

Strand A *NUMBER*

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. Which different 1-digit numbers could a , b and c be if $a + b + c = 14$ and $a \times b \times c = 84$?

2. How many different results can you find? Use $+$, $-$, or \times signs.

$70 \square 10 \square 3 = \square$	$70 \square 10 \square 3 = \square$
$70 \square 10 \square 3 = \square$	$70 \square 10 \square 3 = \square$
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$70 \square 10 \square 3 = \square$	$70 \square 10 \square 3 = \square$

3. Use every number on a dice only once in each subtraction, so that the subtraction makes sense and the difference is:

- a) at least 300

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

- b) the smallest possible

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

- c) between 200 and 300

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

- d) even

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

- e) the greatest possible

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

- f) divisible by 10

$$\begin{array}{r} \square \square \square \\ - \square \square \square \\ \hline \square \square \square \end{array}$$

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4. Are the statements true or false? Write T for true and F for false in each box.

- a) Every number which is a whole hundred is divisible by 2.
- b) There is an even number which has 5 as its units digit.
- c) Every number which is divisible by 5 is a whole ten.
- d) 217 is divisible by neither 5 nor 2.
- e) Every number which is a whole ten is divisible by 2 and by 5.

5. In an opaque bag, there are 5 *black*, 10 *red* and 5 *white* marbles.

What is the smallest number of marbles you must take out of the bag (with your eyes closed) to be **certain** of getting:

- a) 3 marbles which are the same colour
- b) a *red* marble?

6. Circle the natural numbers up to 100 which have only two factors.
(e.g. the only factors of 7 are 7 and 1)

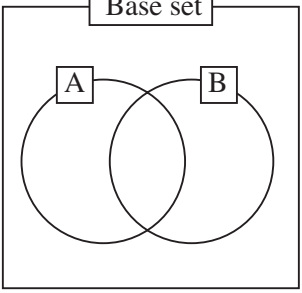
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

We call these numbers **prime numbers**. List them in increasing order.

7. The base set is : $U = \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

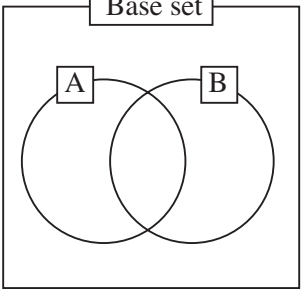
Write the numbers in the Venn diagrams.

a)



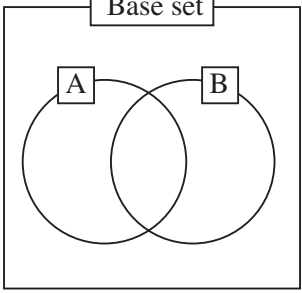
A = {negative numbers}
B = {positive numbers}

b)



A = {at least zero}
B = {at most zero}

c)

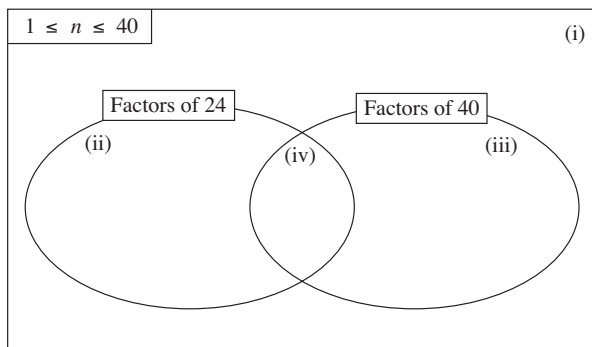


A = {more than -3}
B = {less than 4}

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8. What is the greatest 3-digit natural number in which the **product** of its digits is 108?
9. Use each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 **only once** to make **five** whole numbers, so that one number is twice, another number is three times, another number is four times and the last number is five times the smallest number.
10. a) Write the natural numbers from 1 to 40 in the Venn diagram.



- b) What is the **greatest common factor** of 24 and 40?
- c) What is the **lowest common multiple** of 24 and 40?
- d) What kind of numbers are in the parts of the diagram labelled i), ii), iii) and iv)?
Write a sentence to describe each set.

11. a) Convert these fractions to 24ths and write them in increasing order.

$$\frac{1}{2}, \frac{3}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{4}, \frac{4}{3}, \frac{7}{24}, \frac{16}{8}, \frac{5}{6}, 1\frac{5}{12}$$

- b) Convert each fraction to an equivalent fraction with numerator 12. Write them in increasing order.

$$\frac{3}{4}, \frac{2}{11}, \frac{6}{5}, \frac{1}{3}, \frac{6}{7}, \frac{5}{10}, \frac{9}{6}, \frac{4}{5}, \frac{4}{3}, \frac{3}{2}$$

12. How many different cuboids could be built from 40 small unit cubes?
(All the unit cubes should be used for each cuboid.)