1. Fill in the missing numbers:

   a) $36 = \underline{6} \times \underline{6}$ b) $9 = \underline{} \times \underline{}$ c) $16 = \underline{} \times \underline{}$ d) $49 = \underline{} \times \underline{}$ e) $64 = \underline{} \times \underline{}$

   so $\sqrt{36} = \underline{6}$ so $\sqrt{9} = \underline{}$ so $\sqrt{16} = \underline{}$ so $\sqrt{49} = \underline{}$ so $\sqrt{64} = \underline{}$
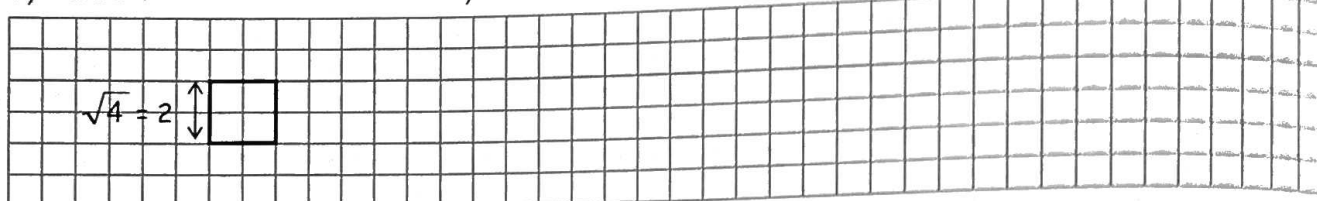
2. Each side of a square with area n has length $\sqrt{n}$. Draw a square with the given area. Then write the side length as a square root of the area of the square:

   a) area 4   b) area 9   c) area 16

   $\sqrt{4} = 2$

3. Fill in the missing numbers:

   a) $\sqrt{\boxed{}} = 5$ b) $\sqrt{100} = \boxed{}$ c) $\sqrt{\boxed{}} = 9$ d) $\sqrt{1} = \boxed{}$

4. Use the pattern to find the missing numbers:

   $\sqrt{100} = \underline{10}$ $\sqrt{10000} = \underline{100}$ $\sqrt{1000000} = \underline{}$ $\sqrt{100000000} = \underline{}$
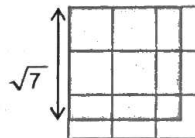
5. The shaded square in part a) below has area 10 square units. So the side length is $\sqrt{10}$. You can see from the picture that $\sqrt{10}$ lies between the whole numbers 3 and 4. Fill in the missing numbers in parts b) and c):
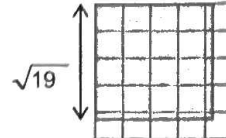
   a) Area = 10 square units

   $\sqrt{10}$
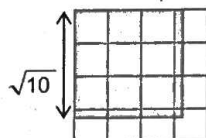
   $\underline{3} \leq \sqrt{10} \leq \underline{4}$

   b) Area = 7 square units

   $\sqrt{7}$

   $\underline{} \leq \sqrt{7} \leq \underline{}$

   c) Area = 19 square units

   $\sqrt{19}$

   $\underline{} \leq \sqrt{19} \leq \underline{}$

6. Perfect squares are numbers that have square roots that are whole numbers:
   - Fill in the blanks with the two perfect squares that are closest to the given number.
   - Then find the two whole numbers that the square root lies between.

   a) $\underline{16} \leq 19 \leq \underline{25}$ b) $\underline{} \leq 13 \leq \underline{}$ c) $\underline{} \leq 39 \leq \underline{}$

   so $\underline{4} \leq \sqrt{19} \leq \underline{5}$ so $\underline{} \leq \sqrt{13} \leq \underline{}$ so $\underline{} \leq \sqrt{39} \leq \underline{}$

   d) $\underline{} \leq 5 \leq \underline{}$ e) $\underline{} \leq 52 \leq \underline{}$ f) $\underline{} \leq 17 \leq \underline{}$

   so $\underline{} \leq \sqrt{5} \leq \underline{}$ so $\underline{} \leq \sqrt{52} \leq \underline{}$ so $\underline{} \leq \sqrt{17} \leq \underline{}$

7. The area of each shaded strip is 2 cm². What fraction of each 1 cm² square is shaded?
   NOTE: The squares below are not drawn to scale.

   a) 1 cm { [grid] 1 cm $\frac{2}{3}$ cm² in each square is shaded.

   b) [grid]   _____ cm² in each square is shaded.

   c) [grid]   _____ cm² in each square is shaded.
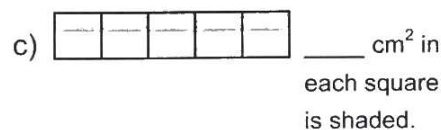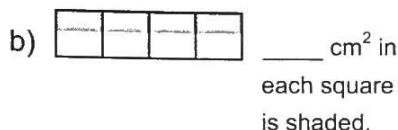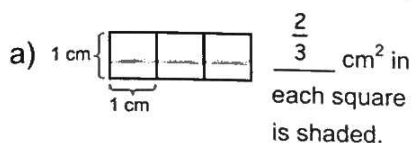
Answer the questions below in your notebook.

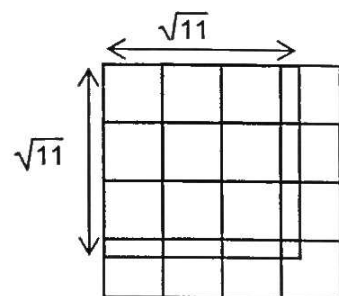8. The length of each side of the shaded square in Figure 1 is $\sqrt{11}$ cm:
   NOTE: The squares below are not drawn to scale.
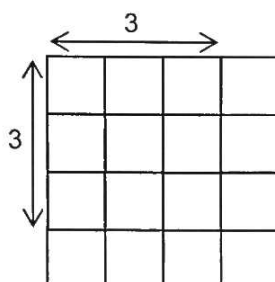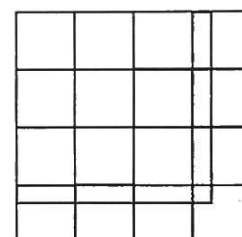

   | Figure 1 | Figure 2 | Figure 3 |

   a) What is the area of the shaded square in Figure 1?

   b) What is the area of the shaded square in Figure 2?

   c) What is the area of the shaded part in Figure 3?

9. How did you find the area of the shaded part in Figure 3?

10. In Figure 3, seven squares (each of area 1 cm²) are partly shaded. The area of the shaded part is 2 cm². About what fraction of each 1 cm² square in Figure 3 is shaded?

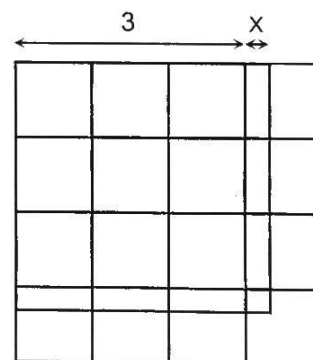11. Why is your answer in Question 10 an approximation? **HINT: Are all the squares shaded identically?**

12. The area of the shaded region is about $\frac{2}{7}$ cm².

    What is the approximate length of X (in cm)?
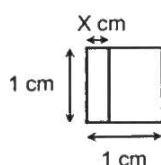
13. a) What is the approximate value of 3 + x (the length of the shaded square)?

    b) What is the approximate value of $\sqrt{11}$?

14. Use the method above to find the approximate square root of:
    a) $\sqrt{7}$ b) $\sqrt{17}$ c) $\sqrt{29}$

15. Maureen noticed the following pattern:

    $$\sqrt{11} = 3\frac{2}{7}$$

    ← difference between 11 and 9 (the largest perfect square less than 11)
    ← difference between 16 and 9 (16 is the next perfect square after 9)
    the root of 9

    Use Maureen's pattern to find: a) $\sqrt{28}$ b) $\sqrt{39}$ c) $\sqrt{53}$

E

Number Sense 2