



Class 9 Maths Chapter 2 – Exercise 2.5

Linear Relationships

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Exercise 2.5 contains **3 questions**. The focus is on finding **a** and **b** in a linear relationship of the form $y = ax + b$ using two observations.

Question 1 – Learning Platform

A learning platform charges a fixed monthly fee plus an additional cost per digital learning module.

When **10 modules** are accessed, the bill is **₹400**.

When **14 modules** are accessed, the bill is **₹500**.

The relationship is:

$$y = ax + b$$

where **x** = number of modules and **y** = monthly bill.

Solution

For $x = 10$, $y = 400$:

$$400 = 10a + b \dots(1)$$

For $x = 14$, $y = 500$:

$$500 = 14a + b \dots(2)$$

Subtract (1) from (2):

$$100 = 4a$$

$$a = 25$$

Substitute $a = 25$ in (1):

$$400 = 10(25) + b$$

$$400 = 250 + b$$

$$b = 150$$

✓ **Answer:**

$$a = 25$$

$$b = 150$$

Therefore,

$$y = 25x + 150$$

So the platform charges **₹25 per module** and has a **fixed monthly fee of ₹150**.

Question 2 – Gym & Badminton Court

A gym charges a fixed monthly fee plus an additional amount per hour for using its badminton court.

When the court is used for **10 hours**, the bill is **₹800**.

When it is used for **15 hours**, the bill is **₹1100**.

Given:

$$y = ax + b$$

Solution

For $x = 10$, $y = 800$:

$$800 = 10a + b \dots(1)$$

For $x = 15$, $y = 1100$:

$$1100 = 15a + b \dots(2)$$

Subtract (1) from (2):

$$300 = 5a$$

$$a = 60$$

Substitute $a = 60$:

$$800 = 10(60) + b$$

$$800 = 600 + b$$

$$b = 200$$

✓ **Answer:**

$$a = 60$$

$$b = 200$$

Therefore,

$$y = 60x + 200$$

So:

-  ₹60 per hour is the variable charge.
 -  ₹200 is the fixed monthly fee.
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Question 3 – Celsius and Fahrenheit

The relationship between Celsius and Fahrenheit temperatures is:

$$^{\circ}\text{C} = a^{\circ}\text{F} + b$$

Given:

- Ice melts at $0^{\circ}\text{C} = 32^{\circ}\text{F}$
- Water boils at $100^{\circ}\text{C} = 212^{\circ}\text{F}$

Find a and b .

Solution

When $^{\circ}\text{F} = 32$ and $^{\circ}\text{C} = 0$:

$$0 = 32a + b \dots(1)$$

When $^{\circ}\text{F} = 212$ and $^{\circ}\text{C} = 100$:

$$100 = 212a + b \dots(2)$$

Subtract (1) from (2):

$$100 = 180a$$

$$a = 100/180$$

$$a = 5/9$$

Now substitute in (1):

$$0 = 32(5/9) + b$$

$$0 = 160/9 + b$$

Therefore,

$$b = -160/9$$

 **Answer:**

$$a = 5/9$$

$$b = -160/9$$

Therefore,

$$^{\circ}\text{C} = (5/9)^{\circ}\text{F} - 160/9$$

This is equivalent to the familiar form:

$$^{\circ}\text{C} = (5/9)(^{\circ}\text{F} - 32)$$



Exercise 2.5 – Quick Answer Key

Question	a	b	Linear Relationship
1. Learning platform	25	150	$y = 25x + 150$
2. Gym	60	200	$y = 60x + 200$
3. Temperature	$\frac{5}{9}$	$-\frac{160}{9}$	$^{\circ}\text{C} = \left(\frac{5}{9}\right)^{\circ}\text{F} - \frac{160}{9}$



Key Concept

For a linear relationship:

$$y = ax + b$$

- a = constant rate of change / variable charge
- b = fixed value / initial amount
- x = independent variable
- y = dependent variable

Exercise 2.5 is particularly important because it connects linear expressions with **real-life situations such as bills, fees and temperature conversion**.