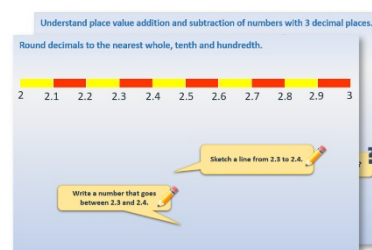


# Week 7, Day 5

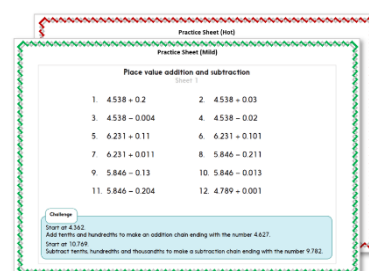
## Equations with two unknowns

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

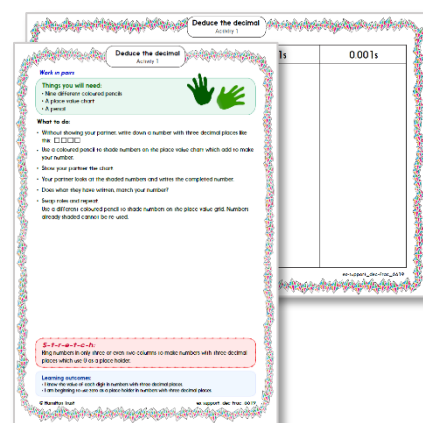
1. Start by reading through the **Learning Reminders**. They come from our *PowerPoint* slides.



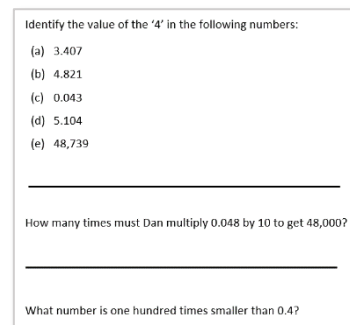
2. Tackle the questions on the **Practice Sheet**. There might be a choice of either **Mild** (easier) or **Hot** (harder)! Check the answers.



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  $a + 2b = 13$ .

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

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

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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*

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## 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  $b = 0$

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$2a$  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  $b = 1$ .**

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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  $6^2 (= 4 \times 9)$ .**