CHANGE THE SUBJECT (ONE STEP)

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

A bar model shows a whole family of facts.

12	
5	7

$5 + 7 = 12$ $12 - 5 = 7$ $12 - 7 = 5$

c	
a	b

$a + b = c$ $b = c - a$ $a = c - b$

1 Use the bar model to fill in the boxes.

a)

15	
6	9

$15 - 6 =$ ☐ $15 -$ ☐ $= 6$

b)

y	
x	4

$x + 4 = y$ so $x =$ ☐

2 Use the bar model to fill in the boxes.

a)

20			
5	5	5	5

$20 \div 4 =$ ☐

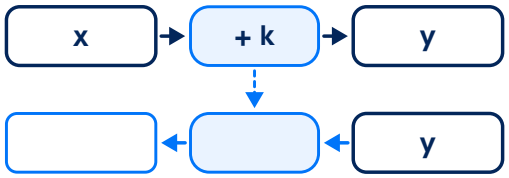
b)

m			
p	p	p	p

$m = 4p$ so $p =$ ☐

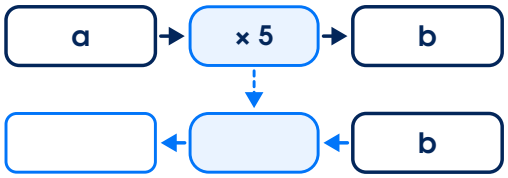
3 The top machine goes in. Fill in the inverse machine underneath, working right to left.

a)



$x =$ ☐

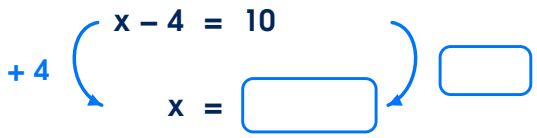
b)



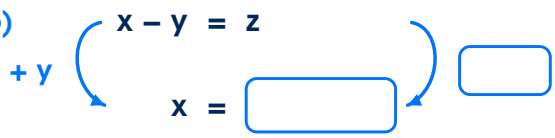
$a =$ ☐

4 Solve the equation in a). Rearrange the formula in b) in the same way.

a)



b)



CHANGE THE SUBJECT (ONE STEP)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Solve an equation

$p + 6 = 20$

-6 ↓ -6

$p = 14$

Rearrange a formula (make p the subject)

$p + q = r$

$-q$ ↓ $-q$

$p = r - q$

1 Make x the subject. Use the inverse of + or –.

a) $x + 5 = y$ $x =$ ____ b) $x - c = d$ $x =$ ____

c) $y = x + 2w$ $x =$ ____ d) $k = x - 3$ $x =$ ____

2 Make the letter shown the subject. Use the inverse of × or ÷.

a) $y = 4x$ $x =$ ____ b) $A = lw$ $w =$ ____

c) $\frac{x}{3} = t$ $x =$ ____ d) $m = \frac{x}{k}$ $x =$ ____

3 Use the bar models to rearrange the formulae.

a)

P			
s	s	s	s

$P = 4s$ $s =$ ____

b)

m				
p	p	p	p	p

$m =$ ____ p $p =$ ____

4 A square has side s and area A, so $A = s^2$.

a) Circle the correct rearrangement: $s = A^2$ $s = \sqrt{A}$ $s = A \div 2$

b) Find s when A = 49. ____

CHANGE THE SUBJECT (ONE STEP)

CORE

NAME _____ CLASS _____ DATE _____

FLUENCY

1 Make the letter shown the subject of each formula.

a) $v = u + 10$

$u =$ ☐

b) $F = ma$

$a =$ ☐

c) $p = \frac{q}{7}$

$q =$ ☐

d) $T = R - 18$

$R =$ ☐

e) $d = st$

$t =$ ☐

f) $A = r^2 \ (r > 0)$

$r =$ ☐

2 Here is the formula for speed.

$s = \frac{d}{t}$

a) Make d the subject: ☐

b) d if s = 12, t = 2.5: ☐

REASONING

3 Jo makes b the subject of a formula. Here is her working.

$a = \frac{b}{5}$ so $b = \frac{a}{5}$

a) Explain Jo's mistake.

.....

b) Correct formula: b = ☐

4 Here is a formula: 2m = n

a) Is n the subject? Explain. .....

b) Rearrange the formula to make m the subject. ☐

CHANGE THE SUBJECT (ONE STEP)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) If $y = x + k$, then $x = y + k$. ALWAYS SOMETIMES NEVER

b) If $p = qr$ and r is not zero, then $q = p \div r$. ALWAYS SOMETIMES NEVER

c) If $A = s^2$, then $s = \sqrt{A}$. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 Which of these formulae are equivalent to $a = bc$? (b and c are not zero.)

$b = \frac{a}{c}$ ☐ $c = \frac{a}{b}$ ☐ $b = ac$ ☐ $c = \frac{b}{a}$ ☐ $\frac{a}{b} = c$ ☐

Tick the ones that are equivalent.

3 The circumference of a circle is $C = \pi d$, where d is the diameter.

a) Make d the subject. _____

b) Find d when $C = 50$ (1 d.p.). _____

c) A bike wheel has a circumference of 210 cm. Find its diameter (1 d.p.). _____

★ CHALLENGE FOR ALL

4 Linked formulae.

$x = y + 3$ $y = 4z$

a) Write a formula for x in terms of z. _____

b) Write a formula for z in terms of y. _____

c) Write a formula for z in terms of x. _____

CHANGE THE SUBJECT (ONE STEP) – ANSWERS

ANSWERS

BUILDING BLOCKS

1 a) 9 · 9 · b) $x = y - 4$
2 a) 5 · b) $p = m \div 4$ (or $m/4$)
3 a) – k: $x = y - k$ · b) ÷ 5: $a = b \div 5$ ($b/5$)
4 a) $x = 14$ · b) $x = z + y$

SUPPORT

1 a) $y - 5$ · b) $d + c$ · c) $y - 2w$ · d) $k + 3$
2 a) $y/4$ · b) $w = A/l$ · c) $3t$ · d) mk
3 a) $s = P/4$ · b) $m = 5p$, $p = m/5$
4 a) $s = \sqrt{A}$ · b) 7

CORE

1 a) $u = v - 10$ · b) $a = F/m$ · c) $q = 7p$ · d) $R = T + 18$ · e) $t = d/s$ · f) $r = \sqrt{A}$
2 a) $d = st$ · b) 30
3 a) She divided a by 5 instead of multiplying: the inverse of ÷ 5 is × 5 · b) $b = 5a$
4 a) Yes: n is on its own on one side (the subject can be on the right) · b) $m = n/2$

GREATER DEPTH

1 a) sometimes (only when $k = 0$; $x = y - k$) · b) always · c) sometimes (s could be $-\sqrt{A}$, but a length is positive)
2 $b = a/c$, $c = a/b$ and $a/b = c$ are equivalent; $b = ac$ and $c = b/a$ are not
3 a) $d = C/\pi$ · b) 15.9 · c) 66.8 cm
4 a) $x = 4z + 3$ · b) $z = y/4$ · c) $z = (x - 3)/4$