



Worksheet on Algebraic Expressions



CASE STUDY: The Greenhouse Garden

In a city, a group of students decide to create a greenhouse garden as part of their science project. They want to explore how different factors like temperature, sunlight, and soil quality affect plant growth. To manage the garden efficiently, they decide to use algebraic expressions to calculate how many plants they can grow within the available space.

Project Details:

- The greenhouse has a rectangular area of 200 square feet.
- They plan to grow four types of plants: Cabbage, Eggplant, Pumpkin, and Tomato.
- Each cabbage plant requires 6 square feet, each eggplant requires 4 square feet, each pumpkin 8 square feet and each tomato plant requires 2 square feet.

QUESTIONS:

1. Can they plant equal numbers of each plant type? Calculate how many.
2. If the students decide to plant 10 eggplant plants, 15 pumpkin plants, and 5 cabbage plants, how much area will they use?
3. The students have 120 kg fertiliser and they distribute the fertiliser among the four plants. If eggplants and pumpkin plants receive the same amount of fertiliser, tomato plants receive the same as cabbage plants and pumpkin plants receive twice as much as cabbage plants, how much fertiliser will each plant type receive?



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ANSWERS

Answer 1. Yes, they can grow up to 10 plants of each type.

Solution: Let the number of each plant type be x .

The **total area required** for each plant type will be:

- **Cabbage:** $6x$ square feet
- **Eggplant:** $4x$ square feet
- **Pumpkin:** $8x$ square feet
- **Tomato:** $2x$ square feet

The combined area for all plants will be: $6x + 4x + 8x + 2x$

The given greenhouse area is of 200 square feet.

Equation formed will be: $6x + 4x + 8x + 2x = 200$ sq. feet

$20x$ sq. feet = 200 sq. feet

$$x = \frac{200}{20} = 10$$

Answer 2. They will use **190 square feet** area.

Answer 3.

All eggplants together will receive 40 kg fertiliser, all pumpkin plants together will receive 40 kg fertiliser, all tomato plants together will receive 20 kg fertiliser and all cabbage plants together will receive 20 kg fertiliser.

Let's say **tomato** and **cabbage** plant types receive x kg of fertiliser each. So **eggplant** and **pumpkin plant types** should receive $2x$ kg of fertiliser each.

Total fertiliser available = 120 kg

Equation formed will be:

$$x + x + 2x + 2x = 120 \text{ kg}$$

$$6x = 120$$

$$x = 20 \text{ kg}$$