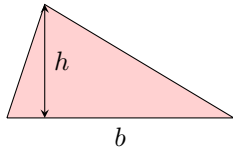


# FORMULAS

## A UNDERSTANDING FORMULAS

### A.1 FINDING THE SUBJECTS



**MCQ 1:** For a triangle, we have the formula

$$A = \frac{b \times h}{2}.$$

Find the subject of the formula.

- ☒  $A$ : the area
- ☐  $b$ : the base
- ☐  $h$ : the height

*Answer:* The subject of the formula is the area  $A$ .

**MCQ 2:** In an electrical circuit, we have the formula

$$U = RI.$$

Find the subject of the formula.

- ☒  $U$ : the voltage
- ☐  $R$ : the resistance
- ☐  $I$ : the current

*Answer:* The subject of the formula is the voltage  $U$ .

**MCQ 3:** In physics, we have the formula

$$v = \frac{d}{t}.$$

Find the subject of the formula.

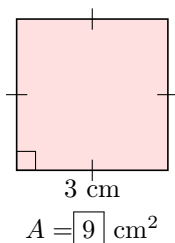
- ☒  $v$ : the velocity
- ☐  $d$ : the distance
- ☐  $t$ : the time

*Answer:* The subject of the formula is the velocity  $v$ .

## B SUBSTITUTING INTO FORMULAS

### B.1 CALCULATING MEASURES IN GEOMETRY

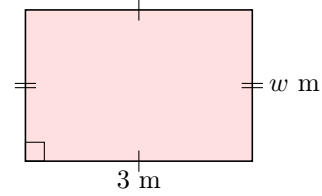
**Ex 4:** Find the area of the figure:



*Answer:*

$$\begin{aligned} A &= s^2 && \text{(identifying the formula)} \\ &= 3^2 && \text{(substituting } s = 3) \\ &= 9 \text{ cm}^2 && \text{(solving)} \end{aligned}$$

**Ex 5:** The area of the rectangle is  $6 \text{ m}^2$  and the length of one side is  $3 \text{ m}$ .



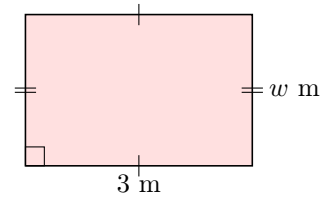
Find the width of the rectangle.

$$w = 2 \text{ m}$$

*Answer:*

$$\begin{aligned} A &= L \times w && \text{(identifying the formula)} \\ 6 &= 3 \times w && \text{(substituting } A = 6 \text{ and } L = 3) \\ w &= \frac{6}{3} && \text{(dividing by 3)} \\ w &= 2 \text{ m} \end{aligned}$$

**Ex 6:** The perimeter of the rectangle is  $10 \text{ m}$ .




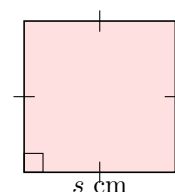
Find the width of the rectangle.

$$w = 2 \text{ m}$$

*Answer:*

$$\begin{aligned} P &= 2L + 2w && \text{(identifying the formula)} \\ 10 &= 2 \times 3 + 2w && \text{(substituting } P = 10 \text{ and } L = 3) \\ 10 &= 6 + 2w \\ 2w &= 10 - 6 && \text{(subtracting 6)} \\ 2w &= 4 \\ w &= \frac{4}{2} = 2 \text{ m} \end{aligned}$$

**Ex 7:**  The area of a square is  $10 \text{ cm}^2$ .




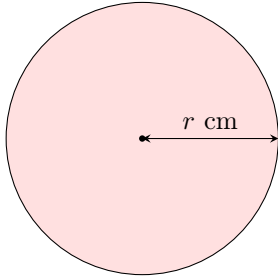
Find the length of the side of the square (round to 2 decimal places).

$$s = \boxed{3.16} \text{ cm}$$

Answer:

$$\begin{aligned} A &= s^2 && \text{(identifying the formula)} \\ 10 &= s^2 && \text{(substituting } A = 10) \\ s &= \sqrt{10} && \text{(taking the square root)} \\ s &\approx 3.16 \text{ cm} && \text{(rounding to 2 decimal places)} \end{aligned}$$

**Ex 8:**  The area of a circle is  $10 \text{ cm}^2$ . Recall the formula:  $A = \pi r^2$ .



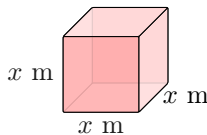
Find the radius of the circle (round your answer to 2 decimal places).

$$r = \boxed{1.78} \text{ cm}$$

Answer:

$$\begin{aligned} A &= \pi r^2 && \text{(recall the formula)} \\ 10 &= \pi r^2 && \text{(substitute } A = 10) \\ r^2 &= \frac{10}{\pi} && \text{(divide both sides by } \pi) \\ r &= \sqrt{\frac{10}{\pi}} && \text{(take the square root)} \\ r &\approx 1.78 \text{ cm} && \text{(rounded to 2 decimal places)} \end{aligned}$$

**Ex 9:** The volume of the cube is  $10 \text{ m}^3$ .




Find the length of the side of the cube (round to 2 decimal places and  $\sqrt[3]{10} = 2.1544\dots$ ).

$$x = \boxed{2.15} \text{ m}$$

Answer:

$$\begin{aligned} V &= x^3 && \text{(identifying the formula)} \\ 10 &= x^3 && \text{(substituting } V = 10) \\ x &= \sqrt[3]{10} && \text{(taking the cube root of both sides)} \\ x &\approx 2.15 \text{ m} && \text{(rounding to 2 decimal places)} \end{aligned}$$


## B.2 CALCULATING MEASURES IN PHYSICS

**Ex 10:**  A car travels at a constant speed of  $120 \text{ km/h}$  for 2 hours. Find the distance traveled by the car. Recall the formula:  $v = \frac{d}{t}$ .

$$d = \boxed{240} \text{ km}$$

Answer:


$$\begin{aligned} v &= \frac{d}{t} && \text{(identifying the formula)} \\ 120 &= \frac{d}{2} && \text{(substituting } v = 120 \text{ and } t = 2) \\ d &= 120 \times 2 && \text{(multiplying both sides by 2)} \\ d &= 240 \text{ km} \end{aligned}$$

**Ex 11:**  A circuit has a resistance of  $5 \Omega$  and a voltage of  $20 \text{ V}$ . Find the current flowing through the circuit. Recall the formula:  $U = RI$ .

$$I = \boxed{4} \text{ A}$$

Answer:


$$\begin{aligned} U &= RI && \text{(identifying the formula)} \\ 20 &= 5I && \text{(substituting } U = 20 \text{ and } R = 5) \\ I &= \frac{20}{5} && \text{(dividing both sides by 5)} \\ I &= 4 \text{ A} \end{aligned}$$

**Ex 12:**  The formula  $F = \frac{9}{5}C + 32$  converts a temperature from Celsius ( $C$ ) to Fahrenheit ( $F$ ). Given a temperature of  $68^\circ\text{F}$ , find the temperature in Celsius.

$$C = \boxed{20}^\circ\text{C}$$

Answer:

$$\begin{aligned} F &= \frac{9}{5}C + 32 && \text{(identifying the formula)} \\ 68 &= \frac{9}{5}C + 32 && \text{(substituting } F = 68) \\ 68 - 32 &= \frac{9}{5}C && \text{(subtracting 32 from both sides)} \\ 36 &= \frac{9}{5}C \\ C &= 36 \times \frac{5}{9} && \text{(multiplying both sides by } \frac{5}{9}) \\ C &= 20^\circ\text{C} \end{aligned}$$

**Ex 13:**  The formula  $E_p = mgh$  calculates the gravitational potential energy ( $E_p$ ) of an object, where  $m$  is the mass in kilograms,  $g$  is the acceleration due to gravity ( $9.8 \text{ m/s}^2$ ), and  $h$  is the height in meters. Given an object with a mass of  $10 \text{ kg}$  and a gravitational potential energy of  $490 \text{ J}$ , find the height at which the object is located.

$$h = \boxed{5} \text{ m}$$

Answer:

$$\begin{aligned} E_p &= mgh && \text{(identifying the formula)} \\ 490 &= 10 \times 9.8 \times h && \text{(substituting } E_p = 490, m = 10, g = 9.8) \\ 490 &= 98h && \text{(calculating } 10 \times 9.8) \\ h &= \frac{490}{98} && \text{(dividing both sides by 98)} \\ h &= 5 \text{ m} \end{aligned}$$

## C REARRANGING FORMULAS

### C.1 REARRANGING LINEAR EQUATIONS

**Ex 14:** Rearrange the equation  $3x + 4y = 13$  to make  $y$  the subject.

$$y = \boxed{\frac{13 - 3x}{4}}$$

Answer:

$$\begin{aligned} 3x + 4y &= 13 \\ 4y &= 13 - 3x && \text{(subtracting } 3x \text{ from both sides)} \\ y &= \frac{13 - 3x}{4} && \text{(dividing both sides by 4)} \end{aligned}$$

**Ex 15:** Rearrange the equation  $5x - 2y = 10$  to make  $y$  the subject.

$$y = \boxed{\frac{5x - 10}{2}}$$

Answer:

$$\begin{aligned} 5x - 2y &= 10 \\ -2y &= 10 - 5x && \text{(subtracting } 5x \text{ from both sides)} \\ -2y &= -5x + 10 && \text{(reordering)} \\ y &= \frac{-5x + 10}{-2} && \text{(dividing both sides by } -2) \\ y &= \frac{5x - 10}{2} && \text{(simplifying)} \end{aligned}$$

**Ex 16:** Rearrange the equation  $3y + 2x = -x + 3$  to make  $y$  the subject.

$$y = \boxed{1 - x}$$

Answer:

$$\begin{aligned} 3y + 2x &= -x + 3 \\ 3y &= -x + 3 - 2x && \text{(subtracting } 2x \text{ from both sides)} \\ 3y &= 3 - 3x \\ y &= \frac{3 - 3x}{3} && \text{(dividing both sides by 3)} \\ y &= 1 - x && \text{(simplifying)} \end{aligned}$$

**Ex 17:** Rearrange the equation  $7y - 5x = 2x + 14$  to make  $y$  the subject.

$$y = \boxed{2 + x}$$

Answer:

$$\begin{aligned} 7y - 5x &= 2x + 14 \\ 7y &= 2x + 14 + 5x && \text{(adding } 5x \text{ to both sides)} \\ 7y &= 7x + 14 \\ y &= \frac{7x + 14}{7} && \text{(dividing both sides by 7)} \\ y &= x + 2 && \text{(simplifying)} \end{aligned}$$

### C.2 REARRANGING GEOMETRIC FORMULAE

**MCQ 18:** The formula for the circumference (perimeter) of a circle is  $C = 2\pi r$ .

Rearrange the formula to make  $r$  the subject.

Choose the correct answer:

- ☐  $r = 2\pi C$
- ☐  $2\pi r = C$
- ☒  $r = \frac{C}{2\pi}$

Answer:

$$\begin{aligned} C &= 2\pi r && \text{(given formula)} \\ r &= \frac{C}{2\pi} && \text{(dividing both sides by } 2\pi) \end{aligned}$$

**MCQ 19:** The formula for the volume of a cube is  $V = s^3$ . Rearrange the formula to make  $s$  the subject.

Choose the correct answer:

- ☐  $s = V^3$
- ☐  $s = \frac{V}{3}$
- ☒  $s = \sqrt[3]{V}$

Answer:

$$\begin{aligned} V &= s^3 && \text{(given formula)} \\ s &= \sqrt[3]{V} && \text{(taking the cube root of both sides)} \end{aligned}$$

**MCQ 20:** The formula for the area of a triangle is  $A = \frac{1}{2}bh$ . Rearrange the formula to make  $h$  the subject.

Choose the correct answer:

- ☐  $h = \frac{b}{2A}$
- ☐  $h = \frac{A}{2b}$
- ☒  $h = \frac{2A}{b}$

Answer:

$$\begin{aligned} A &= \frac{1}{2}bh && \text{(given formula)} \\ 2A &= bh && \text{(multiplying both sides by 2)} \\ h &= \frac{2A}{b} && \text{(dividing both sides by } b) \end{aligned}$$

### C.3 REARRANGING PHYSICS FORMULAE

**MCQ 21:** The formula  $F = \frac{9}{5}C + 32$  converts a temperature from Celsius ( $C$ ) to Fahrenheit ( $F$ ).

Rearrange the formula to make  $C$  the subject.

**Choose the correct answer:**

☒  $C = \frac{5}{9}(F - 32)$

☐  $C = \frac{9}{5}(F - 32)$

☐  $C = \frac{5}{9}F + 32$

*Answer:*

$$F = \frac{9}{5}C + 32 \quad (\text{given formula})$$

$$F - 32 = \frac{9}{5}C \quad (\text{subtracting 32 from both sides})$$

$$C = \frac{5}{9}(F - 32) \quad (\text{multiplying both sides by } \frac{5}{9})$$

**MCQ 22:** The formula  $v = \frac{d}{t}$  relates speed ( $v$ ), distance ( $d$ ), and time ( $t$ ).

Rearrange the formula to make  $t$  the subject.

**Choose the correct answer:**

☒  $t = \frac{d}{v}$

☐  $t = \frac{v}{d}$

☐  $t = dv$

*Answer:*

$$v = \frac{d}{t} \quad (\text{given formula})$$

$$vt = d \quad (\text{multiplying both sides by } t)$$

$$t = \frac{d}{v} \quad (\text{dividing both sides by } v)$$

**MCQ 23:** The formula  $U = RI$  relates voltage ( $U$ ), resistance ( $R$ ), and current ( $I$ ).

Rearrange the formula to make  $I$  the subject.

**Choose the correct answer:**

☒  $I = \frac{U}{R}$

☐  $I = UR$

☐  $I = \frac{R}{U}$

*Answer:*

$$U = RI \quad (\text{given formula})$$

$$I = \frac{U}{R} \quad (\text{dividing both sides by } R)$$

**MCQ 24:** The formula  $E = \frac{1}{2}mv^2$  relates kinetic energy ( $E$ ), mass ( $m$ ), and speed ( $v$ ).

Rearrange the formula to make  $v$  the subject.

**Choose the correct answer:**

☒  $v = \sqrt{\frac{2E}{m}}$

☐  $v = \frac{E}{m}$

☐  $v = \frac{2E}{m}$

*Answer:*

$$E = \frac{1}{2}mv^2 \quad (\text{given formula})$$

$$2E = mv^2 \quad (\text{multiplying both sides by 2})$$

$$v^2 = \frac{2E}{m} \quad (\text{dividing both sides by } m)$$

$$v = \sqrt{\frac{2E}{m}} \quad (\text{taking the square root of both sides})$$

### C.4 REARRANGING RATIO EQUATIONS

**Ex 25:** Rearrange the equation  $\frac{2}{y} = \frac{x}{6}$  to make  $y$  the subject:

$$y = \boxed{\frac{12}{x}}$$

*Answer:*

$$\frac{2}{y} = \frac{x}{6}$$

$$y \times x = 2 \times 6 \quad (\text{cross multiplication})$$

$$y = \frac{12}{x} \quad (\text{dividing both sides by } x)$$

**Ex 26:** Rearrange the equation  $\frac{1}{x} = \frac{2}{y}$  to make  $y$  the subject:

$$y = \boxed{2x}$$

*Answer:*

$$\frac{1}{x} = \frac{2}{y}$$

$$1 \times y = x \times 2 \quad (\text{cross multiplication})$$

$$y = 2x$$

**Ex 27:** Rearrange the equation  $\frac{x}{2} = \frac{4}{y}$  to make  $y$  the subject:

$$y = \boxed{\frac{8}{x}}$$

*Answer:*

$$\frac{x}{2} = \frac{4}{y}$$

$$x \times y = 2 \times 4 \quad (\text{cross multiplication})$$

$$y = \frac{8}{x} \quad (\text{dividing by } x)$$

**Ex 28:** Rearrange the equation  $\frac{y}{x} = \frac{4}{3}$  to make  $y$  the subject:

$$y = \boxed{\frac{4x}{3}}$$

*Answer:*

$$\frac{y}{x} = \frac{4}{3}$$

$$y \times 3 = x \times 4 \quad (\text{cross multiplication})$$

$$y = \frac{4x}{3}$$

## D CONSTRUCTING FORMULAS

### D.1 MODELING LINEAR RELATIONSHIPS WITH ALGEBRA

**Ex 29:** A mechanic charges a \$40 call-out fee and \$30 per hour thereafter.

Find the mechanic's fee  $M$  for a job which takes  $x$  hours.

$$M = \boxed{40 + 30x}$$

*Answer:* The total fee is \$40 plus \$30 for each of  $x$  hours.

- For  $x = 1$ ,  $M = 40 + 30 \times 1$
- For  $x = 2$ ,  $M = 40 + 30 \times 2$
- $\vdots$
- For  $x$ ,  $M = 40 + 30 \times x$

**Ex 30:** A car rental company includes 50 km in the rental and adds/allows 15 km for each extra hour.

Find the total distance  $D$  the car can travel in terms of the rental time  $x$  (in hours).

$$D = \boxed{50 + 15x}$$

*Answer:* The total distance is 50 km plus 15 km for each extra hour.

- For  $x = 1$ ,  $D = 50 + 15 \times 1$
- For  $x = 2$ ,  $D = 50 + 15 \times 2$
- $\vdots$
- For  $x$ ,  $D = 50 + 15 \times x$

**Ex 31:** A gym membership includes a one-time joining fee of \$25 and a monthly fee of \$40.

Find the total cost  $C$  after  $x$  months.

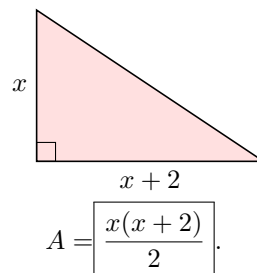
$$C = \boxed{25 + 40x}$$

*Answer:* The total cost is the joining fee of \$25 plus \$40 for each of  $x$  months.

- For  $x = 1$ ,  $C = 25 + 40 \times 1$
- For  $x = 2$ ,  $C = 25 + 40 \times 2$
- $\vdots$
- For  $x$ ,  $C = 25 + 40 \times x$

### D.2 MODELING AREAS AND VOLUMES WITH ALGEBRA: LEVEL 1

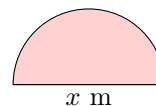
**Ex 32:** A right-angled triangle has a base length of  $x + 2$  units and a height of  $x$  units. Find the area  $A$  of the triangle.



*Answer:* The area of a triangle is half the product of its base and height.

$$A = \frac{\text{base} \times \text{height}}{2} = \frac{x(x+2)}{2}$$

**Ex 33:** A garden is in the shape of a semi-circle with diameter  $x$  meters.



Find the area  $A$  of the garden in terms of the diameter  $x$  of the semi-circle.

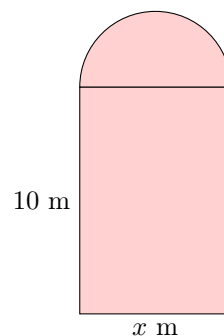
$$A = \boxed{\frac{\pi x^2}{8}} \text{ m}^2.$$

*Answer:*

- The radius  $r$  is half of the diameter:  $r = \frac{x}{2}$ .
- The area of a circle is  $\pi r^2$ , where  $r$  is the radius.

$$\begin{aligned} \text{Area of semi-circle} &= \frac{1}{2} \text{Area of circle} \\ &= \frac{1}{2} \pi r^2 \\ &= \frac{1}{2} \pi \left(\frac{x}{2}\right)^2 \\ &= \frac{1}{2} \pi \frac{x^2}{4} \\ &= \frac{\pi x^2}{8} \end{aligned}$$

**Ex 34:** The door is composed of a rectangle with height 10 meters and width  $x$  meters, topped with a semi-circle of diameter  $x$  meters.



Find the area  $A$  of the door in terms of  $x$ .

$$A = \left[ 10x + \frac{\pi x^2}{8} \right] \text{ m}^2.$$

*Answer:*

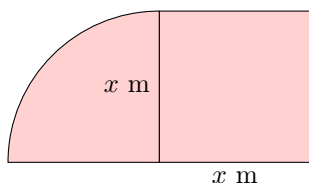
- The area of the rectangle is width times height:  $x \times 10 = 10x$ .
- The radius  $r$  of the semi-circle is half of the diameter:  $r = \frac{x}{2}$ .
- The area of a full circle is  $\pi r^2$ , so the area of the semi-circle is half of that.

$$\begin{aligned} \text{Area of semi-circle} &= \frac{1}{2} \pi r^2 \\ &= \frac{1}{2} \pi \left( \frac{x}{2} \right)^2 \\ &= \frac{1}{2} \pi \frac{x^2}{4} \\ &= \frac{\pi x^2}{8} \end{aligned}$$

- The total area of the door is the sum of the rectangle and semi-circle areas:

$$A = 10x + \frac{\pi x^2}{8}$$

**Ex 35:** The door consists of a square with side length  $x$  meters and a quarter-circle with radius  $x$  meters.



Find the area  $A$  of the door in terms of  $x$ .

$$A = \left[ x^2 + \frac{\pi x^2}{4} \right] \text{ m}^2.$$

*Answer:*

- The area of the square is side times side:  $x \times x = x^2$ .
- The radius  $r$  of the quarter-circle is  $r = x$ .
- The area of a full circle is  $\pi r^2$ , so the area of the quarter-circle is one-fourth of that.

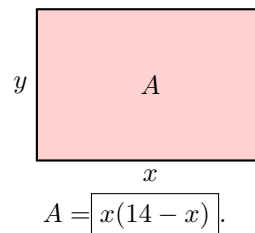
$$\begin{aligned} \text{Area of quarter-circle} &= \frac{1}{4} \pi r^2 \\ &= \frac{1}{4} \pi x^2 \end{aligned}$$

- The total area of the door is the sum of the square and quarter-circle areas:

$$A = x^2 + \frac{\pi x^2}{4}$$

### D.3 MODELING AREAS AND VOLUMES WITH ALGEBRA: LEVEL 2

**Ex 36:** You have 28 meters of fencing to enclose a rectangular vegetable garden. Let  $x$  be the length of the rectangle and  $y$  be the width. Find the area  $A$  of the garden in terms of  $x$ .



*Answer:*

- The perimeter of the rectangle is 28 m, so:

$$2x + 2y = 28$$

- Solve for  $y$  in terms of  $x$ :

$$2x + 2y = 28$$

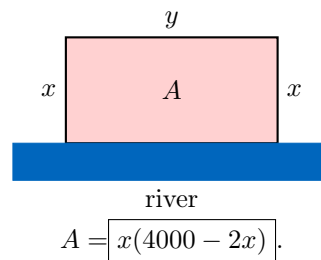
$$2y = 28 - 2x$$

$$y = 14 - x$$

- The area of the rectangle is  $A = x \times y$ . Substituting  $y = 14 - x$ :

$$A = x(14 - x)$$

**Ex 37:** A farmer has 4000 meters of fencing to enclose a rectangular field along a river. Because one side is along the river, fencing is required on only three sides. Let  $x$  be the length perpendicular to the river and  $y$  the length parallel to the river. Find the area  $A$  of the field in terms of  $x$ .



*Answer:*

- Since the fence is on three sides only, the total fencing is:

$$x + x + y = 4000 \quad \text{or} \quad 2x + y = 4000$$

- Solve for  $y$  in terms of  $x$ :

$$2x + y = 4000$$

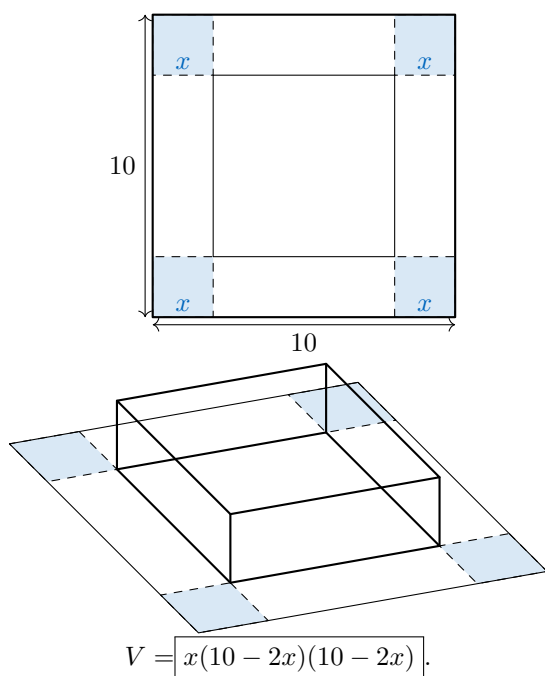
$$y = 4000 - 2x$$

- The area of the rectangle is  $A = x \times y$ . Substituting  $y = 4000 - 2x$ :

$$A = x(4000 - 2x)$$

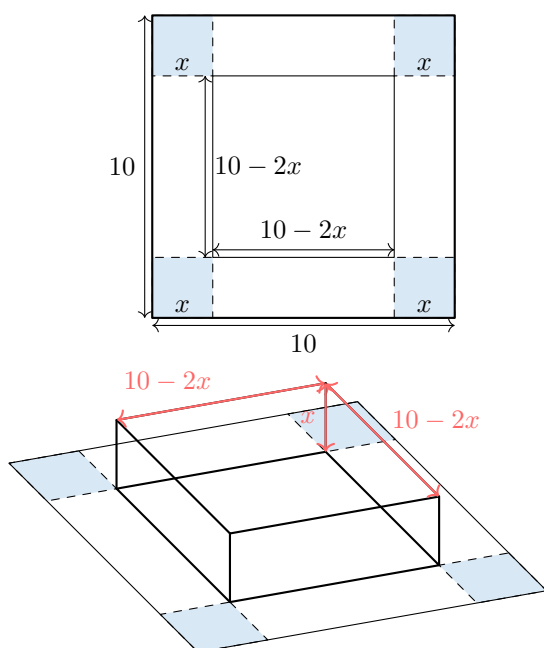
**Ex 38:** A sheet of paper  $10 \text{ cm} \times 10 \text{ cm}$  is made into an open box by cutting  $x$ -cm squares out of each corner and folding up the sides.

Find the volume  $V$  of the box in terms of  $x$ .



Answer:

- After cutting out  $x$ -cm squares, the height of the box is  $x$ . The new length is  $10 - 2x$  and the new width is  $10 - 2x$ .



- The volume of a box is

$$V = \text{height} \times \text{length} \times \text{width}.$$

- Substituting the dimensions:

$$V = x(10 - 2x)(10 - 2x).$$

#### D.4 FINDING PATTERNS AND WRITING FORMULAE

**Ex 39:** Look at the following matchstick pattern:

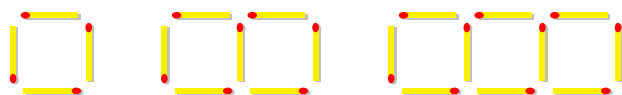


diagram 1

diagram 2

diagram 3

Find a formula for the number of matchsticks in the  $n$ -th diagram.

$$\text{Number of matchsticks} = \boxed{3n + 1}.$$

Answer: Counting the matchsticks in each diagram:

- Diagram 1:  $4 = 3 \times 1 + 1$
- Diagram 2:  $7 = 3 \times 2 + 1$
- Diagram 3:  $10 = 3 \times 3 + 1$
- $\vdots$
- Diagram  $n$ :  $3 \times n + 1$

**Ex 40:** Look at the following triangular matchstick pattern:



diagram 1



diagram 2



diagram 3

Find a formula for the number of matchsticks in the  $n$ -th diagram.

$$\text{Number of matchsticks} = \boxed{2n + 1}.$$

Answer: Counting the matchsticks in each diagram:

- Diagram 1:  $3 = 2 \times 1 + 1$
- Diagram 2:  $5 = 2 \times 2 + 1$
- Diagram 3:  $7 = 2 \times 3 + 1$
- $\vdots$
- Diagram  $n$ :  $2 \times n + 1$

**Ex 41:** Find the  $n$ -th term of the sequence 5, 10, 15, 20, 25, ...

$$n\text{-th term} = \boxed{5n}.$$

Answer:

- 1<sup>st</sup> term:  $5 = 5 \times 1$
- 2<sup>nd</sup> term:  $10 = 5 \times 2$
- 3<sup>rd</sup> term:  $15 = 5 \times 3$
- $\vdots$
- $n^{\text{th}}$  term:  $5 \times n$

**Ex 42:** Find the  $n$ -th term of the sequence 6, 12, 18, 24, 30, 36, ...

$$n\text{-th term} = \boxed{6n}.$$

Answer:

- 1<sup>st</sup> term:  $6 = 6 \times 1$
- 2<sup>nd</sup> term:  $12 = 6 \times 2$
- 3<sup>rd</sup> term:  $18 = 6 \times 3$
- $\vdots$
- $n^{\text{th}}$  term:  $6 \times n$

**Ex 43:** Find the  $n$ -th term of the sequence 1, 3, 5, 7, 9, 11, ...

$$n\text{-th term} = \boxed{2n - 1}.$$

*Answer:*

- 1<sup>st</sup> term:  $1 = 2 \times 1 - 1$
- 2<sup>nd</sup> term:  $3 = 2 \times 2 - 1$
- 3<sup>rd</sup> term:  $5 = 2 \times 3 - 1$
- $\vdots$
- $n^{\text{th}}$  term:  $2 \times n - 1$

**Ex 44:** Find the  $n$ -th term of the sequence  $2, 4, 8, 16, 32, 64, \dots$

$$n\text{-th term} = \boxed{2^n}.$$

*Answer:*

- 1<sup>st</sup> term:  $2 = 2^1$
- 2<sup>nd</sup> term:  $4 = 2^2$
- 3<sup>rd</sup> term:  $8 = 2^3$
- $\vdots$
- $n^{\text{th}}$  term:  $2^n$

**Ex 45:** Find the  $n$ -th term of the sequence  $1, 4, 9, 16, 25, 36, \dots$

$$n\text{-th term} = \boxed{n^2}.$$

*Answer:*

- 1<sup>st</sup> term:  $1 = 1^2$
- 2<sup>nd</sup> term:  $4 = 2^2$
- 3<sup>rd</sup> term:  $9 = 3^2$
- $\vdots$
- $n^{\text{th}}$  term:  $n^2$

**Ex 46:** Find the  $n$ -th term of the sequence  $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \dots$

$$n\text{-th term} = \boxed{\frac{1}{2n}}.$$

*Answer:*

- 1<sup>st</sup> term:  $\frac{1}{2} = \frac{1}{2 \times 1}$
- 2<sup>nd</sup> term:  $\frac{1}{4} = \frac{1}{2 \times 2}$
- 3<sup>rd</sup> term:  $\frac{1}{6} = \frac{1}{2 \times 3}$
- $\vdots$
- $n^{\text{th}}$  term:  $\frac{1}{2n}$