

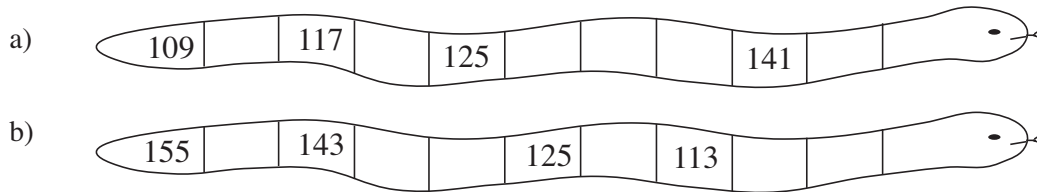
Strand B *ALGEBRA*

Introductory Problems

We have developed a number of problems that are related to the concepts in this strand. You can use these as an introduction to the work that follows and we recommend that you work on them with colleagues.

The problems are designed to encourage mathematical thinking. You can also use them with your classes.

1. Fill in the numbers missing from the snakes. Write the rules in their heads.



2. List the whole numbers which make the inequalities true.

a) $8 \times 6 < a < 7 \times 8$

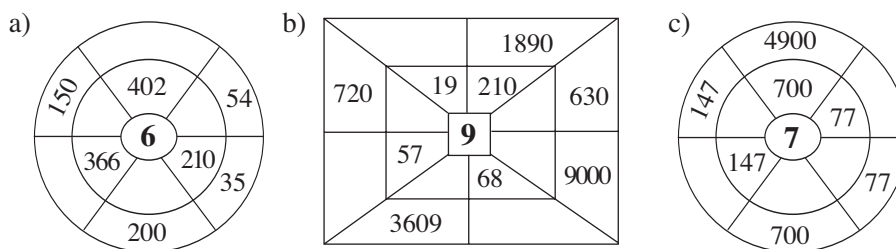
b) $40 \div 8 < b < 72 \div 9$

c) $3 \times 9 - 19 \geq c$

d) $16 - 36 \div 4 \leq d$

3. A 1st class stamp for a letter (up to 100 gm in weight) costs 62 p; a 2nd class stamp costs 53 p. I spent £5.13 on stamps. How many 1st class and how many 2nd class stamps did I buy?

4. Work out the rule for each diagram. Fill in the missing numbers.



5. Which positive integer can be written instead of the letter x so that the inequality is true?
 $48 + x < 52 - x$

6. Choose a positive integer. If it is even, halve it; if it is odd, multiply by 3 and add 1. Repeat the process.

For example,

$$9 \rightarrow 28 \rightarrow 14 \rightarrow 7 \rightarrow 22 \rightarrow 11 \rightarrow 34 \rightarrow \dots$$

What happens?

Does it matter what number you choose to start with?

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7. In the year 2002, a man's age in years was equal to the sum of the digits of the year in which he was born.

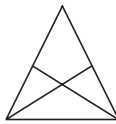
How old was he in 2002?

8. How many triangles can you see in each of these diagrams?

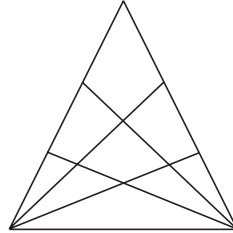
a)



b)



c)



How many triangles do you think will be in the next triangle in the sequence?

- 9.

$$\text{°C} \rightarrow \text{°F}: \frac{9}{5} \times x + 32, \quad \text{°F} \rightarrow \text{°C}: \frac{5}{9} \times (x - 32)$$

- a) "It's 32° here and I'm cold!" said Kate on the phone in London.

"It's 32° here and I'm hot!" Lucia answered from Sao Paolo in Brazil.

Who is correct? Give a reason for your answer.

- b) Convert to degrees Celsius: i) 0° F ii) 50° F iii) 104° F
 c) Convert to degrees Fahrenheit: i) 100° C ii) 30° C iii) -10° C

10. List at least 3 numbers which could be written instead of the square.

a) $\frac{4}{5} < \square < 1$ b) $2 < \square < 2\frac{1}{3}$ c) $1\frac{3}{4} < \square < 2\frac{1}{4}$