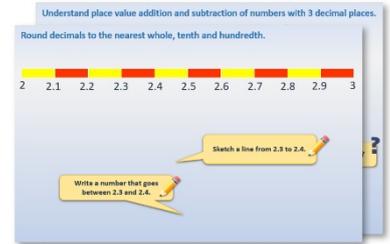


Week 7, Day 5

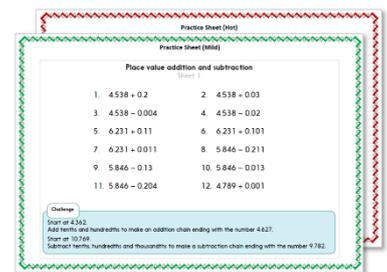
Equations with two unknowns

Each day covers one maths topic. It should take you about 1 hour or just a little more.

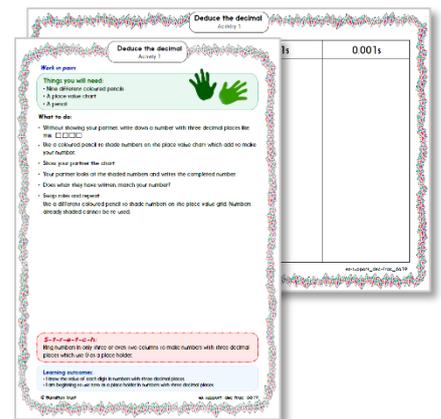
1. Start by reading through the **Learning Reminders**. They come from our *PowerPoint* slides.



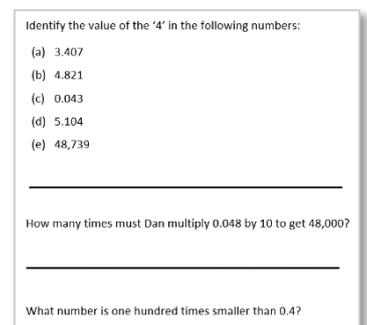
2. Tackle the questions on the **Practice Sheet**. There might be a choice of either **Mild** (easier) or **Hot** (harder)! Check the answers.



3. Finding it tricky? That's OK... have a go with a grown-up at **A Bit Stuck?**



4. Have I mastered the topic? A few questions to **Check your understanding**. Fold the page to hide the answers!



Learning Reminders

Find pairs of numbers that satisfy an equation with two unknowns, enumerate possibilities of combinations of two variables.

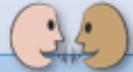
$$a + b = 10$$

a and b are two new mystery whole positive numbers



What might numbers
a and b might represent?

There are LOTS of
possibilities.



This is a list of pairs of
possibilities.

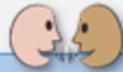


a	b
10	0
9	1
8	2
7	3
6	4
5	5
4	6
3	7
2	8
1	9
0	10

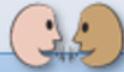
Learning Reminders

Find pairs of numbers that satisfy an equation with two unknowns, enumerate possibilities of combinations of two variables.

$$c \times d = 24$$



Think what whole numbers c and d might represent.



List ALL the pairs of possibilities on your whiteboard.



c	d
1	24
2	12
3	8
4	6
6	4
8	3
12	2
24	1

Learning Reminders

Find pairs of numbers that satisfy an equation with two unknowns, enumerate possibilities of combinations of two variables.

$$2e + f = 8$$

8	
2e	f



Find a pair of whole numbers which will work.



Test out your ideas by substituting for the letters, e.g. if you think 3 and 2 will work, work out $2 \times 3 + 2 = 8$.
So, e could equal 3 and f equal 2. Could e equal 2 and f equal 3? Try it!

Double a number, plus another number makes 8...
If e is 1, then f must be...
If e is 2, then...

Some interesting patterns in this table.

e	f
0	8
1	6
2	4
3	2
4	0

Practice Sheet Mild

Equations with two unknowns

Write the possible pairs of answers for these equations. All answers are whole numbers.

$$a + b = 9$$

$$c \times d = 15$$

$$10 - e = f$$

$$g + h + 1 = 11$$

$$j \times k - 1 = 15$$

$$m + n - 2 = 8$$

$$p \times q = 20$$

$$14 - r = s$$

$$2t + u = 10$$

Challenge

Can you make up a puzzle like this for your partner to solve?

Practice Sheet Hot

Equations with two unknowns

Find a pair of numbers that works in **both** equations:

$$a + b = 10$$

$$a \times b = 21$$

$$c \times d = 16$$

$$c - d = 6$$

$$e + f = 12$$

$$e - f = 4$$

$$g - h = 9$$

$$g \div h = 4$$

$$j \times k = 72$$

$$j \div k = 2$$

Challenge

Can you make up a puzzle like this for your partner to solve?

Practice Sheets Answers

Equations with two unknowns (mild)

$$a + b = 9$$

$$a = 0 \ b = 9, a = 1 \ b = 8, a = 2 \ b = 7, a = 3 \ b = 6, a = 4 \ b = 5, a = 5 \ b = 4, a = 6 \ b = 3, \\ a = 7 \ b = 2, a = 8 \ b = 1, a = 9 \ b = 0$$

$$c \times d = 15$$

$$c = 1 \ d = 15, c = 3 \ d = 5, c = 5 \ d = 3, c = 15 \ d = 1.$$

$$10 - e = f$$

$$e = 0 \ f = 10, e = 1 \ f = 9, e = 2 \ f = 8, e = 3 \ f = 7, e = 4 \ f = 6, e = 5 \ f = 5, e = 6 \ f = 4, \\ e = 7 \ f = 3, e = 8 \ f = 2, e = 9 \ f = 1, e = 10 \ f = 0$$

$$g + h + 1 = 11$$

$$g = 0 \ h = 10, g = 1 \ h = 9, g = 2 \ h = 8, g = 3 \ h = 7, g = 4 \ h = 6, g = 5 \ h = 5, g = 6 \ h = 4, \\ g = 7 \ h = 3, g = 8 \ h = 2, g = 9 \ h = 1, g = 10 \ h = 0$$

$$j \times k - 1 = 15$$

$$j = 1 \ k = 16, j = 2 \ k = 8, j = 4 \ k = 4, j = 8 \ k = 2, j = 16 \ k = 1$$

$$m + n - 2 = 8$$

$$m = 0 \ n = 10, m = 1 \ n = 9, m = 2 \ n = 8, m = 3 \ n = 7, m = 4 \ n = 6, m = 5 \ n = 5, \\ m = 6 \ n = 4, m = 7 \ n = 3, m = 8 \ n = 2, m = 9 \ n = 1, m = 10 \ n = 0$$

$$p \times q = 20$$

$$p = 1 \ q = 20, p = 20 \ q = 1, p = 2 \ q = 10, p = 10 \ q = 2, p = 4 \ q = 5, p = 5 \ q = 4$$

$$14 - r = s$$

$$r = 0 \ s = 14, r = 1 \ s = 13, r = 2 \ s = 12, r = 3 \ s = 11, r = 4 \ s = 10, r = 5 \ s = 9, r = 6 \ s = 8, \\ r = 7 \ s = 7, r = 8 \ s = 6, r = 9 \ s = 5, r = 10 \ s = 4, r = 11 \ s = 3, r = 12 \ s = 2, r = 13 \ s = 1, \\ r = 14 \ s = 0$$

$$2t + u = 10$$

$$t = 4 \ u = 2, t = 3 \ u = 4, t = 2 \ u = 6, t = 1 \ u = 8$$

Equations with two unknowns (hot)

$$a = 7 \ b = 3 \text{ or } a = 3 \ b = 7$$

$$c = 8 \ d = 2$$

$$e = 8 \ f = 4$$

$$g = 12 \ h = 3$$

$$j = 12 \ k = 6$$

A Bit Stuck? Mystery pairs

1. Two numbers have been multiplied together to make 12: $\square \times \square = 12$

We can use letters to represent each number instead of empty boxes:

$$a \times b = 12$$

There are lots of possible pairs of whole numbers!

This person has started working through some answers. See if you can finish their work.

$1 \times 12 = 12$	$a = 1, b = 12$
$2 \times 6 = 12$	$a = 2, b = 6$
$3 \times$	$a = , b =$
$4 \times$	
$6 \times$	
$12 \times$	

2. Two numbers have been added together to make 9: $\square + \square = 9$

We can use letters to represent each number instead of empty boxes:

$$c + d = 9$$

There are lots of possible pairs of whole numbers!

Your challenge is to find them ALL!

3. Two numbers have been multiplied together to make 18: $\square \times \square = 18$

We can use letters to represent each number instead of empty boxes:

$$e \times f = 18$$

There are lots of possible pairs of whole numbers!

Your challenge is to find them ALL!

Check your understanding

Questions

Both a and b are whole numbers.

How many possibilities are there for values of a and b if $a + 2b = 13$.

$2a$ is 5 more than $3b$.

If a and b are both whole numbers and $a < 10$, what are the possible values for a and b ?

A number less than 10 is multiplied by itself. The answer is equal to a different number multiplied by 9. What are the possible numbers?

Fold here to hide answers

Check your understanding

Answers

Both a and b are whole numbers.

How many possibilities are there for values of a and b if $a + 2b = 13$. **There are 7 solutions.**

Since $2 \times$ any number is an even number, a must be odd. Some children may miss the solution where b is 0. The solutions are:

$a = 1$ and $b = 6$

$a = 3$ and $b = 5$

$a = 5$ and $b = 4$

$a = 7$ and $b = 3$

$a = 9$ and $b = 2$

$a = 11$ and $b = 1$

$a = 13$ and $b = 0$

$2a$ is 5 more than $3b$.

If a and b are both whole numbers and $a < 10$, what are the possible values for a and b ?

Either $a = 7$ and $b = 3$, or $a = 4$ and $b = 1$.

A number less than 10 is multiplied by itself. The answer is equal to a different number multiplied by 9. What are the possible numbers?

Either $3^2 (= 1 \times 9)$ or $6^2 (= 4 \times 9)$.