1) Make 25 2 divisible by 3.

2) $3.95 x 10 = 39.5

3) 20% of 45 = 9

4) What is 45% written as a decimal? 0.45

5) What type of decimal is $3.\overline{54}$? repeating

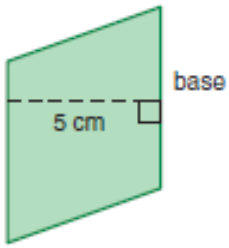
6) How many 1/2 hours in 2 hours? 4

7) (-9) + (+2) = -11

8) Which is greater - 1/4 or 1/3?

9) What is the base? 3/12 4/12

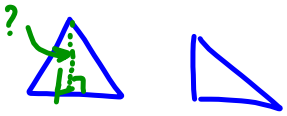
c) Area = 30 cm²



30/5 = 6 cm

(-9) - (+2)

(-9) + (-2) = -11



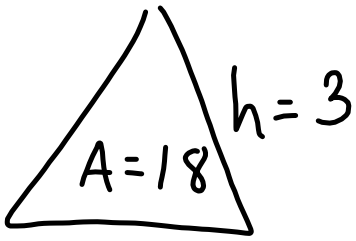
$A = 12m^2$

$b = 4m$

$A = bh \div 2$

$12 = 4(h) \div 2$

$= (4 \times h) \div 2$



$A = bh \div 2$

$18 = b(3) \div 2$

$18 \times 2 = 36 \div 3$

6.1 Solving Equations

Focus Solve equations by inspection and by systematic trial.

Look at the algebraic expressions and equations below.
Which ones are equations? Which ones are expressions?
How do you know?

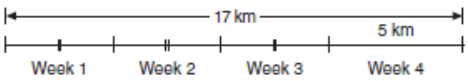
$3n + 12$ $3n = 12$ $5x + 2$ $5x + 2 = 27$

expression - no = 😕

equation - (always have an =)

Connect

Janet walked ~~a total~~ of 17 km in February.
She walked the same number of kilometres in each of the first 3 weeks.
Then she walked 5 km in the fourth week.
How many kilometres did Janet walk in each of the first 3 weeks?



A: 6h

coefficient → $3d + 5 = 17$ ← variable

$17 = 5 + 3d$

Let d represent the distance Janet walked, in kilometres, in each of the first 3 weeks.
So $3 \times d$, or $3d$, represents the total number of kilometres Janet walked in the first 3 weeks.
She walked 5 km in the fourth week, for a total of 17 km.
The equation is: $3d + 5 = 17$

When we use the equation to find the value of d, we *solve the equation*.

Here are 2 ways to solve this equation

Writing and solving equations is a useful strategy for solving problems.

Method 1: By Systematic Trial

$3d + 5 = 17$

We choose a value for d and substitute.

Try $d = 2$. $3d + 5 = 3 \times 2 + 5$
$= 6 + 5$
$= 11$

11 is too small, so choose a greater value for d.

Try $d = 5$. $3d + 5 = 3 \times 5 + 5$
$= 15 + 5$
$= 20$

20 is too large, so choose a lesser value for d.

Try $d = 4$. $3d + 5 = 3 \times 4 + 5$
$= 12 + 5$
$= 17$

This is correct.

Janet walked 4 km during each of the first 3 weeks of February.

Systematic trial means choosing a value for the variable, then checking by substituting. Use the answer and reasoning to choose the next value to check.

Example

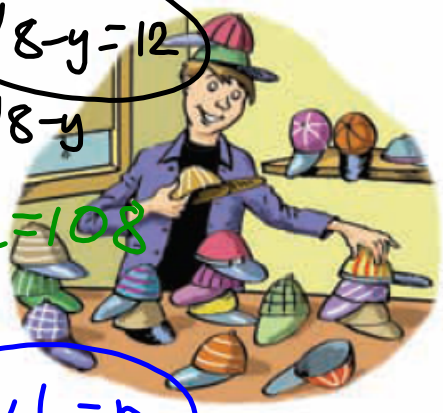
For each situation, write an equation.
Ben has a large collection of baseball caps.

a) Ben takes y caps from a group of 18 caps.
There are 12 caps left.
How many caps did Ben take away?
Solve the equation by inspection.

b) Ben put k caps in each of 6 piles.
There are 108 caps altogether.
How many caps did Ben put in each pile?
Solve the equation by systematic trial.

c) Ben shares n caps equally among 9 piles.
There are 6 caps in each pile.
How many caps did Ben have?
Solve the equation by inspection.

d) Ben combines p groups of 4 caps each into one large group.
He then takes away 7 caps. There are 49 caps left.
How many groups of 4 caps did Ben begin with?
Solve the equation by systematic trial.



$18 - y = 12$

$12 = 18 - y$

$6k = 108$

$9 \times 6 = n$

$n \div 6 = 9$

$\frac{n}{6} = 9$

$4p - 7 = 49$

A Solution

a) 18 subtract y equals 12.

$18 - y = 12$

Which number subtracted from 18 gives 12?

We know that $18 - 6 = 12$; so $y = 6$.

Ben took away 6 caps.

b) 6 times k equals 108.

$6k = 108$

Try $k = 15$. $6k = 6(15)$

$= 90$

90 is too small, so choose a greater value for k.

Recall: $6(15) = 6 \times 15$

Try $k = 20$. $6k = 6(20)$
$= 120$
120 is too large, so choose a lesser value for k.
Try $k = 17$. $6k = 6(17)$
$= 102$
102 is too small, but it is close to the value we want.
Try $k = 18$. $6k = 6(18)$
$= 108$
This is correct.
Ben put 18 caps in each pile.

c) n divided by 9 equals 6.
$n \div 9 = 6$, or $\frac{n}{9} = 6$
Which number divided by 9 gives 6?
We know that $54 \div 9 = 6$; so $n = 54$.
Ben had 54 caps.

d) 4 times p subtract 7 equals 49.
$4p - 7 = 49$
Since $4 \times 10 = 40$, we know we need to start with a value for p greater than 10.
Try $p = 12$. $4p - 7 = 4 \times 12 - 7$
$= 48 - 7$
$= 41$, which is too small
41 is 8 less than 49, so we need two more groups of 4.
Try $p = 14$. $4p - 7 = 4 \times 14 - 7$
$= 56 - 7$
$= 49$
This is correct.
Ben began with 14 groups of 4 caps each.

Practice

1. Look at the algebraic expressions and equations below.
Which are expressions? Equations?
How do you know?

a) $4w = 48$ b) $g - 11$ c) $3d + 5$
d) $\frac{x}{12} = 8$ e) $\frac{j-5}{10}$ f) $6z + 1 = 67$

$\frac{x}{3} = 5$

1a) $4w = 48$
$w = 12$

b) ? c) ?

d) $\frac{x}{12} = 8$
$x = 96$
$x \div 12 = 8$

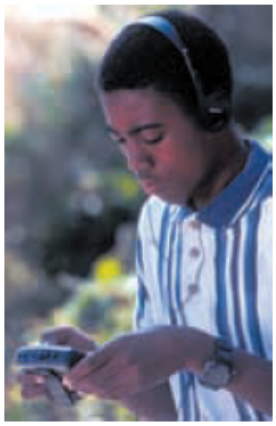
f) $6z + 1 = 67$
$z = 11$

a) Write an equation you can solve to find how many CDs Shenker had to begin with.
b) Solve the equation.

. Write an equation for each sentence.
Solve each equation by inspection.
a) Seven more than a number is 18.
b) Six less than a number is 24.
c) Five times a number is 45.
d) A number divided by six is 7.
e) Three more than four times a number is 19.

. Write an equation you could use to solve each problem.
Solve each equation by systematic trial.
a) Aiko bought 14 DVDs for $182.
She paid the same amount for each DVD.
How much did each DVD cost?
b) Kihew collects beaded leather bracelets. She lost 14 of her bracelets.
Kihew has 53 bracelets left.
How many bracelets did she have to begin with?
c) Manuel gets prize points for reading books.
He needs 100 points to win a set of tangrams.
Manuel has 56 points. When he reads 11 more books,
he will have 100 points.
How many points does Manuel get for each book he reads?

3. Shenker gives 10 CDs to his brother.
Shenker then has 35 CDs.
a) Write an equation you can solve to find how many CDs Shenker had to begin with.
b) Solve the equation.



4. Write an equation for each sentence.
Solve each equation by inspection.
a) Seven more than a number is 18.
b) Six less than a number is 24.
c) Five times a number is 45.
d) A number divided by six is 7.
e) Three more than four times a number is 19.

5. Write an equation you could use to solve each problem.
Solve each equation by systematic trial.
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He needs 100 points to win a set of tangrams.
Manuel has 56 points. When he reads 11 more books, he will have 100 points.
How many points does Manuel get for each book he reads?

$14d = 182$
$d = 182 \div 14$
$= \$13$

$4 + n = 96$
$4 + n = 96$
$100 - 56 = 44$

$b + 56 = 100$

Exit
four more than a number is 96.