Exercises:

1. Add the same digit to the number 10 on the right and left so that the resulting four-digit number is divisible by 12.

2. Write in a row the first 10 prime numbers. How do you cross out 6 digits to get the largest possible number?

   First 10 prime numbers:
   2357111317192329 It's a 16-digit number. If 6 digits are removed, it will become a 10-digit number.
   2357111317192329 -> 7317192329

3. In which number system is the equation $3 \cdot 4 = 10$ true?

   First 2-digit number in that system should be the product of 3 and 4, so it's 12 in decimal. In based 12 system.

4. Can you find out which numbers are multiplied?

$$
\begin{array}{r}
* \; * \\
\times \; * \; * \\
\hline
* \; * \\
+ \; * \; * \; * \\
\hline
9 \; * \; * \; *
\end{array}
$$

5. Can you find out which numbers are multiplied?

$$
\begin{array}{r}
* \; * \\
\times \; * \; * \\
\hline
* \; * \\
+ \; * \; 7 \\
\hline
* \; * \; * \; *
\end{array}
$$

   (Hint: The answer should start with 10 and second line of the sum should be 97 (think why?).

6. Write number 295 in 8-based (octal) system.

7. Write number 432 in 8-based (octal) system.

   $432 = 384 + 48 = 64 \cdot 6 + 8 \cdot 6 = 8^2 \cdot 6 + 8^1 \cdot 6 + 8^0 \cdot 0 = 660_8$

8. Write number 376_8 in decimal system.

9. Write number 735_8 in decimal system.

   $735_8 = 8^2 \cdot 7 + 8^1 \cdot 3 + 8^0 \cdot 5 = 64 \cdot 7 + 8 \cdot 3 + 1 \cdot 5 = 448 + 24 + 5 = 477$

10. Write number 10101010_2 in decimal system.

$$10101010_2 = 2^7 \cdot 1 + 2^6 \cdot 0 + 2^5 \cdot 1 + 2^4 \cdot 0 + 2^3 \cdot 1 + 2^2 \cdot 0 + 2^1 \cdot 1 + 2^0 \cdot 0$$
$$= 128 + 32 + 8 + 2 = 170$$

11. Write number 11101111_2 in decimal system.

12. Write number 295 in binary system.

$$295 = 256 + 32 + 4 + 2 + 1 = 2^8 + 2^5 + 2^2 + 2^1 + 2^0$$
$$= 2^8 \cdot 1 + 2^7 \cdot 0 + 2^6 \cdot 0 + 2^5 \cdot 1 + 2^4 \cdot 0 + 2^3 \cdot 0 + 2^2 \cdot 1 + 2^1 \cdot 1 + 2^0 \cdot 1$$
$$= 100100111_2$$

13. Write number 111 in binary system.

14. Write number 111_2 in decimal system.

Review:

15. Two ladybugs crawled down the wall from the ceiling to the floor. Upon reaching the floor, they crawled back up. The first fly crawled to both ends at the same speed, while the second, though it climbed twice as slowly as the first, descended twice as fast. Which of the ladybug will reach back first? Which fly has a higher average speed?

16. Two people simultaneously set out from A to B. The first one rode a bicycle, while the second one traveled by car at a speed five times greater than the first. Halfway to the destination, the car experienced an accident, and the motorist continued the remaining journey on foot at a speed half that of the bicyclist. Who arrived in B first?

17. Two friends set out simultaneously from two villages towards each other, with the distance between the villages being 18 km. The first friend walked at a speed of 5 km/h, while the second one walked at 4 km/h. The first friend brought a dog with him, which ran at a speed of 8 km/h. The dog immediately ran towards the second man, met him, barked, turned around, and ran towards its owner at the same speed, and so on. This continued until the friend met. How many kilometers did the dog run?

18. 7 wolves eat 7 sheep in 7 days. How many days will it take for 9 wolves to eat 9 sheep?P