

PA5-8 Numerical Expressions

A **numerical expression** is a combination of numbers, operation signs, and sometimes brackets that represents a quantity.

Example: These numerical expressions all represent 10.

$5 + 2 + 3$

$14 - 4$

$70 \div 7$

$(3 + 2) \times 2$

1. Calculate the numerical expression.

a) $2 + 5 + 1$ _____

b) 2×5 _____

c) $3 \times 2 \times 4$ _____

d) $(8 \times 3) \div 2$ _____

e) $(1 + 3) \times 4$ _____

f) $3 + (6 \div 2)$ _____

g) $(6 \times 3) \div 2$ _____

h) $(10 - 4) \div 2$ _____

i) $10 - (4 \div 2)$ _____

2. Write the number 3 in the box and then calculate the expression.

a) $\boxed{3} + 4 \longrightarrow \underline{7}$

b) $\boxed{3} + 2 \longrightarrow \underline{\quad}$

c) $9 - \boxed{\quad} \longrightarrow \underline{\quad}$

d) $\boxed{\quad} - 2 \longrightarrow \underline{\quad}$

e) $\boxed{\quad} \times 5 \longrightarrow \underline{\quad}$

f) $18 \div \boxed{\quad} \longrightarrow \underline{\quad}$

An **equation** is a statement that has two equal expressions separated by an equal sign.

Examples: $14 - 4 = 70 \div 7$ $12 = 3 \times 4$

3. a) Circle two expressions in Question 1 that represent the same number.
 b) Write an equation using the two expressions.

_____ = _____

4. Verify that the equation is true.

a) $(4 + 3) \times 2 = (5 \times 3) - 1$

b) $2 \times 4 \times 5 = 4 \times 10$

$(4 + 3) \times 2$ and $(5 \times 3) - 1$

$2 \times 4 \times 5$ and 4×10

$= 7 \times 2$

$= 15 - 1$

$= 14$

$= 14$

c) $\boxed{3} + 11 = (3 + 1) + (11 - 1)$

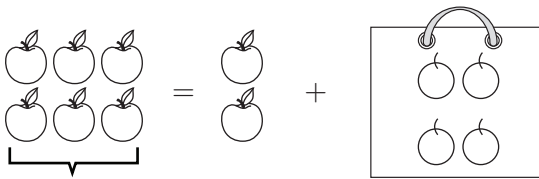
d) $\boxed{3} + 11 = (3 + 2) + (11 - 2)$

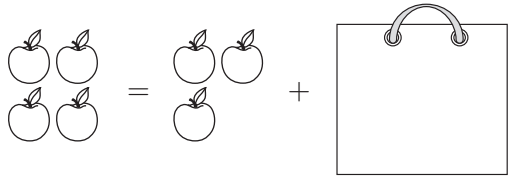
$3 + 11$ and $(3 + 1) + (11 - 1)$

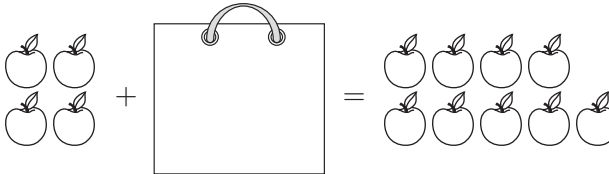
$3 + 11$ and $(3 + 2) + (11 - 2)$

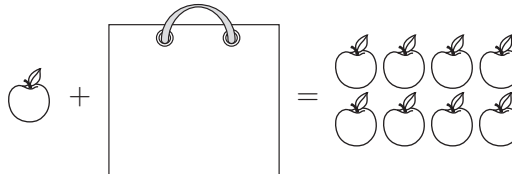
PA5-9 Unknown Quantities and Equations

1. Some apples are inside a bag and some are outside the bag. The total number of apples is shown. Draw the missing apples in the bag.

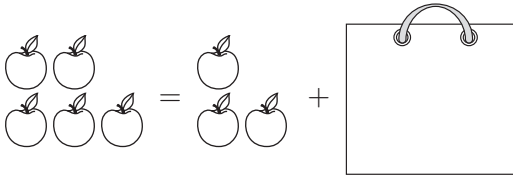
a)  $6 = 1 + 4$

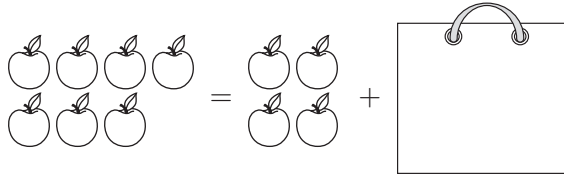
b)  $4 = 3 + \square$

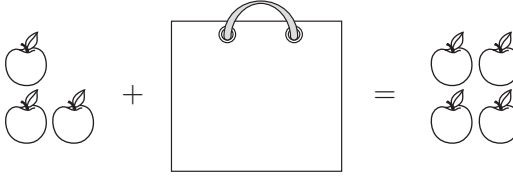
c)  $4 + \square = 8$

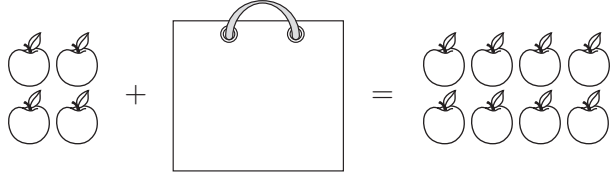
d)  $1 + \square = 8$

2. Draw the missing apples in the bag. Then write an equation (with numbers) to represent the picture.

a)  $5 = 3 + \square$

b)  $7 = 4 + \square$

c)  $3 + \square = 4$

d)  $4 + \square = 8$

3. Write an equation for each problem. Use a box for the unknown quantity.

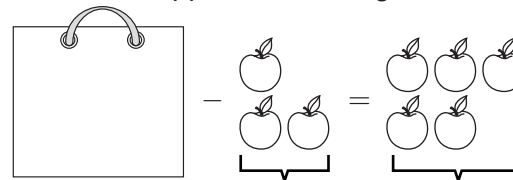
a) There are 7 apples altogether. There are 4 outside a basket. How many are inside?
 $7 = 4 + \square$

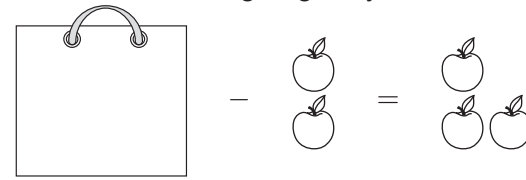
b) There are 9 apples altogether. There are 7 outside a basket. How many are inside?
 $9 = 7 + \square$

c) There are 11 plums altogether. There are 5 inside a bag. How many are outside?
 $11 = 5 + \square$

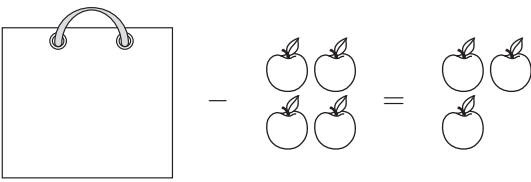
d) 17 students are at the library. There are 9 in the computer room. How many are outside the computer room?
 $17 = 9 + \square$

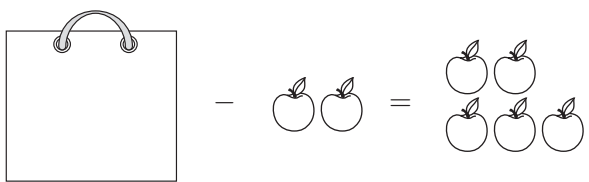
4. Jun took some apples from a bag. Show how many apples were in the bag originally.

a)  $\square - 3 = 6$

b)  $\square - 2 = 3$

5. Show how many apples were in the bag originally. Then write an equation to represent the picture.

a) 
 $\square - 4 = 3$

b) 
 $\square - 2 = 5$

6. Find the number that makes the equation true and write it in the box.

a) $\boxed{6} + 3 = 9$

b) $\square + 4 = 9$

c) $\square + 5 = 9$

d) $8 - \square = 5$

e) $13 - \square = 11$

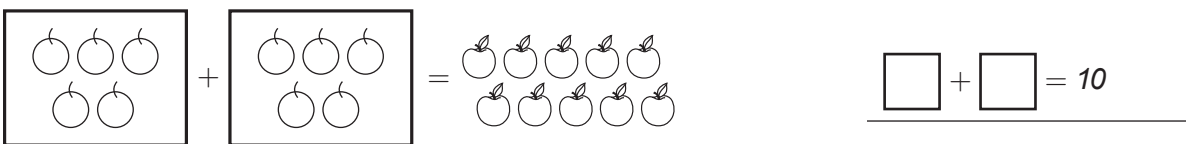
f) $19 - \square = 8$

g) $3 + 6 = 5 + \square$

h) $10 - 3 = \square + 4$

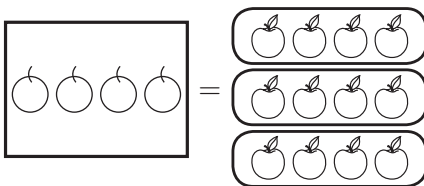
i) $1 + 5 = 7 - \square$

7. Draw the same number of apples in each box. Write the equation for the picture.

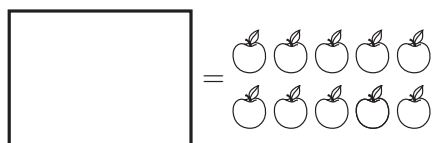
a) 
 $\square + \square = 10$

b) 
 $\square + \square + \square = 12$

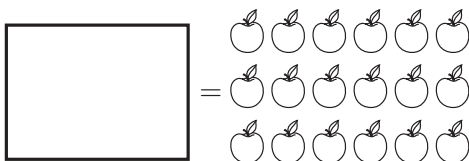
8. Draw a picture for the equation. Use your picture to solve the equation.

a) 

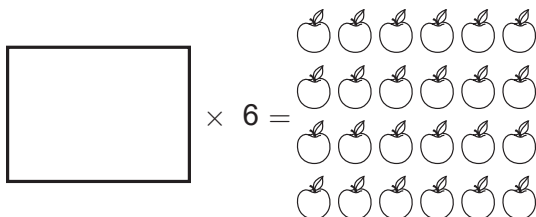
$3 \times \boxed{4} = 12$

b) 

$2 \times \square = 10$

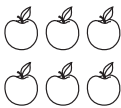
c) 


$3 \times \square = 18$

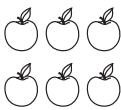
d) 

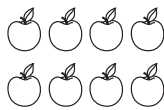
$\square \times 6 = 24$

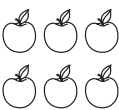
9. How many apples should be in the box? Write the number.


a) $2 \times \boxed{3} =$ 


b) $2 \times \boxed{} =$ 


c) $\boxed{} \times 3 =$ 

d) $\boxed{} \times 4 =$ 


e) $3 \times$  $= \boxed{}$

f) $3 \times$  $= \boxed{}$

g) $8 \times$  $= \boxed{}$

h) $7 \times$  $= \boxed{}$

BONUS ▶ There are 13 apples in the bag. What number goes in the box?

$4 \times ($  $) = \boxed{}$

Use circles instead of apples to make your drawing simpler.

10. Draw a picture of each equation. Then solve the equation using your picture.

a) $3 \times 4 = \boxed{}$

b) $3 \times \boxed{} = 18$

11. Solve the equation by guessing and checking.

a) $6 \times \boxed{} = 30$

b) $\boxed{} \times 2 = 18$

c) $2 \times \boxed{} = 24$

d) $\boxed{} \times 7 = 42$

e) $24 \div \boxed{} = 6$

f) $\boxed{} \div 5 = 6$

g) $5 \times 4 = \boxed{} \times 10$

h) $12 \times 3 = 9 \times \boxed{}$

12. Solve the equation by writing the unknown by itself.

a) $3 \times \boxed{} = 18$

b) $\boxed{} \times 7 = 28$

c) $\boxed{} \div 4 = 5$

d) $12 \div \boxed{} = 6$

e) $\boxed{} \times 8 = 32$

f) $\boxed{} \div 5 = 7$

g) $24 \div \boxed{} = 4$

h) $30 \div \boxed{} = 2$

PA5-10 Translating Words into Expressions

1. Match the description with the correct numerical expression.

- | | | | |
|------------------------|--------------|----------------------|---------------|
| a) 2 more than 6 | 4×6 | b) 2 divided into 11 | 3×11 |
| 6 divided by 3 | $6 - 2$ | 11 reduced by 4 | $11 \div 2$ |
| 2 less than 6 | $6 + 2$ | 11 times 3 | $11 + 3$ |
| the product of 6 and 4 | $6 - 3$ | twice as many as 11 | $11 - 4$ |
| 6 decreased by 3 | $6 \div 3$ | 11 increased by 3 | 2×11 |

2. Write an expression for each description.

- | | |
|--|--|
| a) 4 more than 3 <u>$3 + 4$</u> | b) 15 decreased by 8 _____ |
| c) 24 divided by 8 _____ | d) 2 less than 9 <u>$9 - 2$</u> |
| e) 67 increased by 29 _____ | f) 35 added to 4 _____ |
| g) twice as many as 5 _____ | h) 15 divided by 5 _____ |
| i) the product of 7 and 4 _____ | j) 5 times 8 _____ |

3. Turn the written instructions into mathematical expressions.

- | | |
|--|-----------------------------|
| a) Add 8 and 3. <u>$8 + 3$</u> | b) Divide 6 by 2. _____ |
| c) Add 34 and 9. _____ | d) Subtract 5 from 7. _____ |
| e) Multiply 42 and 2. _____ | f) Decrease 3 by 2. _____ |
| g) Add 8 and 4. Then divide by 3. _____ | |
| h) Divide 8 by 4. Then add 5. _____ | |
| i) Divide 4 by 2. Then add 10. Then subtract 4. _____ | |
| j) Multiply 6 and 5. Then subtract 20. Then divide by 2. _____ | |

4. Write the mathematical expressions in words.

- a) $(6 + 2) \times 3$ Add 6 and 2. Then multiply by 3.
- b) $(6 + 1) \times 2$ _____
- c) $12 - 5 \times 2$ _____
- d) $(3 - 2) \times 4$ _____

BONUS ►

$4 \times (3 - 1 + 5)$ _____

5. How far will a motorcycle travel at the speed and in the time given? Write the numerical expression.

a) Speed: 60 km per hour
Time: 2 hours

b) Speed: 80 km per hour
Time: 4 hours

c) Speed: 70 km per hour
Time: 5 hours

Distance: 60×2 km

Distance: _____ km

Distance: _____ km

6. a) Look at the sign below, then write a numerical expression for the cost of renting a bike for ...

i) 1 hour: 5×1

ii) 2 hours: _____

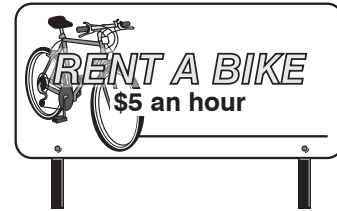
iii) 4 hours: _____

b) Complete the description of the expression.

i) 5×3 is the cost of renting a bike for 3 hours.

ii) 5×2 is the cost of renting a bike for _____ hours.

iii) 5×5 is the cost of renting a bike for _____ hours.



7. a) A different rental company charges \$3 for each hour. Write the numerical expression for the cost of renting a bike for ...

i) 1 hour: 3×1

ii) 2 hours: _____

iii) 4 hours: _____

b) Complete the description of the expression.

i) 3×3 is the cost of renting a bike for 3 hours.

ii) 3×2 is the cost of renting a bike for _____ hours.

iii) 3×5 is the cost of renting a bike for _____ hours.

8. A field trip for a Grade 5 class costs \$11 per student plus \$2 for a snack.

a) Write an expression to represent the cost for 1 student and 1 snack. _____

b) Write an expression to represent the cost for 3 students and 3 snacks. _____



BONUS ► Write a word problem that could be represented by $19 \times (11 + 2)$.

9. A day pass can be used by 2 adults and 2 children for unlimited one-day bus travel on weekends. Write an expression to represent the number of day passes that are needed for 10 adults and 10 children. Hint: The number of adults and the number of children are the same.



BONUS ► 20 students from each class go to the museum. There are 5 classes, along with 13 teachers and 16 parents.

a) Write an expression to represent the number of people who go to the museum.

b) How many buses will be needed if 30 people ride in each bus?

PA5-11 Variables

1. Look at the sign at the right, then write a numerical expression for the cost of renting skates for ...

- a) 2 hours: 3×2 b) 5 hours: _____
 c) 6 hours: _____ d) 8 hours: _____



A **variable** is a letter or symbol (such as x , n , or H) that represents a number.
 To make an **algebraic expression**, replace some numbers in a numerical expression with variables.
 Examples of algebraic expressions: $x + 1$ $3 + 4 \times T$ $2 + t - 3 \times h$

2. Write an expression for the distance a car would travel at the given speed and time.

- | | | |
|--------------------------|--------------------------|--------------------------|
| a) Speed: 60 km per hour | b) Speed: 80 km per hour | c) Speed: 70 km per hour |
| Time: 2 hours | Time: 3 hours | Time: h hours |
| Distance: _____ km | Distance: _____ km | Distance: _____ km |

In the product of a number and a variable, the multiplication sign is usually dropped.
 Examples: $3 \times T$ can be written $3T$ and $5 \times z$ can be written $5z$.

3. Look at the sign at the right, then write an algebraic expression for the cost of renting skis for ...

- a) h hours: $5 \times h$ or $5h$ b) t hours: _____ or _____
 c) x hours: _____ or _____ d) n hours: _____ or _____



4. Write an equation that tells you the relationship between the numbers in Column A and Column B. Hint: First find the number that you need to add or multiply.

- | a) <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr><th>A</th><th>B</th></tr> </thead> <tbody> <tr><td>1</td><td>4</td></tr> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>6</td></tr> </tbody> </table>

<u>$A + 3 = B$</u> | A | B | 1 | 4 | 2 | 5 | 3 | 6 | b) <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr><th>A</th><th>B</th></tr> </thead> <tbody> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>6</td></tr> </tbody> </table>

<u>$2 \times A = B$</u>
<u>or $2A = B$</u> | A | B | 1 | 2 | 2 | 4 | 3 | 6 | c) <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr><th>A</th><th>B</th></tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>5</td></tr> </tbody> </table>

_____ | A | B | 1 | 3 | 2 | 4 | 3 | 5 | d) <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr><th>A</th><th>B</th></tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>6</td></tr> <tr><td>3</td><td>9</td></tr> </tbody> </table>

_____ | A | B | 1 | 3 | 2 | 6 | 3 | 9 | e) <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr><th>A</th><th>B</th></tr> </thead> <tbody> <tr><td>1</td><td>5</td></tr> <tr><td>2</td><td>10</td></tr> <tr><td>3</td><td>15</td></tr> </tbody> </table>

_____ | A | B | 1 | 5 | 2 | 10 | 3 | 15 |
|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|---|--|---|---|---|---|---|----|---|----|
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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When replacing a variable with a number, we use brackets.

Example: Replacing n with 7 in the expression $3n$ gives $3(7)$, which is another way to write 3×7 .

5. Write the number 2 in the brackets and evaluate.

a) $5(2) = 5 \times 2 = 10$ b) $3(\quad) = \underline{\quad} = \underline{\quad}$ c) $4(\quad) = \underline{\quad} = \underline{\quad}$

d) $2(\quad) + 5$ e) $4(\quad) - 2$ f) $6(\quad) + 3$
 $= \underline{2 \times 2 + 5} = \underline{4 + 5}$ $= \underline{\quad} = \underline{\quad}$ $= \underline{\quad} = \underline{\quad}$
 $= \underline{9}$ $= \underline{\quad}$ $= \underline{\quad}$

6. Replace n with 2 in each expression and evaluate.

a) $4n + 3$ b) $5n + 1$ c) $3n - 2$
 $4(2) + 3$
 $= 8 + 3 = 11$

d) $2n + 3$

e) $4n - 3$

f) $2n - 4$

7. Replace the variable with the given number and evaluate.

a) $5h + 2, \quad h = 3$ b) $2n + 3, \quad n = 6$ c) $5t - 2, \quad t = 4$
 $5(3) + 2$
 $= 15 + 2 = 17$

d) $3m + 9, \quad m = 8$ e) $9 - z, \quad z = 4$ f) $3n + 2, \quad n = 5$

8. Evaluate each expression.

a) $2n + 3, \quad n = 5$ b) $2t + 3, \quad t = 5$ c) $2w + 3, \quad w = 5$
 $2(5) + 3$
 $= 10 + 3 = 13$

9. What do you notice about your answers to Question 8? _____

Why is that so? _____

larger part – smaller part = difference

$$9 - x = 4$$

9 is 4 more than x . x is 4 fewer than 9. So $x = 9 - 4$ and now the variable x is by itself.

4. Fill in the table. Write x for the number you are not given. Circle the larger part and then write the difference another way.

	Parts		Difference	Another Way to Write the Difference
	Apples	Oranges		
a) 13 apples, 5 more oranges than apples	13	x	5	$x - 13$
b) 9 more oranges than apples, 12 apples				
c) 6 apples, 7 oranges				
d) 19 oranges, 8 fewer apples than oranges				
e) 27 oranges, 13 fewer oranges than apples				

5. Circle the part that is larger. Write the difference two ways to make an equation.

- | | | |
|---|--|--|
| a) <u>8 apples</u>
3 fewer oranges than apples
x oranges
<u>$8 - x = 3$</u> | b) 5 apples
13 oranges
x more oranges than apples
_____ | c) 12 more apples than oranges
5 oranges
x apples
_____ |
|---|--|--|

6. Circle the part that is larger. Write the difference two ways to make an equation. Then solve the equation.

- | | | |
|--|---|--|
| a) There are <u>7 games.</u>
There are x books.
There are 5 more games than books. | b) There are x games.
There are 12 books.
There are 6 fewer games than books. | c) There are 12 games.
There are 29 books.
There are x fewer games than books. |
|--|---|--|

- d)** There are 17 pens.
There are x pencils.
There are 8 more pens than pencils.

- e)** Tom has 19 stickers.
Avril has x stickers.
Tom has 13 fewer stickers than Avril.

- f)** Eric's class has x students.
Amy's class has 34 students.
Eric's class has 6 fewer students than Amy's class.

7. Fill in the table. Write x for the number you are not given.

Problem	Parts	How Many?	Equation and Solution
a) Alex has 22 jazz songs in his collection. He has 8 more jazz songs than pop songs. How many pop songs does he have?	<i>jazz songs</i>	22	$22 - x = 8$
	<i>pop songs</i>	x	$22 - 8 = x$ $14 = x$
b) Dory has 21 red balloons. She has 9 green balloons. How many more red balloons than green balloons does she have?			
c) There are 7 apples in the fridge. There are 4 more oranges than apples in the fridge. How many oranges are there?			
d) Female European wolves weigh 4 kg less than male wolves. Males weigh 38 kg. How much do females weigh?			

8. Write the difference two ways to write an equation. Then solve the equation.

- a) Simon exercised for 25 minutes on Saturday. On Sunday he exercised for 17 minutes more than on Saturday. For how long did he exercise on Sunday?

$$\begin{aligned} x - 25 &= 17 \\ x &= 17 + 25 \\ &= 42 \end{aligned}$$

- b) There are 32 teachers in the school. There are 18 fewer volunteers than teachers. How many volunteers are there?

$$\begin{aligned} & \\ & \\ & \end{aligned}$$

- c) North American wolves weigh 36 kg. Indian–Arabian wolves weigh 11 kg less. How much do Indian–Arabian wolves weigh?

- d) Jasmin biked 13 km on Saturday. She biked 5 km more on Sunday than on Saturday. How many kilometres did she bike on Sunday?

- e) Raj counted 68 cars in a parking lot on Monday and 39 cars on Tuesday. How many fewer cars were parked there on Tuesday?

- BONUS** ▶ Grace’s art exhibition had 658 visitors on the first night. The next night, there were 18 more visitors than on the first night. How many visitors came on the second night?

PA5-13 Problems and Equations—Addition and Subtraction

1. Fill in the table. Write x for the number you need to find. Cross out the cell you do not use.

	Problem	Parts	How Many?	Difference	Equation and Solution
				Total	
a)	Ethan has 2 dogs and 5 fish. How many pets does he have?	<i>dogs</i>	2	Difference: _____	$2 + 5 = x$ $x = 7$
		<i>fish</i>	5	Total: <u> x </u>	
b)	Sharon hiked 9 km on Saturday. She hiked 12 km on Sunday. How far did Sharon hike in two days?			Difference: _____	
				Total: _____	
c)	Luc saved \$36 in January. He saved \$17 less in February than in January. How much money did he save in February?			Difference: _____	
				Total: _____	
d)	The Leviathan roller coaster is 93 m tall. It is 25 m taller than the Yukon Striker roller coaster. How tall is the Yukon Striker?			Difference: _____	
				Total: _____	
e)	A supermarket sold 164 bags of white and yellow potatoes. If 76 of the bags were filled with white potatoes, how many bags of yellow potatoes were sold?			Difference: _____	
				Total: _____	

2. Write the parts and how many of each part. Then write and solve an equation.

- Cam has 12 blue marbles. He has 9 more red marbles than blue marbles. How many red marbles does he have?
- Cam also has 7 fewer green marbles than red marbles. How many green marbles does he have?
- How many red, blue, and green marbles does Cam have altogether? _____

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Write an equation to solve the problems on this page.

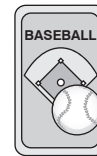
3. There are 32 children in a class. 13 of them wear eyeglasses.

- a) How many students don't wear eyeglasses?
- b) How many more students are there who don't wear eyeglasses than students who wear eyeglasses?



4. Rani bought 8 hockey cards and 10 baseball cards. She gave away 3 cards.

- a) How many cards did she buy altogether?
- b) How many cards does she have left?



5. Neka is three years older than Megan. Megan is 9 years old. How old is Neka?

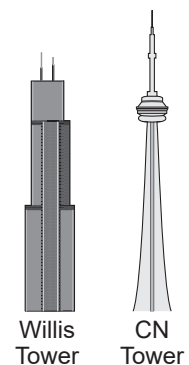
6. Anton bought a science-fiction novel for \$11 and a graphic novel for \$7.

- a) How much more expensive is the science-fiction novel than the graphic novel?
- b) How much did the books cost in total?

7. Nina watched TV for 60 minutes. She spent 20 minutes less on her homework than on watching TV. How much time did she spend on homework?

8. A recreation pass costs \$23. It is \$8 more than a movie pass. How much does the movie pass cost?

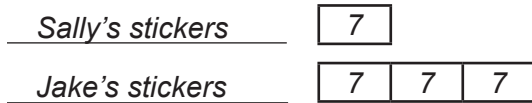
9. The Willis Tower in Chicago, USA, is 442 m tall. The CN Tower in Toronto is 553 m tall. How much taller is the CN Tower than the Willis Tower?



PA5-14 Models and “Times as Many”

1. Draw a diagram to model the story.

- a) Sally has 7 stickers. Jake has 3 times as many stickers as Sally does.



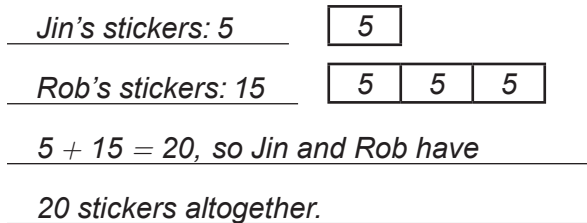
- b) There are 5 blue marbles. There are 4 times as many red marbles.

- c) There are 12 red apples. There are 4 times as many green apples as red apples.

- d) Yu has 4 stickers. Nora has 5 times as many stickers.

2. Solve the problem by drawing a model.

- a) Jin has 5 stickers. Rob has 3 times as many stickers as Jin. How many stickers do they have together?



- b) Randi studies rats and hamsters. She has 7 rats and twice as many hamsters. How many animals does she have altogether?

- c)** There are 12 chocolate chip cookies in a box. There are 6 times as many oatmeal cookies in the box. How many cookies are there altogether?

- d)** There are 17 math books in a school library. There are 4 times as many science books in the library. How many math books and science books are in the library altogether?

3. Draw a model for the story. Then write the given number beside the correct bar.

- a) There are 24 mangoes. There are 4 times as many mangoes as avocados.

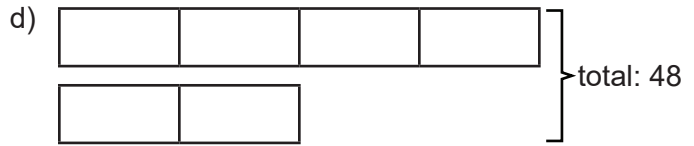
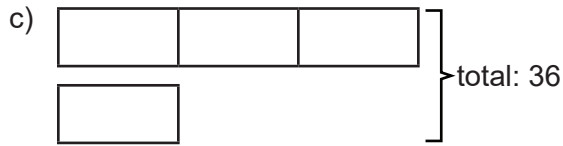
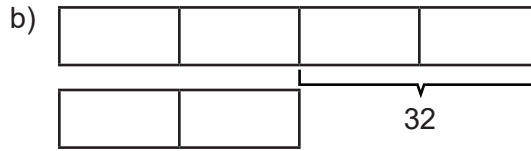
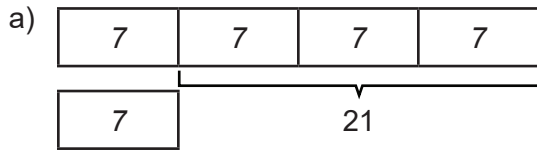


- b) There are 30 seniors in the audience. There are 6 times as many seniors as children.

- c) Matt spent \$24 on shoes and twice as much on pants.

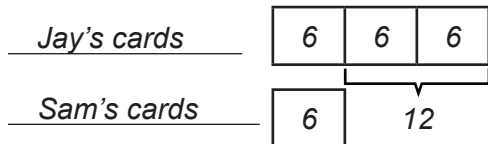
- d) Abella studied math for 30 minutes and science for 3 times as many minutes.

4. All the blocks are the same size. What is the size of each block?



5. Draw the model. Find the length of one block in the model. Then solve the problem.

a) Jay has 3 times as many cards as Sam. Jay has 12 more cards than Sam. How many cards does each person have?



Jay has 18 cards

and Sam has 6 cards.

b) Vicky is 4 times as old as Ella. Vicky is 15 years older than Ella. How old are Vicky and Ella?

Vicky is years old

and Ella is years old.

BONUS ▶

c) There are 6 times as many party balloons as streamers to decorate a house. There are 42 decorations altogether. How many balloons and how many streamers are there?

A pancake recipe calls for 2 tablespoons of butter and 3 times as many tablespoons of sugar per batch. Anna wants to make 24 batches. How many tablespoons of sugar and butter does she need?

There are party balloons

and streamers.

Anna needs tablespoons of butter and

 tablespoons of sugar.

6. A pair of shoes costs twice as much as a wallet. Glen paid \$51 for a pair of shoes and a wallet. How much does each item cost?



BONUS ▶ How much would Glen pay for two pairs of shoes and three wallets?

PA5-15 Problems and Equations—Multiplication and Division

When the larger part is 3 times the size of the smaller part, we say the **scale factor** is 3.

Smaller Part

Larger Part

You can find one part from another part using the scale factor.

Larger Part = Smaller Part \times Scale Factor

Smaller Part = Larger Part \div Scale Factor

1. Circle the larger part and underline the smaller part in the problem. Then fill in the blanks for the equation where the unknown is by itself and cross out the other equation.

a) There are 21 cats and m dogs. There are three times as many dogs as cats.

$$\frac{m}{\text{Larger Part}} = \frac{21}{\text{Smaller Part}} \times \frac{3}{\text{Scale Factor}} \quad \text{or} \quad \frac{\text{Smaller Part}}{\text{Larger Part}} = \frac{3}{\text{Scale Factor}}$$

b) There are m cats and 6 dogs. There are 3 times as many dogs as cats.

$$\frac{\text{Larger Part}}{\text{Smaller Part}} = \frac{6}{\text{Scale Factor}} \times \frac{3}{\text{Scale Factor}} \quad \text{or} \quad \frac{\text{Smaller Part}}{\text{Larger Part}} = \frac{3}{\text{Scale Factor}}$$

c) There are 12 cars in a parking lot. There are twice as many vans as cars in the parking lot.

$$\frac{\text{Larger Part}}{\text{Smaller Part}} = \frac{12}{\text{Scale Factor}} \times \frac{2}{\text{Scale Factor}} \quad \text{or} \quad \frac{\text{Smaller Part}}{\text{Larger Part}} = \frac{2}{\text{Scale Factor}}$$

2. Fill in the table. Write n for the number you are not given.
Hint: Circle the larger part and underline the smaller part.

	Problem	Parts	How Many?	Equation
a)	There are 20 green apples in a box. There are 4 times as many <u>green apples</u> as <u>red apples</u> .	<i>green apples</i>	20	$20 \div 4 = n$
		<i>red apples</i>	n	
b)	There are 16 mangoes. There are twice as many mangoes as kiwis.			
c)	There are 6 cats in a shelter. There are three times as many dogs as cats in the shelter.			

3. Complete the table.

	Total Number of Things	Number of Sets	Number in Each Set	Multiplication or Division Equation
a)	p	5	2	$5 \times 2 = p$
b)	12	4	p	$12 \div 4 = p$
c)	14	p	7	
d)	p	2	11	

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4. Fill in the table. Write x to show what you don't know. Then write a multiplication or division equation in the last column and solve the equation.

	Total Number of Things	Number of Sets	Number in Each Set	Multiplication or Division Equation
a) 24 people 4 vans	24	4	x	$24 \div 4 = x$ 6 people in each van
b) 8 balloons in each bag 5 bags				_____ balloons
c) 35 students 7 teams				_____ students on each team
d) 9 books on each shelf 6 shelves				_____ books
e) 6 juice boxes in each pack 48 juice boxes				_____ packs of juice

5. A store sold 6 rats and twice as many hamsters.
- How many hamsters did the store sell?
 - How many rats and hamsters were sold altogether?
 - How many more hamsters than rats were sold?



6. Emma is 5 times as old as Eddy. Emma is 35.
- How old is Eddy?
 - How much older than Eddy is Emma?
7. A female angler fish is 5 times as large as a male angler fish. The female can be 100 cm long.
- How long is the male angler fish?
 - How much longer than the male is the female angler fish?

PA5-16 More Problems and Equations

1. a) There are 12 blue beads. There are 3 times as many blue beads as red beads.
There are 7 fewer yellow beads than blue beads.

How many red beads are there? _____ How many yellow beads are there? _____

- b) Ronin is 3 times as old as Liz. Karen is four years older than Liz. Liz is 6 years old.

How old is Ronin? _____ How old is Karen? _____

2. Zara is two years older than Tristan. Tristan is 10 years old. Tristan is 7 years older than Carl. How old are Zara and Carl?

Zara is _____ years old and Carl is _____ years old.

3. Ansel bought six books about mammals and two books about reptiles.
Each book cost \$12.

a) How many books did Ansel buy altogether? _____

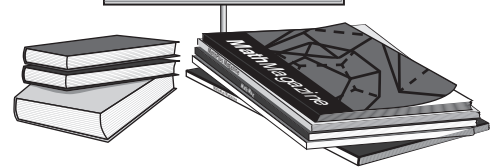
b) How much did the books cost? _____

4. Aputik bought 7 books and 10 magazines. (See the prices in the picture.)

a) How much did Aputik spend on books? _____

b) How much did Aputik spend on magazines? _____

c) How much did Aputik spend altogether? _____



5. What question do you need to ask and answer before you can solve the problem?

- a) Mary has twice as many hockey cards as Ren does. Mary has 10 more hockey cards than David. David has 16 hockey cards. How many cards does Ren have?

How many cards does Mary have?

- b) Ben is twice as old as Lela. Lela is three years older than John. John is five years old. How old is Ben?

- c) Ryder had \$53. He spent \$15 on a hat, \$8 on a scarf, and \$12 on a pair of mitts. How much money does Ryder have left?

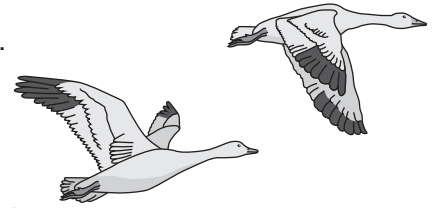
- 6.** Tina earns \$15 per hour. She worked 3 hours on Friday, 2 hours on Saturday, and 2 hours on Sunday. How much money did Tina earn in these three days?

7. Ava used 3 times as many blue beads as red beads for a bracelet. She used 12 more blue beads than yellow beads. She used 3 yellow beads.

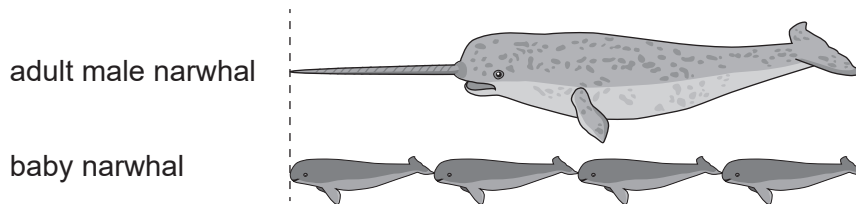
- a) How many beads of each colour did Ava use?
- b) How many beads did she use in total?

8. Snow geese can fly 160 km in 2 hours. They can fly for a very long time.

- a) Some snow geese flew for 18 hours, rested, and then flew for another 20 hours. How long did the geese travel? How far did the geese travel?
- b) Snow geese need to fly about 3200 km from British Columbia, Canada to Texas, USA. How much flying time do the geese need?



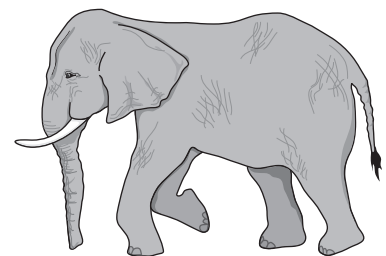
9. A narwhal is an arctic whale. The adult male has one very long tooth. An adult narwhal is about 5 m long from nose to tail, and its tooth is 3 m long. Use the diagram to tell how long a baby narwhal is.



10. An eraser is 5 cm long. A pencil is 15 cm long. Write your answer as a full sentence.

- a) How many times as long as the eraser is the pencil?
- b) How many centimetres longer is the pencil than the eraser?

11. An elephant weighs 4000 kg and is 4 m tall. Is this elephant 1000 times as heavy as it is tall? Explain.



12. There are 5 people at a pizza party. They ordered 2 pizzas. Each pizza has 8 slices. Each person gets the same number of slices. How many slices can each person have?

13. There are 52 avocados in a crate. Thirteen are spoiled. Zack packs the rest into bags of 5 avocados. How many full bags can he make?

14. There are 24 students in one class and 23 students in another class going on a field trip. Each car can hold 4 students. How many cars are needed to transport all the students?