Creating Reasoning Routines, Building Problem-Solvers

Session 3

Building Children as Problem-Solvers

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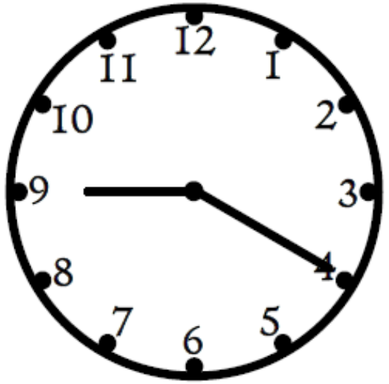
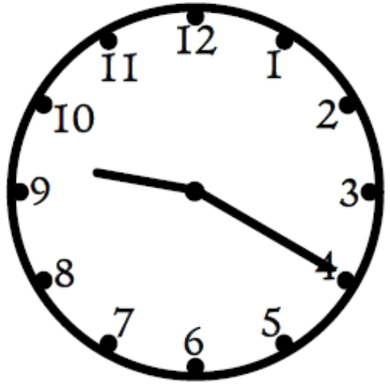
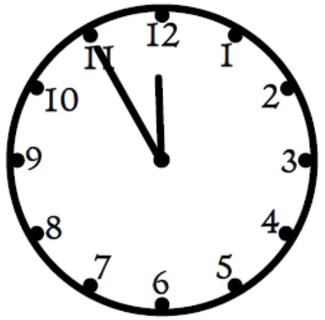
Y3 & Y4

Spot the Difference

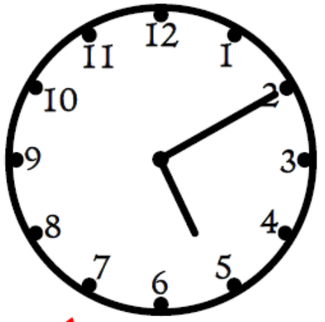




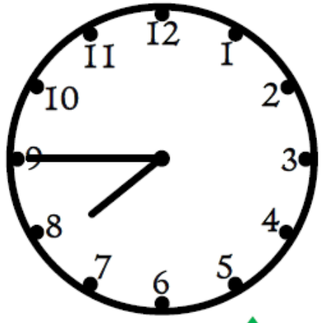
Explain the Mistakes



11:00



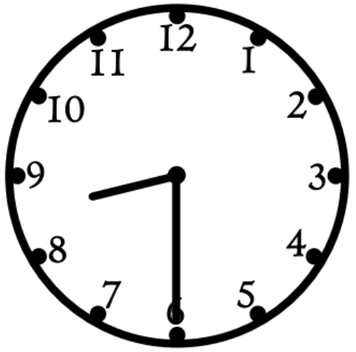
5:02



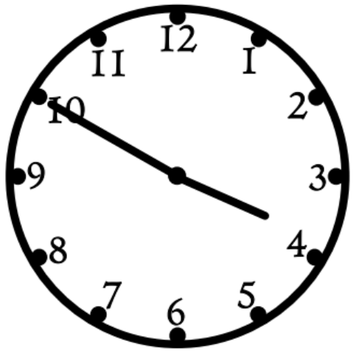
8:45

When the minute hand points to… it means…
If the time was… the hour hand would be…

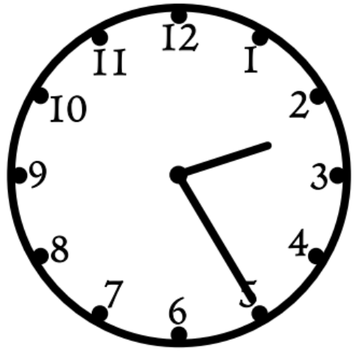
Which Answer?



8:30 **OR** 9:30



4:10 **OR** 3:50



2:05 **OR** 2:25

Explain the mistakes.

Small Difference Questions

$375 + 145 =$ 520

$345 + 175 =$ 520

$345 + 157 =$ 502

$353 + 149 =$ 502

(d) 64 + 83

(e) 71 + 76

(d) 78 – 56

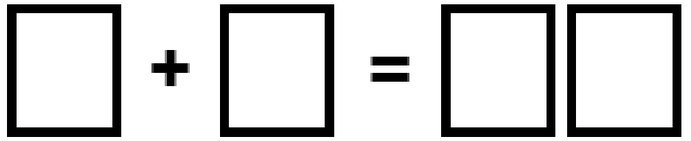
(e) 81 – 59

(d) 24 × 6

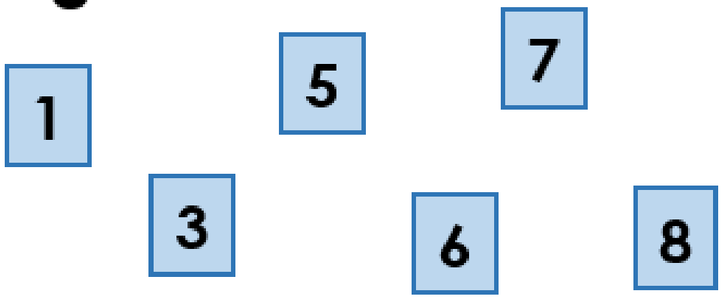
(e) 48 × 3

(d) 24 ÷ 4

(e) 48 ÷ 8



Answer using four of the digits:



Answers:

Level 1: *I can find an answer*

Level 2: *I can find different answers*

Level 3: *I know how many answers there are*

Question 1:

I think of **3 numbers** (not 0).

They are all **different.**

They have a **sum** of **7.**

Answer: ☐ ☐ ☐

Question 2:

I think of **3 numbers** (not 0).

They are all **different.**

They have a **sum** of **12.**

Answer: ☐ ☐ ☐

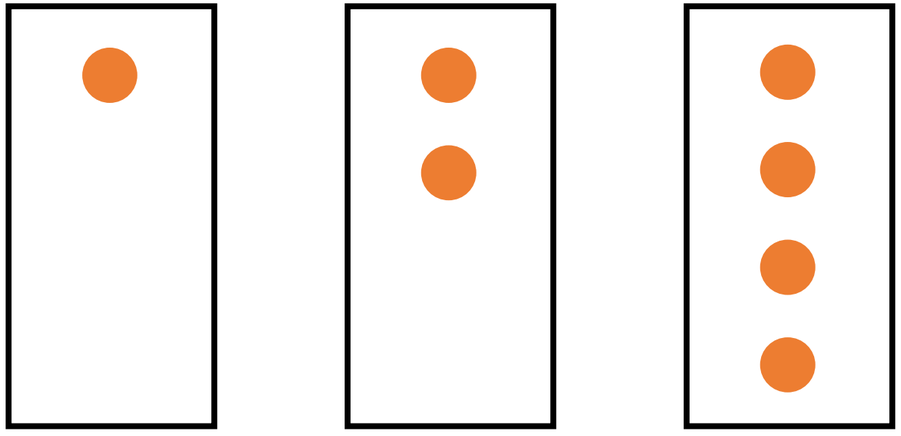
Question 1:

I think of **3 numbers** (not 0).

They are all **different.**

They have a **sum** of **7.**

Answer: ☐ ☐ ☐



Question 2:

I think of **3 numbers** (not 0).

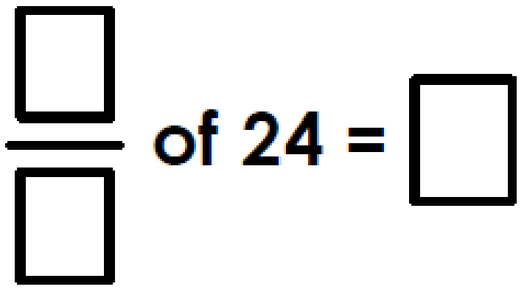
They are all **different.**

They have a **sum** of **12.**

Answer: ☐ ☐ ☐

How Many Ways?

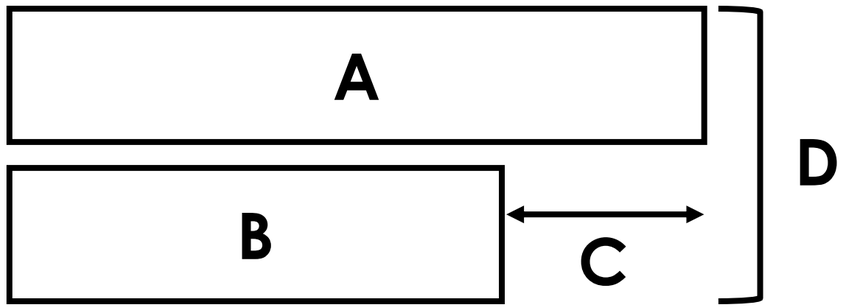
Fill each gap with a **single-digit number:**



Level 1: *I can find an answer*

Level 2: *I can find different answers*

Level 3: *I know how many answers there are*



1. Raja has 6 stickers. He has 4 stickers less than Zack.
How many stickers does Zack have?

2. Jen has 6 stickers. Helen has 4 stickers. In total, they have 10 stickers.
How many more stickers does Jen have than Helen?

3. Tim has 6 stickers. He has 4 more stickers than Mo.
How many stickers do Tim and Mo have in total?

Success…

A challenge…

Next steps…

Question:

View Deconstructing Word Questions Samples

Consider use of How Many Ways questions

7 10 4

7 10 4

Here are three different numbers

The sum of the numbers is 21

6 8 7

Here are three different numbers

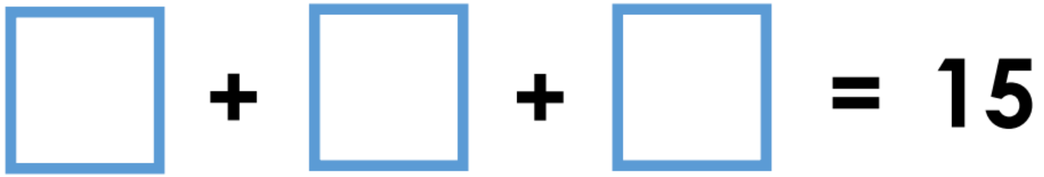
The sum of the numbers is 21

Spot the mistake

5 11 5

Here are three different numbers

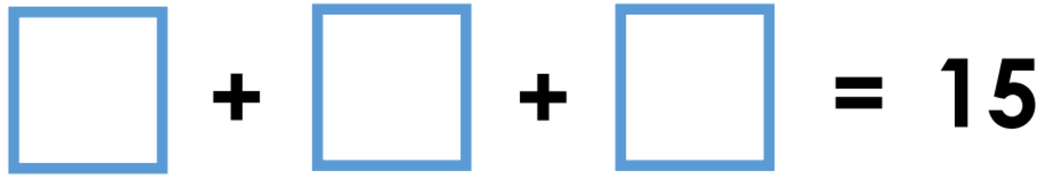
The sum of the numbers is 21



I think of three different whole numbers.

Each number is 3 or more. The numbers add to make 15.

What could the three numbers be?



I think of three different whole numbers.

Each number is 3 or more. The numbers add to make 15.

What could the three numbers be?

Spot the mistakes:

8 + 5 + 2

6 + 6 + 3

4 + 5 + 7

I think of three **different** whole numbers.

Each number is **more than 5.** The numbers add to make 24.

What could the three numbers be?

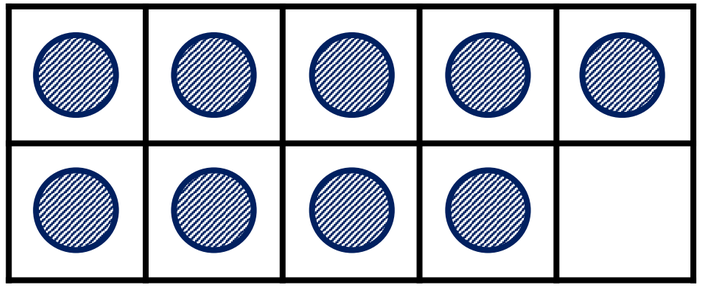
There are different possible answers!

Which number sentence is correct?

$9 - 4 = 5$

$5 - 4 = 9$

$9 - 4 = 6$



Subtraction Bordering Tens

Task A

True or False? ✓ or ✗

$9 - 3 = 6$

$11 - 4 = 8$

$14 - 5 = 11$

$8 - 5 = 4$

$3 - 9 = 6$

$17 - 9 = 8$

$13 - 9 = 4$

$17 - 8 = 9$

Answer using three of the digits:

Explain the Mistake:

□ - □ = □

3 5 4 8

Answer using three of the digits:

Explain the Mistake:

5	–	8	=	3

4

Subtraction Bordering Tens

Task B

Question A:

9 − 5 = 4

Complete using the digits 0→9

0	3	7
1	5	8
2	6	9

There are different answers.

Answers:

9−5=4
7−3=4
6−2=4
5−1=4

Question B:

9 − 2 = 7

Complete using the digits 0→9

0	3	6
1	4	8
2	5	9

There are different answers.

Answers:

9−2=7
8−1=7

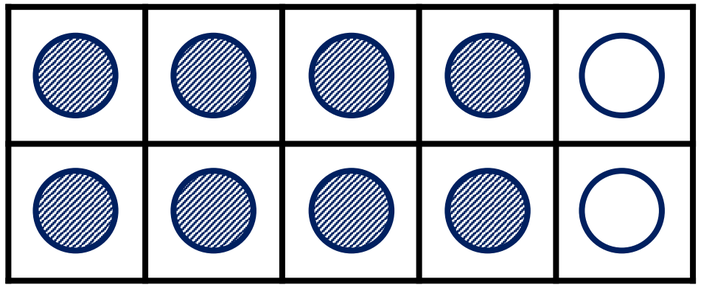
Extension: *Which question can be answered in more ways?* A

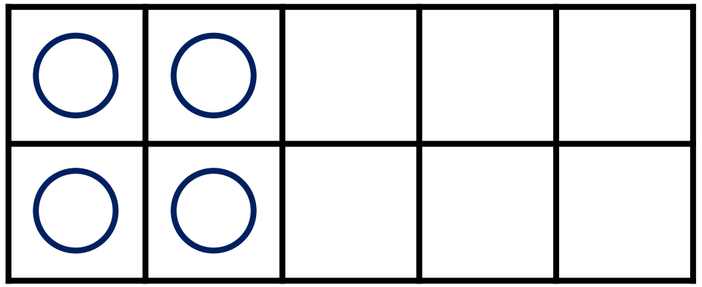
Answer using four of the digits:

Explain the Mistake:

8

1	4	–	6	=	9

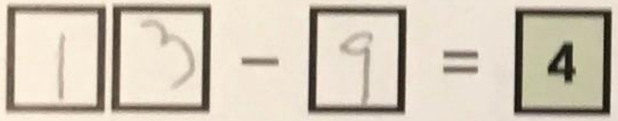




Subtraction Bordering Tens

Task C

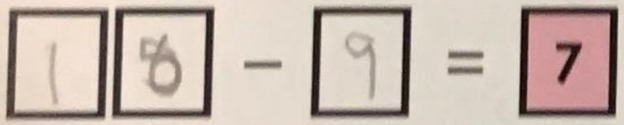
Question X:



Complete using the digits 0→9

0 5 1 6 2 7 8 3 9

Question Y:



Complete using the digits 0→9

0 4 1 5 2 6 3 8 9

Extension: *Which question can be answered in more ways?* Y

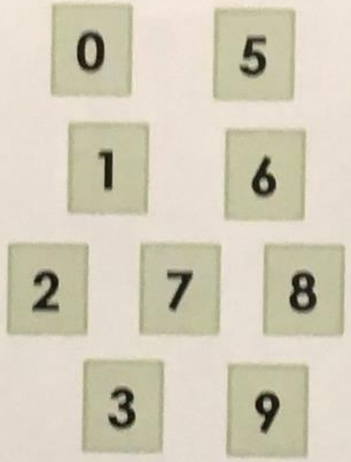
Subtraction Bordering Tens

Task C

Question X:

13 − 9 = 4

Complete using the digits 0→9



There are different answers.

Answers:

13 − 9 = 4

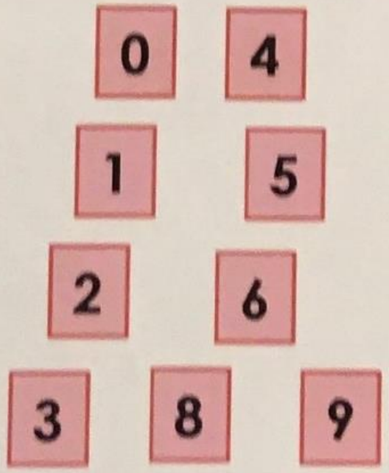
12 − 8 = 4

10 − 6 = 4

Question Y:

18 − 9 = 7

Complete using the digits 0→9



There are different answers.

Answers:

16 − 9 = 7

15 − 8 = 7

~~14 − 7 = 7~~

13 − 6 = 7

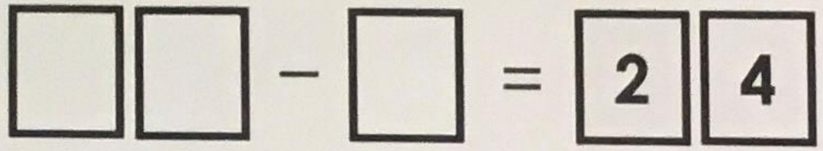
12 − 5 = 7

10 − 3 = 7

Extension: *Which question can be answered in more ways?* Y

Subtraction Bordering Tens

Task D



Complete using the digits 0→9

1 5 7 9 0 3 6 8

Level 1: *I can find an answer*

Level 2: *I can find different answers*

Level 3: *I know how many answers there are*

2 Answers:

30 − 6 = 24

31 − 7 = 24

~~32~~ 22 twotwo?

~~33~~ Same digits

~~34~~ too big!

42×8

38×4

Explain the Mistakes

48 × 3

	40	8
3	120	24

$$\begin{array}{r} 120 \\ 24 \\ +\quad 3 \\ \hline 147 \end{array}$$

617 × 5

	600	10	7
5	300	50	35

$$\begin{array}{r} 300 \\ 50 \\ +\quad 35 \\ \hline 385 \end{array}$$

What's the same? What's different?

65×4

54×6

64×5

What's the same? What's different?

65×4

54×6

64×5

All answers are the same

Some answers are the same

All different answers

What's the same? What's different?

65 × 4 = 260

60 × 4 = 240

5 × 4 = 20

54 × 6 = 324

50 × 6 = 300

4 × 6 = 24

64 × 5 = 320

60 × 5 = 300

4 × 5 = 20

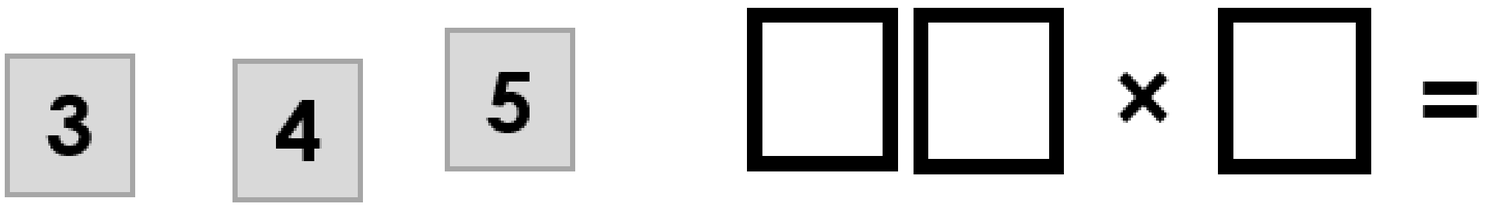
All answers are the same

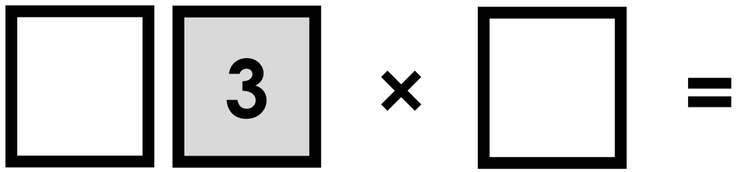
Some answers are the same

All different answers

TASK

Position the digits 3, 4 and 5 to make the product as large as possible.




3
×
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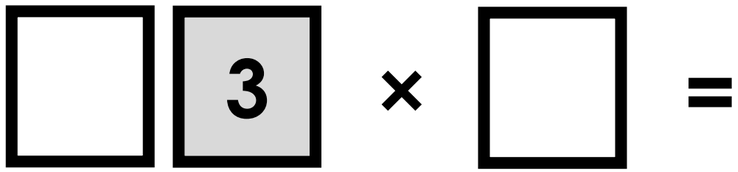
3
×
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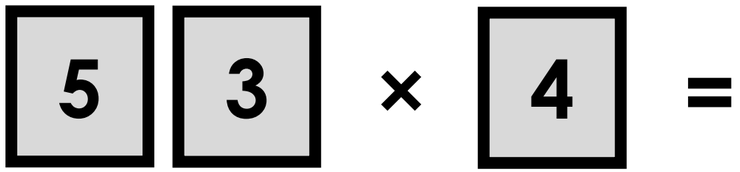
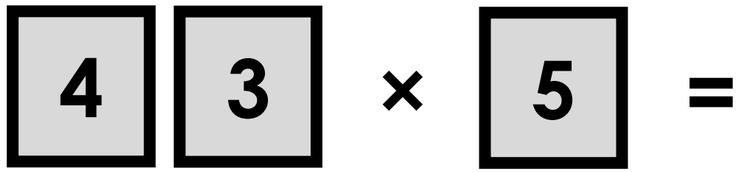
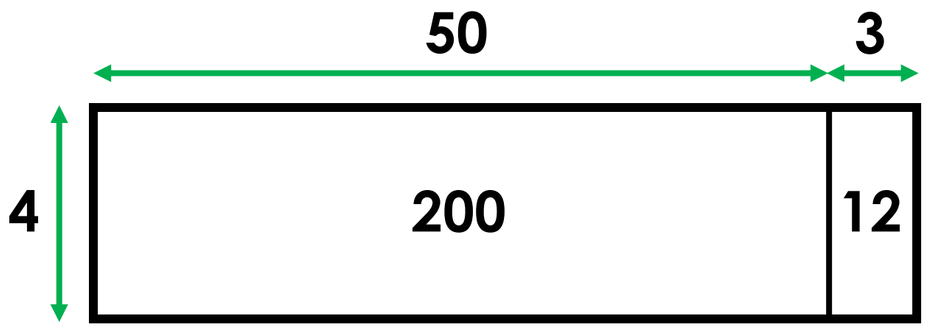

5
3
×
4
=


4
3
×
5
=

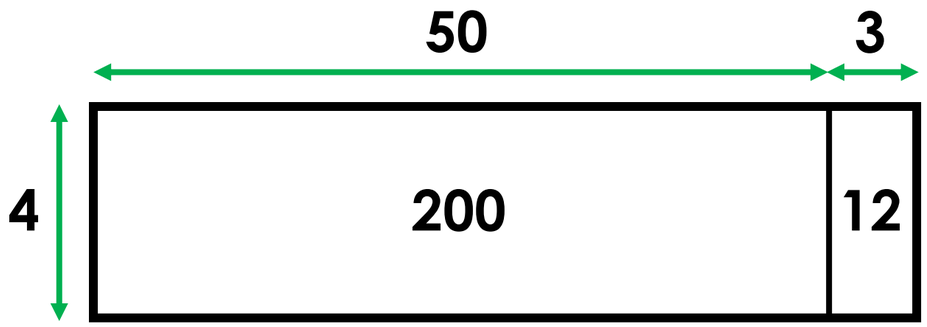
$$\boxed{5}\boxed{3} \times \boxed{4} = 212$$



$53 \times 4 = 212$

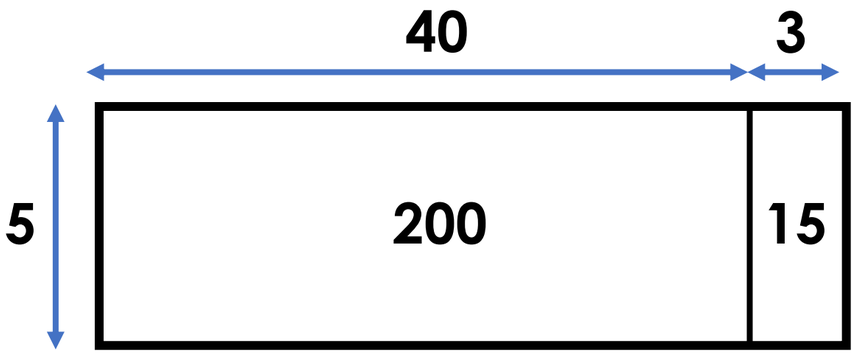
$$\boxed{4}\boxed{3} \times \boxed{5} =$$

$$\boxed{5}\boxed{3} \times \boxed{4} = 212$$



$53 \times 4 = 212$

$$\boxed{4}\boxed{3} \times \boxed{5} = 215$$



$43 \times 5 = 215$

EXPLAIN

Complete the calculations:

46×5

	40	6
5		

56×4

	50	6
4		

What's the same? What's different?

EXTEND

Position the digits 3, 4, 5 and 6 to make the product as large as possible. Do it again to make the product as small as possible.

Consecutive Numbers:

4, 5, 6, 7

14, 15

49, 50, 51

3 Consecutive Numbers:

8, 10, 12

14, 15

99, 100, 101

TASK

Think of **three consecutive numbers**. These are your numbers.

Add your numbers.

TASK

Think of **three consecutive numbers**. These are your numbers.

Add your numbers.

Multiply your middle number by 3.

What do you notice? Explain.

TASK

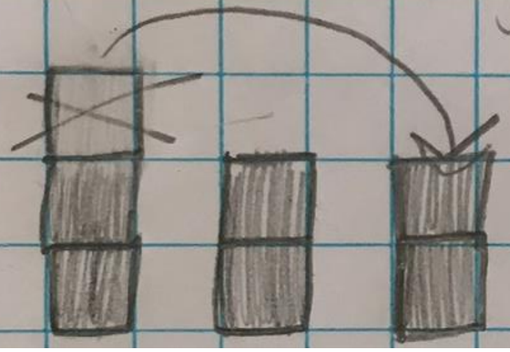
Think of **three consecutive numbers**. These are your numbers.

Add your numbers.

Multiply your middle number by 3.

What do you notice? Explain.

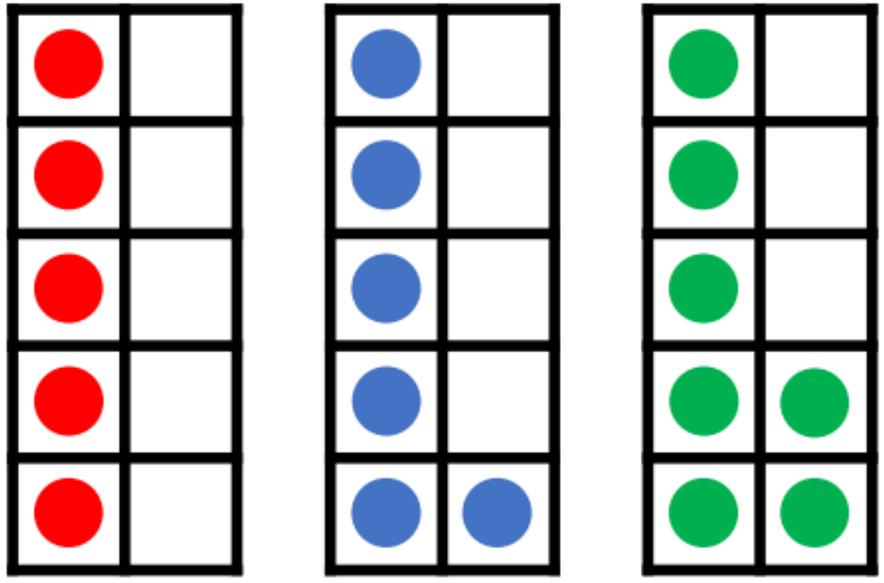
1, 2, 3 is the same as 2 X 3 because for 1 theres one less and 3 theres one more so if your 3 and you give 1, 1 of your numbers it will be three twos. So its the same just shown differently. Example:



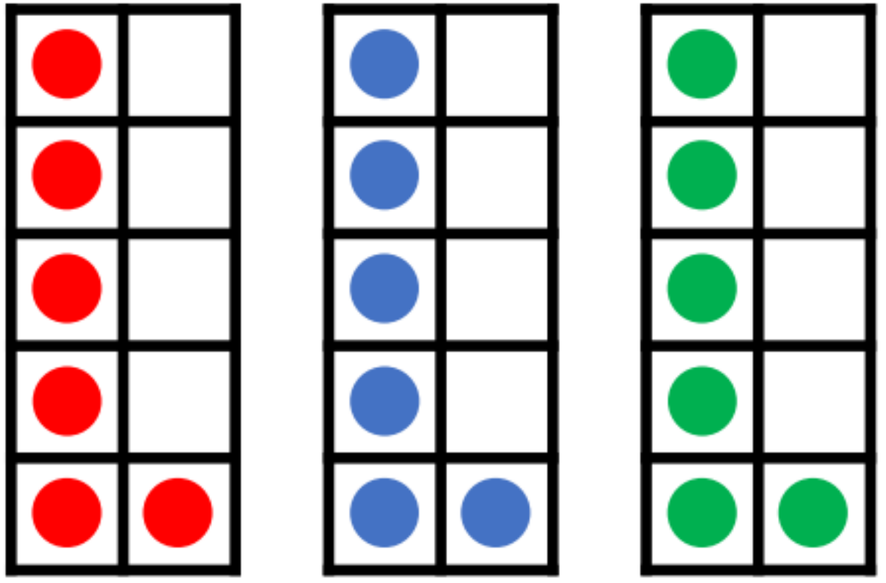
All two.

SUPPORT

This picture shows 5 + 6 + 7



This picture shows 3 × 6



Explain why 5 + 6 + 7 gives the same answer as 3 × 6.

EXTEND

These consecutive numbers add up to make 18:

5, 6 and 7 3, 4, 5 and 6

Which consecutive numbers add up to make 30?

There are 3 possible answers.

1) 9, 10, 11

2) 6, 7, 8, 9

3) 4, 5, 6, 7, 8

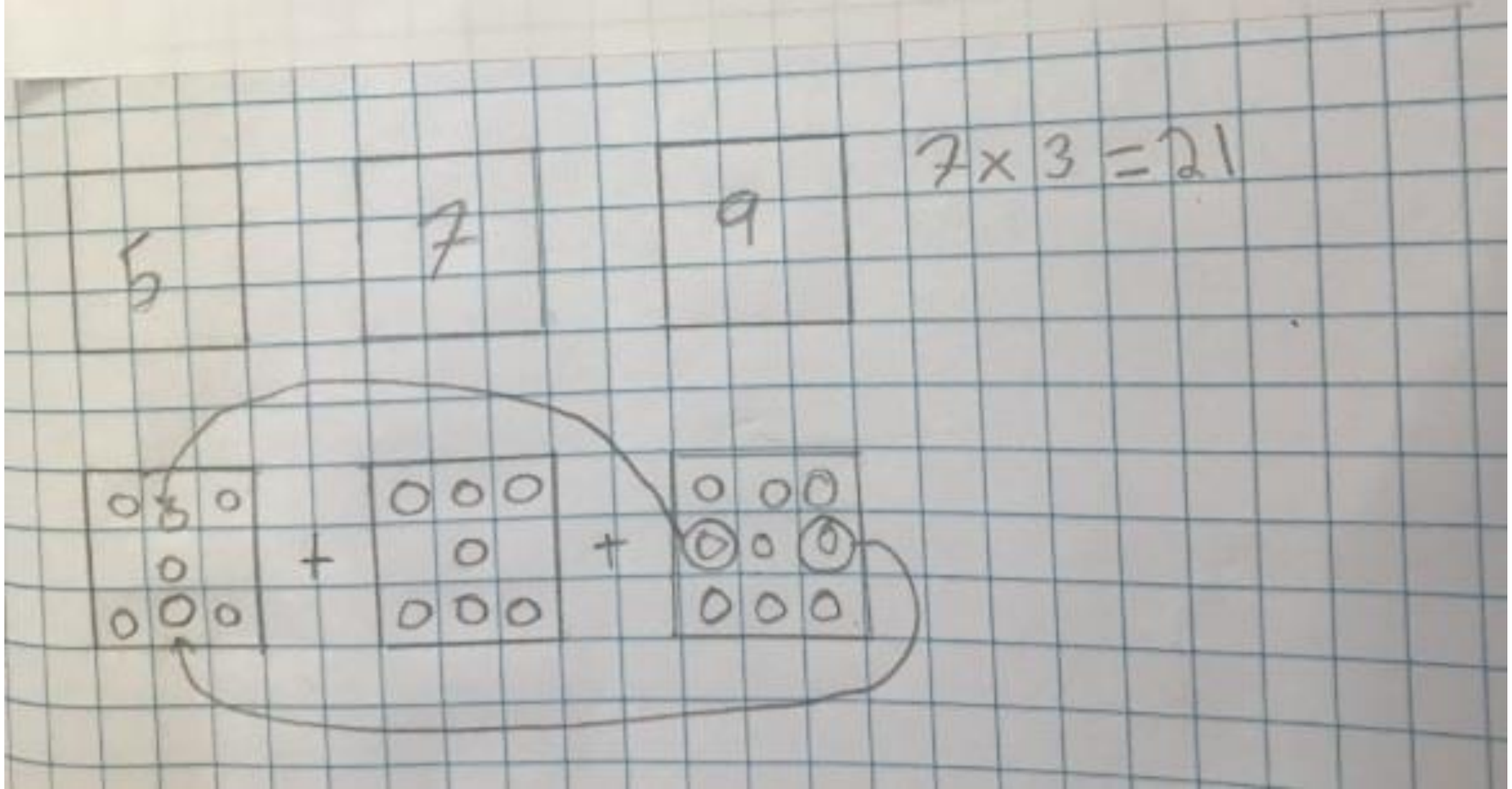
Challenge 1

Sarah goes on a 3-day holiday.

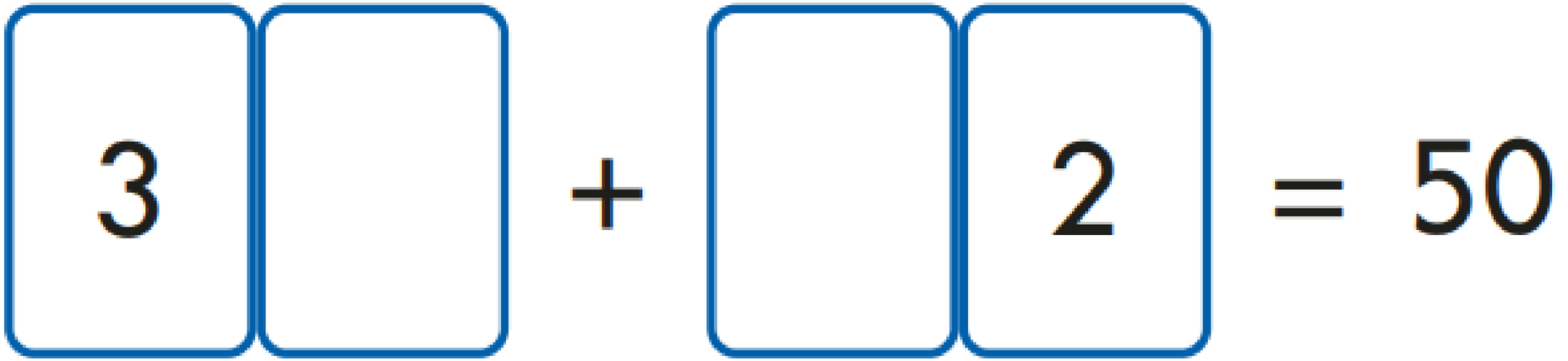
She makes 21 sandcastles.

Each day she makes two more sandcastles than the day before.

How many sandcastles does she make each day?



Write a digit in each box to complete this number sentence.



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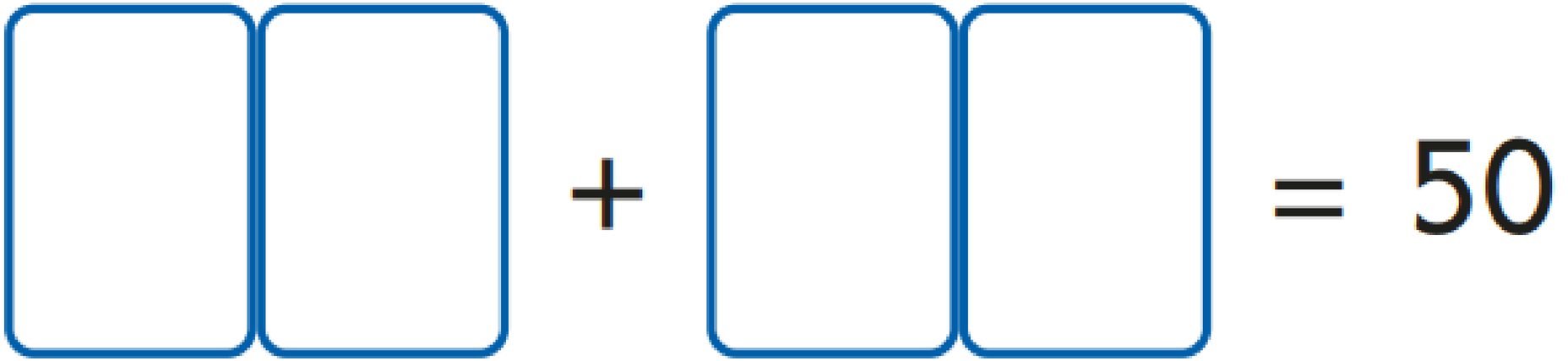
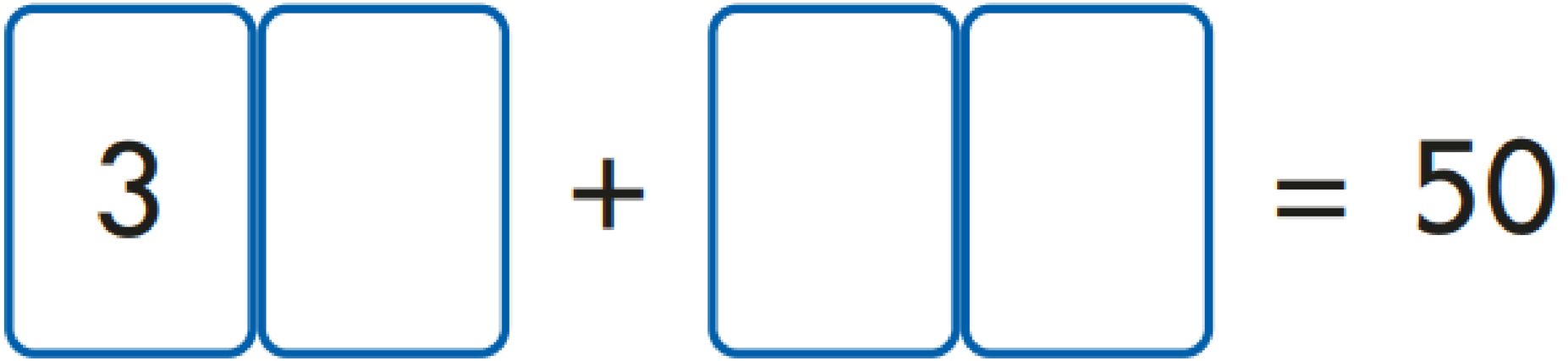
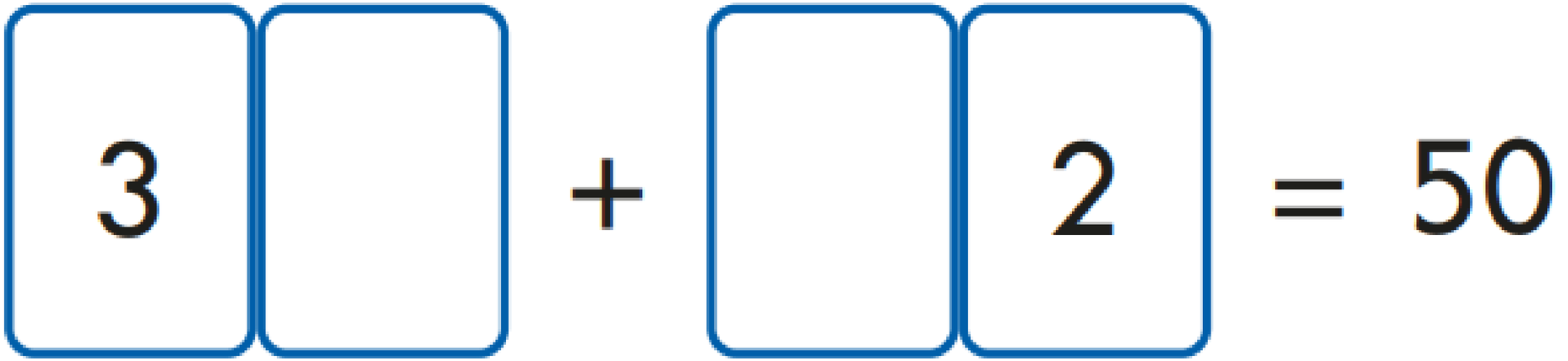
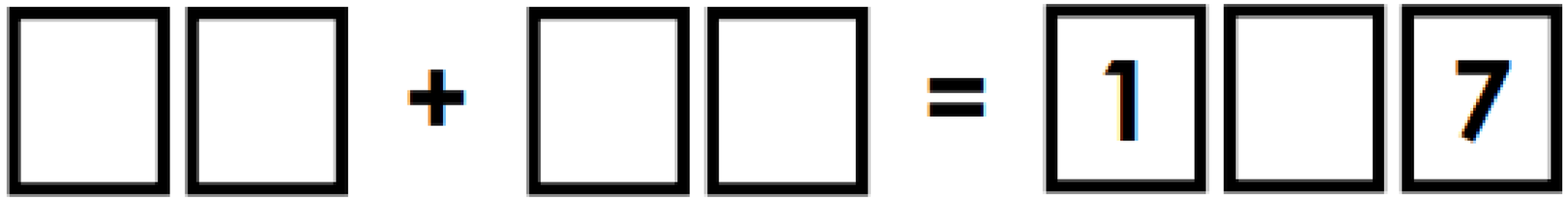


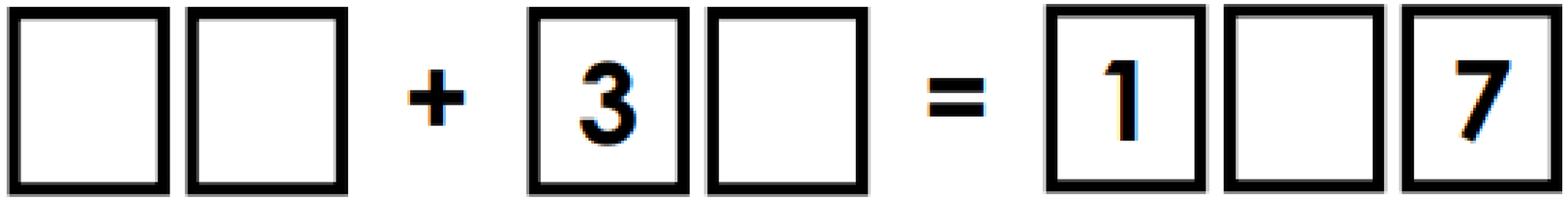
Write a digit in each box to complete this number sentence.

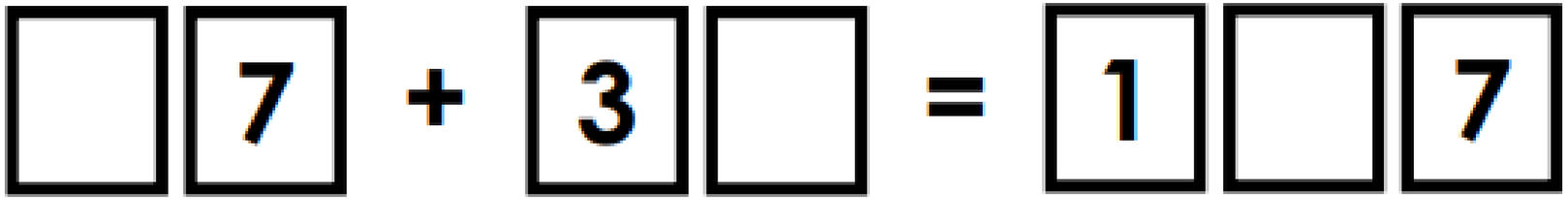


Write a digit in each box to complete this number sentence.



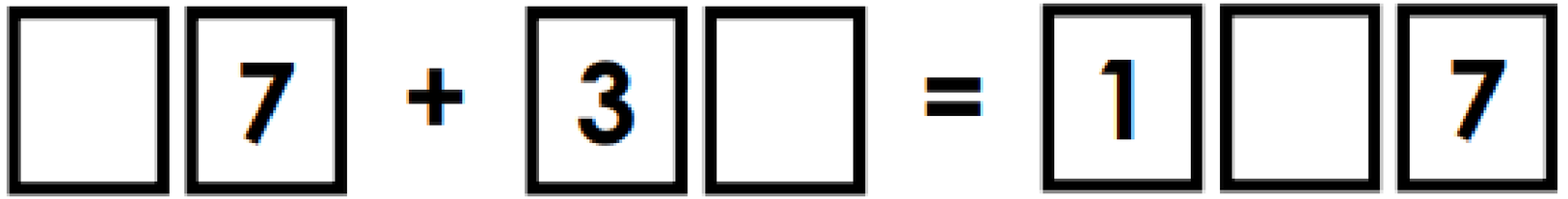

1
7


3
1
7


7
+
3
=
1
7

How Many Ways?

Complete the calculation:



Level 1: *I can find an answer*

Level 2: *I can find different answers*

Level 3: *I know how many answers there are*

BUILD

Which calculations give a 2-digit product?

47×2 21×5 18×6

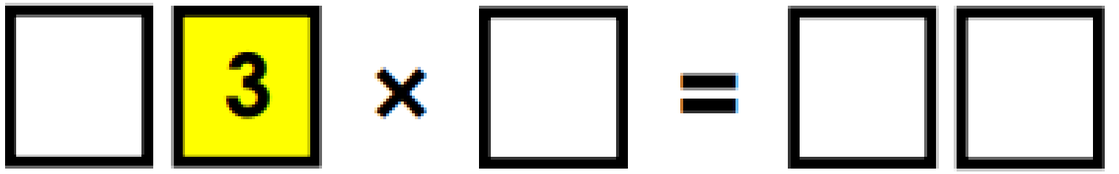
13×8 23×4 14×7

TASK

Use the digits 1-9 to complete the number sentence.

Position the digit 3 as shown:

You can only use each digit once in each number sentence.



1 2 4 5

6 7 8 9

Level 1: *I can find a way*

Level 2: *I can find different ways*

Level 3: *I know how many ways it can be done*

TASK

Use the digits to complete the number sentence.

You can only use each digit once in each number sentence.

1 2 6 3 7 9

Level 1: *I can find a way*
Level 2: *I can find different ways*
Level 3: *I know how many ways it can be done*

Example: *16 + 3 = 19 is* ***not an answer*** *because it uses 1 twice.*

I think of two numbers.
The sum of my numbers is 12.
The product of my numbers is less than 30.
What could my numbers be?

BUILD

Fill the gaps. The digit in the blue box must be **different** to the digit in the red box.

*One example has been done. Answer in **3 different ways.***

3	7	+	5	=	4	2
		+		=		
		+		=		
		+		=		

What is the difference between the digit in the blue box and the digit in the red box?

SUPPORT

Tip: try positioning the digits like this.

Finish each example.

1	9	+		=	2	
2		+	9	=	3	
6		+		=	7	2

My numbers: 7 and 4

The sum of my numbers: 11

The product of my numbers: 28

My numbers: 7 and 4

The sum of my numbers: 11

The product of my numbers: 28

Your numbers: 6 and 3

The sum of your numbers:

The product of your numbers:

My numbers: 7 and 4

The sum of my numbers: 11

The product of my numbers: 28

Your numbers: 6 and 3

The sum of your numbers: 9

The product of your numbers: 18

What do you notice?

5 + 5 =

6 + 4 =

7 + 3 =

8 + 2 =

What do you notice?

$5 + 5 = 10$

$6 + 4 = 10$

$7 + 3 = 10$

$8 + 2 = 10$

What do you notice?

$5 + 5 = 10$

$6 + 4 = 10$

$7 + 3 = 10$

$8 + 2 = 10$

$5 \times 5 =$

$6 \times 4 =$

$7 \times 3 =$

$8 \times 2 =$

What do you notice?

$5 + 5 = 10$

$6 + 4 = 10$

$7 + 3 = 10$

$8 + 2 = 10$

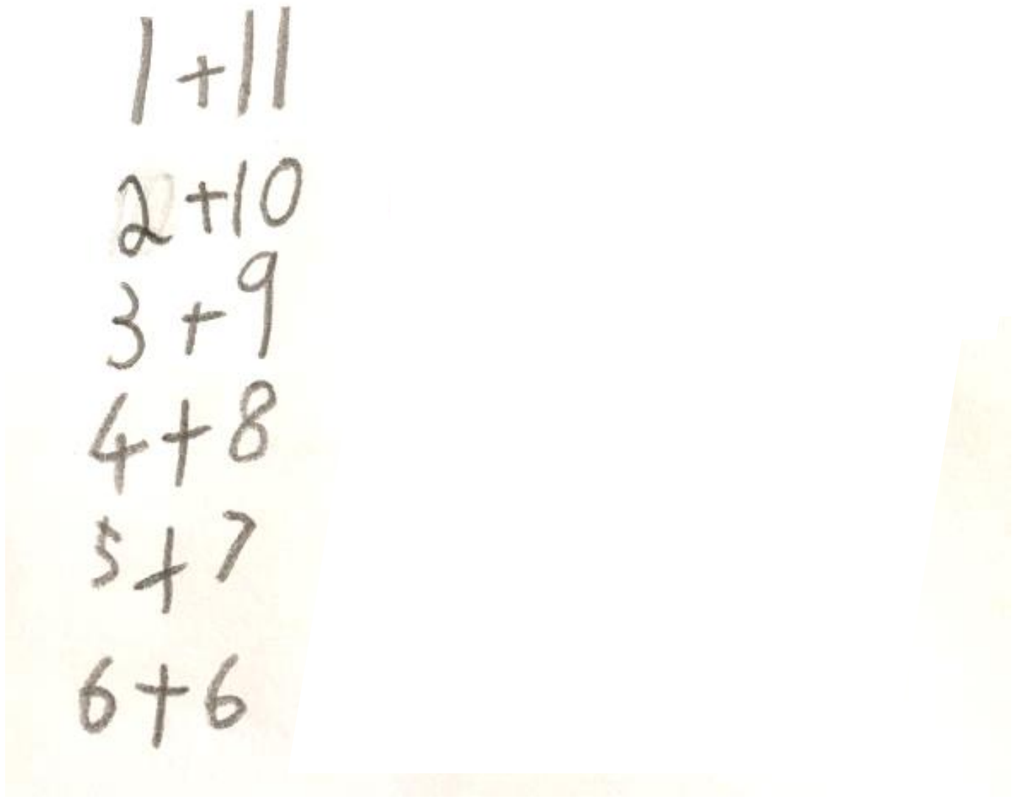
$5 \times 5 = 25$

$6 \times 4 = 24$

$7 \times 3 = 21$

$8 \times 2 = 16$

I think of two numbers.
The sum of my numbers is 12.
The product of my numbers is less than 30.
What could my numbers be?



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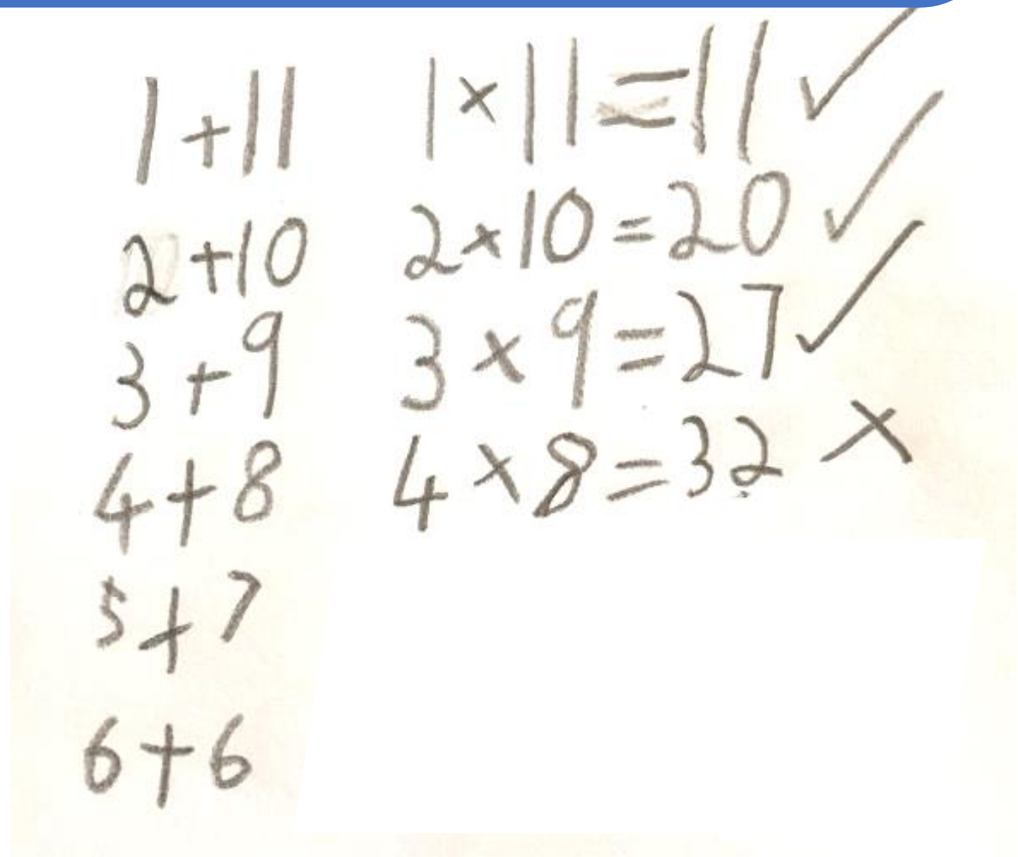

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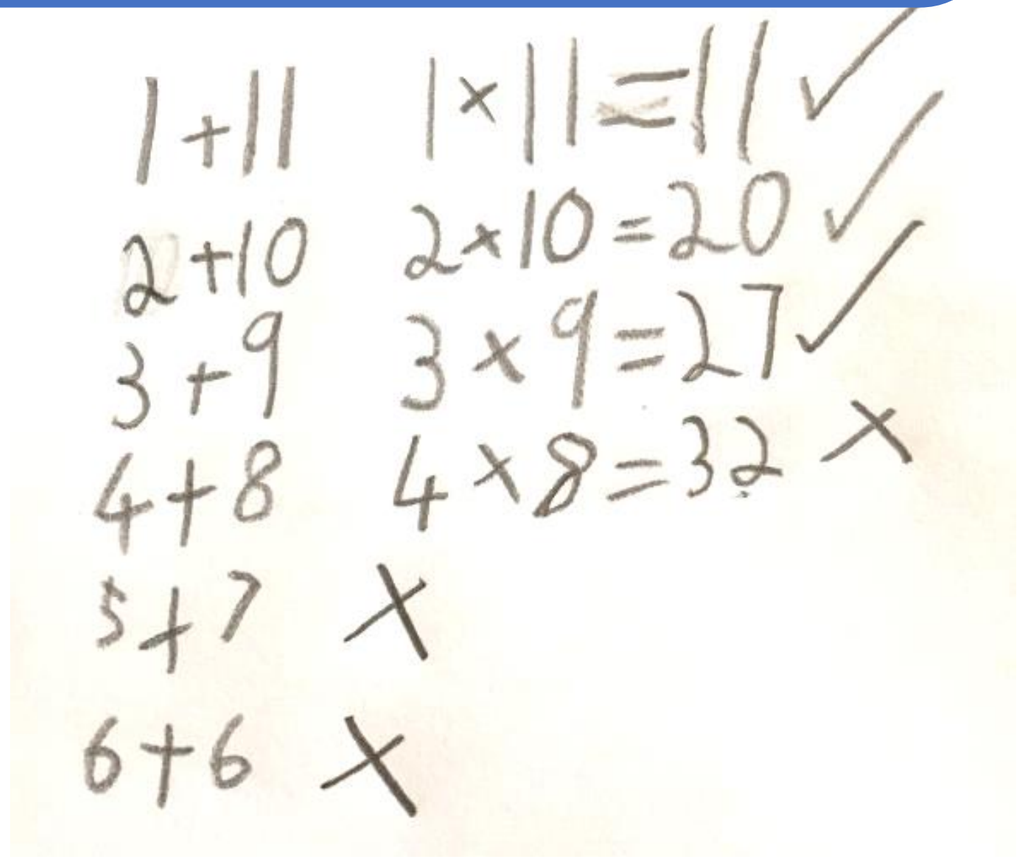
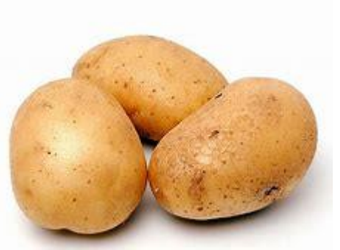


Odd One Out

Raisins

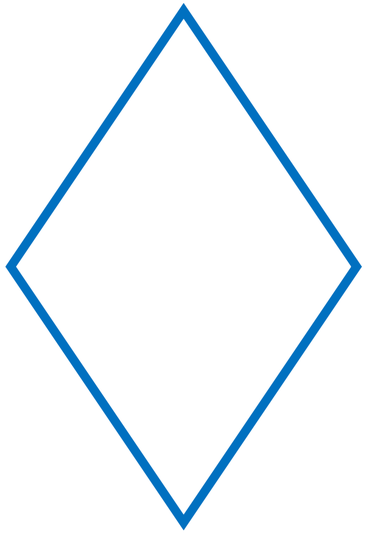
Bananas

Potatoes

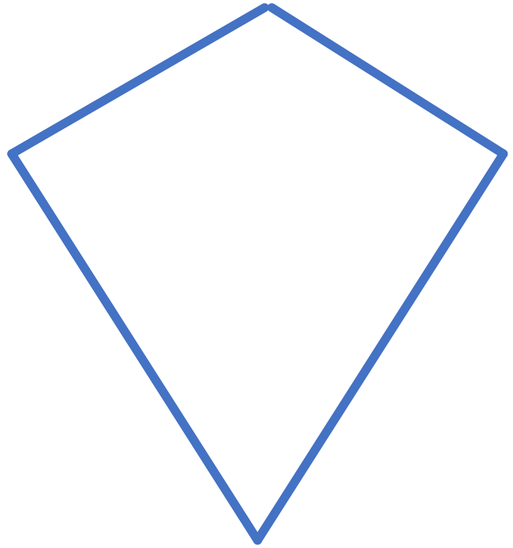
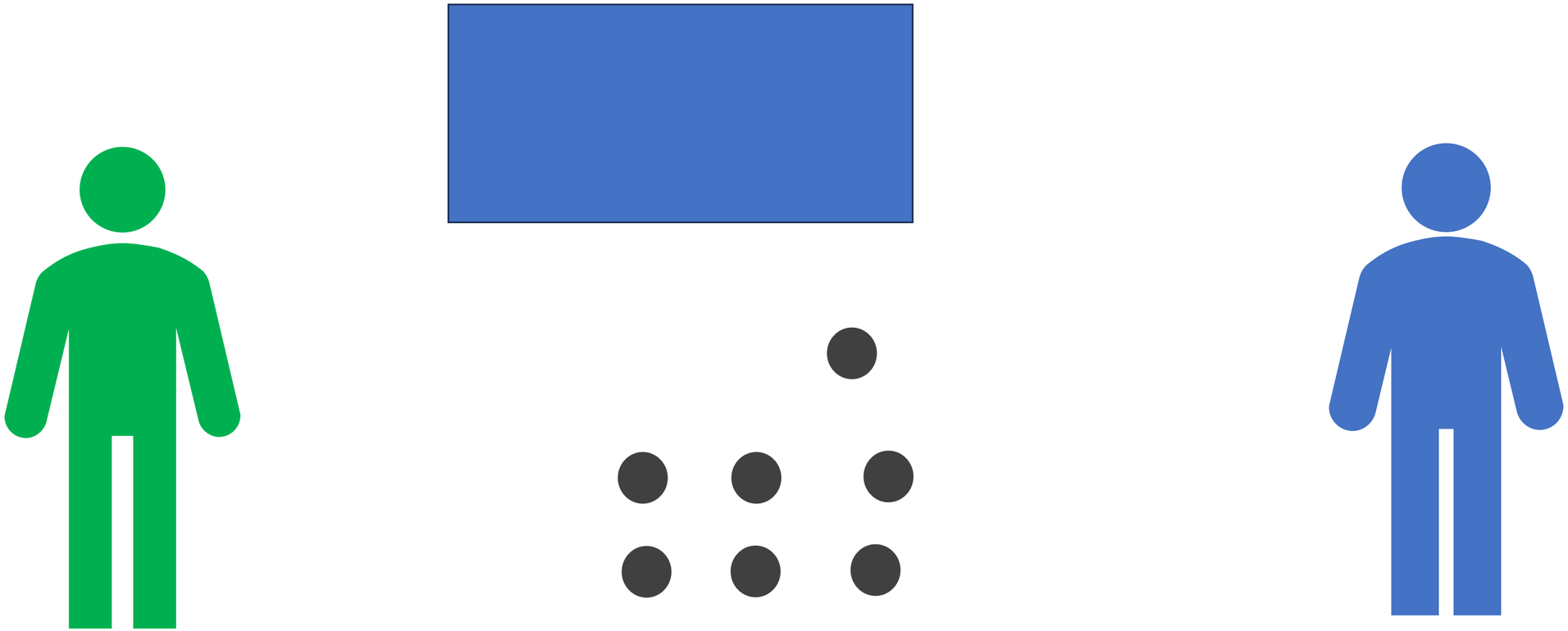


Odd One Out

Diamond



Kite



Parallelogram