# Input Problem

A certain shopping mall sells a batch of branded shirts, with an average daily sales of 20 pieces and a profit of 40 yuan per piece. In order to expand sales, increase profits, and reduce inventory as soon as possible, the mall has decided to take appropriate price reduction measures. After investigation, it was found that for every 1 yuan decrease in the price of this shirt, an average of 2 more shirts are sold per day. If the mall wants to make an average profit of 1200 yuan per day, how much price should each shirt be reduced?

#### Chain-of-Thought

- 1.Calculate the current daily profit: Current daily profit = 20 \* 40 = 800 yuan
- 2. Calculate additional daily profit from selling more shirts: Additional daily profit = 2 \* 40 = 80 yuan
- 5. Calculate Price reduction: Price reduction needed = 320 / 2 = 160 yuan

Therefore, each shirt should be reduced by 160 yuan in order for the mall to make an average profit of 1200 yuan per day.

#### Plan-and-Solve

To devise a plan to solve the problem, let's break it down into steps:

#### 1. Determine the current daily profit:

Calculate the current daily profit using the average daily sales and profit per shirt

## 3. Set up the equation for the desired daily profit

Create an equation that relates new profit per shirt, increased number of shirts sold, and desired daily profit

Step 4: Solve the equation

Expand the equation and collect like terms:

 $1200 = (20 \times 40) + (2p \times 40) - (20 \times p) - (2p \times p)$ 

Divide by 2 to simplify:

 $p^2 - 30p - 200 = 0$ 

p≈35.6155



# **Buffer of Thoughts**

### Thought Template $T_1$

To solve any quadratic equation of the form  $ax^2 + bx + c = 0$ , we can follow a general approach based on the method described. Here is the structured template for solving such equations:

#### **Step 1: Calculate the Discriminant**

•Compute the discriminant D using the formula  $D=b^2-4ac$ .

**Step 2: Determine the Nature of the Roots** 

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#### Thought Template $T_N$

def process\_element(element):
 # Define how to process each individual element,

e.g., applying a filter or transformation.

def combine elements(element1, element2):

# Define how to combine elements, e.g., summing numbers, concatenating strings, etc. def check condition(accumulated result):

# Define the condition that the accumulated result must meet.

def solve\_problem(input\_list):.

Meta Buffer

Problem Distillation &
Thought Retrieval

### Thought Template T<sub>1</sub>

To solve any quadratic equation of the form  $ax^2 + bx + c = 0$ , we can follow a general approach based on the method described. Here is the structured template for solving such equations:

#### **Step 1: Calculate the Discriminant**

•Compute the discriminant *D* using the formula  $D=b^2-4ac$ .

#### **Step 2: Determine the Nature of the Roots**

- •If  $D \ge 0$ , the equation has two distinct real roots.
- •If *D*=0, the equation has exactly one real root (also known as a repeated or double root).
- •If *D*<0, the equation has two complex roots.

#### **Step 3: Compute the Roots**

•For  $D \ge 0$ , calculate the roots using the formula  $a = -b \pm \sqrt{D}$ 

For D < 0, calculate the real and imaginary parts of the complex roots using the formula x =

 $\frac{-b\pm\sqrt{-D}i}{2a}$ 

where i is the imaginary unit.

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#### **Instantiated Reasoning**

#### **Solution:**

- •p be the original profit per shirt (40 yuan).
- •x be the amount by which the price of each shirt is reduced.
- •q be the original quantity of shirts sold daily (20 pieces).
- •r be the rate at which the quantity of shirts sold increases. The mall wants to maintain an average daily profit of

. . . . . .

After simplification:

$$x^2 - 30x + 200 = 0$$

1200 yuan, so we have:

Now we can solve this quadratic equation using the steps outlined in the template:

**Step 1: Calculate the Discriminant** 

 $D=b^2-4ac$ 

$$D = (-30)^2 - 4 * 1 * 200 = 100$$

**Step 2: Determine the Nature of the Roots** 

Since  $D \ge 0$ , the equation has two distinct real roots.

**Step 3: Compute the Roots** 

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{30 \pm 1}{2}$$

The two possible solutions are:

$$x=20 \text{ or } x=10$$

Due to reducing inventory as soon as possible, x=20 is taken