The Parent Sessions:
Mathematical Methods
Year 5

An explanation of ARE (Appropriate, Reliable, Efficient)

- The ARE framework (Appropriate, Reliable, Efficient) in maths helps choose the best problem-solving strategy:

1. **Appropriate:** Select a method suited to the problem (e.g., mental maths for simple calculations, algorithms for complex ones).
2. **Reliable:** Ensure the method consistently gives correct results (e.g., standard algorithms for accuracy).
3. **Efficient:** Solve the problem quickly without sacrificing accuracy (e.g., using shortcuts like compensation).

- It promotes accuracy, practicality, and flexibility in solving maths problems.

Question: 5400 – 79 =

- To use column method to answer this question might not be the most efficient way. A different approach could be to use the compensation strategy (5400 – 80 + 1)

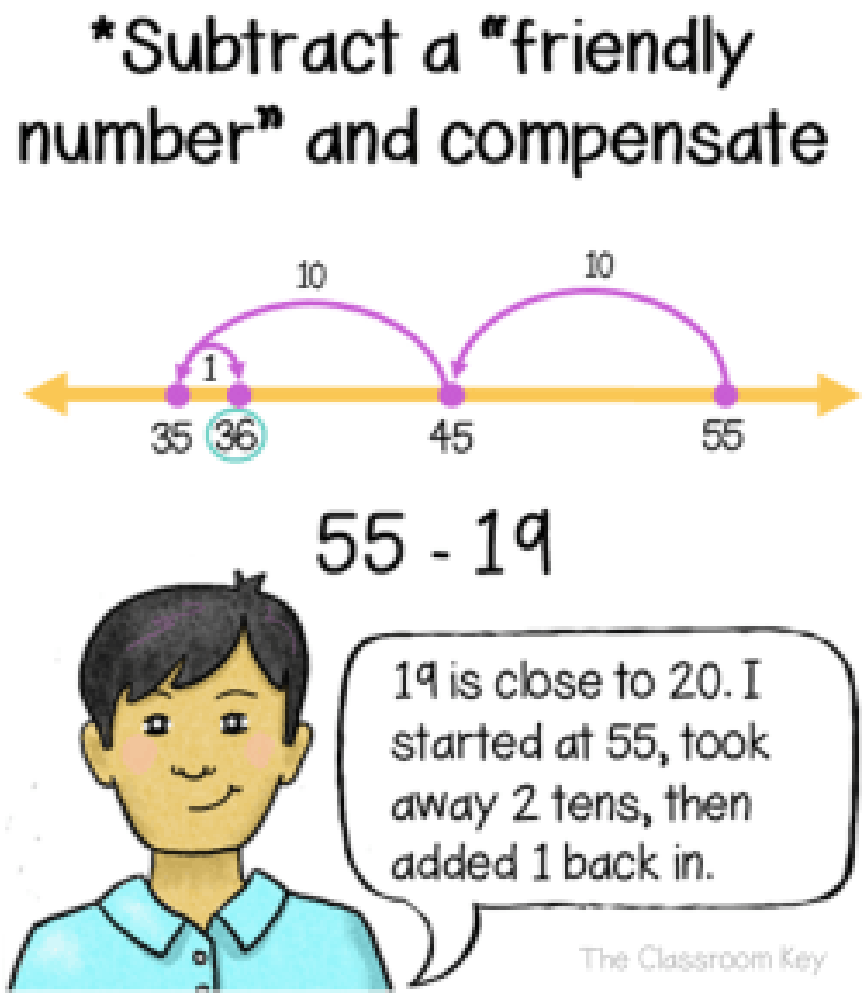
The Rationale Behind:

Compensation on a number line

- Using compensation on a number line is a strategy that simplifies mental maths by adjusting numbers to facilitate easier calculations. This approach works because:

1. **Simplification:** Compensation converts a complex operation into a simpler one, such as turning an addition or subtraction into one involving round numbers (e.g., multiples of 10 or 100).
2. **Visualisation:** On a number line, it becomes easier to see the adjustments visually and track how moving forward or backward relates to the original problem.
3. **Flexibility:** It encourages thinking flexibly about numbers, allowing for quick adjustments and fostering a deeper understanding of place value and arithmetic operations.

- For example, solving 48+27 can be adjusted to 50+25 by compensating 2 from the 27 to the 48, which is easier to compute. The number line helps students visually track and verify this adjustment.



Example Questions: Compensation on a number line

Question 1:

- Using compensation, solve 48+27 on a number line.

Solution:

1. Adjust 48 to 50 by adding 2 (compensation step).
2. Subtract the 2 from 27, making it 25.
3. Now compute 50+25=75.
4. On a number line, move from 48 to 50, then add 25 to reach 75.

Example Questions: Compensation on a number line

Question 2:

- Find 63−29 using compensation on a number line.

Solution:

1. Adjust 29 to 30 by adding 1.
2. Calculate 63−30=33.
3. Add back the 1 you subtracted earlier: 33+1=34.
4. On a number line, move back 30 from 63 to 33, then forward 1 to reach 34.

Example Questions: Compensation on a number line

Question 3:

- Calculate 135+47 using compensation on a number line.

Solution:

1. Adjust 47 to 50 by adding 3.
2. Calculate 135+50=185.
3. Subtract the 3 you added earlier: 185−3=182.
4. On a number line, move 135 forward 50 to 185, then back 3 to 182.

Practice questions for using compensation on a number line, organized into three levels.

Starter (Basic Questions)

- Focus on simple addition or subtraction within 50, emphasizing small adjustments.

1. 38+9: Use compensation to simplify the addition.
   (Hint: Adjust 9 to 10 for easier calculation.)
2. 24−8: Use compensation to solve.
   (Hint: Adjust 8 to 10, then subtract and adjust back.)
3. 45+6: Solve using compensation.
   (Hint: Add 5 to make 45 a round number.)

Expected (Intermediate Questions)

- Involve larger numbers and require more flexible compensation strategies.

4. 63 + +29: Use compensation to simplify.
   (Hint: Adjust 29 to 30 for easier addition.)
5. 84−27: Solve using compensation.
   (Hint: Adjust 27 to 30 by adding 3, then compensate.)
6. 56+48: Apply compensation to find the total.
   (Hint: Round 48 to 50 for a simpler calculation.)

Practice questions for using compensation on a number line, organized into three levels.

Challenge (Advanced Questions)

- Require multi-step compensation or involve larger numbers.

7. 135+47: Use compensation to solve.
   (Hint: Round 47 to 50, then adjust back.)
8. 219−88: Solve using compensation.
   (Hint: Round 88 to 90, subtract, and compensate.)
9. 375 + +198: Simplify using compensation.
   (Hint: Adjust 198 to 200 for easier addition.)
10. 1,004−497: Use compensation to find the result.
    (Hint: Round 497 to 500, then adjust.)

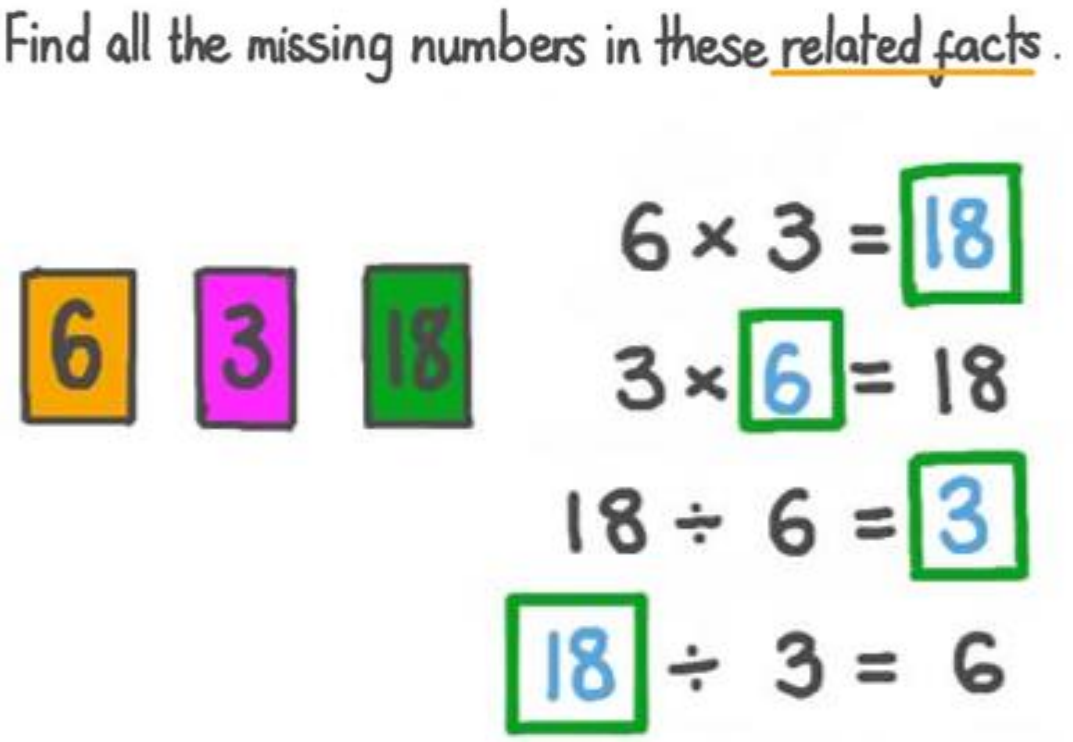
Questions to ask during the process – Compensation on a number line

- **What is the easiest way to adjust one of the numbers to make the calculation simpler?**
  (Helps the student think about how to compensate by rounding a number to a more convenient value.)
- **How do you move on the number line to reflect your compensation?**
  (Encourages the student to visualise the adjustments on the number line.)
- **After you adjust, what do you need to do to make sure you haven't changed the original problem?**
  (Prompts the student to remember to compensate back to maintain accuracy.)
- **How can you check that your compensation is correct?**
  (Encourages the student to double-check their work by reversing the compensation step.)
- **Can you think of a different way to compensate that might make the calculation easier?**
  (Encourages flexible thinking and exploring alternative compensation strategies.)

The Rationale Behind:

Related Number Facts

- We use related number facts in maths to help students make connections between known and new calculations, simplifying problem-solving. For example:
- **Building Efficiency:** Knowing that (6 + 4 = 10) helps solve (60 + 40 = 100), reinforcing the connection between basic and extended facts.
- **Promoting Understanding:** It strengthens understanding of place value and arithmetic relationships, fostering deeper number sense.
- **Encouraging Mental Strategies:** Related facts support mental maths by allowing students to break problems into smaller, more manageable parts based on familiar patterns.
- This approach develops confidence and fluency in mathematical operations.



Example Questions: Related Number Facts

Question 1:

- Using the fact 5+5=10, solve 50+50.

Solution:

1. Recognize the relationship between 5+5=10 and 50+50.
2. Since 50=5×10, the answer is 10×10=100.
3. Final Answer: 50+50=100.

Example Questions: Related Number Facts

Question 2:

- If $7 \times 6 = 42$, what is 70×6?

Solution:

1. Use the related fact $27 \times 6 = 42$.
2. Multiply 42 by 10 (since $70 = 7 \times 10$).
3. Final Answer: $70 \times 6 = 420$.

Example Questions: Related Number Facts

Question 3:

- Using the facts $8-3=5$, solve $80-30$.

Solution:

1. Recognize that 80 and 30 are multiples of 8 and 3 (scaled by 10).
2. Subtract $80-30$ by scaling 5 (the result of $8-3$) by 10.
3. Final Answer: $80-30=50$.

Practice questions for using related number facts, organized into three levels.

Starter (Basic Questions)

- Focus on simple, small-scale number facts to build confidence.
- If 3+2=5, what is 30+20?
  (Hint: Scale up by 10.)
- Using 4×2=8, solve 40×2.
  (Hint: Multiply 88 by 10.)
- If 9−5=4, what is 90−50?
  Hint: Scale the result by 10.)
- Using 6+7=13, find 60+70.(
  Hint: Scale up the sum by 10.)

Expected (Intermediate Questions)

- Extend to larger numbers or include decimals.

5. If 8×3=24, solve 80×3.
   (Hint: Scale the product by 10.)
6. Using 12 + 8 = 20, find 120+80.
   (Hint: Use place value to simplify.)
7. If 14−6=8, solve 140−60.
   (Hint: Recognize the scaled subtraction.)
8. Using 25+25=50, find 2.5+2.5.
   (Hint: Scale down the original sum.)

Practice questions for using related number facts, organized into three levels.

Challenge (Advanced Questions)

- Introduce multi-step problems and more complex scaling.

9. Using 7×6=42, find 70×60.
   (Hint: Multiply 42 by 10 twice for scaling.)
10. If 5 + 3 = 8, solve 0.5 + 0.3.
    (Hint: Scale down by 10 and add.)

Questions to ask during the process – Related Number Facts

- **What smaller fact do you already know that could help you solve this?**
  (Encourages the student to identify a simpler, related fact.)
- **How does this fact relate to the numbers in the problem?**
  (Prompts them to connect the known fact to the scaled-up or extended problem.)
- **Can you explain how scaling up or down affects the result?**
  (Helps the student think about the impact of place value or multiplication/division.)
- **How can you check if your answer makes sense?**
  (Promotes self-checking by verifying the relationship between the fact and the solution.)
- **What would happen if the numbers were 10 times bigger (or smaller)?**
  (Encourages flexible thinking about scaling and reinforces understanding.)

Key Language to use

Compensation on a number line

- Round
- Compensate
- Inverse
- Prove
- Check
- Friendly number
- Visualisation

Related Number Facts

- Facts
- Inverse
- Number bonds
- Multiplication facts
- Division facts