Name: _____ Date: _____

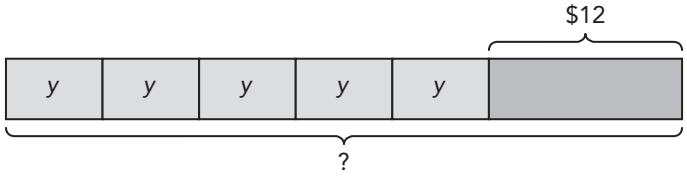
Lesson 7.5 Real-World Problems: Algebraic Expressions

Solve. Show your work.

Example

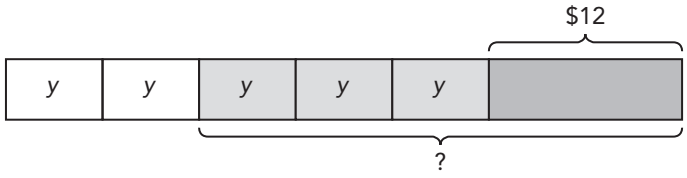
Andy has 5*y* dollars. Scott has \$12 more than Andy. Jacob has 2*y* dollars less than Scott.

a) Find how much money Scott has in terms of *y*.



Scott has $(5y + 12)$ dollars.

b) Find how much money Jacob has in terms of *y*.



$5y + 12 - 2y = 5y - 2y + 12$

$= 3y + 12$

Jacob has $(3y + 12)$ dollars.

c) If $y = 6$, how much money does Jacob have?

When $y = 6$, $3y + 12 = 3 \cdot 6 + 12$

$= 18 + 12$

$= 30$

Jacob has \$30.

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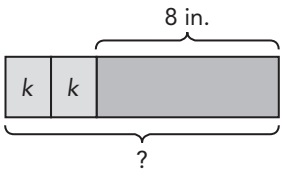
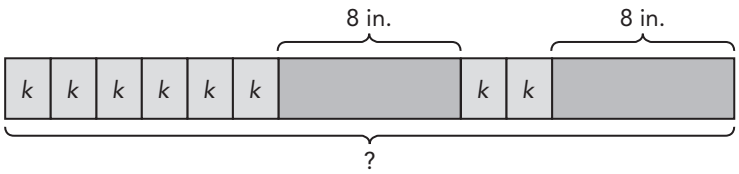
1. The figure shows a rectangle with a width of $2k$ inches. The length of the rectangle is 8 inches longer than the width.

a) Find the length of the rectangle in terms of k.



The length of the rectangle is _____ inches.

b) What is the perimeter of the rectangle in terms of k.



_____ + _____ + _____ + _____

= _____ + _____

= _____

The perimeter of the rectangle is _____ inches.

c) If $k = 3$, find the perimeter of the rectangle.

When $k = 3$,

The perimeter of the rectangle is _____ inches.

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2. Prince is $6n$ years old. Jordan is $3n + 10$ years older than Prince.

a) Find Jordan's age.

b) Find the total age of Prince and Jordan.

c) Kimberly is 9 years younger than Prince. Find Kimberly's age.

d) Find the total age of the three people.

e) If $n = 4$, find the total age of the three people.

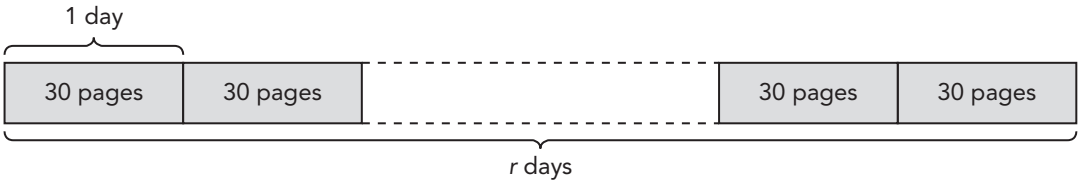
Name: _____ Date: _____

Solve. Show your work.

Example

Billy reads 30 pages of a novel each day.

a) If he continues to read the novel at this pace, how many pages can he read in r days?

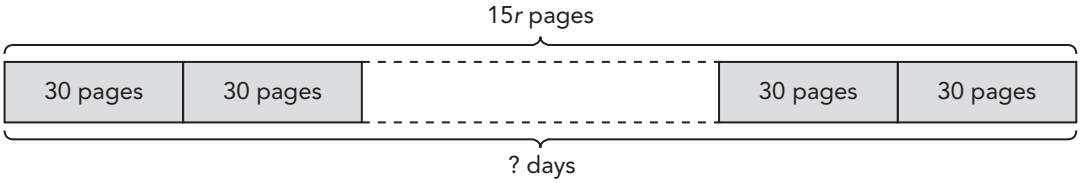


1 day → 30 pages

r days → $\underline{r}$ · $\underline{30}$ = $\underline{30r}$ pages

Billy can read $\underline{30r}$ pages of the novel in r days.

b) How many days will Billy take to read $15r$ pages of the novel?
Evaluate this expression when $r = 34$.



30 pages → 1 day

$15r$ pages → $\underline{15r}$ ÷ $\underline{30}$ = $\underline{\frac{15r}{30}}$ days

Billy will take $\underline{\frac{15r}{30}}$ days to read $15r$ pages of the novel.

When $r = 34$, $\frac{15r}{30} = \frac{15 \cdot 34}{30}$

$= \frac{510}{30}$

$= 17$

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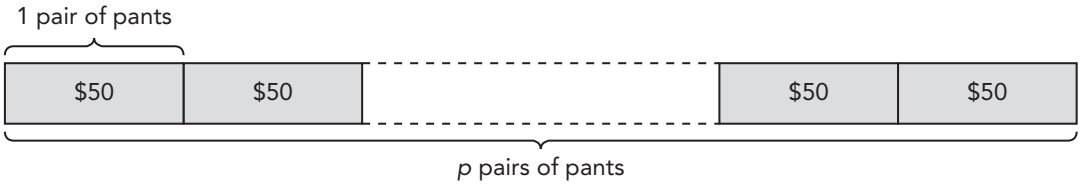
3. Each pair of pants Andy buys costs $50.

a) How much money does Andy need for p pairs of pants?

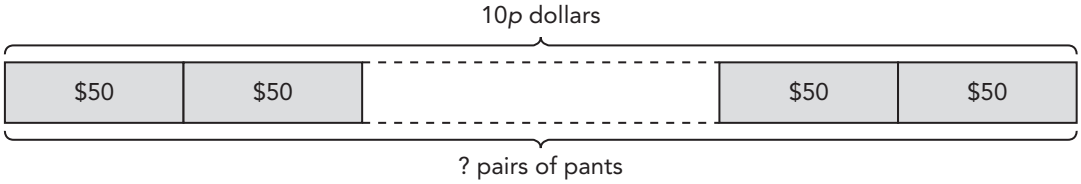


1 pair of pants → $50

3 pairs of pants → _____ · _____ = _____ dollars

Andy needs _____ dollars for p pairs of pants.

b) How many pairs of pants can Andy buy with $10p$ dollars?
Evaluate this expression when $p = 20$.



$50 → 1 pair of pants

$10p$ dollars → _____ ÷ _____ = _____ pairs of pants

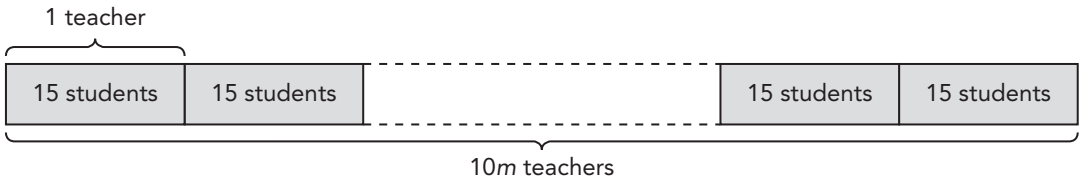
Andy can buy _____ pairs of pants with $10p$ dollars.

When $p = 20$,

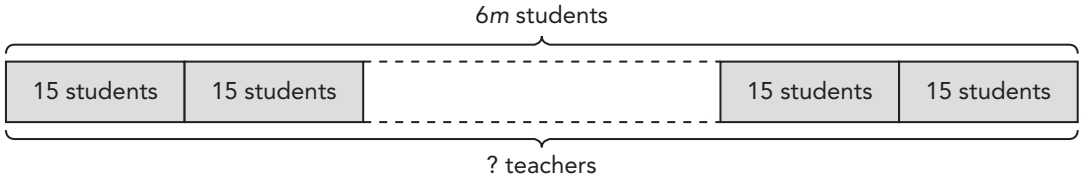
Name: _____ Date: _____

4. There are 15 students for every teacher in a school.

a) How many students are there if there are 10*m* teachers?



b) How many teachers are there if there are 6*m* students?
Evaluate the expression when $m = 20$.



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Solve. Show your work.

Example

An apple has a mass of $2v$ grams. A pear is 12 grams heavier than the apple.
An orange is 3 times as heavy as the pear.

a) Find the total mass of the three fruits in terms of v.

Mass of the apple = $2v$

Mass of the pear = $2v$ + 12

= $2v + 12$ grams

Mass of the orange = 3 · $2v + 12$

= $6v + 36$ grams

Total mass of the three fruits = $2v$ + $2v + 12$ + $6v + 36$

= $2v + 2v + 6v + 12 + 36$

= $10v + 48$ grams

The total mass of the three fruits is $10v + 48$ grams.

b) If $v = 5$, find the total mass of the three fruits.

When $v = 5$,

Total mass of the 3 fruits $= 10v + 48$

$= 10.5 + 48$

$= 50 + 48$

$= 98$ grams

The total mass of the three fruits is 98 grams.

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5. Nathan has 15*m* dollars. He buys 2 bags and 3 books.
Each bag costs 2*m* dollars. Each book costs $10.

a) How much money does Nathan spend?

Cost of the 2 bags = _____ · _____

= _____ dollars

Cost of the 3 books = _____ · _____

= $_____

Total cost = _____ dollars

Nathan spends _____ dollars.

b) How much money does Nathan have left?

_____ − _____ = _____ dollars

Nathan has _____ dollars left.

c) If $m = 8$, how much money does Nathan have left?

When $m = 8$,

Money left =

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6. A rectangle has a perimeter of $16p$ centimeters. It has a width of $2p$ centimeters. Each side of an equilateral triangle is $\frac{1}{2}$ the length of the rectangle.

a) Find the length of the rectangle in terms of p.

b) Find the perimeter of the triangle in terms of p.

c) Find the total perimeter of the rectangle and the triangle if $p = 8$ centimeters.

d) Alvin bought a wire that is 3 meters long. How many meters of wire is left after making both the rectangle and equilateral triangle shapes if $p = 8$?

Lesson 7.3

1. $p + p + p + p + p + p = \underline{6} \cdot p$
$= \underline{6p}$
In the term $\underline{6p}$, the coefficient of p is $\underline{6}$.

2. $n + n + n + 13 + 8 = \underline{3} \cdot n + 13 + 8$
$= \underline{3n} + 21$
In the term $\underline{3n}$, the coefficient of n is $\underline{3}$.

3. $d + d + d + d + d + 5 - 2$
$= \underline{5} \cdot d + 3$
In the term $\underline{5d}$, the coefficient of d is $\underline{5}$.

4. $4m$, $4m$, 4

5. $5r$, $5r$, 5

6. Figure label: d, d;
$\underline{d} + \underline{d} + \underline{d} = \underline{3} \cdot \underline{d}$
$= \underline{3d}$
The perimeter of the triangle is $\underline{3d}$ inches.

7. Figure label: m, 2;
$\underline{m} + \underline{2} + \underline{m} + \underline{2} = \underline{2} \cdot \underline{m} + \underline{4}$
$= \underline{2m + 4}$
The perimeter of the rectangle is $\underline{(2m + 4)}$ feet.

8. Figure label: h, h, h, h, h, h, h;
8h centimeters

9. $7g$

10. $11p$

11. $16m$

12. $20y$

13. $43d$

14. Equivalent

15. Not equivalent

16. Not equivalent

17. Equivalent

18. $3x$

19. $16n$

20. 0

21. $29z$

22. $14b$

23. Not equivalent

24. Equivalent

25. Equivalent

26. Not equivalent

27. $12c - 3c - 3c = \underline{9c} - 3c$
$= \underline{6c}$

28. $5j + 2j + 9j = \underline{7j} + 9j$
$= \underline{16j}$

29. $10k$

30. $5y$

31. $5t + 4 + 2t = \underline{5t + 2t} + \underline{4}$
$= \underline{7t + 4}$

32. $6m - 10 - 2m - m$
$= \underline{6m - 2m - m} - \underline{10}$
$= \underline{3m - 10}$

33. $12r - 12$

34. $9j + 3$

35. $\underline{2y + 2} + \underline{2y + 2} + \underline{5y} + \underline{5y}$
$= \underline{2y + 2y + 5y + 5y} + \underline{2 + 2}$
$= \underline{(14y + 4)}$
The perimeter of the triangle is $\underline{(14y + 4)}$ centimeters.

36. $(5d + 36)$ inches

Lesson 7.4

1. Figure label $\underline{4} \cdot \underline{g}$, $\underline{4} \cdot \underline{4}$;
$4(g + 4) = 4 \cdot (g + 4)$
$= \underline{4 \cdot g} + \underline{4 \cdot 4}$
$= \underline{4g + 16}$

2. $2h + 14$

3. $9k - 36$

4. $42s + 54$

5. $27c - 18$

6. Not equivalent

7. Equivalent

8. Equivalent

9. Not equivalent

10. The factors of $3d$ are:
$1 \cdot 3d$
$3 \cdot \underline{1d}$
The factors of 9 are:
$1 \cdot 9$
$3 \cdot \underline{3}$
$9 \cdot \underline{1}$
The common factor of $3d$ and 9 is $\underline{3}$.
$3d = \underline{3} \cdot \underline{d}$
$9 = \underline{3} \cdot \underline{3}$
$3d + 9 = \underline{3} \cdot \underline{d} + \underline{3} \cdot \underline{3}$
$= \underline{3(d + 3)}$

11. $8(3g + 1)$

12. $7(3b - 1)$

13. $5(9h + 1)$

14. $6(9z - 1)$

15. Equivalent

16. Not equivalent

17. Not equivalent

18. Not equivalent

19. $6p + 2 + 4p + 13p$
$= \underline{6p} + \underline{4p} + \underline{2} + \underline{13}$
$= \underline{10p} + \underline{15}$
$= \underline{5(2p + 3)}$

20. $7(v + 2)$

21. $3(17a + 19)$

22. $2(8s + 25)$

Lesson 7.5

1. a) $2k + 8$

b) $\underline{6k} + \underline{8} + \underline{2k} + \underline{8}$
$= \underline{6k + 2k} + \underline{8 + 8}$
$= \underline{8k + 16}$
The perimeter of the rectangle is $\underline{(8k + 16)}$ inches.

c) When $k = 3$
$8k + 16 = 8 \cdot 3 + 16$
$= 24 + 16$
$= 40$
The perimeter of the rectangle is $\underline{40}$ inches.

2. a) $(9n + 10)$ years

b) $(15n + 10)$ years

c) $(6n - 9)$ years

d) $(21n + 1)$ years

e) 85 years

3. a) 3 pairs of pants

$\rightarrow p \cdot 50 = 50p$ dollars

Andy needs $50p$ dollars for p pairs of pants.

b) $10p$ dollars

$\rightarrow 10p \div 50$

$= \frac{10p}{50}$ pairs of pants

Andy can buy $\frac{10p}{50}$ pairs of pants with $10p$ dollars.

When $p = 20$,

$\frac{10p}{50} = \frac{10 \cdot 20}{50}$

$= \frac{200}{50}$

$= 4$

4. a) $150m$ students

b) $\frac{6m}{15}$ teachers; 8

5. a) Cost of the 2 bags

$= 2m \cdot 2$

$= 4m$ dollars

Cost of the 3 books

$= 10 \cdot 3$

$= \$30$

Total cost $= (4m + 30)$ dollars

Nathan spent $(4m + 30)$ dollars.

b) $15m - (4m + 30) = (11m - 30)$ dollars

Nathan has $(11m - 30)$ dollars left.

c) Money left $= 11m - 30$

$= 11 \cdot 8 - 30$

$= 88 - 30$

$= \$58$

Nathan has $\$58$ left.

6. a) $6p$ centimeters

b) $9p$ centimeters

c) 200 centimeters

d) 1 meter