Building Arithmetic Fluency Through Conceptual Understanding

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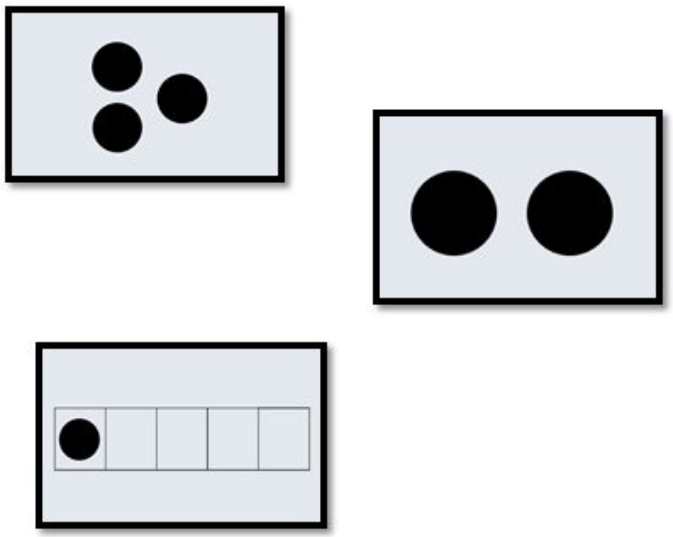


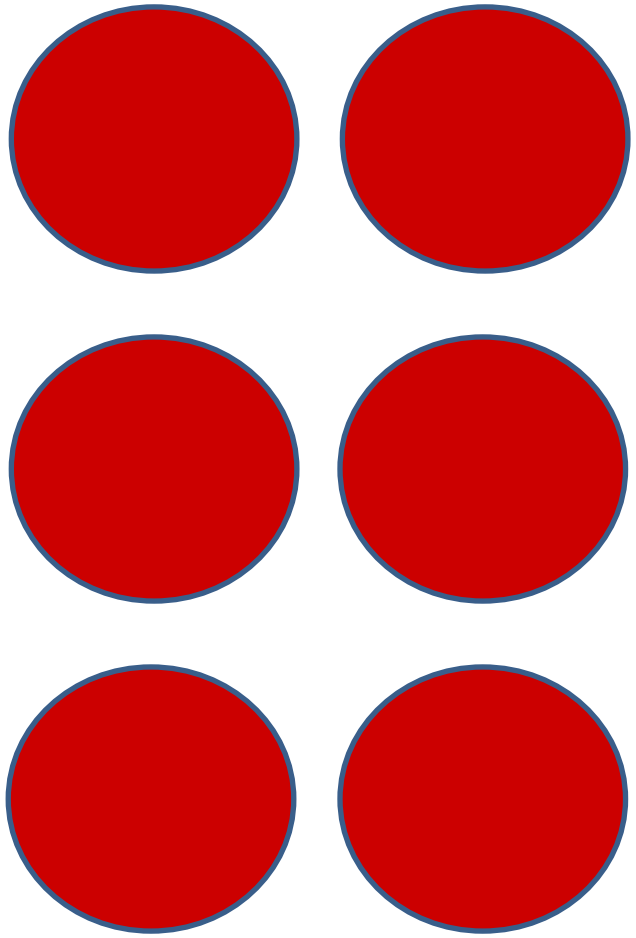
What do this dog and baby have in common?

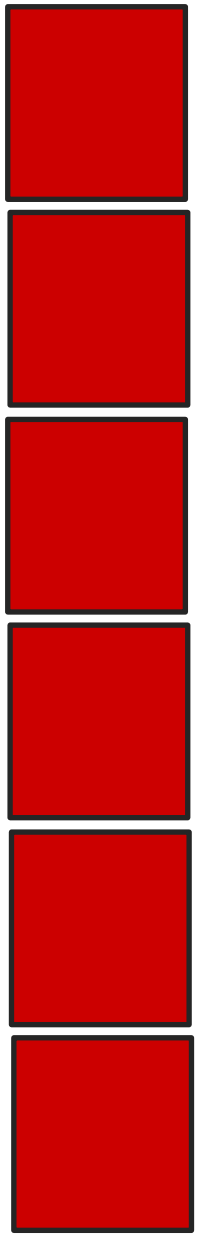
1
4

Cat

SIX

6

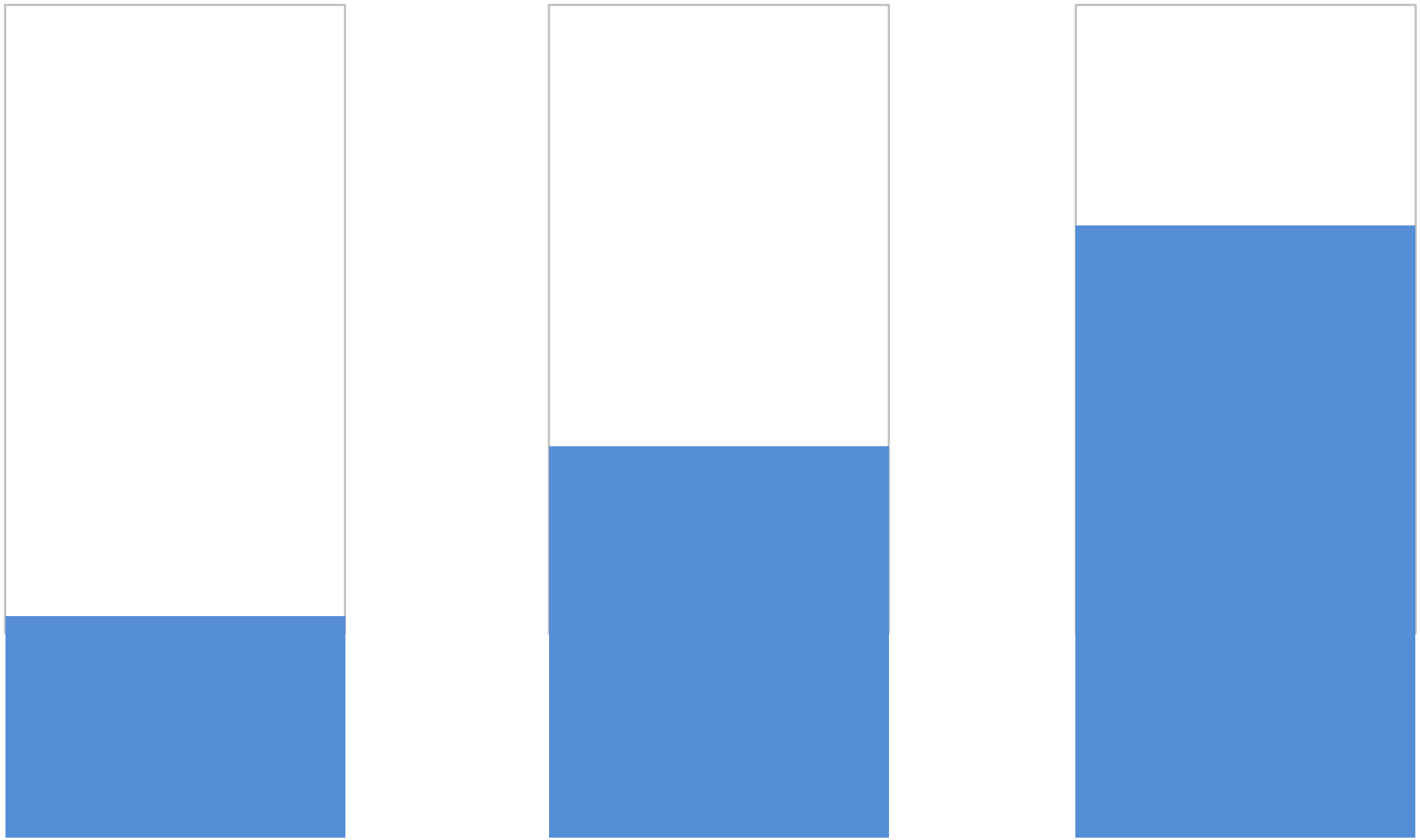




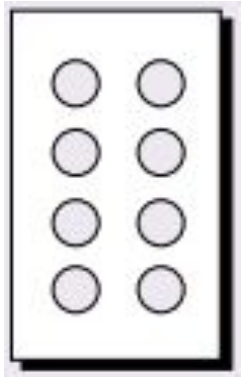
While you watch the video:

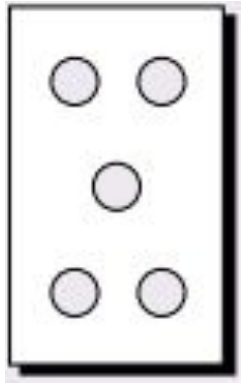
Why is it imperative that teachers understand that humans have an "Analog Processor" when it comes to the instructional decisions that they make?

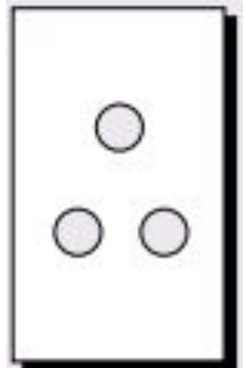
Why is it imperative that teachers understand that we have an “Analog Processor” when it comes to the instructional decisions that they make?


1
2
3

Subitizing





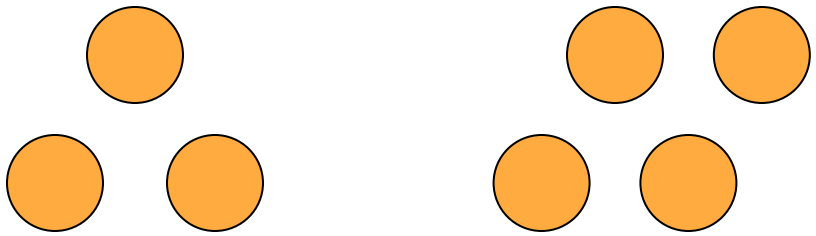


This is a critical skill and may lay underneath early math number sense difficulties with addition and subtraction.

-Douglas Clements

(1999)

Number Sense & Instructional Choices



3 + 4

When you are making instructional decisions as you plan your lessons, how does this thinking play into that planning?

Subitising through the years

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The importance and usefulness of building on perceptual subitising and the development of conceptual subitising is explained. A guide on how to continue to develop numerical ideas based on subitising is shared.

As you read, think about/take notes on:

- ❑ the implications for your teaching
- ❑ the connections to higher level math
- ❑ the connection between literacy and math
- ❑ how subitizing aids in your student's mathematical identity

01 Perceptual 1 0-3.pptx

02 Perceptual 2 0-5.pptx

03 Conceptual 1 0-5.pptx

04 Conceptual 2 0-9.pptx

06 ...dels.pptx

07 Conceptual 0-12.pptx

08 Conceptual 10-20 Tens Frame.pptx

09 Conceptual Break Apart to Make 10 ...

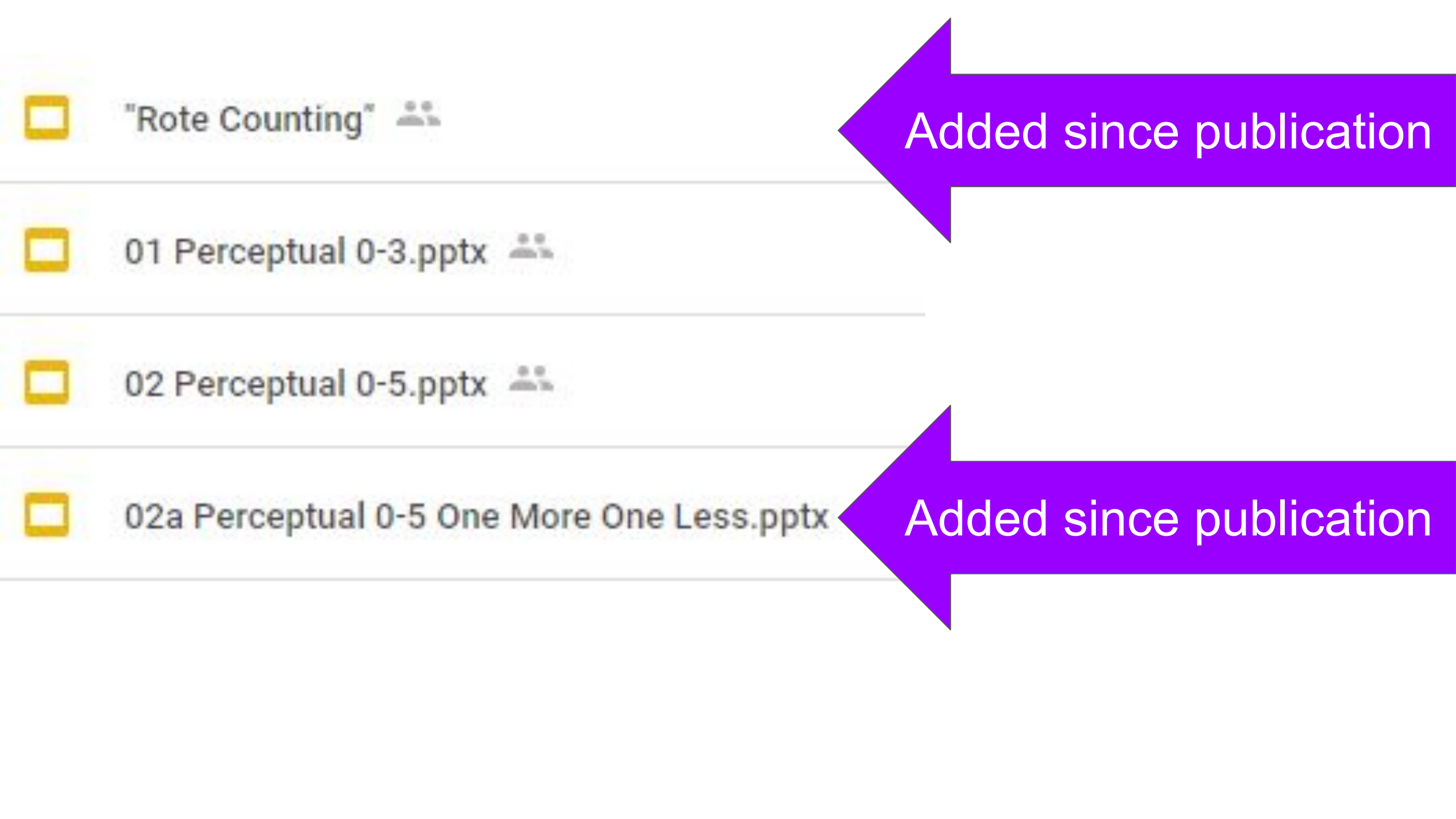
...Addend.pptx

...Conceptual Multiplication.pptx

13 Conceptual Multiplication Missing Factor.pptx

14 Conceptual Division.pptx

tinyurl.com/subitizing


"Rote Counting"
Added since publication
01 Perceptual 0-3.pptx
02 Perceptual 0-5.pptx
02a Perceptual 0-5 One More One Less.pptx
Added since publication

Note to Teacher:
These slides are designed to be “flashed” to ensure that the student is not counting the quantity on the card. Students will **choral respond** with the quantity they see.

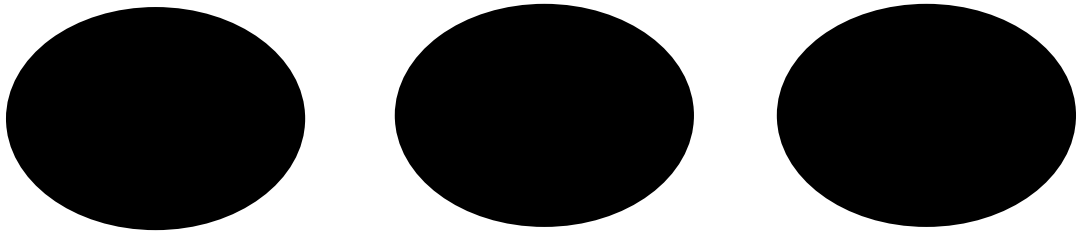
ADDITIONAL ACTIVITIES:

Connection to Fingers!

Have the students hold up the number of fingers to match the quantity they see

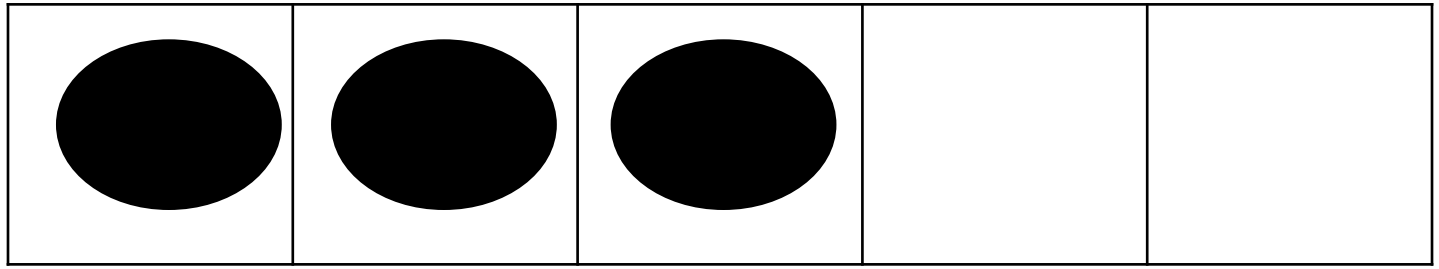
Connection to Numeral!

Have the student write down the numeral of the quantity their see (they could air write it too)



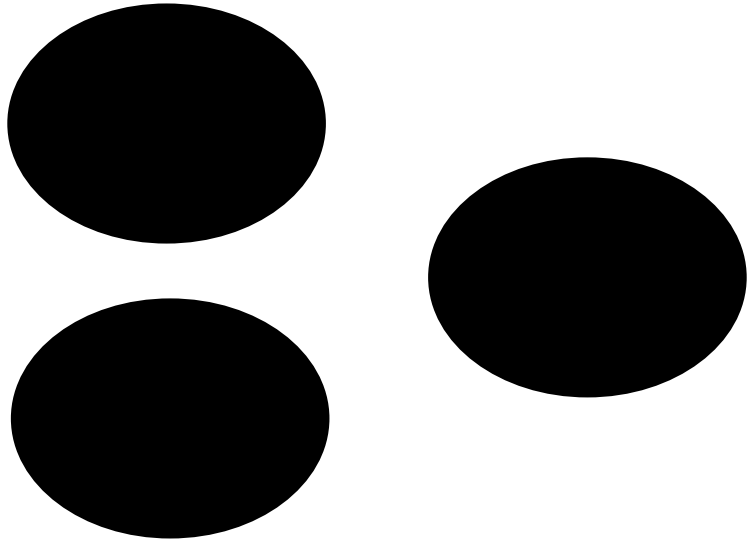
Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



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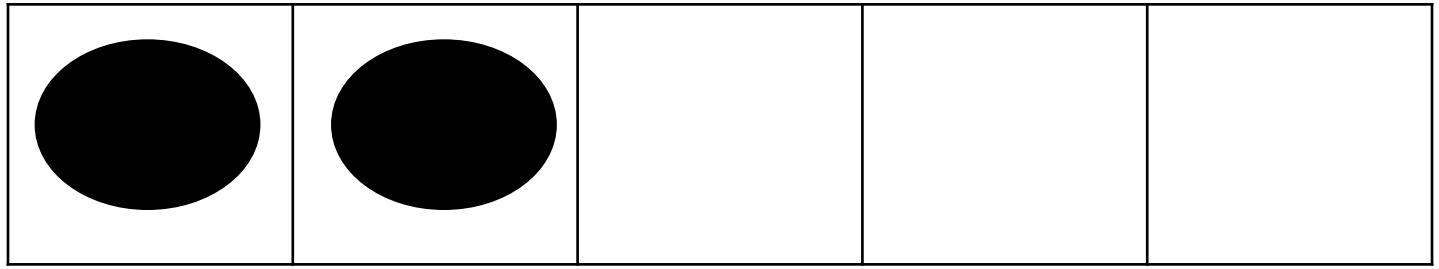
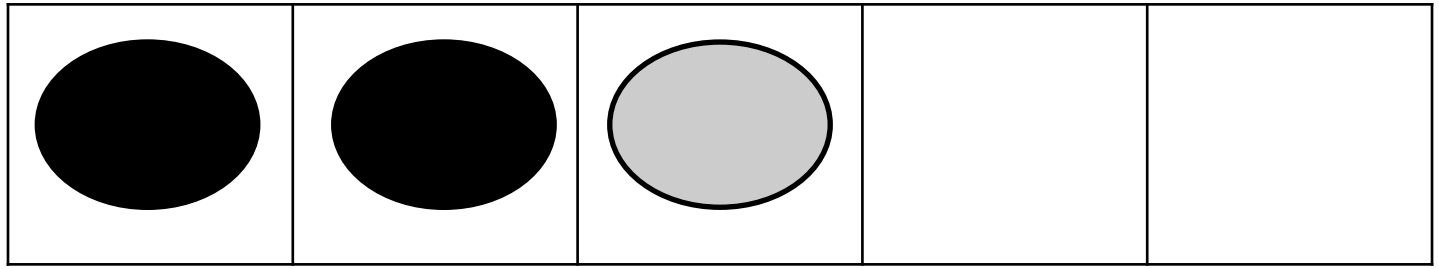
What is **one more** than….



Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

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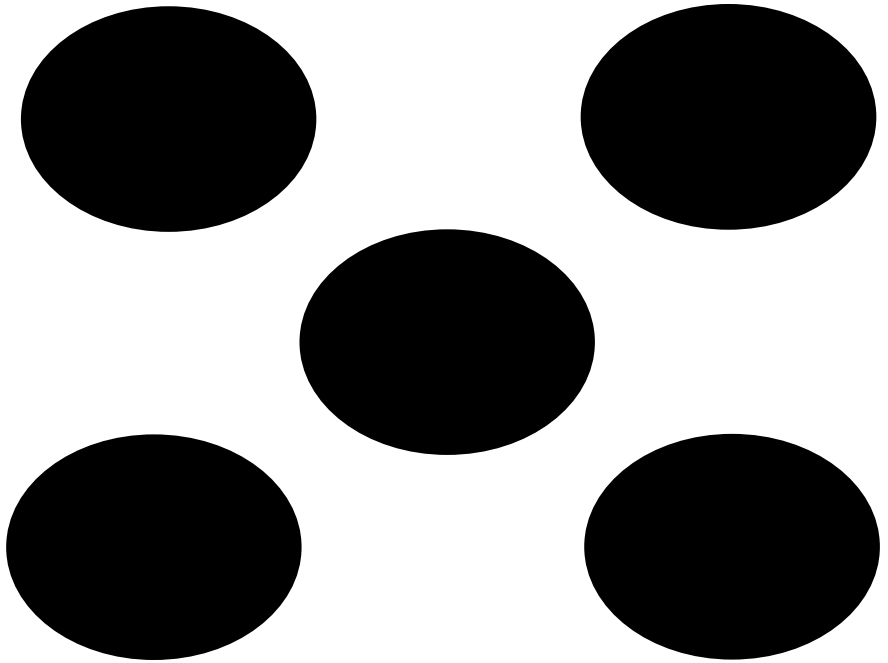

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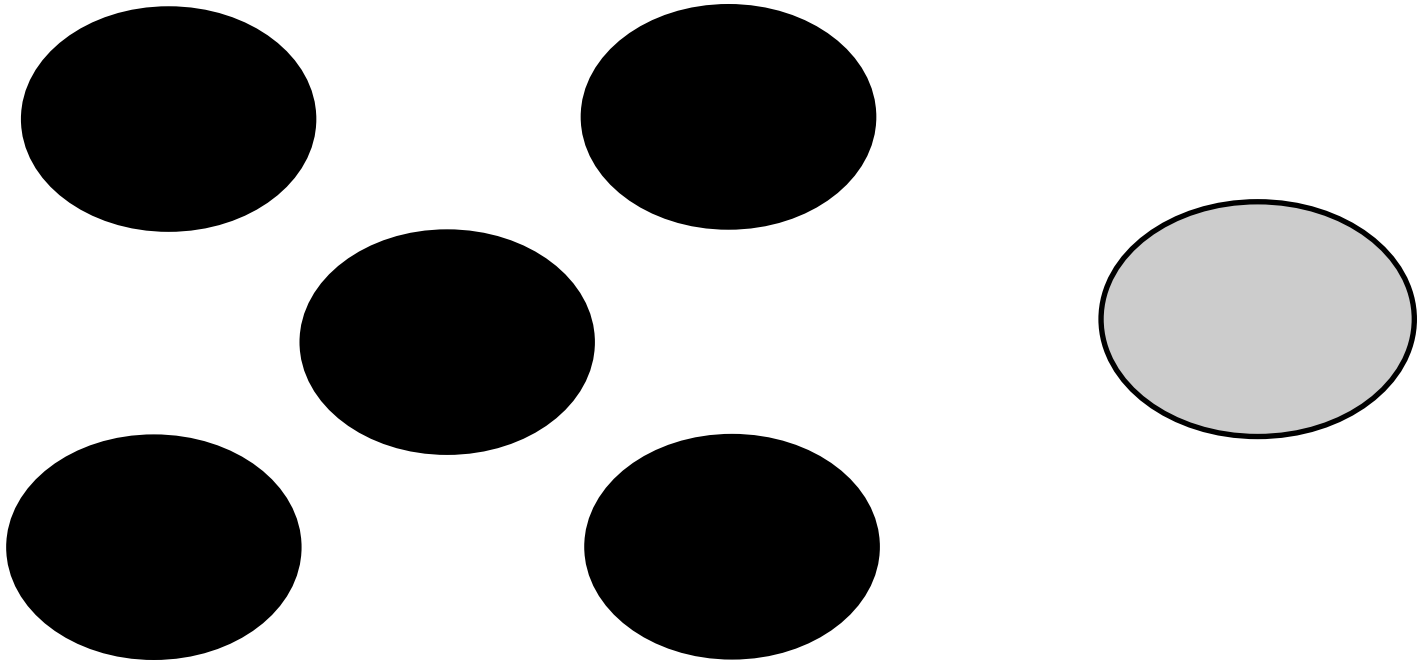

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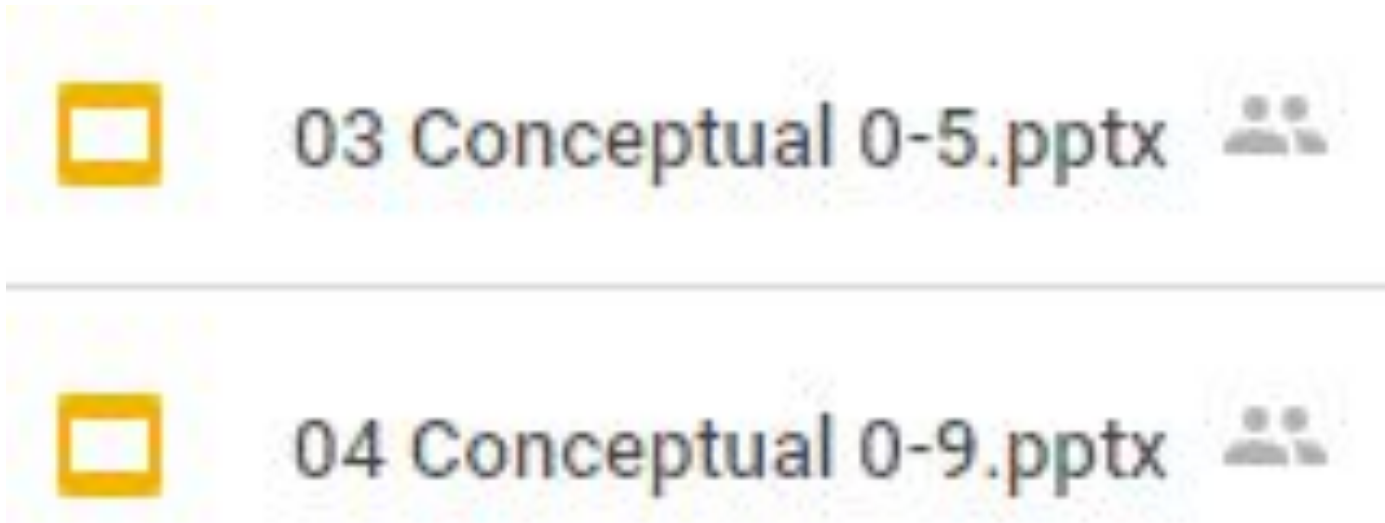
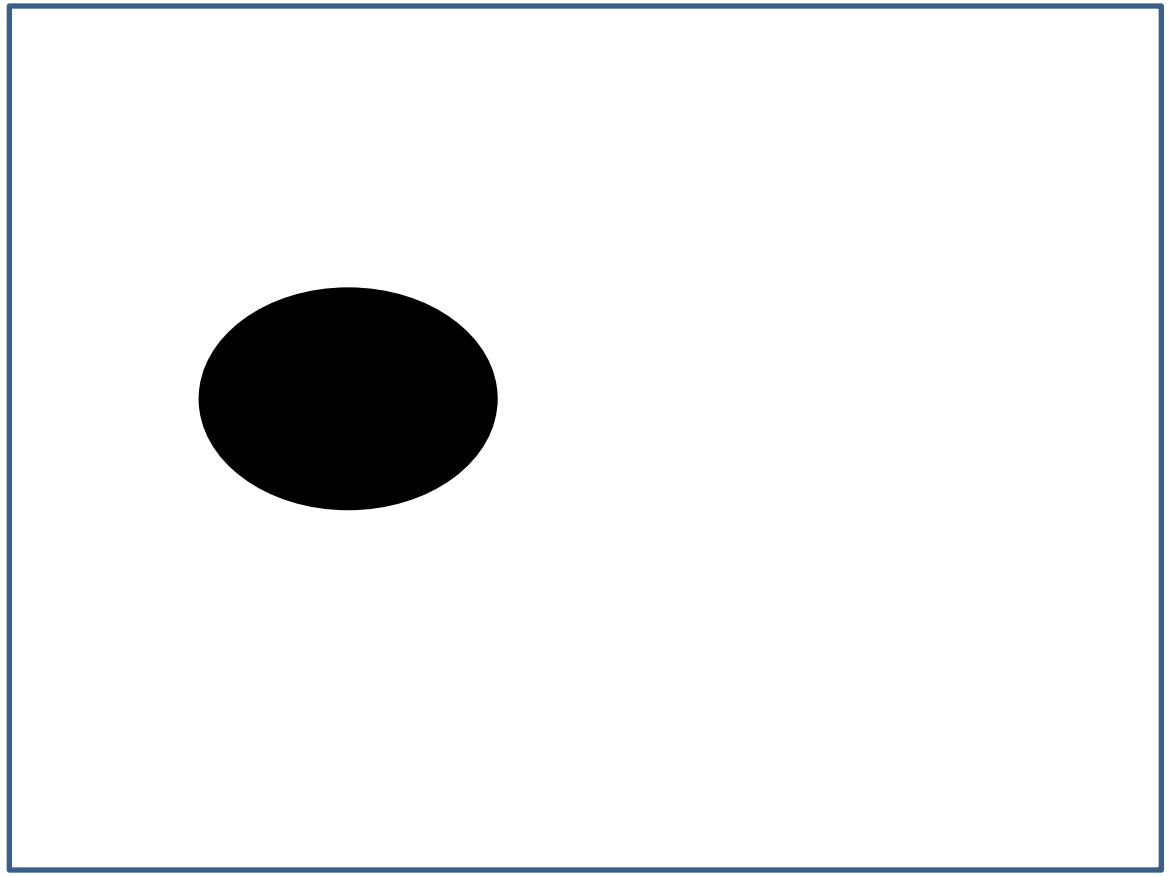
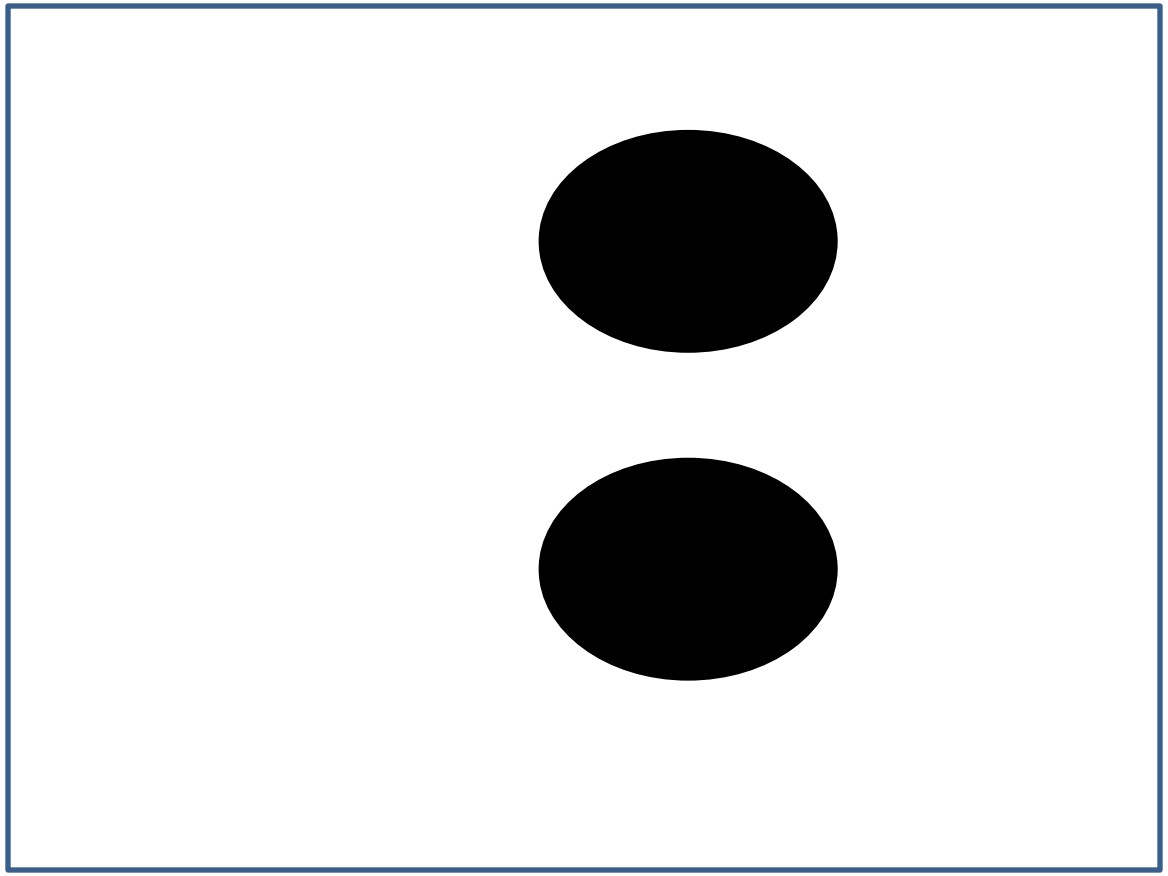

03 Conceptual 0-5.pptx
04 Conceptual 0-9.pptx





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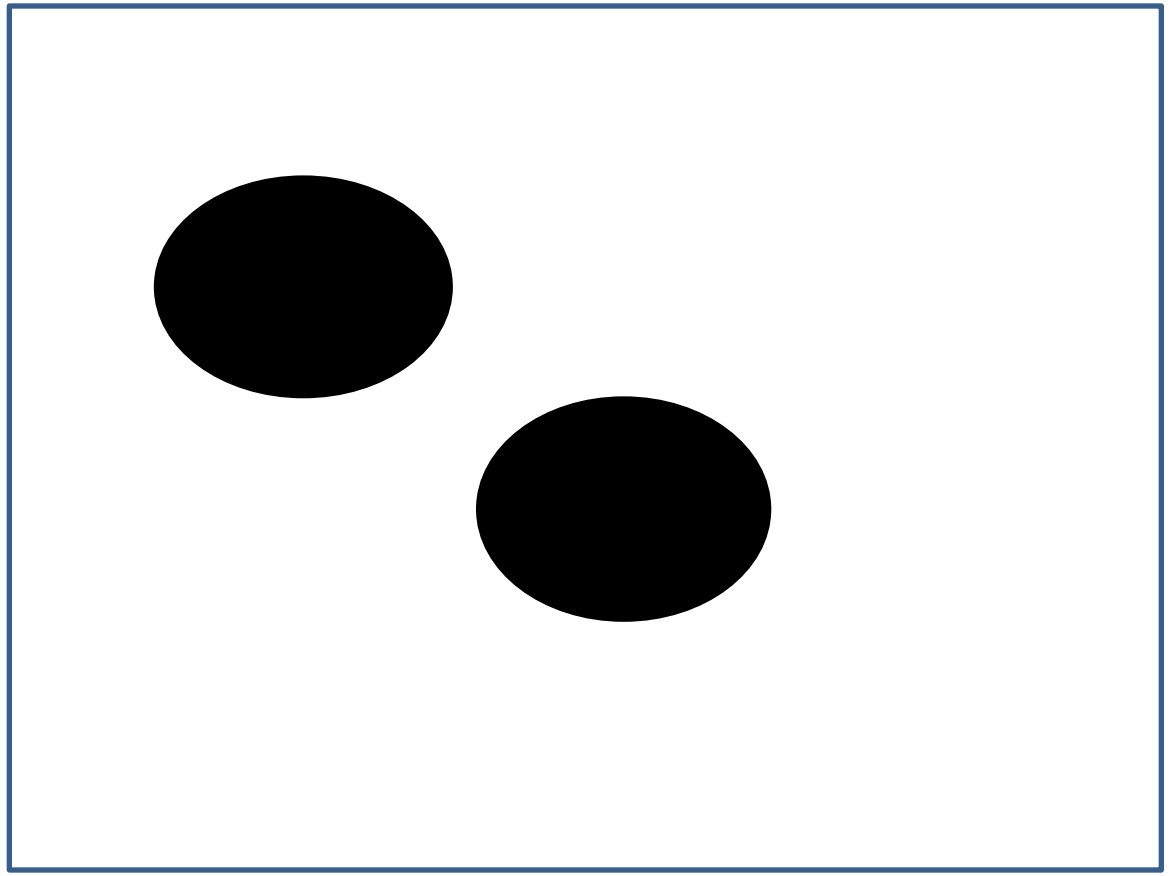

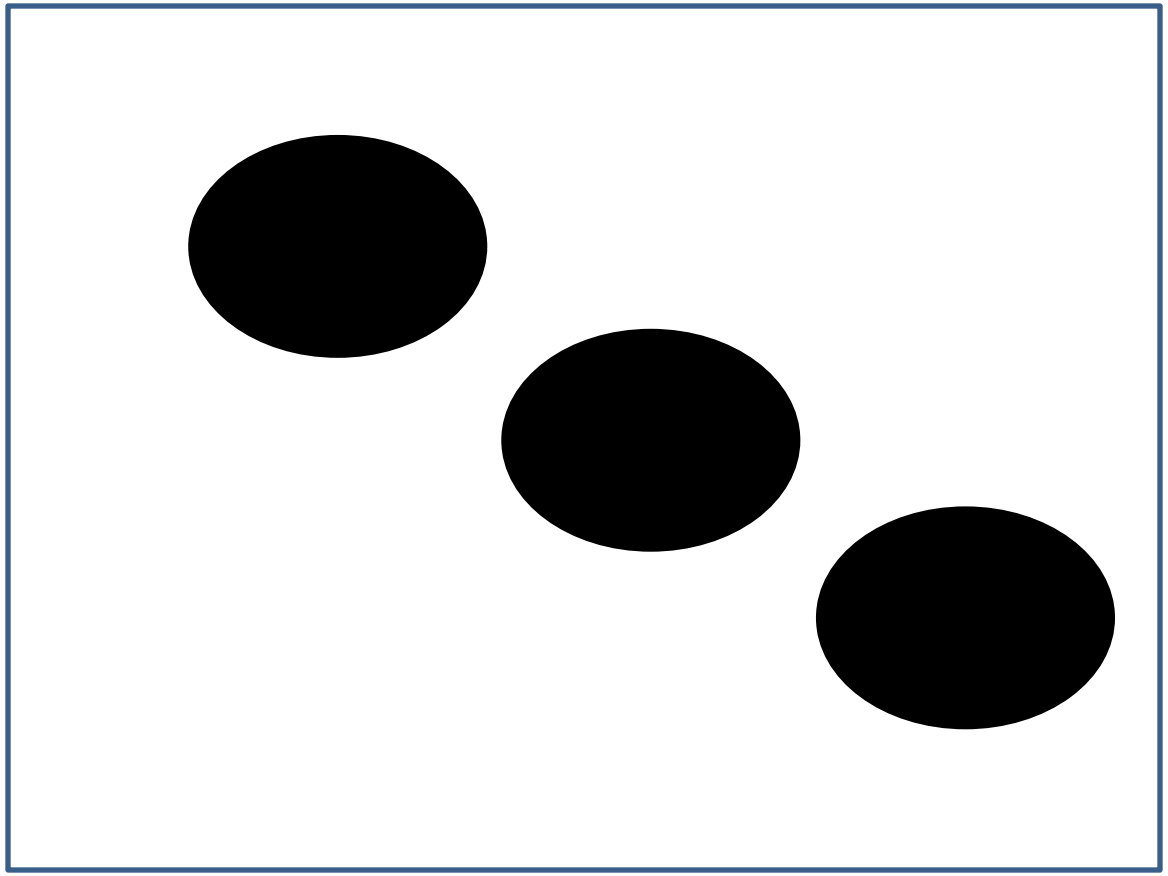

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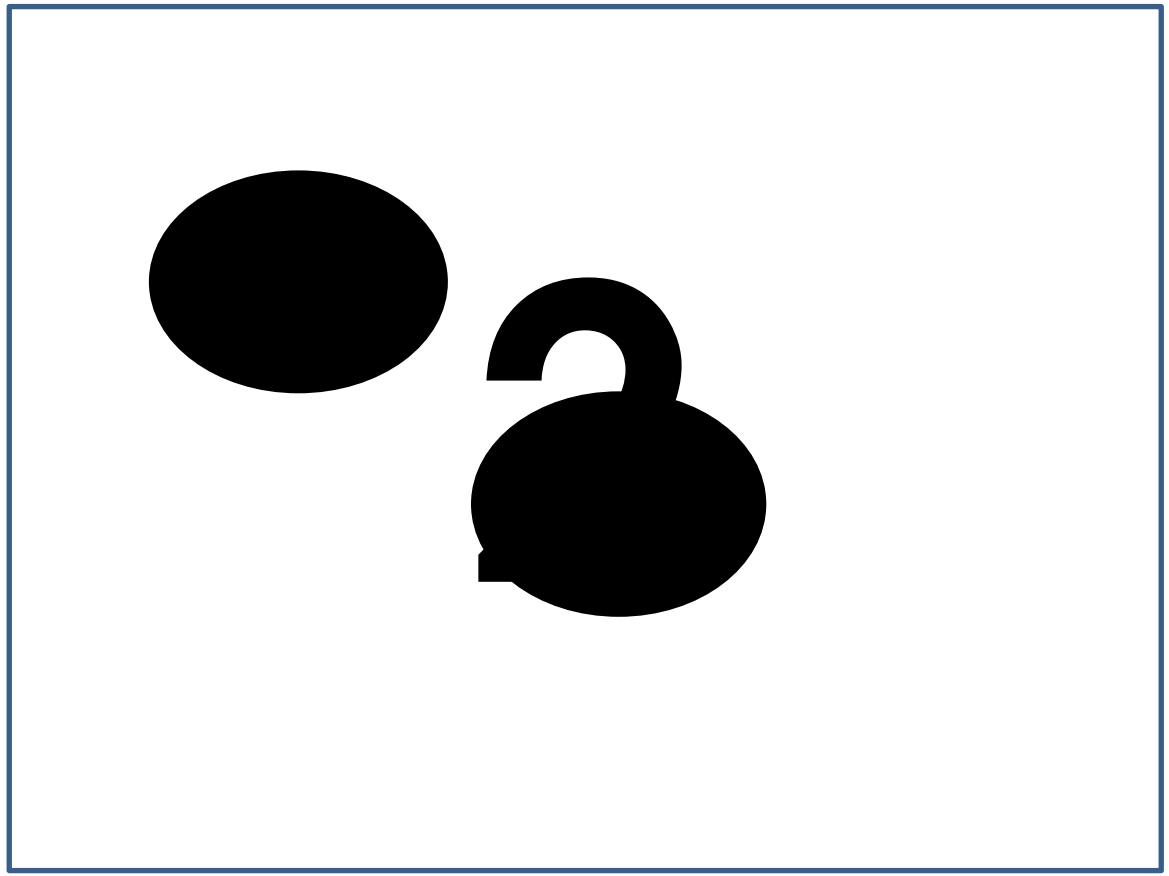
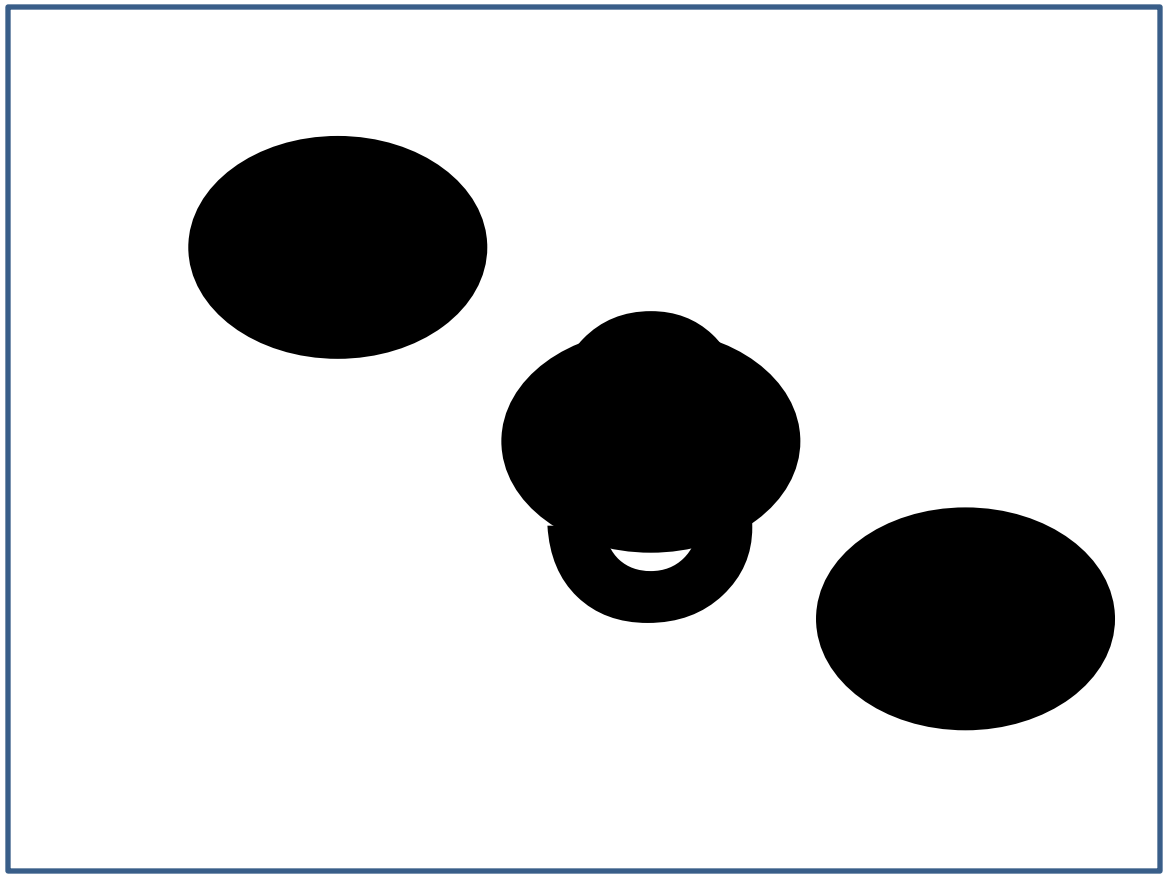
Faulkner & Ainslie, 2016





0 1 2 3 4 5 6 7 8 9 10

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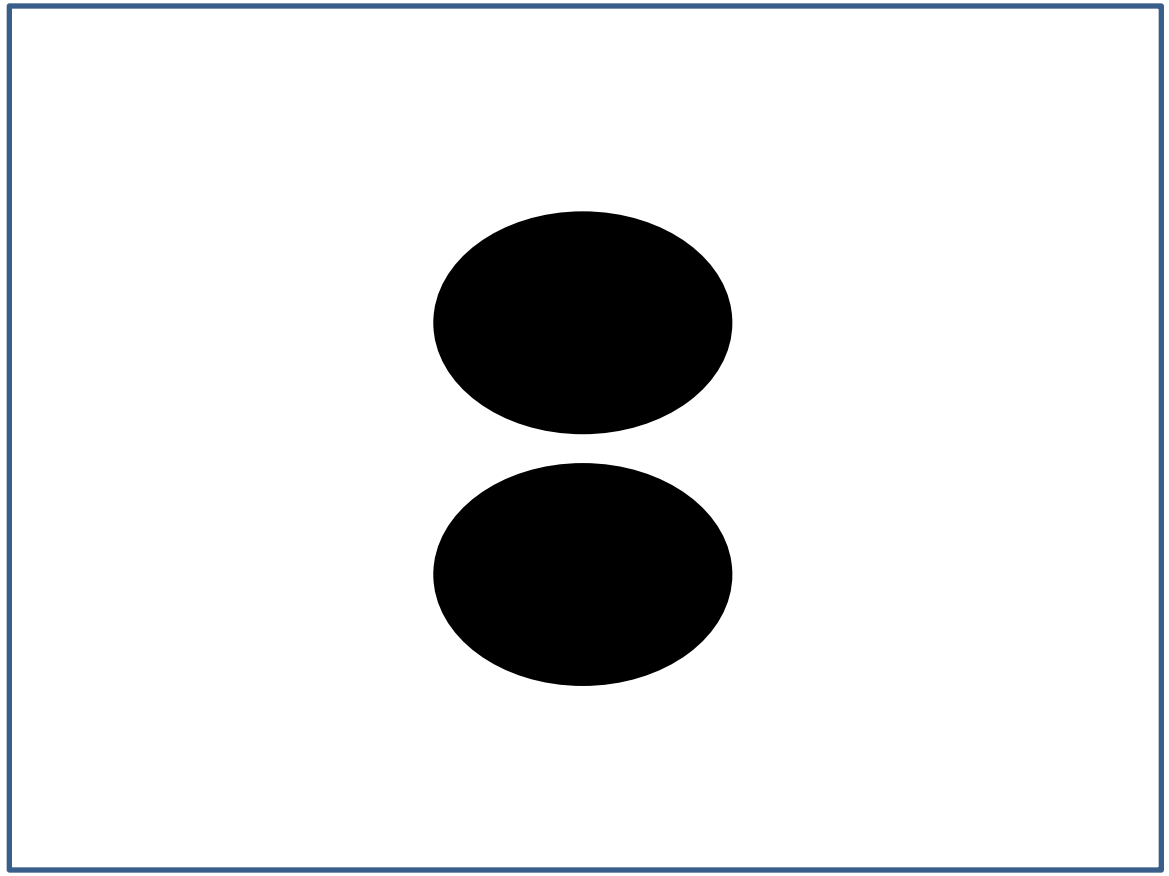
05 Conceptual 0-5 Missing Addend.pptx

05b Conceptual 0-9 Missing Addend.pptx

I have two cards that total

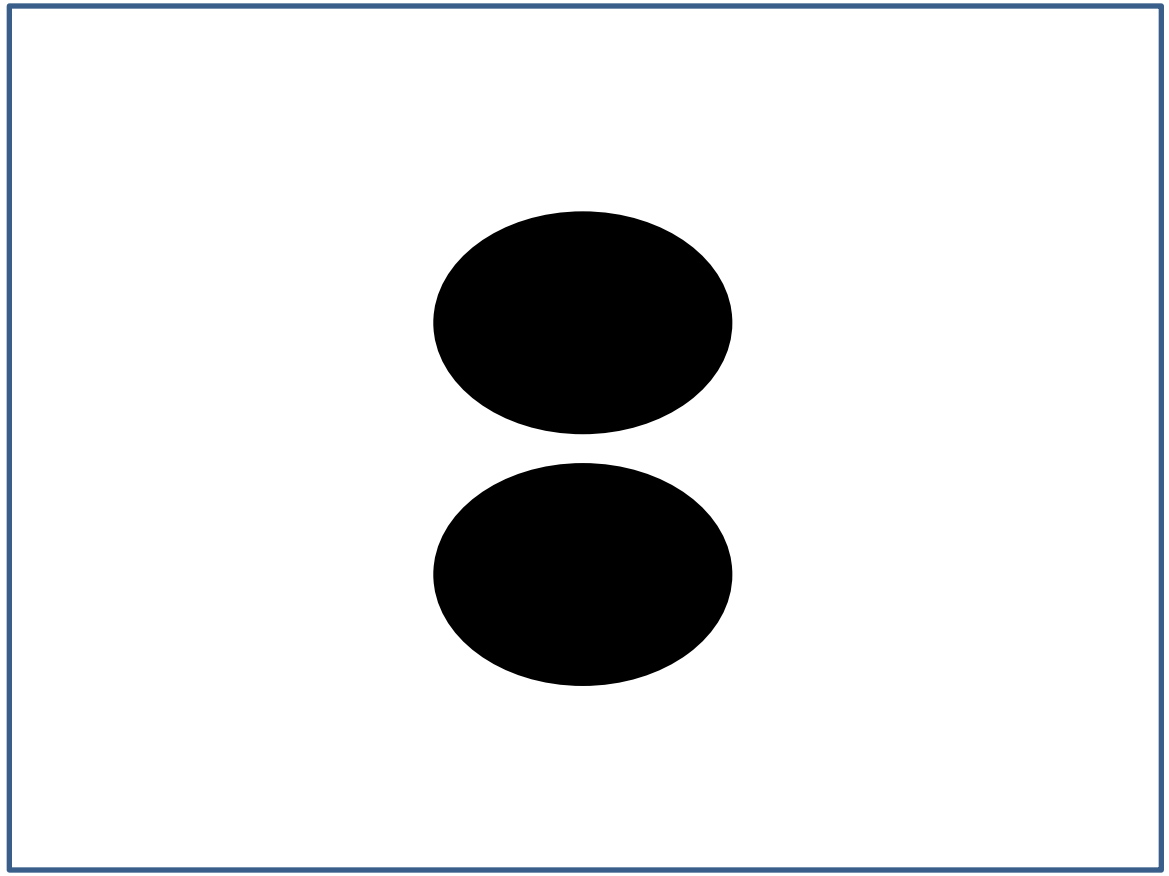
5

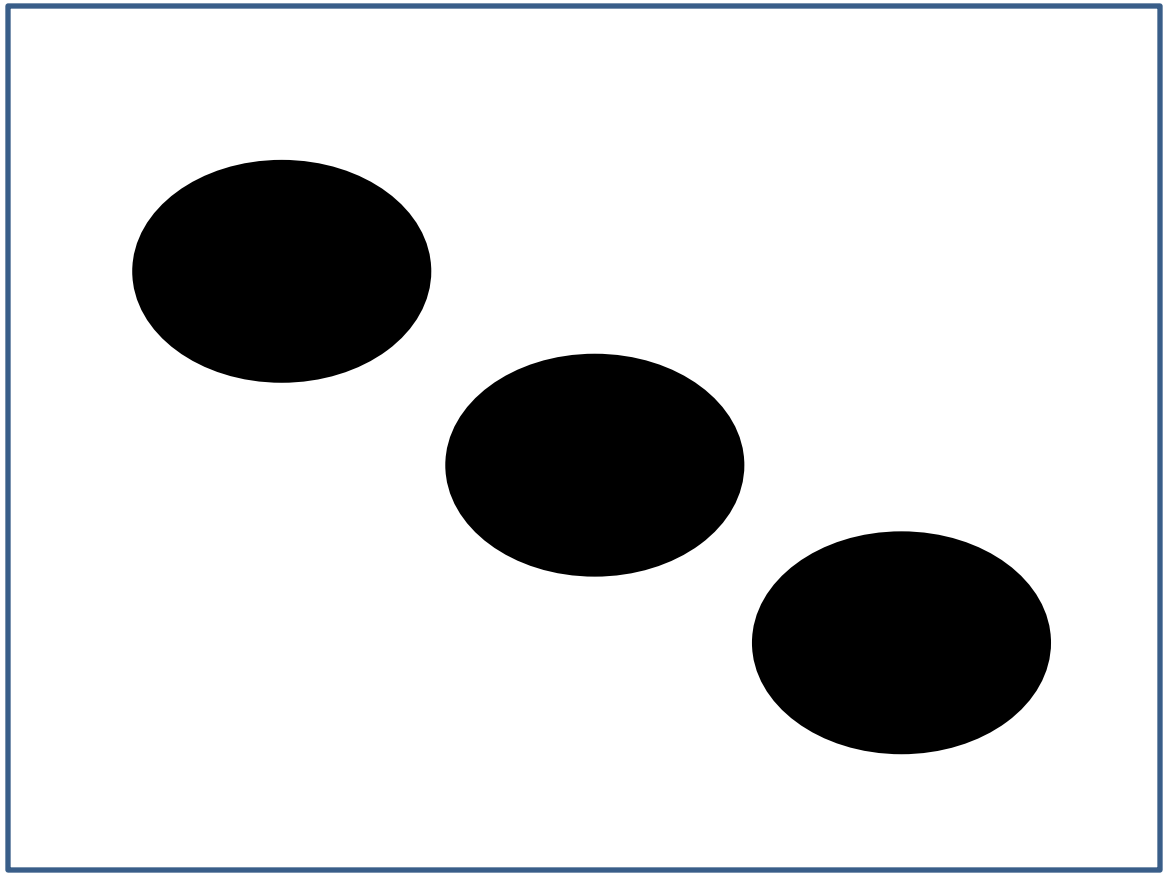
What is the value of the missing card?



Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016





Faulkner & Ainslie, 2016

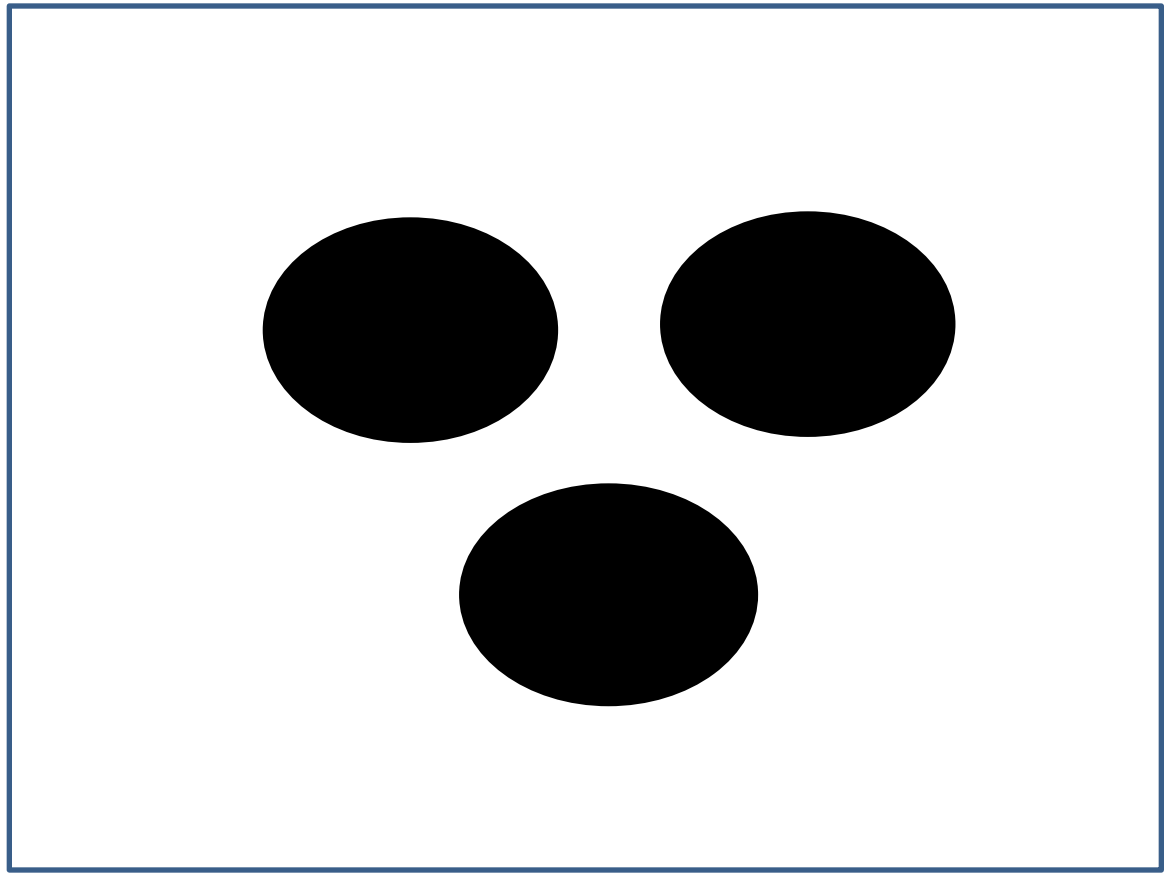
$$2 + ? = 5$$

$$2 + x = 5$$

I have two cards that total

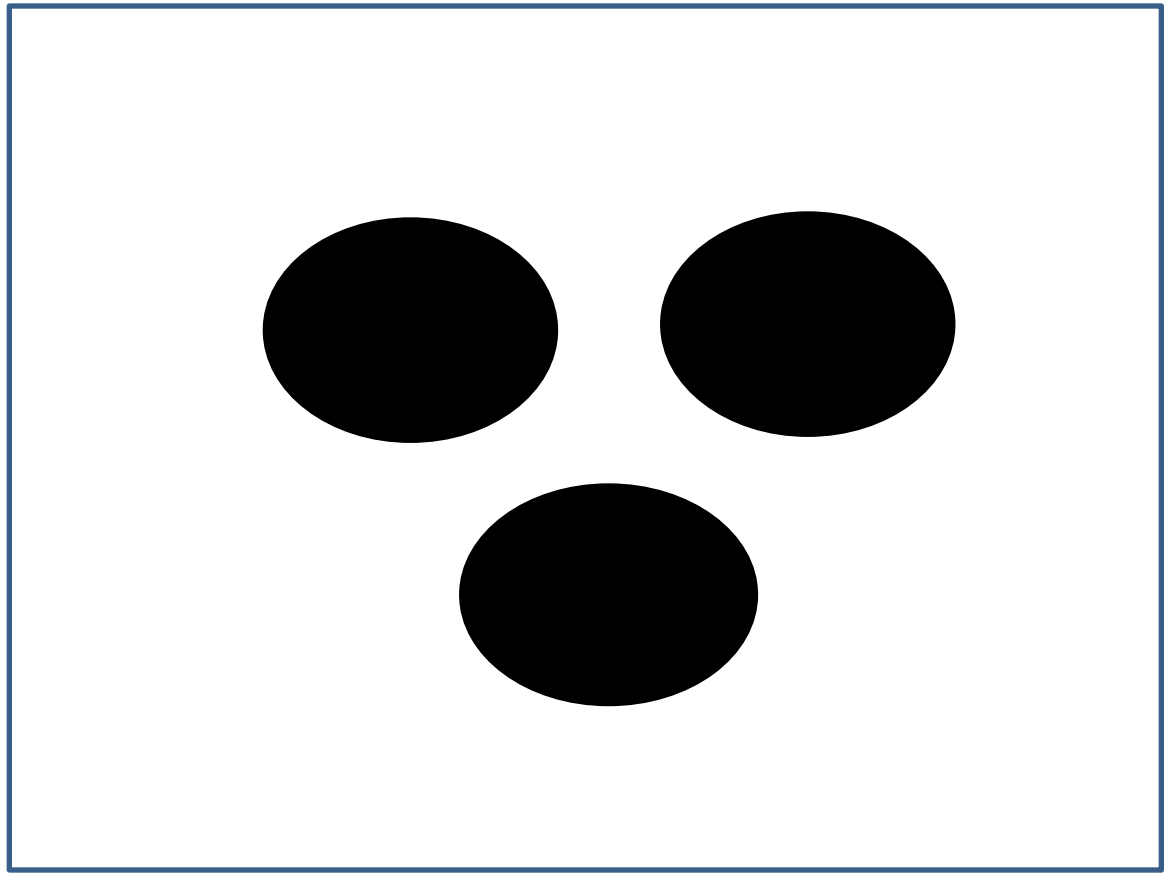
4

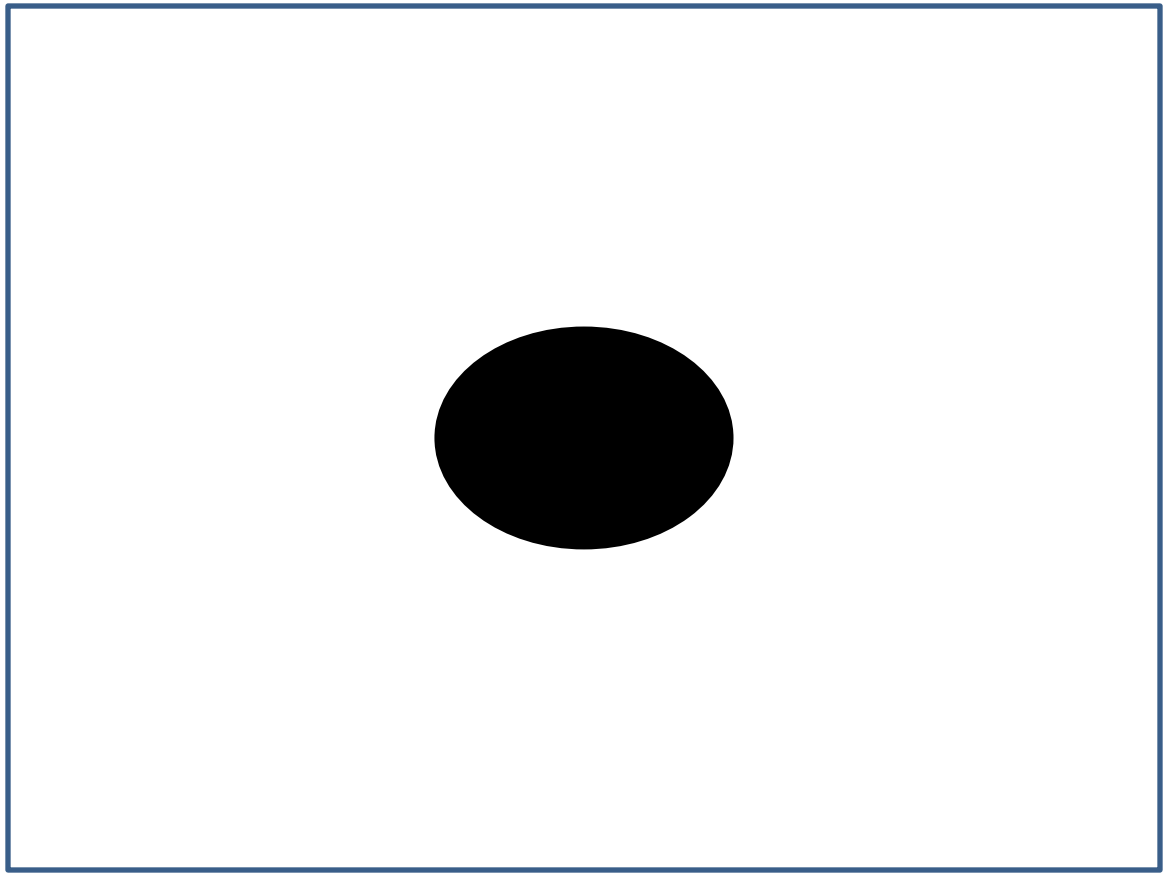
What is the value of the missing card?



Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016





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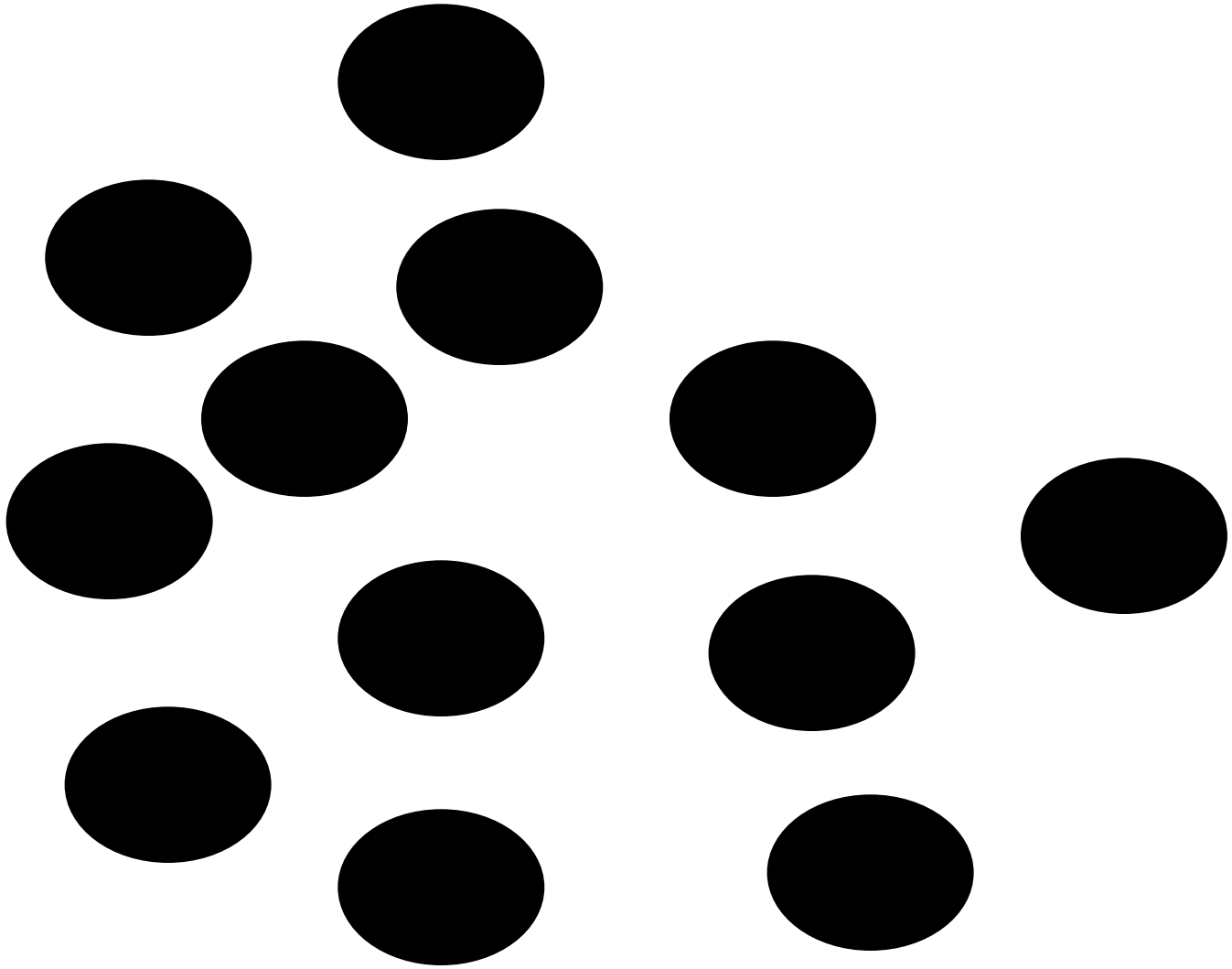
06 Bar Models.pptx

06a How Many to Make 10

Added since publication

07 Conceptual 0-12.pptx

08 Conceptual 10-20 Tens Frame.pptx

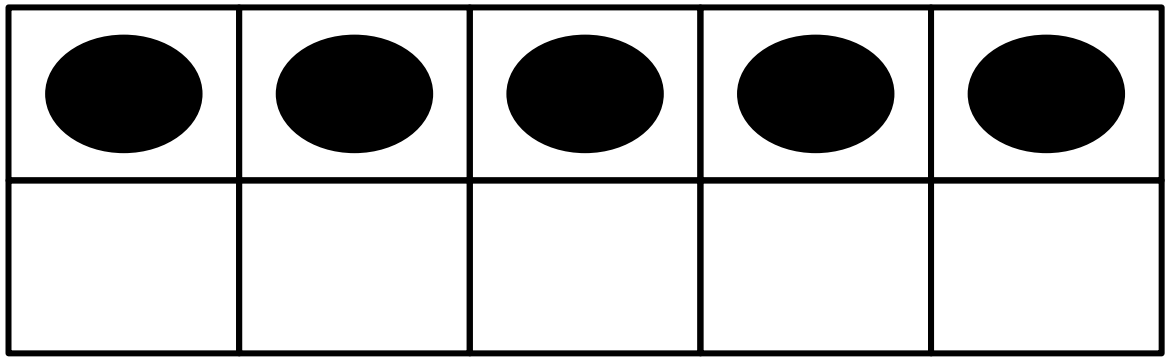


Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016

How many?

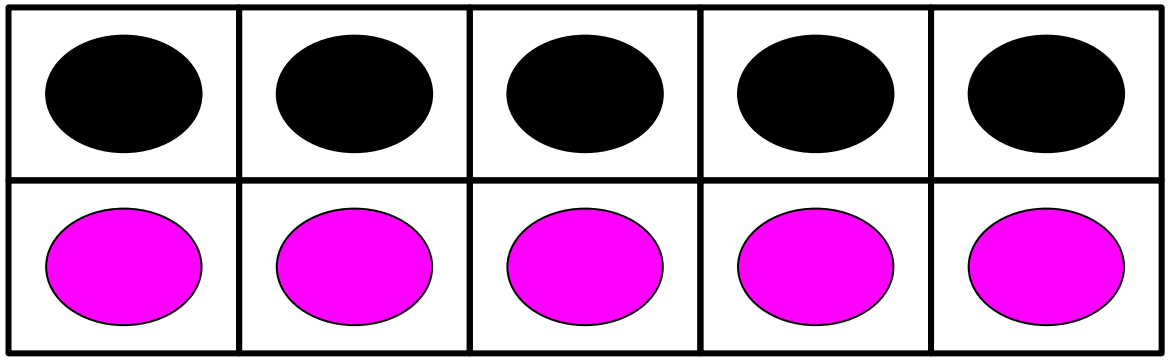
Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

How many **more** to make 10?

Faulkner & Ainslie, 2016

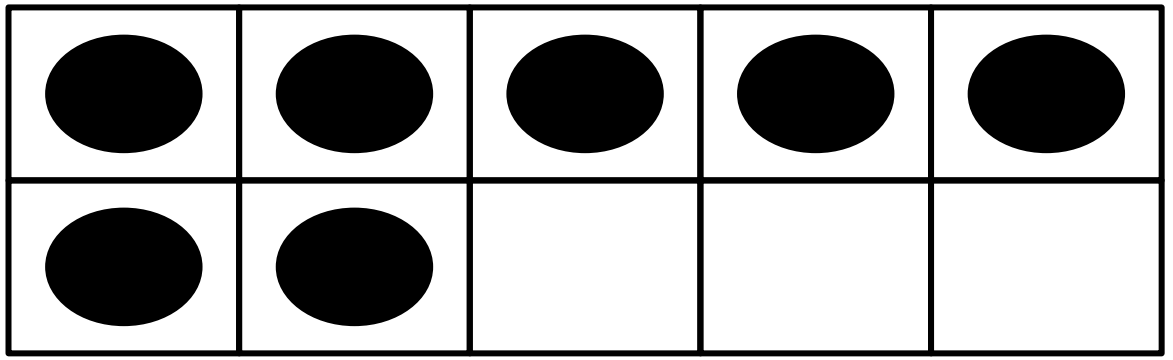


Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016

How many?

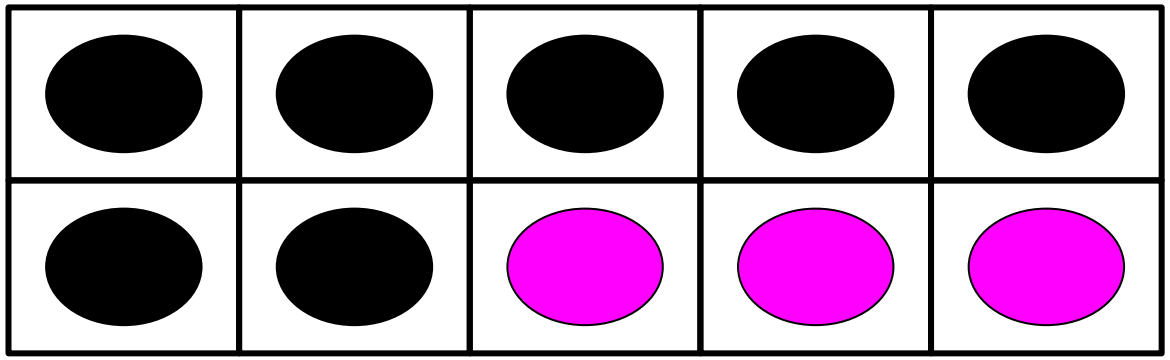
Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

How many **more** to make 10?

Faulkner & Ainslie, 2016



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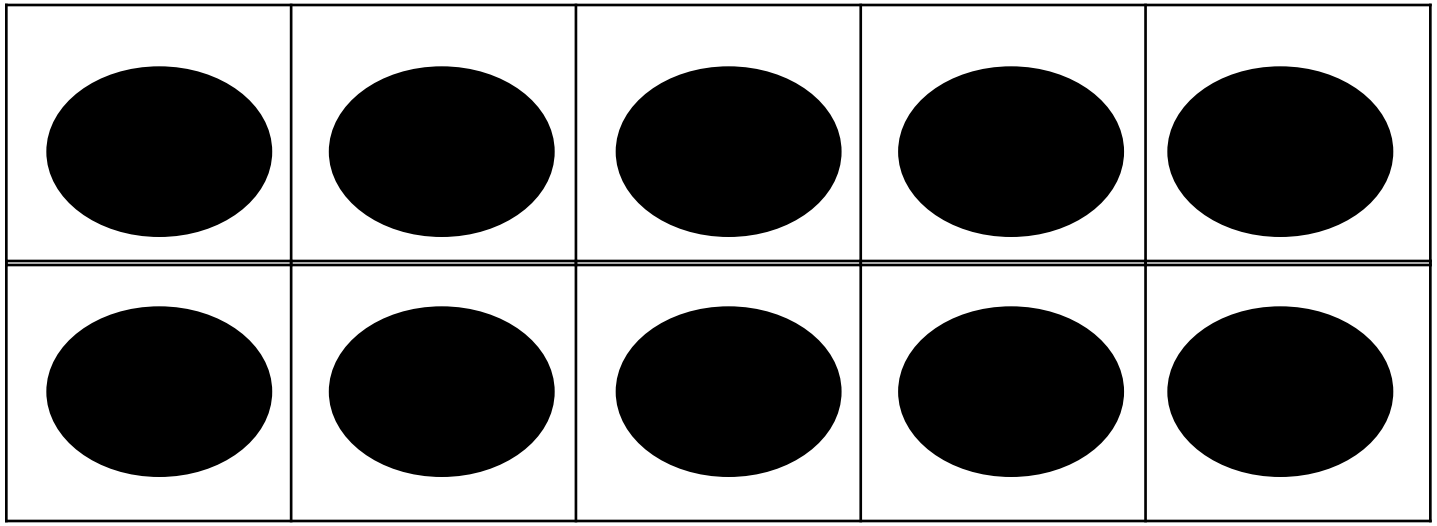
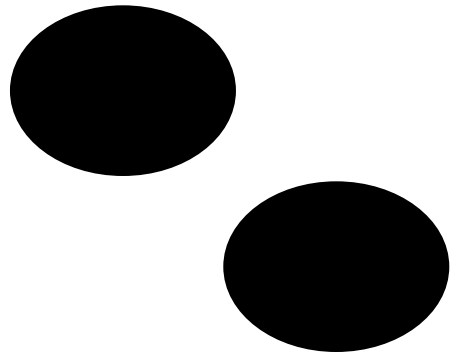




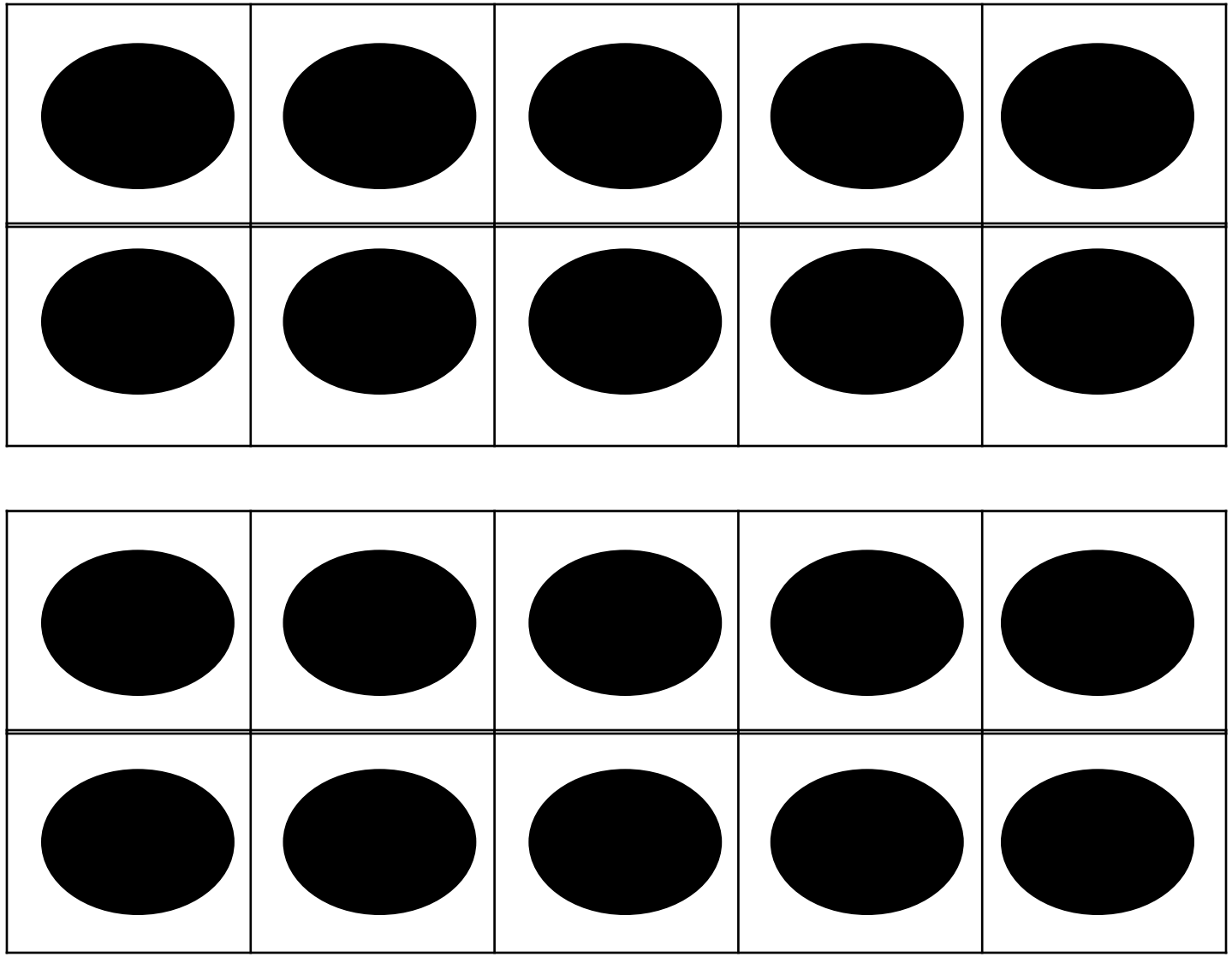
Faulkner & Ainslie, 2016

What is the Real Name?

One ten and two ones!

Nickname?
12

Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

What is the Real Name?

Two tens!

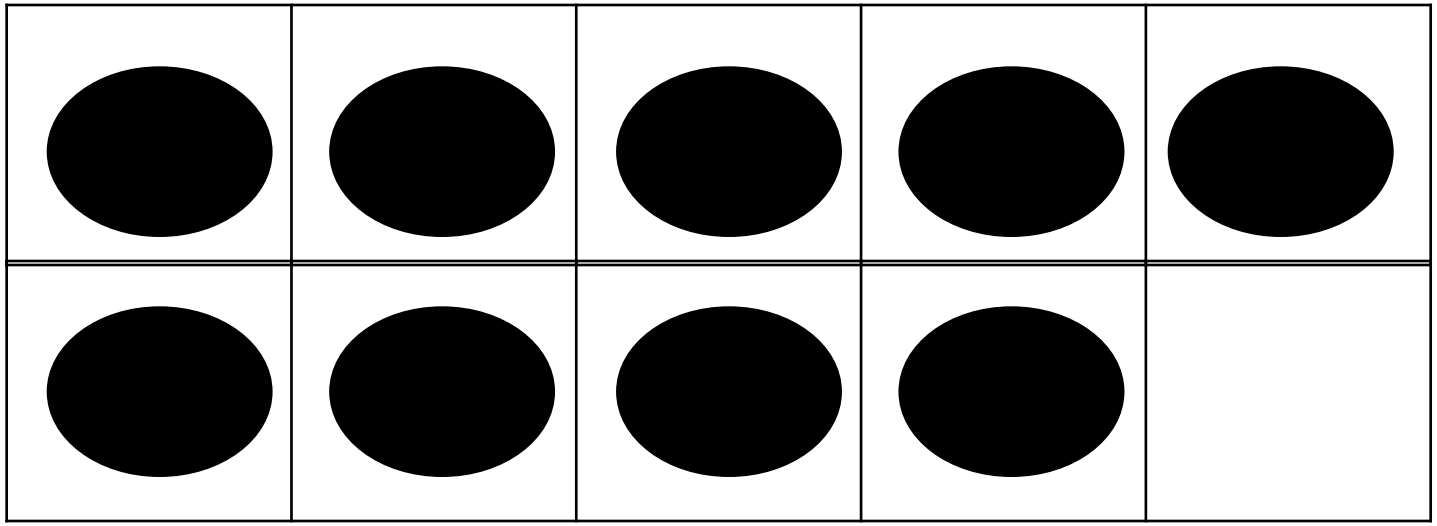
Nickname?
20

09 Conceptual Break Apart to Make 10 with 9, 8.pptx

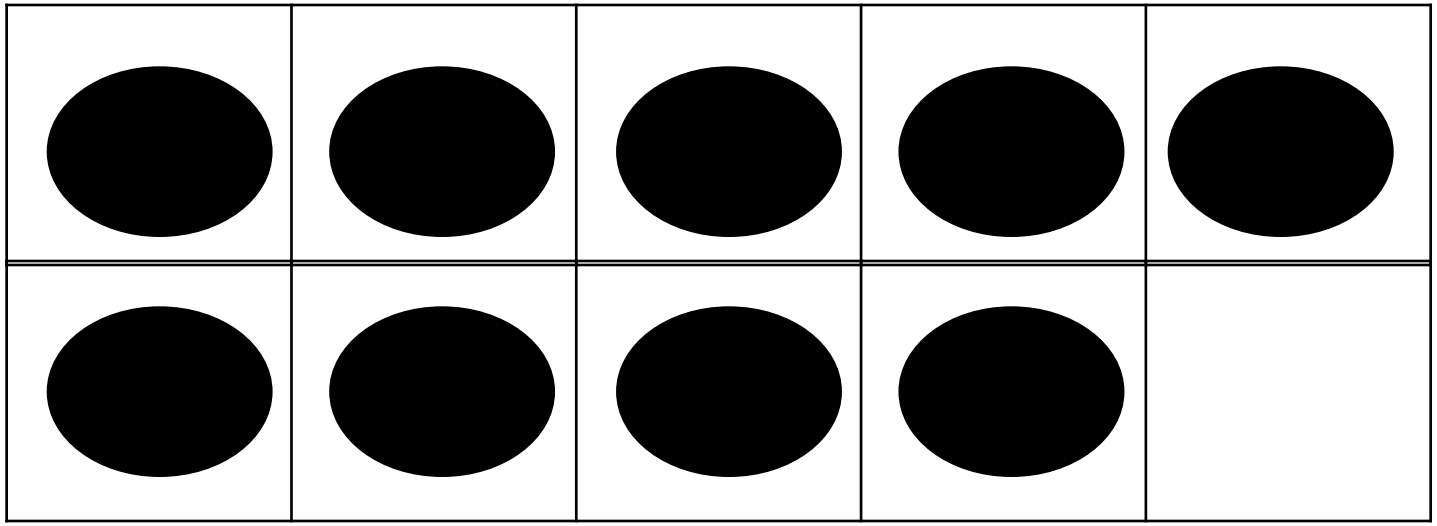
10 C8 BAMT 7, 6, 5.pptx

11 Conceptual Break Apart to Make 10 Small First Addend.pptx

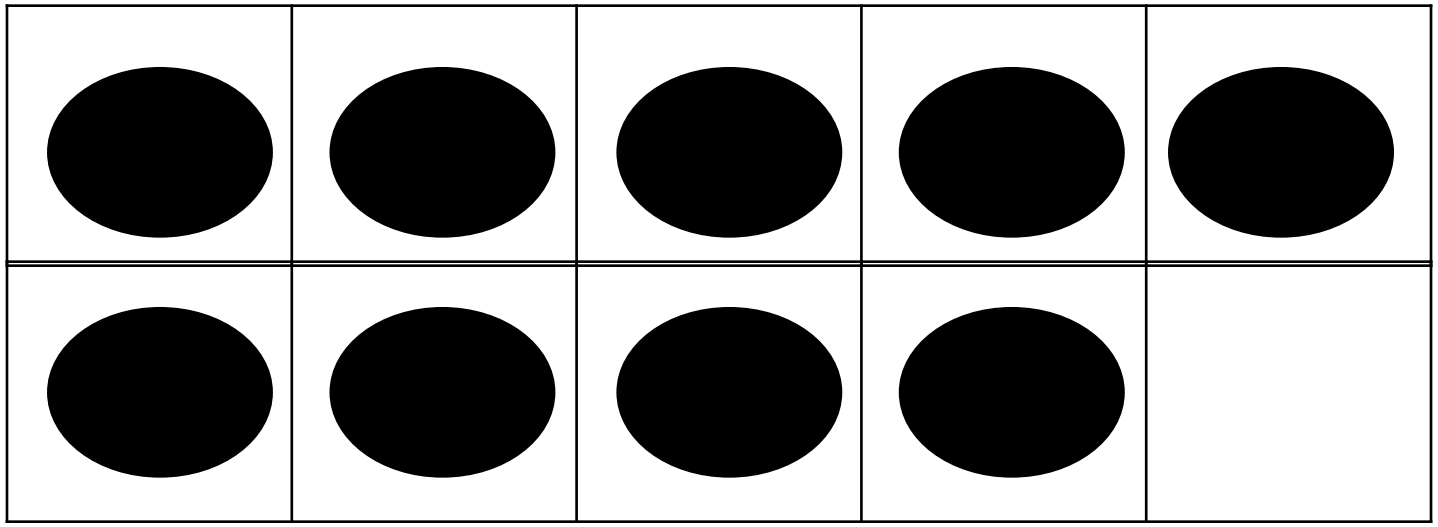
What is this value?

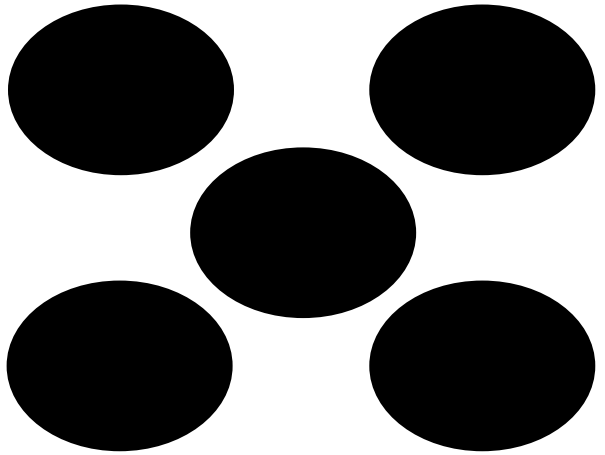


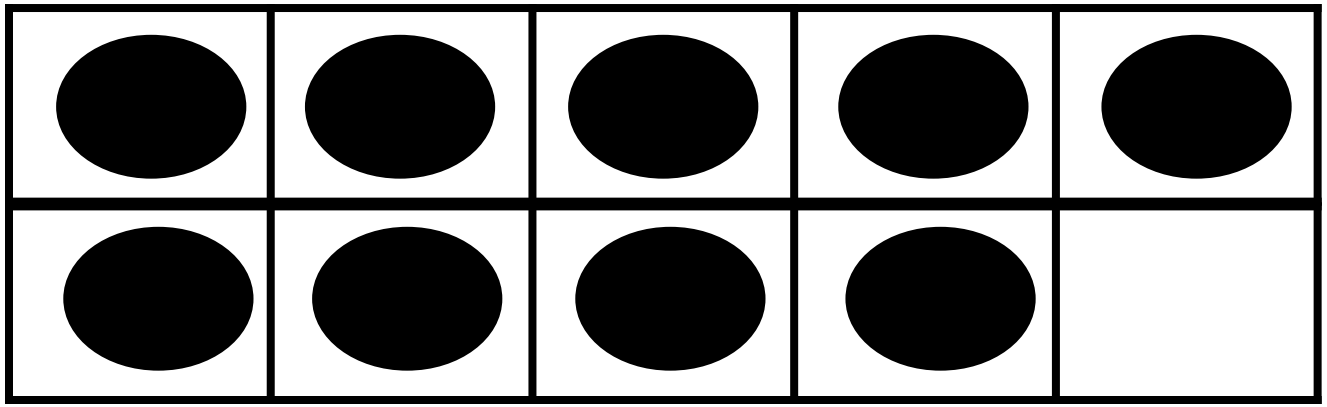
How many more do we need to make 10?

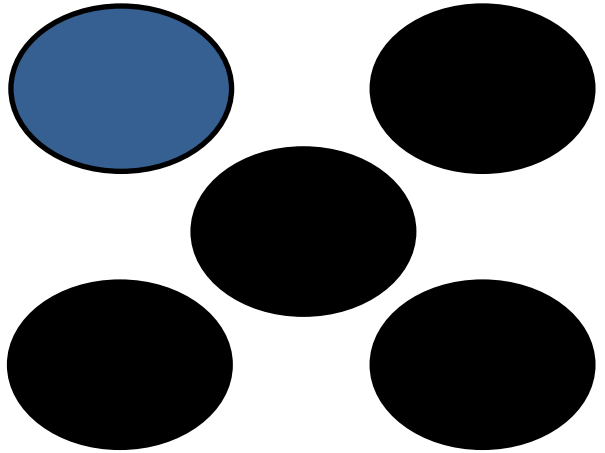


How many to make 10?
How many left over?









1 to make 10

4 left over

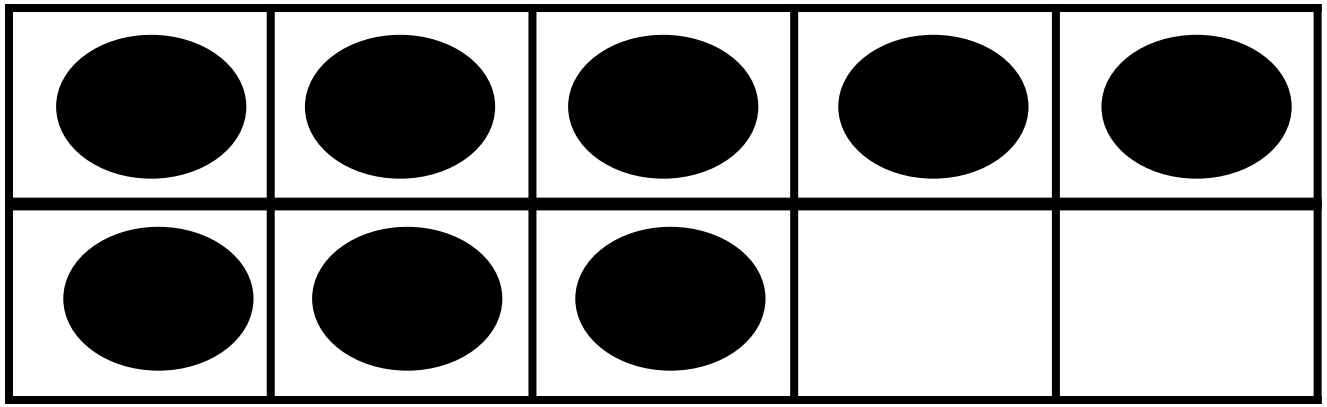
Real Name: 1 ten 4 ones

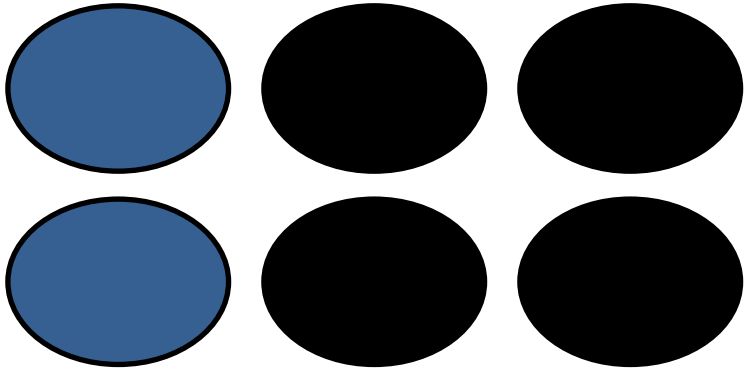
Nickname: Fourteen (14)

Looking at the symbolic representation

*Only move on to this step after students have mastered the previous slides and their explanation sounds like:

Student Response: 13!
What is the real name for that number? *10 and 3.*
How did you get 10 and 3? *I decomposed the 5 into a 2 and a 3.*
Why did you decompose your 5 into a 2 and a 3? *Because I knew I needed two more to make a ten so I decomposed the 5 into 2 and 3.*





$$8 + 6$$

$$8 + (2 + 4)$$

$$(8 + 2) + 4$$

$$10 + 4 = 14$$

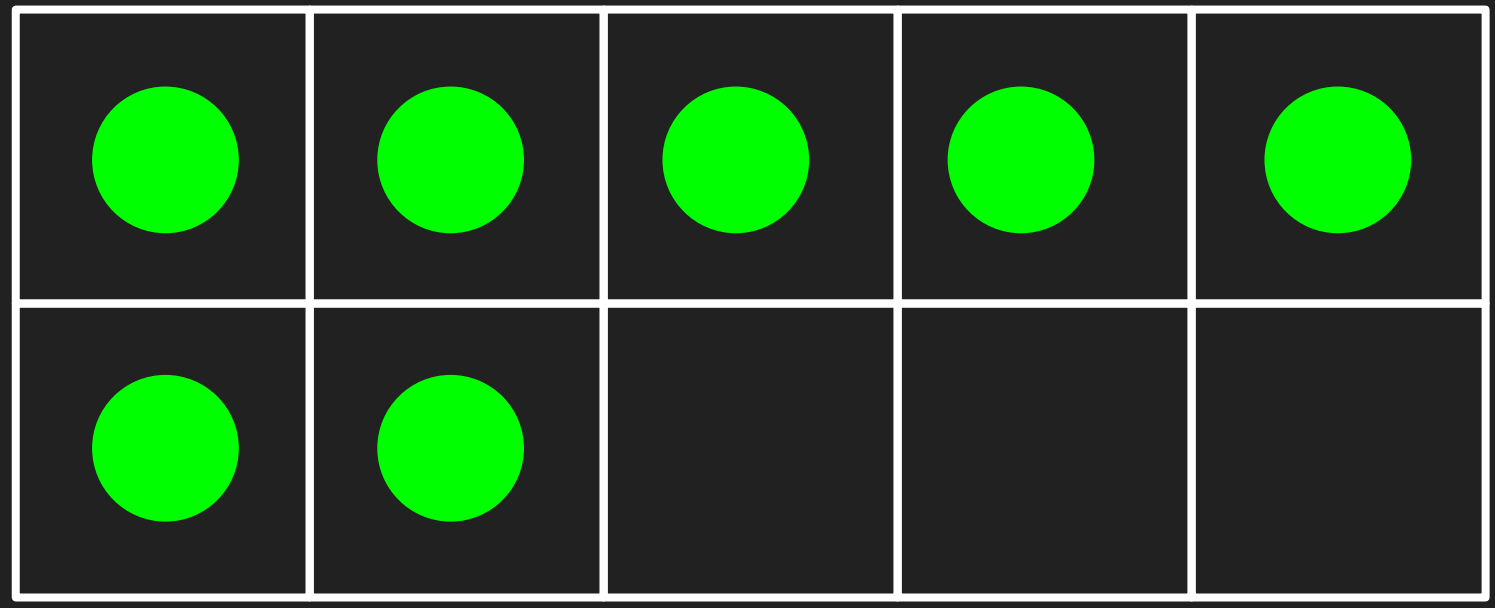
This is the Associative Property at work!

12 Conceptual Multiplication.pptx

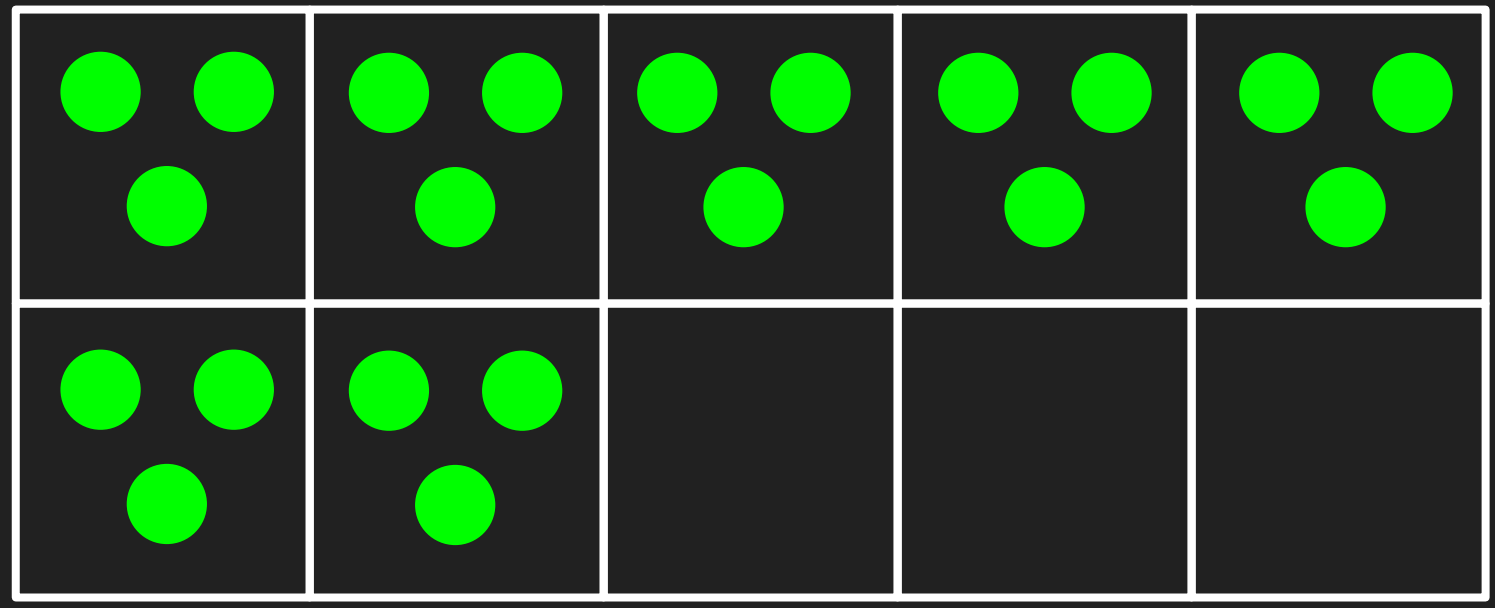
13 Conceptual Multiplication Missing Factor.pptx

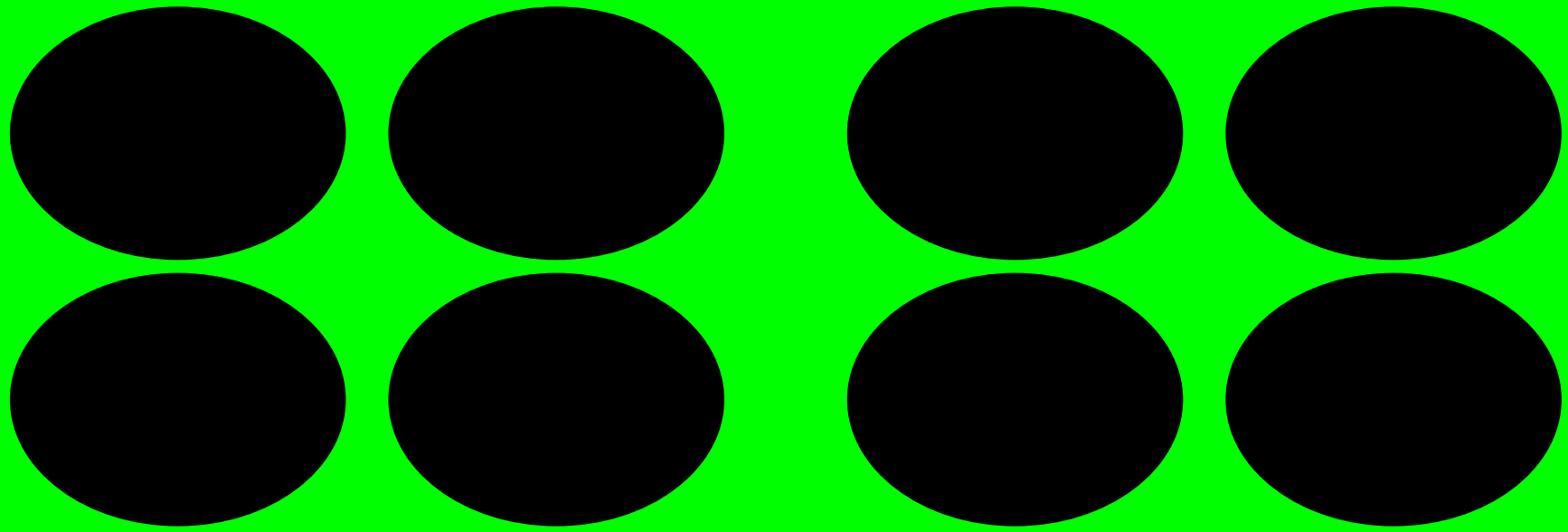
14 Conceptual Division.pptx

Subitizing in Base 10

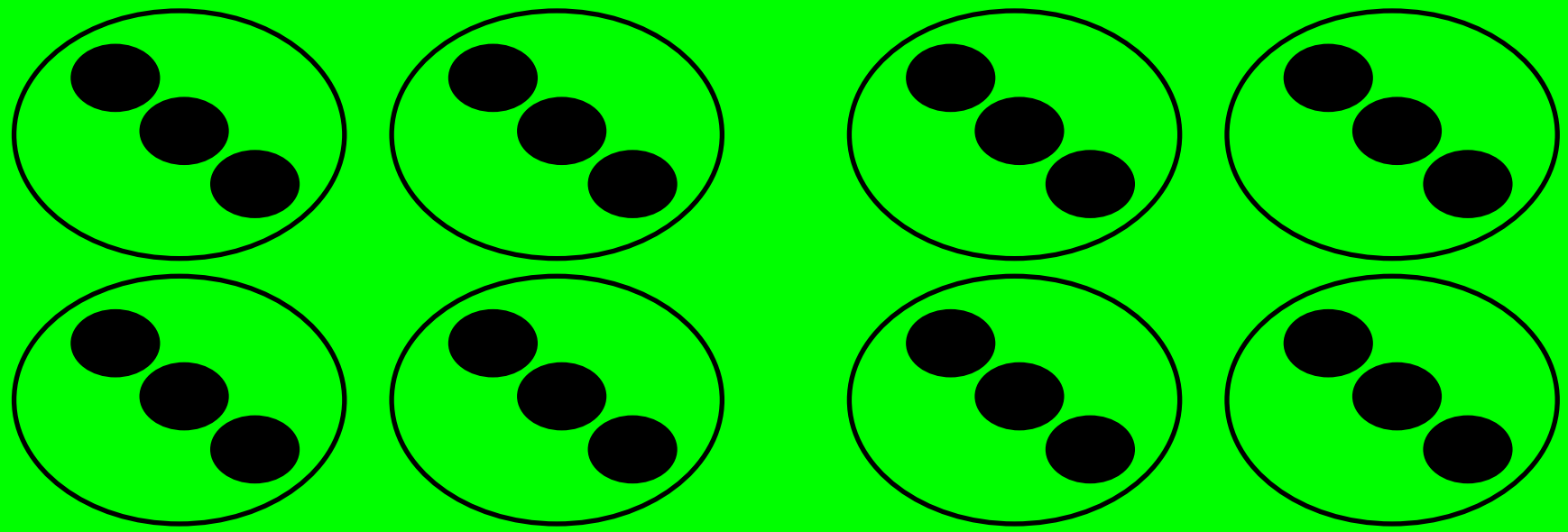


Subitizing in Base 10

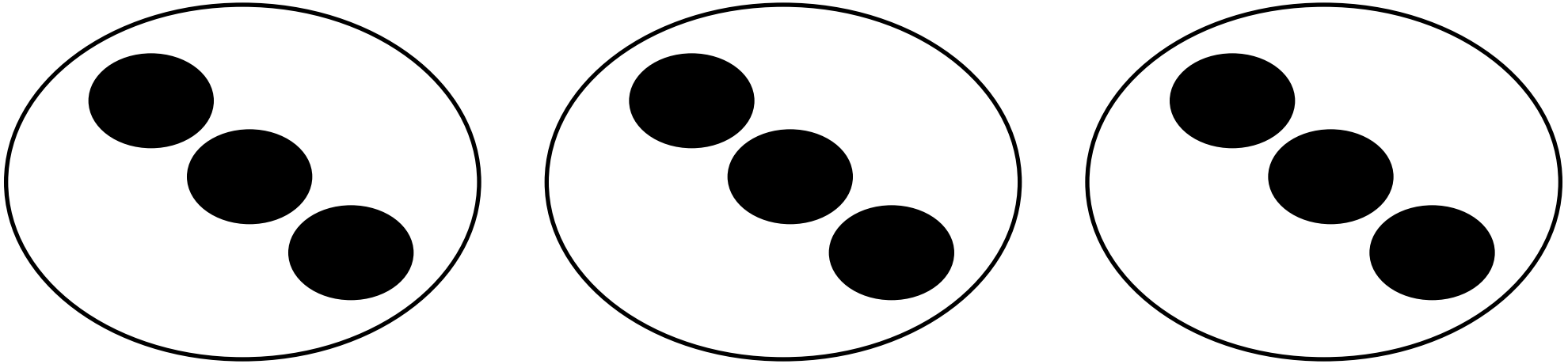




Faulkner & Ainslie, 2016

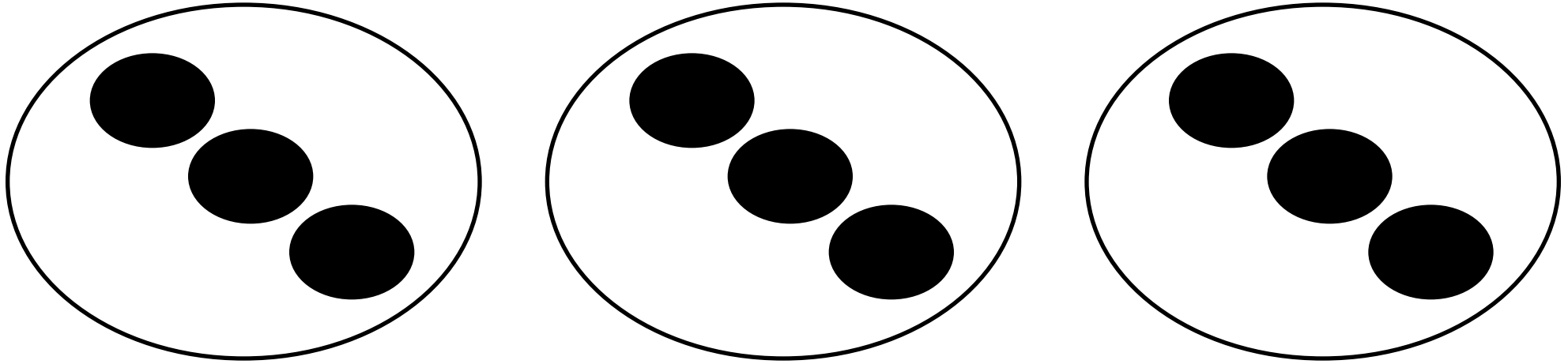


Faulkner & Ainslie, 2016



Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



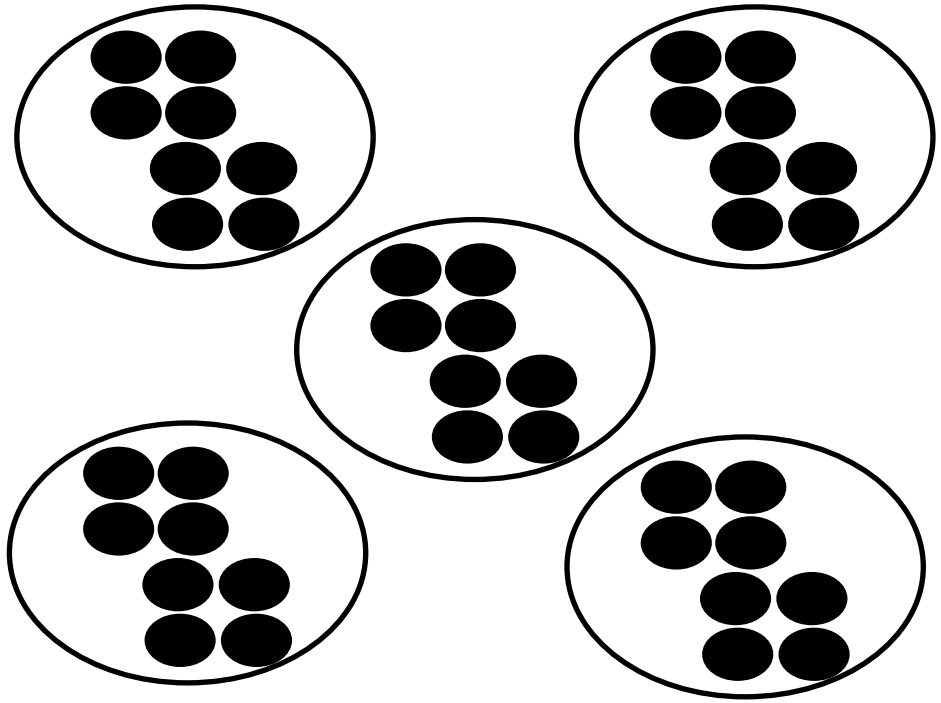
Factors: 3 and 3

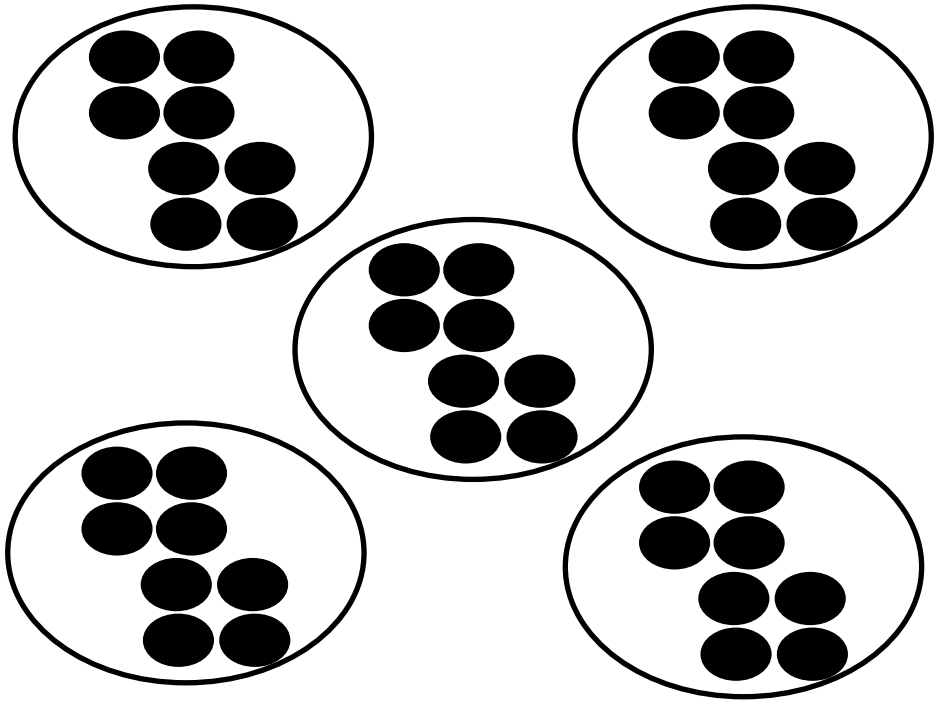
3 groups of 3 dots = 9 total dots

Product: 9

$3 \times 3 = 9$

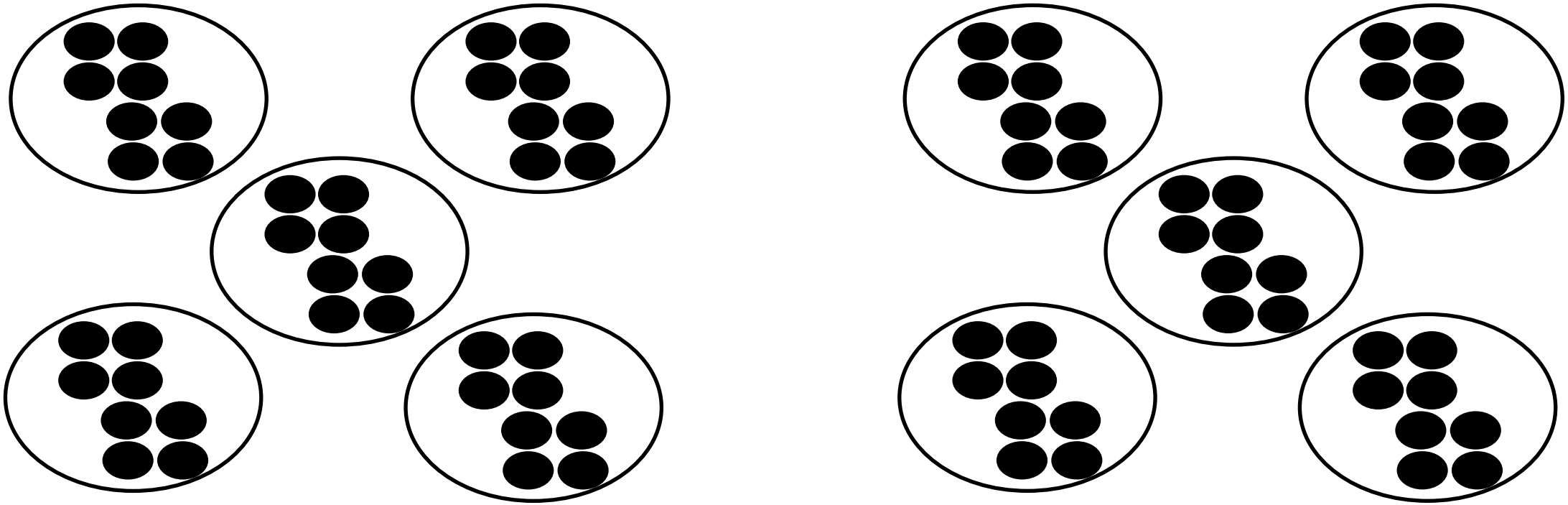
Faulkner & Ainslie, 2016





Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



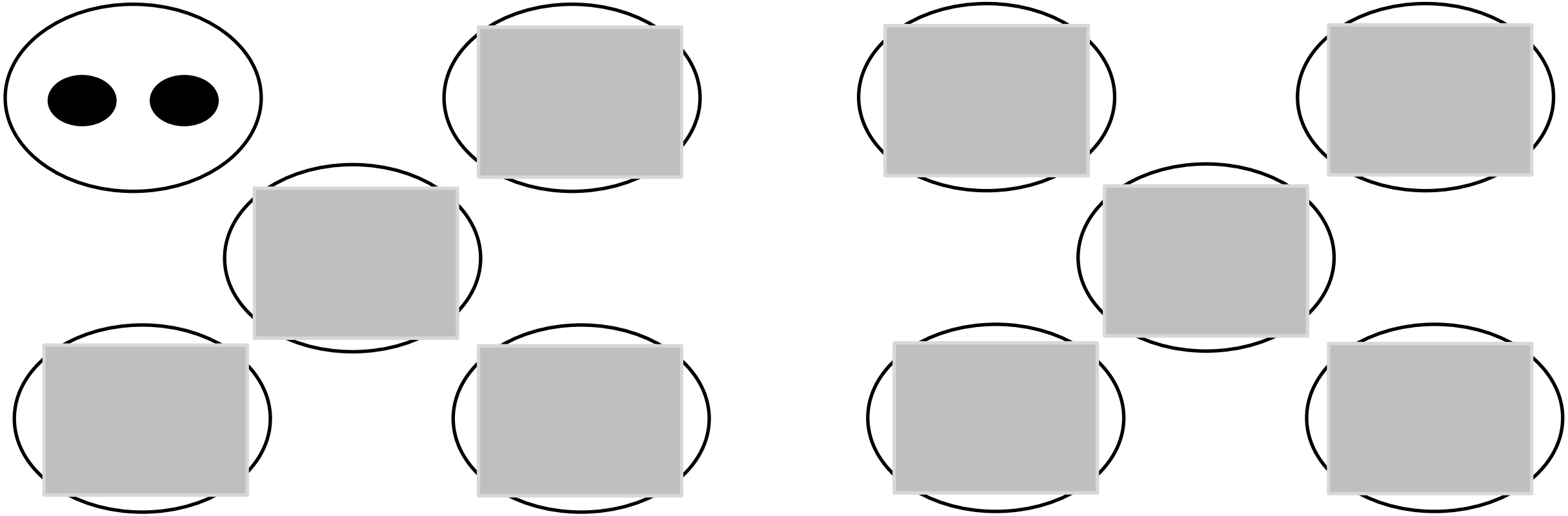
Factors: 10 and 8

10 groups of 8 dots = 80 total dots

Product: 80

$10 \times 8 = 80$

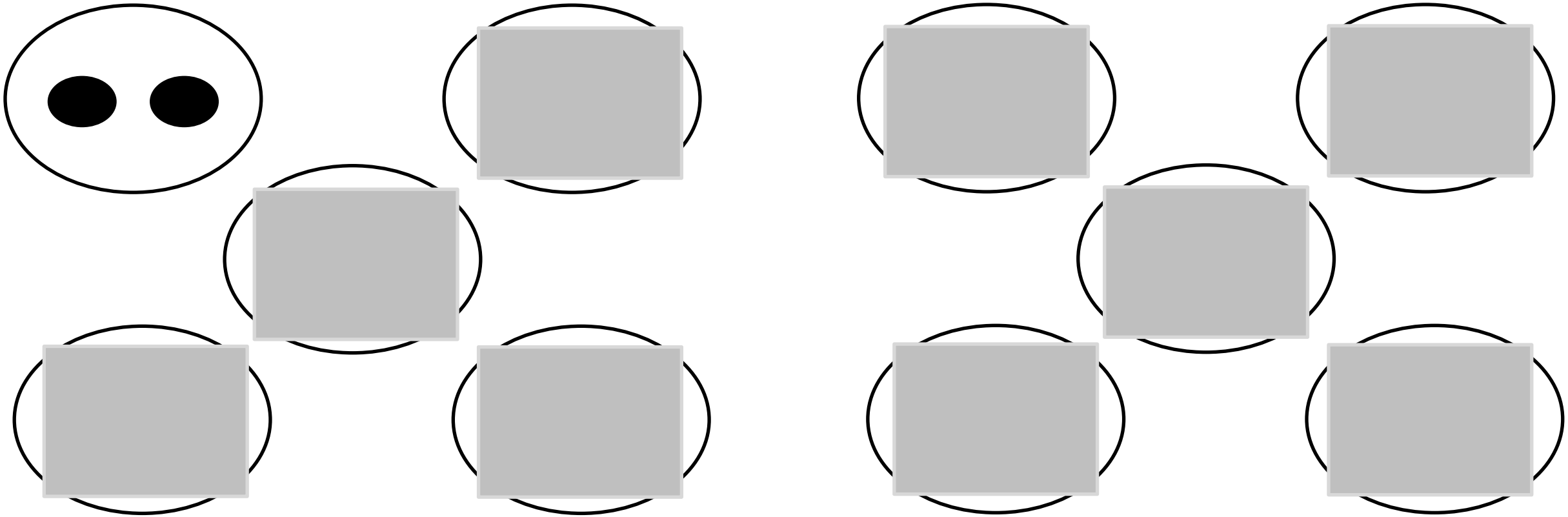
Assuming that each group has the same number of dots, can you tell me the two factors?



Faulkner & Ainslie, 2016

Factors: 10 and 2

How did you know that?

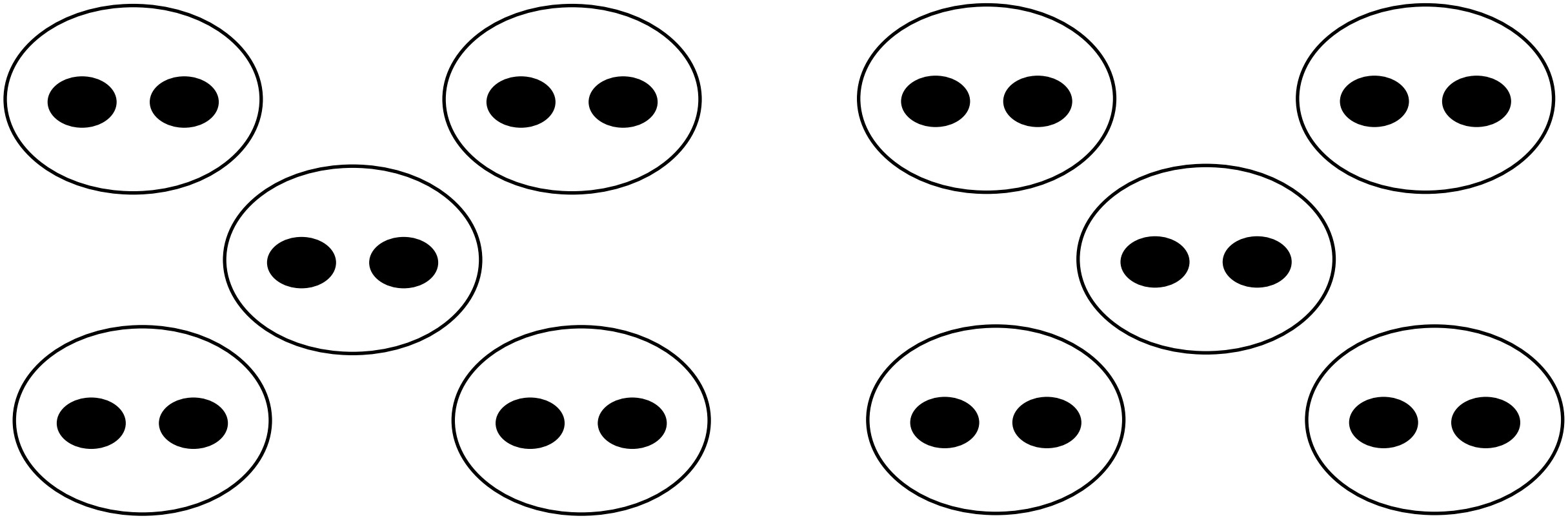


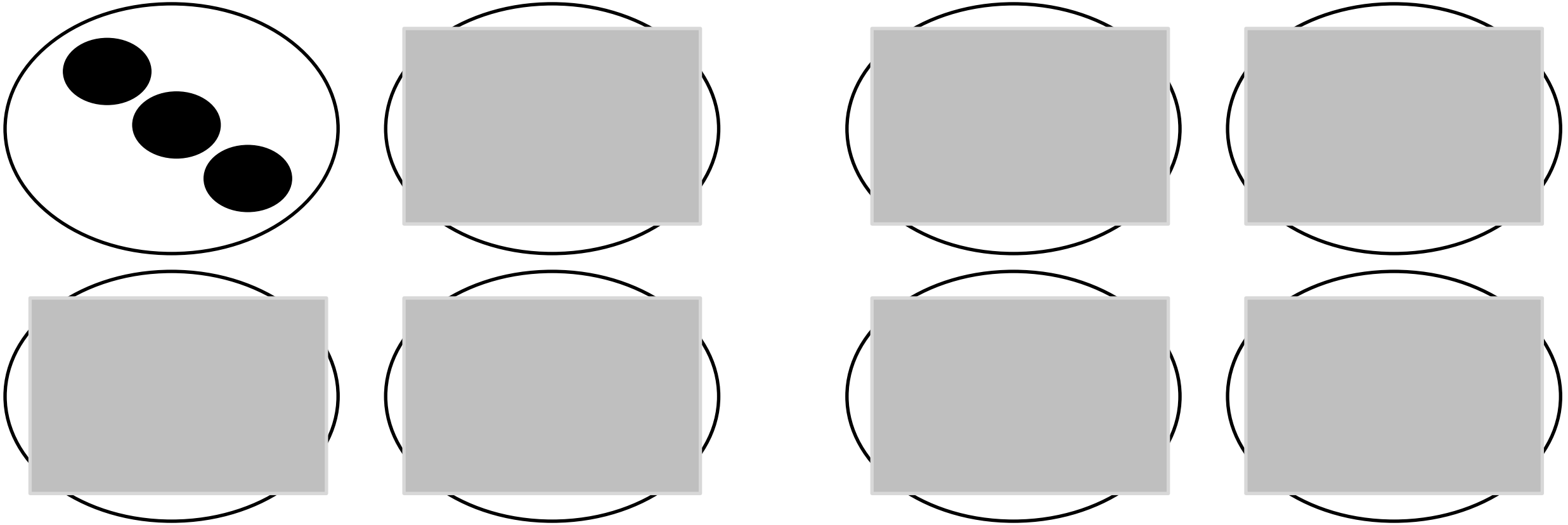
Without seeing all of the dots, can you tell me the product?

Faulkner & Ainslie, 2016

10 x 2 = 20

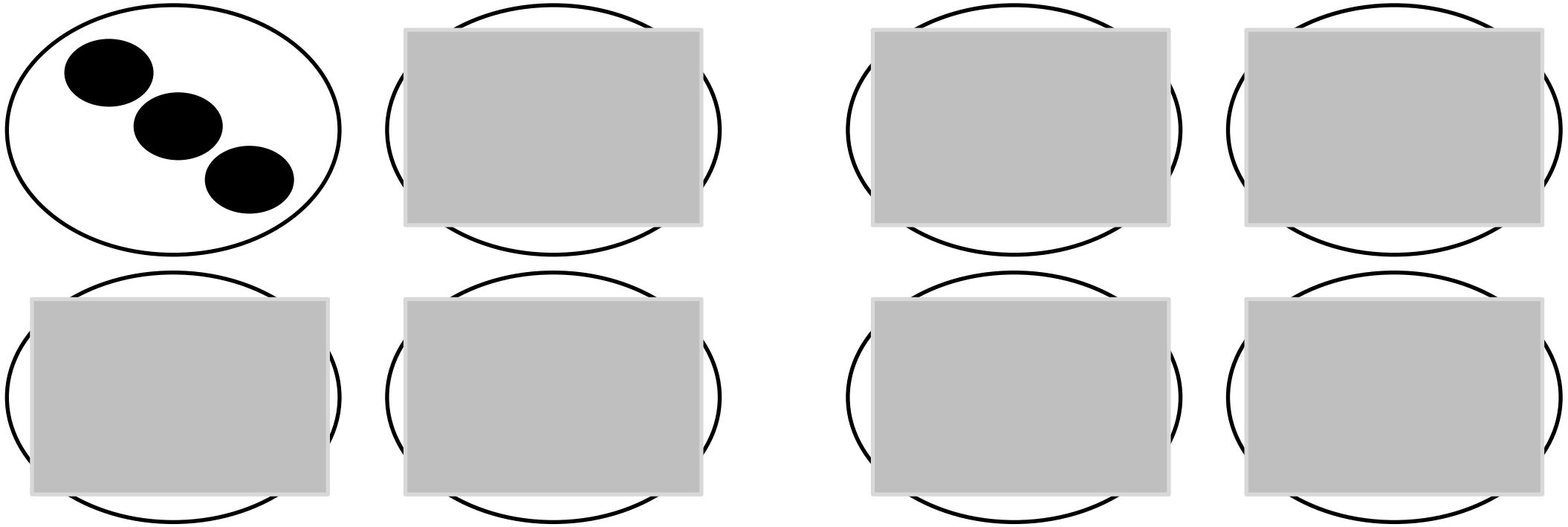
10 groups of 2 dots each = 20 total dots





Faulkner & Ainslie, 2016

Faulkner & Ainslie, 2016



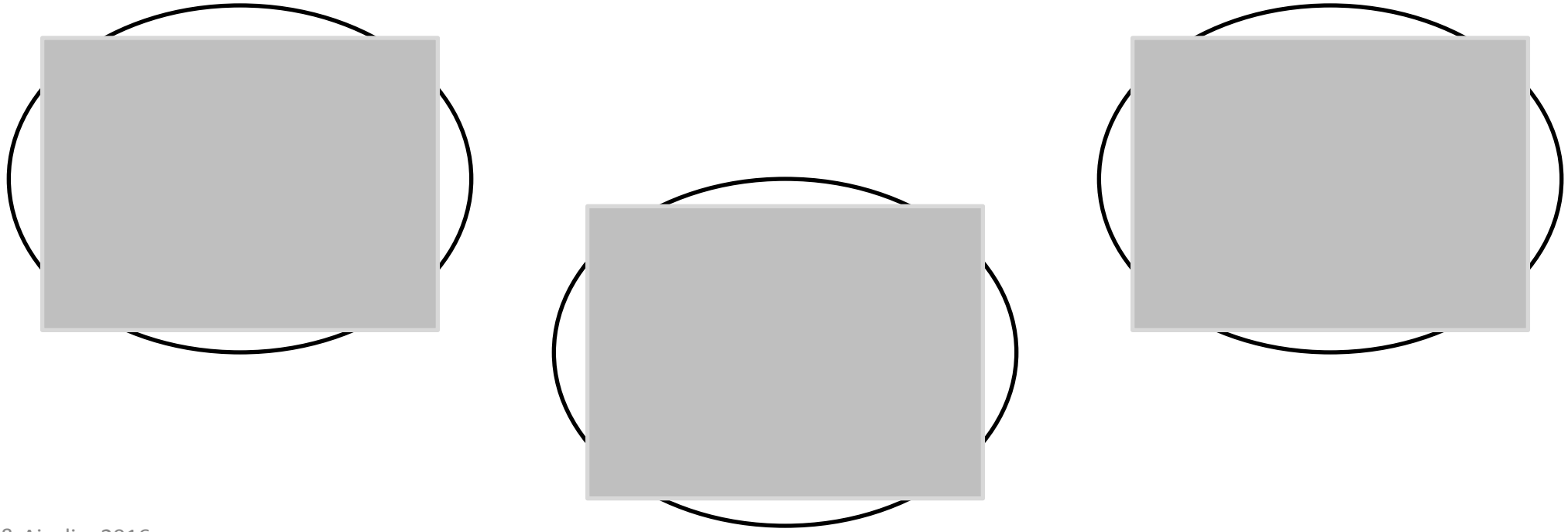
Factors: 8 and 3

8 groups of 3 dots = 24 total dots

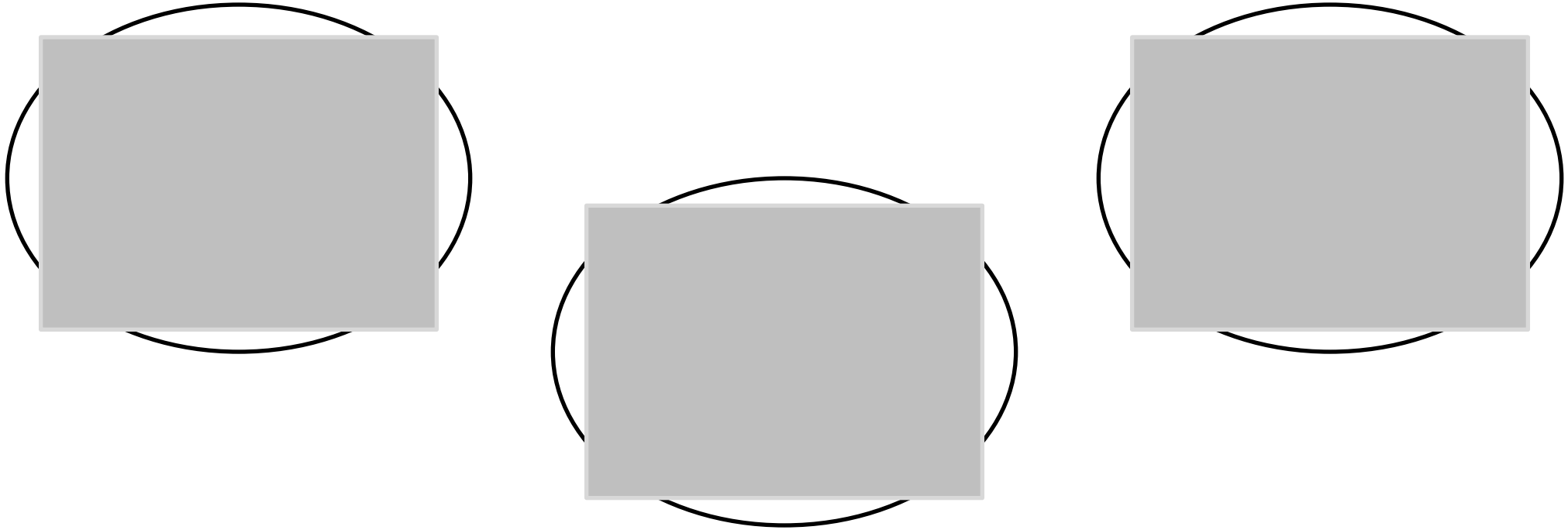
Product: 24

$8 \times 3 = 24$

Assuming that each group has the same number of dots, can you tell me the two factors if the product is 6?



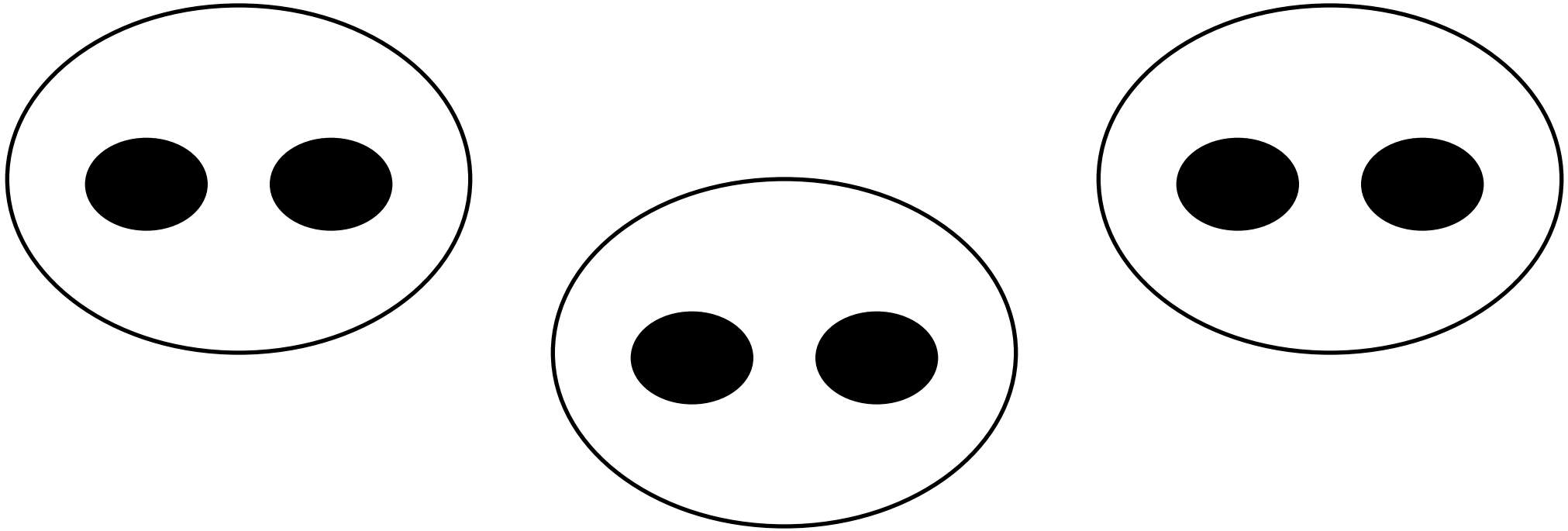
Factors: 2 and 3
How did you know that?



Faulkner & Ainslie, 2016

6 ÷ 3 = 2

6 total dots divided equally into 3 groups means 2 dots have to be in each group



Flash!
Flash!
Flash!
Flash!
TALK

Caution!

The Subitizing Song! [suhb-itizing] (Version 1-- dots, ten-frames ...

https://www.youtube.com/watch?v=nsScVF6Jo6A
Feb 9, 2017 - Uploaded by Harry Kindergarten Music
Up next. Tens Frame **Song**. **Subitize** Up To 5 (soo-bi-tize) | Math **Song** for Kids | Jack Hartmann. The ...

Subitize Up to 5 (soo-bi-tize) | Math Song For Kids | Jack ... - YouTube

https://www.youtube.com/watch?v=6yyz_OycV4A
Jun 30, 2017 - Uploaded by Jack Hartmann Kids Music Channel
Subitize is the ability to tell the number of objects in a set, quickly, without counting. In this **subitizing song** name ...

Subitize Rock (sŭbitize) | Math Song for Kids | Jack Hartmann - YouTube

https://www.youtube.com/watch?v=A1Mazc-SsG0
Jun 21, 2017 - Uploaded by Jack Hartmann Kids Music Channel
Subitize is the ability to tell the number of objects in a set, quickly, without counting. In this **subitizing song** name ...

Subitize Up To 5 (soo-bi-tize) | Math Song for Kids | Jack ... - YouTube

https://www.youtube.com/watch?v=PSIA-u_ABmU
Jun 24, 2017 - Uploaded by Jack Hartmann Kids Music Channel
Jack Hartmann's website: www.jackhartmann.com Remember to connect with Jack Hartmann on his Social ...

Thank you!

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@JennyAinslie

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Valerie Faulkner, NCSU