrow x &\leq 4 \end{aligned}$$

$$\begin{aligned} \text{c) } m &= \text{music radio on} \\ c &= \text{Canadian music} \\ \Rightarrow c &\geq 0.35m \end{aligned}$$

21. Find the whole number solution set for each inequality.

a) $j + 4 > 35$

c) $2g \leq 12$

b) $17 < w - 3$

d) $5 + 3 \geq m$


$$\begin{aligned} \text{a) } j + 4 &> 35 \\ j + 4 - 4 &> 35 - 4 \\ j &> 31 \\ \Rightarrow j &= 32, 33, 34, \dots \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{2g}{2} &\leq \frac{12}{2} \\ g &\leq 6 \\ \Rightarrow g &= 6, 5, 4, 3, \dots \end{aligned}$$

$$\begin{aligned} \text{b) } 17 &< w - 3 \\ 17 + 3 &< w - 3 + 3 \\ 20 &< w \\ \Rightarrow w &= 19, 18, 17, \dots \\ \text{d) } 5 + 3 &\geq m \\ 8 &\geq m \\ \Rightarrow m &= 8, 7, 6, \dots \end{aligned}$$

22. A family has a monthly budget of \$1800 for food, rent, and clothing. They spend \$1050 per month on rent and \$630 for food. Develop an inequality modelling the money available for clothing each month.

| Monthly Budget | | \$1800 | | |
|----------------|----------|--------|--|--|
| 1 | food | \$630 | | |
| 2 | rent | \$1050 | | |
| 3 | clothing | | | |
| 4 | | | | |
| 5 | | | | |



$$f = \text{food}$$

$$r = \text{rent}$$

$$c = \text{clothing}$$

$$f + r + c \leq 1800$$

$$1050 + 630 + c \leq 1800$$

$$1680 + c \leq 1800$$

$$1680 + c - 1680 \leq 1800 - 1680$$

$$c \leq 120$$

⇒ Can spend a maximum of \$120 per month on clothing.