

## Problem Solving - Questions for Plenaries

### Strand 1 - Problem solving

#### Objective.

- ◆ To use near multiples of 10 to add on 9,19,21,29,etc.

#### Questions.

1. There are 16 on a bus. 19 people get on at the next stop and 31 get on at the stop after that. How many people are on the bus altogether?
2. There are 27 yellow pencils, 21 red pencils and 29 blue pencils. How many pencils are there altogether?
3. Three children play Tiddlywinks. Anne scores 134 and another 39. James scores 164 and another 31. Alice scores 215 and another 41. What was each child's score?
4. I think of a number. I subtract 29 and the answer is 76. What was my number?
5. I have £126. My parents give me £51 for my birthday. How much do I have now?
6. There are 38 people on a bus. 19 people get off at the next stop and 41 get on. How many are on the bus now?
7. I buy two books. One costs £35 and the other £19. How much money have I spent altogether? What change would I get from £60?

#### Objective.

- ◆ To use near multiples of 10 to subtract 9,19,21,29,etc.

#### Questions

1. There are 264 pencils in a box. Mrs Marsh takes out 49 for her class and then Mr Smith takes out 41 for his class. How many pencils are left in the box?

2. 165 tickets for a concert go on sale. 29 are bought the first day and 41 are bought the second day. How many tickets are left to be sold at the end of the first and the second day?

### Objective

- ◆ Converting between analogue and digital time.

### Questions

1. I have to catch a train at 15.30. If I want to leave the house  $1\frac{1}{2}$  hours before the train is due to leave what will be the time on my 12 - hour watch?
2. The bus timetable says that the bus leaves at 14:25. My journey will take 1 hour and 10 minutes. What will be the time on my analogue watch when I reach my destination?

### Objective

- ◆ To use time zones around the World.

### Questions

1. If it is 9.30 am in London and the time in Delhi is 6 hours ahead of London, what time is it in Delhi?
2. If it is 14:00 hours in London and the time in Washington is 5 hours behind us, what time is it in Washington?
3. If it is 21:30 in Singapore, which is 7 hours ahead on London time, what time is it in London?

### Objective

- ◆ Positive and Negative Numbers

### Questions

1. If the temperature is  $5^{\circ}\text{C}$  at present and it falls by  $8^{\circ}\text{C}$ , what is the new temperature?

2. If the temperature is  $-6^{\circ}\text{C}$  and it rises by  $8^{\circ}\text{C}$  and then falls by  $12^{\circ}\text{C}$  what is the final temperature?
3. The temperature in London is  $3^{\circ}\text{C}$  and the temperature in Moscow is  $21^{\circ}\text{C}$  below the London temperature. What is the temperature in Moscow?
4. If the temperature changes from  $5^{\circ}\text{C}$  to  $-12^{\circ}\text{C}$  by how many degrees has it fallen?

Place	Temperature
London	$5^{\circ}\text{C}$
Paris	$8^{\circ}\text{C}$
Moscow	$-15^{\circ}\text{C}$
Rome	$14^{\circ}\text{C}$
Helsinki	$-23^{\circ}\text{C}$

5. What is the difference in temperature between:-
  - ◆ London and Moscow
  - ◆ Paris and Moscow
  - ◆ Moscow and Helsinki
  - ◆ Which place is the warmest?
  - ◆ Which place is the coldest?
6. Alice sets herself the target of saving  $\pounds 5$  a week for 5 weeks. She records the amount she saves by using positive and negative numbers in relation to her target. These are her recordings.

$-2,$	$3,$	$-3,$	$-1,$	$2$
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- ◆ What was the most she saved in any one week?
- ◆ What was the least she saved?
- ◆ How much did she save altogether?
- ◆ What was her mean saving per week?

### Objective

- ◆ Using written methods for short division, giving quotient as a fraction.

### Questions

1. Louise has 21 bars of chocolate to share between 4 people. How much chocolate does each person get?

- Lucy has 44 small cakes to share between 8 friends. She must share all the cakes out. How much cake should she give to each person?

### Objective

- Using written methods for short division, giving quotient as a decimal.

### Questions

- Oliver has £27 to share between four people. How much should he give each person?
- Five children decide to share their money out equally. They each have, £2, £3, £4, £1 and £2. How much does one receive?
- Ian measures a line three times. He records his answers as 4.2cm, 4.6cm and 4.5cm. What is the average of his measurements to 1 decimal place?

### Objective

- Rounding up or down after division.

### Questions.

- 149 children are going on a camping holiday. They are sleeping in tents that sleep 6 children. How many tents will be needed?
- 156 children are going on a school trip. There must be at least 1 adult to 8 children. How many adults will be needed?
- 127 eggs are to be packed in boxes of 6. What is the maximum number of boxes that can be filled?

### Objective

- To multiply HTU by TU.

### Questions

- There are 256 children in a school and each child needs 14 pencils. How many pencils are needed altogether.

2. There are 342 children in a school. Half of them need 12 exercise books and the other half need 16 exercise books. How many exercise books will be needed altogether?

### Objective

- ◆ To divide HTU by TU.

### Questions

1. I have 322 pencils that I need to share between 14 children. How many shall I give to each one?
2. I have 432 milk chocolates that I want to share out between 18 of my friends. How many shall I give to each person? I also have 252 plain chocolates, which I want to share out between my 18 friends. How many of each type of chocolate will they receive and how many chocolates altogether?

### Objective

### Money

### Questions

1. I buy a CD and a book priced at £12.99 and £ 5.99. How much do I pay for both? How much change do I receive from £20?

### Objective

Converting to a common denominator.

### Questions

1. I cut  $\frac{1}{4}$ ,  $\frac{1}{8}$  and  $\frac{1}{3}$  from a whole cake. How much is left?

### Objective

- ◆ Ordering fractions by converting them to a common denominator.

### Questions

1. Emily needs to place these fractions accurately in order on a number line from 0 to 1. Show how she might do this.

$\frac{2}{3}$ ,  $\frac{3}{8}$ ,  $\frac{5}{6}$ ,  $\frac{5}{12}$ ,  $\frac{11}{12}$ .

### Objective

- ◆ Fractions.

### Questions

1. If I have  $\frac{3}{10}$  of £50 how much money do I have and what percentage of £50 do I have?
2. If Amy has  $\frac{5}{8}$  of £160 and Louise has  $\frac{5}{6}$  of £120. Show who has the most and by how much.

### Objective

Percentages

### Questions

1. 30% of a class are girls. If there are 30 children in the class how many are girls? What percentage are boys?

### Objective

- ◆ Conversion of foreign currency

### Questions

1. There are 3 Swiss francs to the £. Draw a conversion graph for up to £30 and use it to answer these questions.
  - a) How many Swiss franc will I receive for £10
  - b) How many £s will I get for 65 Swiss francs?
  - c) How many Swiss francs will I get if I exchange £25
  - d) How many £s will I get for 85 Swiss francs

## **Strand 2 - Communicating**

### **Objective**

- ◆ To use near multiples of 10 to add on 9,19,21,29,etc.

### **Questions**

1. Adam says that 19 added on to 56 is 75. Explain why he is right.
2. Louise writes that 39 more than 146 is 186. Explain why she is wrong.
3. Jonathan explains that 41 added to 246 gives the answer 287. Explain why he is right.

### **Objective**

- ◆ To use near multiples of 10 to subtract 9,19,21,29,etc.

### **Questions**

1. Alex writes in his maths book that 345 subtract 39 is 306. Anne says that he is wrong and that the answer is 304. Explain who is right and why?
2. Katy writes  $264 - 41 = 223$ . Explain why she is right.

### **Objective**

- ◆ Converting between analogue and digital time.

### **Questions**

1. Jane says that if she leaves the house when her analogue clock on the wall says 4.30pm and she walks for 45 minutes to the station, the station clock will read 17:15 when she arrives there. Explain why she is right.
2. Adam argues that if his digital watch reads as 13.45 it will be 2.55pm 1 hour and 15 minutes later. Explain whether or not he is right.

## Objective

- ◆ To use time zones around the World.

## Questions

1. Michael says that if the time in Hong Kong is 8 hours ahead of London time then when it is 11:30 in London it is 19:30 in Hong Kong. Explain why he is wrong.
2. Emily write in her book that if the time in Winnipeg is 6 hours behind the time in London and she catches a plane at 09:30 and travels for 9 hours it will be 07.30 when she lands in London. Explain whether or not she is right.
3. Susan catches a plane in Los Angeles at 21:15. The time in Los Angeles 9 hours behind the time in London. If her journey takes 10 hours explain why she does not land in London at 15:15.

## Objective

- ◆ Positive and negative numbers.

## Questions

1. Daniel says that the difference between  $-6^{\circ}\text{C}$  and  $12^{\circ}\text{C}$  is the same as the difference between  $-15^{\circ}\text{C}$  and  $3^{\circ}\text{C}$ . Explain why he is right?
2. Mark says that if a temperature of  $-6^{\circ}\text{C}$  rises by  $14^{\circ}\text{C}$  it will reach the same temperature as  $-8^{\circ}\text{C}$  rising by  $12^{\circ}\text{C}$ . Explain whether or not he is right.

## Objective

- ◆ Using written methods for short division, giving quotient as a fraction.

## Questions

1. Natasha says that dividing 25 by 10 gives the same answer as dividing 10 by 4. Explain why she is right.

2. Ben says that if you divide 146 by 3 you get the same answer as if you divide 292 by 6. Show why he is right.
3. Daniel argues that the answers to 156 divided by 8 and 175 divided by 9 are equal as they both have the answer 19 remainder 4. Explain why he is wrong.

### Objective

- ◆ Using written methods for short division, giving quotient as a decimal.

### Questions

1. Mary is practising the long jump. She jumps 4m, 3m, 4m, and 4m. and says that her average is 3 remainder 4. Show how she could have written this answer as a decimal.

### Objective

- ◆ Rounding up or down after division.

### Questions

1. Philip says that if each booklet that he is making needs 6 staples and he has 2,000 staples he can completely make 334 books. Jane says that he is wrong and that he can only make 333 books. Explain who is right.
2. A school party is being organised. The children are being transported by mini bus. Each mini bus can take 14 children. There are 76 children altogether to be transported. Adam says that the school needs to hire 5 mini buses and Zoe says that the school must hire 6 mini buses. Show who is right.

### Objective

- ◆ To multiply HTU by TU

### Questions

1. Simon writes down that 456 multiplied by 17 is 7752. Explain why he is right.

2.

$$\begin{array}{|c|c|c|} \hline 3 & 4 & \\ \hline \end{array} \times \begin{array}{|c|c|} \hline 1 & 5 \\ \hline \end{array} = \begin{array}{|c|c|c|c|} \hline 5 & 1 & 3 & 0 \\ \hline \end{array}$$

What is the missing digit?

### Objective

- ◆ To divide HTUs by TUs

### Questions.

1. Anne writes in her book that 645 divided by 23 is 42. Show whether or not she is right.

### Objective

- ◆ To order fractions using a common denominator.

### Questions

1. Steven writes in his book that  $\frac{2}{3}$  is greater than  $\frac{3}{5}$  but Dominic writes that  $\frac{3}{5}$  is greater than  $\frac{2}{3}$ . Show who is right.
2. Charlotte says that  $\frac{5}{12}$  is greater than  $\frac{2}{5}$  but Naomi says that they are equal. Show who is right.

### Objective

Fractions of numbers

### Questions

1. Ian says that  $\frac{3}{4}$  of 24 is the same as  $\frac{2}{5}$  of 45. David says that he is wrong. Show who is right.
2. Which of these statements are equal:-
  - a) 25% of 16
  - b)  $\frac{1}{2}$  of 8
  - c) 50% of 10
  - d) 25% of 20

- e) 0.4 of 10
- f)  $\frac{1}{8}$  of 40

### Objective

- ◆ Conversion of foreign currency

### Questions

1. Jane says that if she changes £8 into French franc, (the exchange rate is 9.8Ff to the £) she will receive 712 French francs. Explain why she is wrong.
2. James goes to the bank with his 56 German marks. The sign in the bank says £1 = 3 German marks. James thinks that he will get £20 for his German marks. Show whether or not he is right.

## Strand 3 – Reasoning.

### Objective

- ◆ To use near multiples of 10 to add on 9,19,21,29,etc.

### Questions

1. Show by partitioning and using the nearest multiple of 10 that  $274 + 97 = 371$
2. Show by partitioning and using the nearest multiple of 10 that  $1456 + 57 = 1513$

### Objective.


- ◆ To use near multiples of 10 to subtract 9,19,21,29,etc.




1. Show by partitioning and using the nearest multiple of 10 that  $378 - 56 = 322$ .
2. Show by partitioning and using the nearest multiple of 109 that  $957 - 64 = 893$ .

### Objective

- ◆ To multiply HTU by TU

### Questions

1. Show by partitioning how the answer to  $38 \times 27$  can be found.
2. Show how  $46 \times 37$  can be calculated by partitioning.
3. Each  represents a missing digit. Use your calculator to help you

Solve    $\times 4$    $= 2,491$

4. Find two consecutive numbers with a product of 210.
5. Find two numbers with a difference of 2 and a product of 323.

### Objective

- ◆ To divide HTUs by TUs

### Questions

1. Show that 420 divided by 15 can be worked out by dividing by numbers less than 10.
2. Show how 646 divided by 17 can be found using a different operation.

### Objective

Finding percentages of numbers

### Questions

3. Show how  $17 \frac{1}{2} \%$  of 2,000 can be calculated without using a calculator.

## Objective

Fractions of numbers

## Questions

1. Show that  $\frac{1}{32}$  of 160 could be found by repeatedly finding a half.

## Objective

- ◆ Positive and negative numbers

## Questions

6. If  $\triangle + \square = 15$ , what could the two numbers be if one must be positive and the other negative?  
Is there more than one answer?  
Can you see a pattern in your answers?

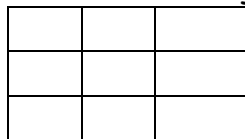
7. Find different ways to complete  $\diamond + \triangle + \square = 1$

## Objective

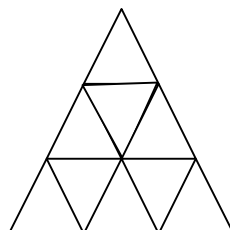
Solving mathematical puzzles

## Questions

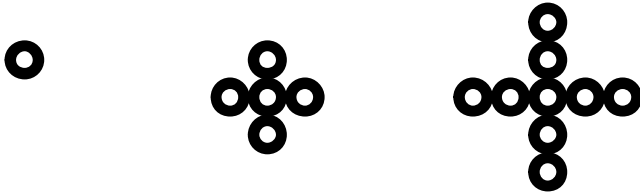
1. Show that there are 26 rectangles in this diagram.



2. How many triangles can you find? Explain your reasoning.



- Investigate the statement 'With 24 square you can make 4 different rectangles'.
- How many squares do you need to make exactly 5 different rectangles?  
Is there more than one answer?
- This number sequence is made from circles.



How many circles will there be in the 5th pattern? How many in the 8<sup>th</sup> pattern? How many in the n<sup>th</sup> pattern?

- For how many 2 digit numbers does the sum of the digits equal 12?
- For how many 3 digit numbers does the sum of the digits equal 15?
- Can you crack this code? Each letter is a number between 1 and 6. Zero is O.

$$\begin{aligned} C \times A &= C \\ B \times E &= DO \\ D \times D &= B \\ D \times E &= AO \\ F \times B &= AD \end{aligned}$$

- Can you show that the diagonals of a rhombus intersect at 90°?
- Can you write a formula for the number of hours in a week?
- What would be the formula for the perimeter of a regular hexagon?
- A sequence starts 1, 1, 2, 3, 5, . Can you continue this sequence and explain the pattern?

5. A sequence starts 1, 5, 3, 7, 5, 9, 7, . Can you continue the sequence and explain the pattern?
6. What would be the  $n^{\text{th}}$  term for this sequence: - 6, 12, 18, 24, 30.....
7. What would be the  $n^{\text{th}}$  term for this sequence: - 4, 7, 10, 13,.....
8. Can you show that any square number is the sum of two consecutive triangular numbers?
9. Think of a three-digit number. Reverse the digits and add the two numbers together. Do you always get a palindrome for an answer?
10. Can you divide a number by another number and get an answer bigger than the original number?