


Knowledge organiser for 9H Linear Equations and Expressions Review

By: _____

Date: _____

Form expressions

<u>Addition</u> More than, greater than, older than...	<u>Subtraction</u> Less than, smaller than, younger than...
4 more than $t = t+4$	8 less than $k = k-8$
<u>Multiplication</u> Lots of, product, times...	<u>Division</u> Divide, share, halve, goes into...
4 lots of $t = 4t$	A quarter of $x = \frac{x}{4}$
<u>With shapes</u>	
Perimeter of the square =	$a+a+a+a = 4a$
Area of square =	$a \times a = a^2$

Collect like terms: we can only combine terms if they are like.



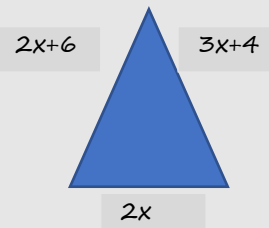
One variable (like terms)

$$a + 2a - a + 3a = 5a$$

Two variables (unlike terms)

$$5a - 3 + 6a + 8 = 11a + 5$$

With Shapes



Find the perimeter of the triangle

$$\begin{aligned} &= 2x+6+3x+4+2x \\ &= 7x + 10 \end{aligned}$$

Perimeter

Substitution:

If $t = 7$, find $4t$ Remember $4t$ means '4 lots of t '

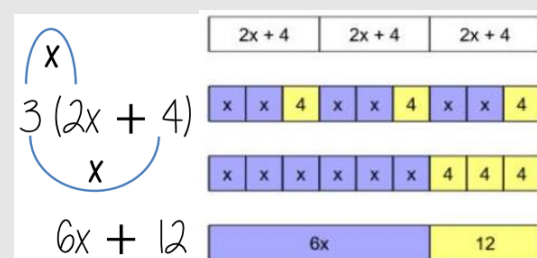
$$4t = 4 \times 7 = 28$$

If $a = 2$, $b = 4$ and $c = -3$, find:

$3a - 2b$	$ab - 2c$
$= 3 \times 2 - 2 \times 4$	$= 2 \times 4 - 2 \times (-3)$
$= 6 - 8$	$= 8 + 6$
$= -2$	$= 14$

Expand single brackets:

We expand everything inside the bracket by the term outside



$$\begin{aligned} &5(3x + 2) \\ &= 15x + 10 \end{aligned}$$

$$\begin{aligned} &4(z - 3) \\ &= 4z - 12 \end{aligned}$$

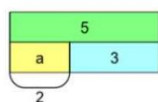
Inverse Operations:

Operation	Inverse Operation
Addition	Subtraction
Subtraction	Addition
Multiplication	Division
Division	Multiplication

Solve one step equations: we want to get one variable on its own. We use inverse operations.

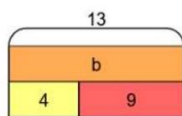
Find a when:

$$\begin{aligned} a + 3 &= 5 \\ -3 \quad -3 \\ \hline a &= 2 \end{aligned}$$



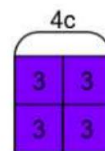
Find b when:

$$\begin{aligned} b - 4 &= 9 \\ +4 \quad +4 \\ \hline b &= 13 \end{aligned}$$



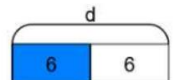
Find c when:

$$\begin{aligned} 4c &= 12 \\ \div 4 \quad \div 4 \\ \hline c &= 3 \end{aligned}$$



Find d when:

$$\begin{aligned} \frac{d}{2} &= 6 \\ \times 2 \quad \times 2 \\ \hline d &= 12 \end{aligned}$$



Solve two step equations:

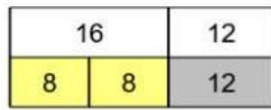
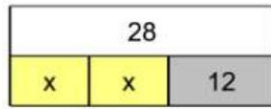
$$2x + 12 = 28$$

$$-12 \quad -12$$

$$2x = 16$$

$$\div 2 \quad \div 2$$

$$x = 8$$



$$3t + 5 = 20$$

$$-5 \quad -5$$

$$3t = 15$$

$$\div 3 \quad \div 3$$

$$t = 5$$

Solve equations with variables on both sides:

$$8x + 5 = 4x + 13$$

$$-5 \quad -5$$

$$8x = 4x + 8$$

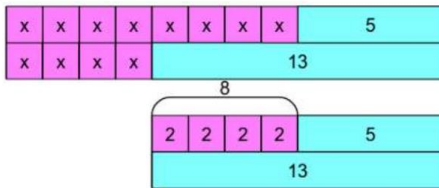
$$-4x \quad -4x$$

$$4x = 8$$

$$\div 4 \quad \div 4$$

$$x = 2$$

inverse operations



$$7y + 26 = y + 8$$

$$-y \quad -y$$

$$6y + 26 = 8$$

$$-26 \quad -26$$

$$6y = -18$$

$$\div 6 \quad \div 6$$

$$y = -3$$

Solve equations with brackets

$$3(2x + 4) = 30$$

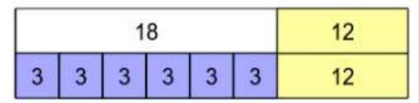
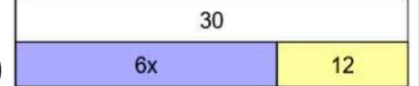
$$6x + 12 = 30$$

$$-12 \quad -12$$

$$6x = 18$$

$$\div 6 \quad \div 6$$

$$x = 3$$



$$7(x - 2) = 42$$

$$7x - 14 = 42$$

$$+14 \quad +14$$

$$7x = 56$$

$$\div 7 \quad \div 7$$

$$x = 8$$

Solve equations with fractions

$$\frac{x}{6} - 7 = 5$$

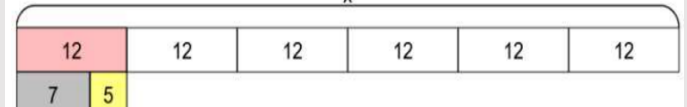
$$+7 \quad +7$$

$$\frac{x}{6} = 12$$

$$\times 6 \quad \times 6$$

$$x = 72$$

We need to get x on its own but its stuck to the 6 by the fraction line, so we get rid of the -7 first



$$\frac{d}{3} - 7 = 9$$

$$+7 \quad +7$$

$$\frac{d}{3} = 16$$

$$\times 3 \quad \times 3$$

$$d = 48$$

Key learning

Collecting like terms

Expanding single brackets

Solving one and two step equations

Solving equations with brackets

Solving equations with variables on both sides

Hegarty clips

156, 157

160

178-182

183

184 - 186