Mathematical challenges for able pupils

Year 1 A Counting, partitioning and calculating

Four-pin bowling

- Which pins must Joshua knock down to score exactly 5?

Next: Find 2 different ways to score 5. Answers!

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts up to 10.

Solution to the Four-pin bowling problem.

- Score 5 by knocking down **1 and 4** or **2 and 3.**
- Score 6 by knocking down **2 and 4** or **1, 2 and 3**.
- Score 7 by knocking down **3 and 4**, or **1, 2 and 4**.

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts up to 10.

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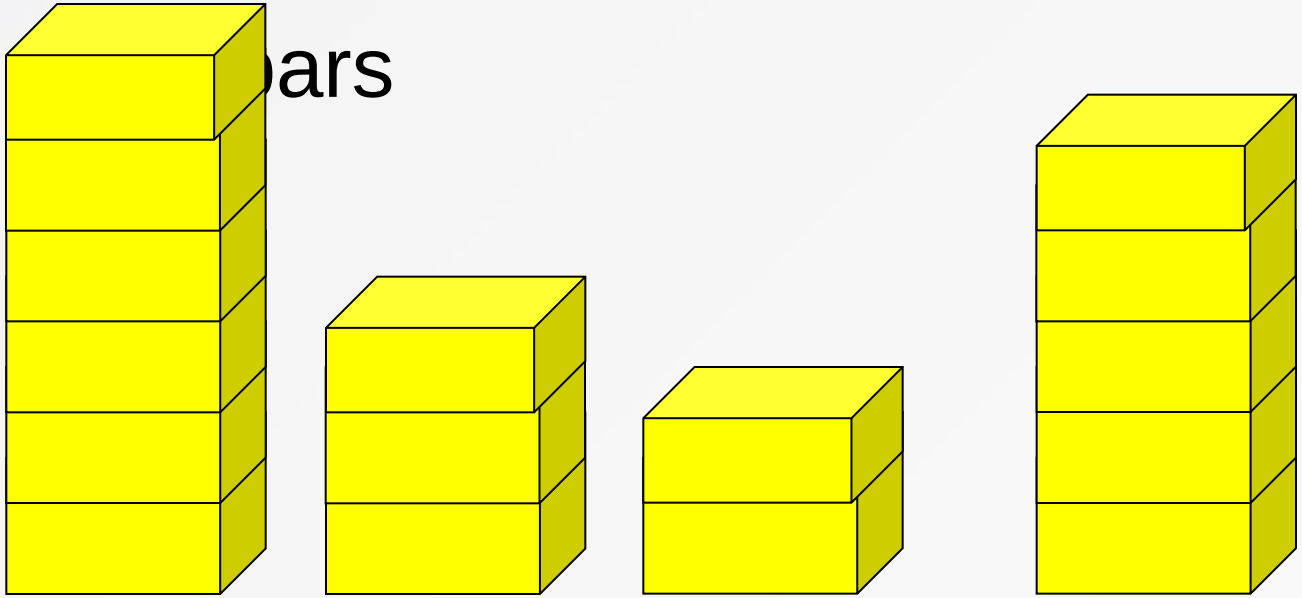


Pete is a pirate.

His gold bars are in piles.

He can move one or more bars at a time.

He made all the piles the same height.

He made just two moves.

How did he do it?

Learning Objective:

- Solve mathematical problems or puzzles.
- Explain methods and reasoning.

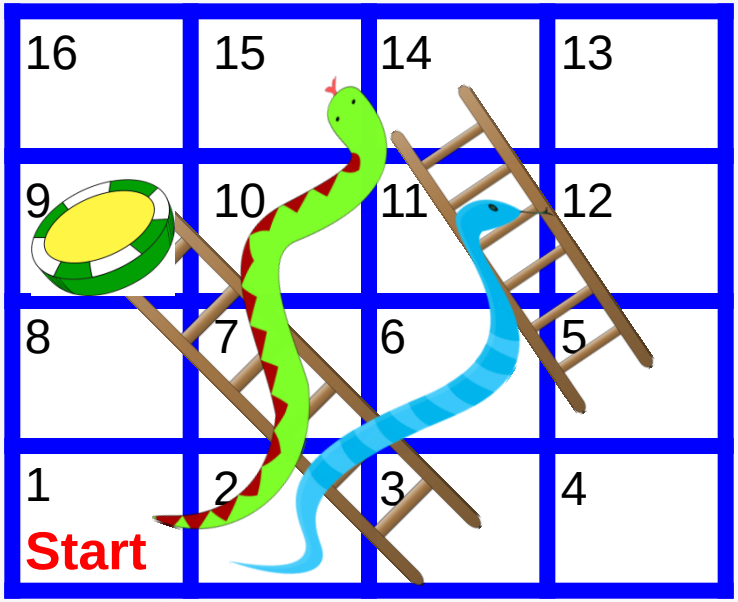
Solution to the 7 Gold bars problem.

- Move two bars from pile 1 to pile 3.
- Move one bar from pile 4 to pile 2.

Learning Objective:

- Solve mathematical problems or puzzles.
- Explain methods and reasoning.

Snakes and ladders



Your counter is on 9. You roll a 1 to 6 dice.

After two moves you land on 16. Find all the different ways you can do it.

Now think of other questions you could ask.

Learning Objective:

- Solve mathematical problems or puzzles.
- Count on from any small number.

Solution to the Snakes and ladders problem.

Watching out for snakes, there are four different ways to get to 16 in two throws:

1 then 6

3 then 4

4 then 3

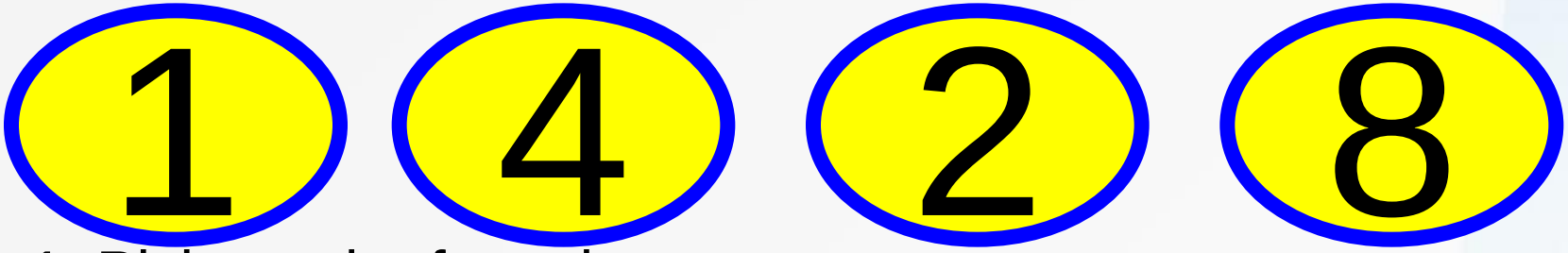
5 then 2

Learning Objective:

- Solve mathematical problems or puzzles.
- Count on from any small number.

Pick a pair

Choose from these numbers.



1. Pick a pair of numbers.
Add them together.
Write the numbers and the answer.
Pick a different pair of numbers.
Write the numbers and the answer.
Keep doing it. How many different answers can you get?

2. Now take one number from the other.
How many different answers can you get now?

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts up to 10.

Solution to the Pick a pair problem.

There are six different sums and six different (positive) differences.

1. $1 + 2 = 3$
   $1 + 4 = 5$
   $2 + 4 = 6$
   $1 + 8 = 9$
   $2 + 8 = 10$
   $4 + 8 = 12$

2. $2 - 1 = 1$
   $4 - 2 = 2$
   $4 - 1 = 3$
   $8 - 4 = 4$
   $8 - 2 = 6$
   $8 - 1 = 7$

Adapt the puzzle by using larger numbers.

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts up to 10.

Bean-bag buckets

- Dan threw 3 bean-bags.
- Each bag went in a bucket.
- More than one bag can go in a bucket.
- The scores are written on the buckets.

2. Find the highest score Dan can get?

3. What is the lowest score?

4. What other scores can he get?

Next click brings you the solutions...

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition facts up to 10.

Solution to the Bean-bag buckets problem.

1. The highest score is 12 (3 bags in 4).

2. Score 6 in three ways:

1 bag in 4 and 2 bags in 1, or 1 bag in 1, 1 bag in 2 and 1 bag in 3, or 3 bags in 2.

3. Score 9 in three ways:

1 bag in 1 and 2 bags in 4, or 1 bag in 2, 1 bag in 3, 1 bag in 4, or 3 bags in 3.

4. Besides 6, 9 and 12, other possible scores are:

3: 3 bags in 1

4: 2 bags in 1, 1 bag in 2

5: 2 bags in 1, 1 bag in 3, or
1 bag in 1, 2 bags in 2

7: 1 bag in 1, 2 bags in 3, or
2 bags in 2, 1 bag in 3, or
1 bag in 1, 1 bag in 2, 1 bag in 4

8: 2 bags in 2, 1 bag in 4, or
1 bag in 2, 2 bags in 3, or
1 bag in 1, 1 bag in 3, 1 bag in 4

10: 1 bag in 2, 2 bags in 4

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition facts up to 10.

Crossword

Write the answers to this puzzle in words:

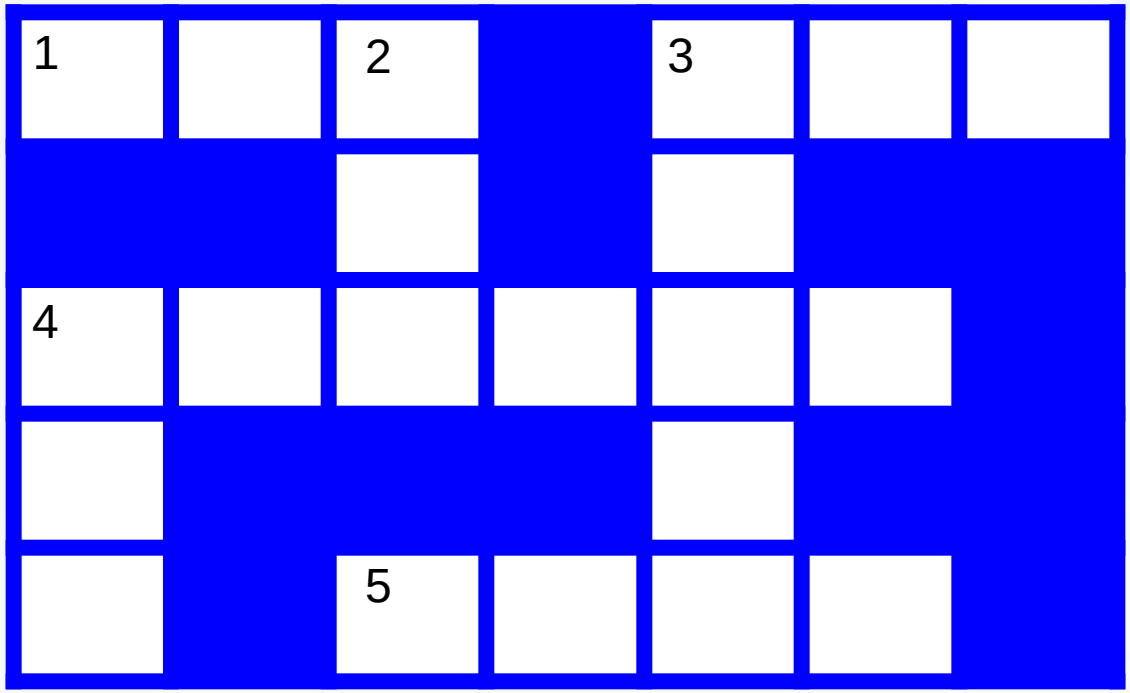
ONE, TWO, THREE.. (UP TO TWELVE)

Across →

1. 7 – 5
3. 2 + 5 – 1
4. 4 + 4 + 4
5. 13 – 4

Down ↓

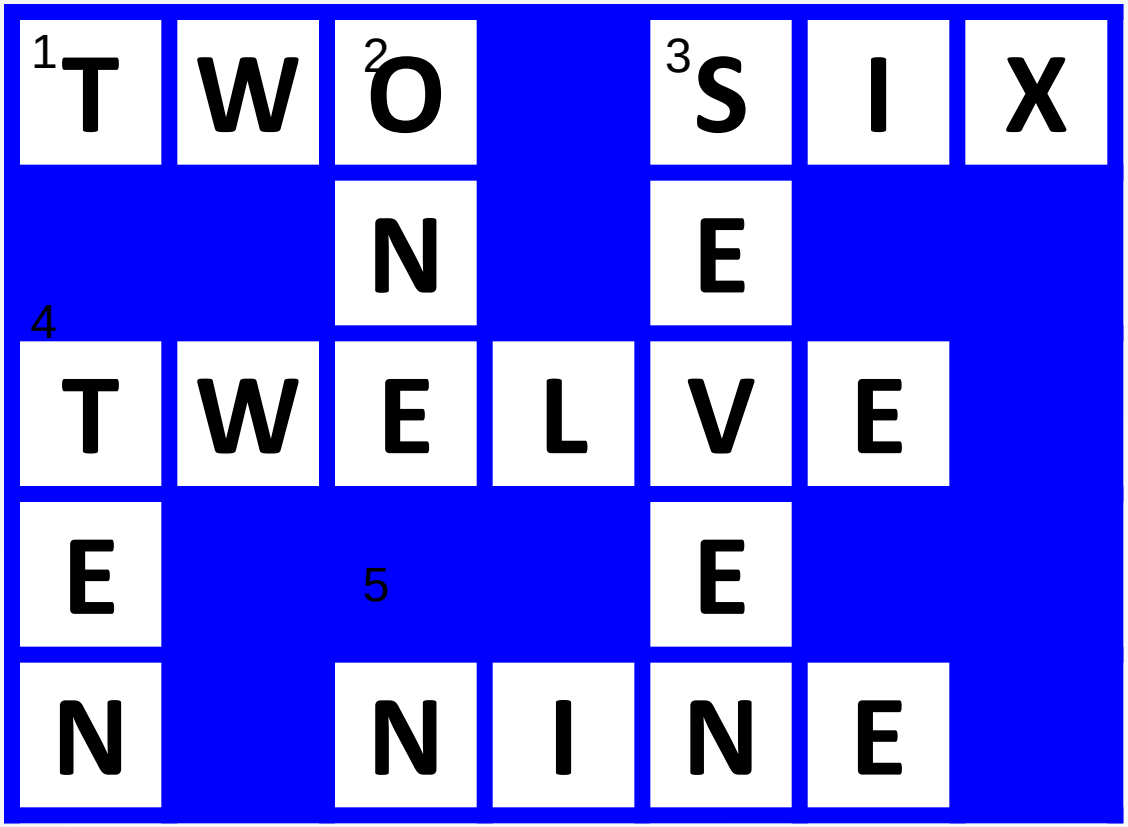
2. 3 + 4 – 6
3. 9 – 2
4. 11 – 4 + 3



Learning Objective:

- Solve mathematical problems or puzzles.
- Use known number facts and place value to add and subtract mentally.
- Read and write whole numbers.

Solution to the Crossword problem.



Learning Objective:

- Solve mathematical problems or puzzles.
- Use known number facts and place value to add and subtract mentally.
- Read and write whole numbers.

Sum up

Choose from these four cards.

Make these totals:

What other totals can you make from the cards?

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts to at least 10.
- Add three small numbers mentally.

Solution to the Sum Up problem.

If each number can be used only once:

9 = 2 + 3 + 4

10 = 2 + 8

11 = 3 + 8

12 = 4 + 8

13 = 2 + 3 + 8

14 = 2 + 4 + 8

15 = 3 + 4 + 8

Other solutions are possible if numbers can be repeated.

Other totals:

5 = 2 + 3

6 = 2 + 4

7 = 3 + 4

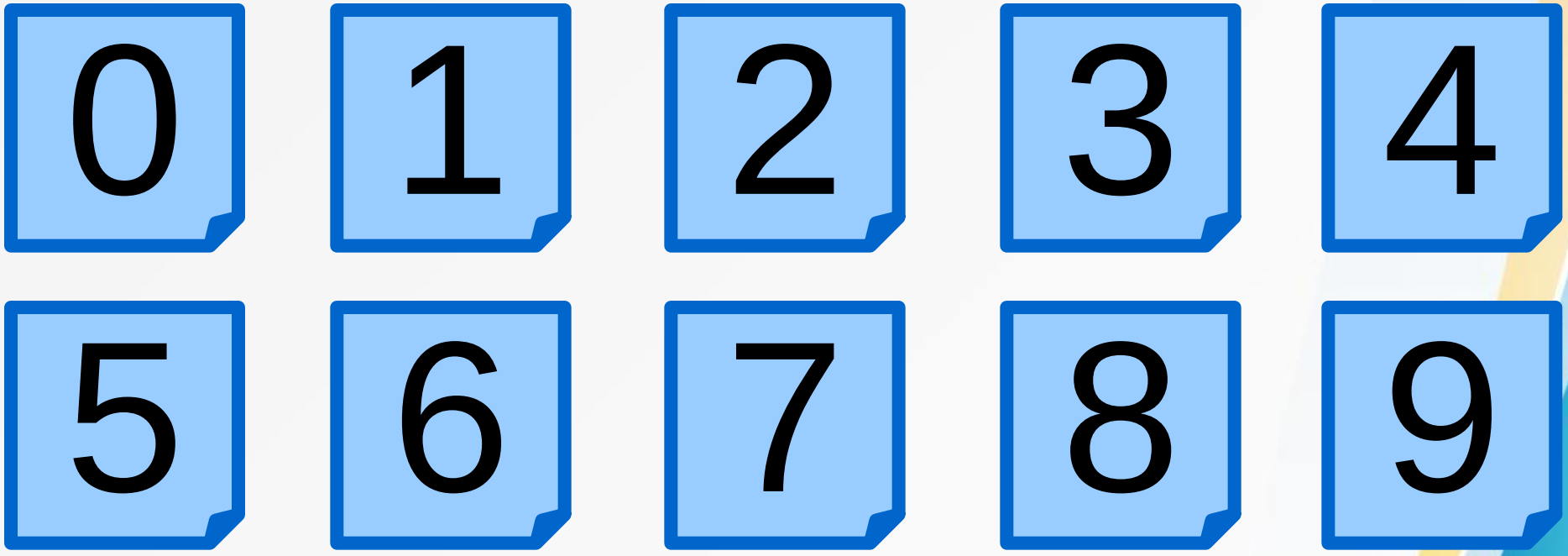
17 = 2 + 3 + 4 + 8

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition and subtraction facts to at least 10.
- Add three small numbers mentally.

Card sharp

Take ten cards numbered 0 to 9.



1. Pick three cards with a total of 12.
2. Now pick four cards with a total of 12.
3. Can you pick five cards with a total of 12?

How many different ways can you do it in 10 different tries?

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition facts to at least 10.
- Solve a problem by sorting, classifying and organising information

Solution to the problem.

1. There are 10 different ways to choose three cards with a total of 12:

0, 3, 9	**1, 2, 9**	**2, 3, 7**	**3, 4, 5**
0, 4, 8	**1, 3, 8**	**2, 4, 6**	**0, 5, 7**
1, 4, 7	**1, 5, 6**		

2. There are 9 different ways to choose four cards with a total of 12:

0, 1, 2, 9	**0, 2, 3, 7**	**1, 2, 3, 6**	**0, 1, 3, 8**
0, 2, 4, 6	**1, 2, 4, 5**	**0, 1, 4, 7**	**0, 3, 4, 5**
0, 1, 5, 6			

3. **No.**

Learning Objective:

- Solve mathematical problems or puzzles.
- Know addition facts to at least 10.
- Solve a problem by sorting, classifying and organising information

Thank You For Working!

References and additional resources.

These units were organised using advice given at:
http://www.edu.dudley.gov.uk/numeracy/problem_solving/Challenges%20and%20Blocks.doc

PowerPoint template published by www.ksosoft.com

These Mental Maths challenges can be found as a PDF file at :

http://www.edu.dudley.gov.uk/numeracy/problem_solving/Mathematical%20Challenges%20Book.pdf

The questions from this PowerPoint came from:
Mathematical challenges for able pupils in Key Stages 1 and 2
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