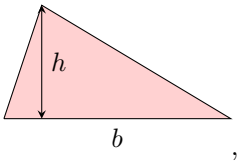
FORMULAS

A DEFINITIONS

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

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

MCQ 3: In physics, we have the formula

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

.Find the subject of the formula.

☐ v: the velocity

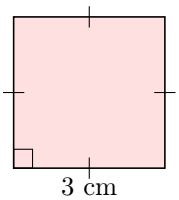
☐ d: the distance

☐ t: the time

B PROBLEM SOLVING

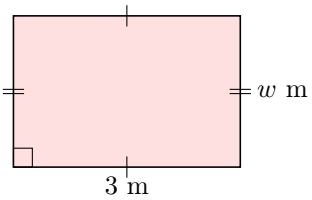
B.1 CALCULATING MEASURES IN GEOMETRY

Ex 4: Find the area of the figure:



$A =$ ☐ cm^2

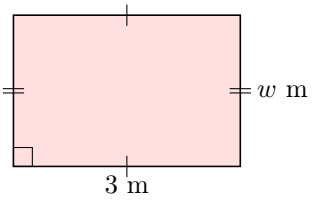
Ex 5: The area of the rectangle is $6\,\text{m}^2$ and the length of one side is $3\,\text{m}$.



Find the width of the rectangle.

$w =$ ☐ m

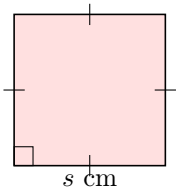
Ex 6: The perimeter of the rectangle is $10\,\text{m}$.



Find the width of the rectangle.

$w =$ ☐ m

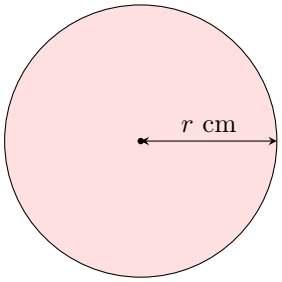
Ex 7: The area of a square is $10\,\text{cm}^2$.



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

$s =$ ☐ cm

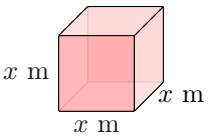
Ex 8: The area of a circle is $10\,\text{cm}^2$. Recall the formula: $A = \pi r^2$.



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

$r =$ ☐ cm

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 $\sqrt[3]{10} = 2.1544\ldots$).

$x =$ ☐ m

B.2 CALCULATING MEASURES IN PHYSICS

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

$$d = \square \text{ km}$$

Ex 11: A circuit has a resistance of 5 Ω and a voltage of 20 V.
Find the current flowing through the circuit. Recall the formula: $U = RI$.

$$I = \square \text{ A}$$

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

$$C = \square \text{°C}$$

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 m/s^2), and h is the height in meters.
Given an object with a mass of 10 kg and a gravitational potential energy of 490 J, find the height at which the object is located.

$$h = \square \text{ m}$$

C REARRANGING FORMULAE

C.1 REARRANGING LINEAR EQUATIONS

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

$$y = \square$$

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

$$y = \square$$

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

$$y = \square$$

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

$$y = \square$$

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:

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

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:

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

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:

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

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:

- ☐ $C = \frac{5}{9}(F - 32)$
- ☐ $C = \frac{9}{5}(F - 32)$
- ☐ $C = \frac{5}{9}F + 32$

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:

- ☐ $t = \frac{d}{v}$
- ☐ $t = \frac{v}{d}$
- ☐ $t = dv$

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:

☐ $I = \dfrac{U}{R}$

☐ $I = UR$

☐ $I = \dfrac{R}{U}$

MCQ 24: The formula $E = \dfrac{1}{2}mv^2$ relates kinetic energy (E), mass (m), and speed (v).
Rearrange the formula to make v the subject.

Choose the correct answer:

☐ $v = \sqrt{\dfrac{2E}{m}}$

☐ $v = \dfrac{E}{m}$

☐ $v = \dfrac{2E}{m}$

C.4 REARRANGING RATIO EQUATIONS

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

$y =$ ☐

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

$y =$ ☐

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

$y =$ ☐

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

$y =$ ☐

D CONSTRUCTING FORMULAE

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.

$M =$ ☐

Ex 30: A car rental company charges a fixed distance of 50 km included in the rental and 15 km for each extra hour of rental.
Find the total distance D the car can travel in terms of the rental time x (in hours).

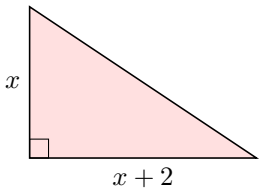
$D =$ ☐

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.

$C =$ ☐

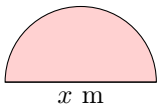
D.2 MODELING AREAS AND VOLUMES WITH ALGEBRA: LEVEL 1

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.



$A =$ ☐.

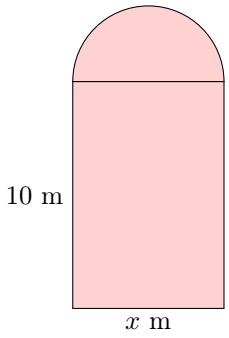
Ex 33: A garden is in the shape of a semi-circle with diameter x meters.



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

$A =$ ☐ m^2.

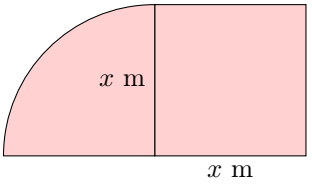
Ex 34: The door is composed of a rectangle with height 10 meters and width x meters, topped with a semi-circle of diameter x meters.



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

$A =$ ☐ m^2.

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

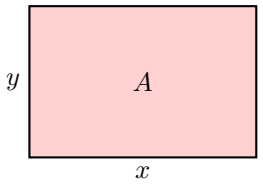


Find the area A of the door in terms of x.

$A =$ ☐ m^2.

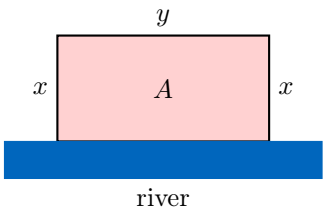
D.3 MODELING AREAS AND VOLUMES WITH ALGEBRA: LEVEL 2

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.



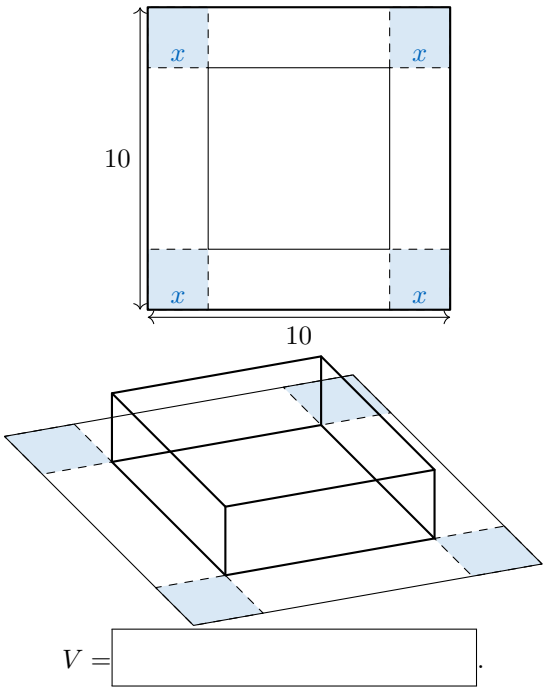
$A =$ ☐.

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.



$A =$ ☐.

Ex 38: A sheet of paper 10 cm × 10 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.



$V =$ ☐.

D.4 FINDING PATTERNS AND WRITING FORMULAE

Ex 39: Look at the following matchstick pattern:

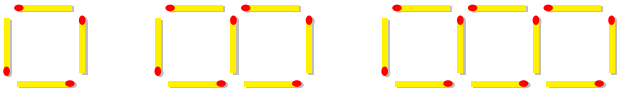


diagram 1 diagram 2 diagram 3

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

Number of matchsticks = ☐.

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.

Number of matchsticks = ☐.

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

n-th term = ☐.

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

n-th term = ☐.

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

n-th term = ☐.

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

n-th term = ☐.

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

n-th term = ☐.

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

n-th term = ☐.