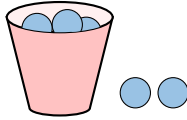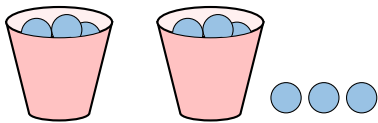# ALGEBRA

A DEFINITIONS

A.1 WRITING EXPRESSIONS

Ex 1:

A cup contains x marbles. Next to the cup, there are 2 marbles outside. Write an algebraic expression for the total number of marbles.

Ex 2:

Each cup contains x marbles. Next to the cups, there are 3 marbles outside.Write an algebraic expression for the total number of marbles.

Ex 3:

Each cup contains x marbles. Next to the cups, there is 1 marble outside.Write an algebraic expression for the total number of marbles.
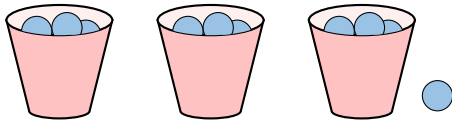
Ex 4:

Each cup contains x marbles. Next to the cups, there are 3 marbles outside.Write an algebraic expression for the total number of marbles.
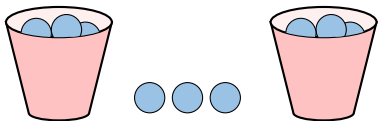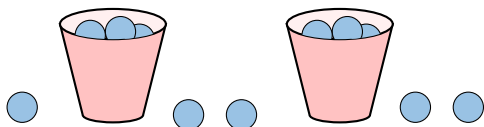
Ex 5:

Each cup contains x marbles. Outside the cups, there are 1 marble, then 2 marbles, then another 2 marbles.Write an algebraic expression for the total number of marbles.

A.2 IDENTIFYING EQUATIONS OR EXPRESSIONS

MCQ 6: Is $2\pi r$ an equation?

☐ Yes

☐ No

MCQ 7: Is $x^2 + y^2 = r^2$ an equation?

☐ Yes

☐ No

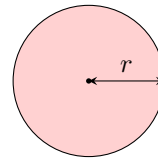**MCQ 8:** Is $a + b + c$ an equation?

☐ Yes

☐ No

MCQ 9: Is $5x = 20$ an equation?

☐ Yes

☐ No

A.3 IDENTIFYING VARIABLES OR CONSTANTS
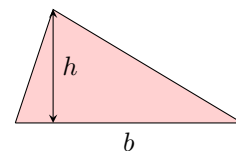
MCQ 10:

In the equation for the perimeter of the circle,

$$P = 2\pi r$$

find the variables.

☐ P

☐ 2

☐ π

☐ r

MCQ 11:

In the equation for the area of a triangle,

$$A = \frac{1}{2}b \times h$$

find the variables.

☐ A

☐ $\frac{1}{2}$

☐ b

☐ h

MCQ 12: In the equation for Ohm's law,

$$V = IR$$

find the variables.

☐ V

☐ I

☐ R

MCQ 13: In the equation of a line

$$y = 2x + 1$$

find the variables.

☐ y

☐ 2

☐ x

☐ 1

B NOTATIONS

B.1 SIMPLIFYING REPEATED ADDITION

Ex 14: Simplify:

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

Ex 15: Simplify:

$$n + n + n + n + n = \boxed{}$$

Ex 16: Simplify:

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

Ex 17: Simplify:

$$x + x + x + 2 \times 3 = \boxed{}$$

B.2 SIMPLIFYING REPEATED MULTIPLICATION

Ex 18: Simplify:

$$x \times x \times x = \boxed{}$$

Ex 19: Simplify:

$$n \times n = \boxed{}$$

Ex 20: Simplify:

$$x \times x \times x \times x = \boxed{}$$

Ex 21: Simplify:

$$x \times x + 2 + 3 = \boxed{}$$

Ex 22: Simplify:

$$x \times x \times x - x \times x = \boxed{}$$

B.3 COMBINING LIKE TERMS

Ex 23: Simplify:

$$3x + 2x = \boxed{}$$

Ex 24: Simplify:

$$2n + 4n = \boxed{}$$

Ex 25: Simplify:

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

Ex 26: Simplify:

$$5x - 2x = \boxed{}$$

Ex 27: Simplify:

$$3n - 2n = \boxed{}$$

B.4 COMBINING LIKE TERMS

Ex 28: Simplify:

$$10x + 5x = \boxed{}$$

Ex 29: Simplify:

$$x - 8x = \boxed{}$$

Ex 30: Simplify:

$$2x - 4x - 3x = \boxed{}$$
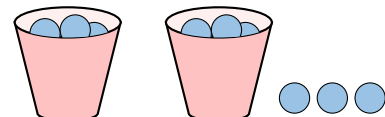
Ex 31: Simplify:

$$x - 2x + 5x = \boxed{}$$

C IDENTITY

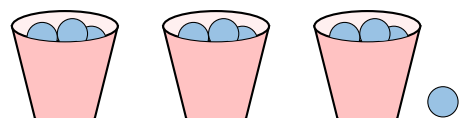## C.1 WRITING ALGEBRAIC EXPRESSIONS IN SIMPLIFIED FORM

Ex 32:

Each cup contains x marbles. Next to the cups, there are 3 marbles outside. Write an algebraic expression for the total number of marbles. **Express your answer in simplified form.**
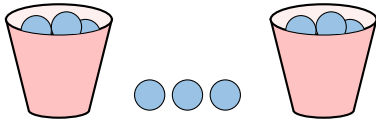
$$\boxed{}$$

Ex 33:

Each cup contains x marbles. Next to the cups, there is 1 marble outside.Write an algebraic expression for the total number of marbles.**Express your answer in simplified form.**
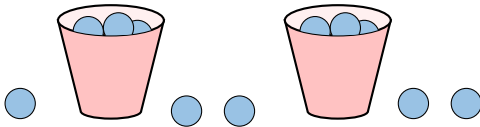
          _____

Ex 34:

Each cup contains x marbles. Next to the cups, there are 3 marbles outside.Write an algebraic expression for the total number of marbles.**Express your answer in simplified form.**
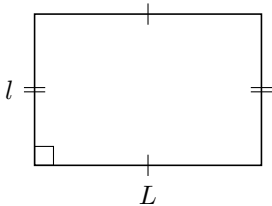
          _____

Ex 35:

Each cup contains x marbles. Outside the cups, there are 1 marble, then 2 marbles, then another 2 marbles.Write an algebraic expression for the total number of marbles.**Express your answer in simplified form.**
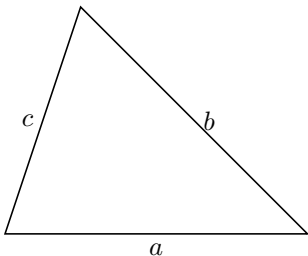
          _____
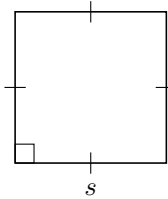
C.2 WRITING FORMULAS FOR PERIMETER AND AREA

Ex 36:

Write a formula for the perimeter of the rectangle using the variables P (perimeter), l (length), and L (width).
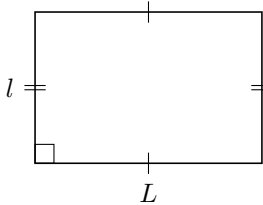
Ex 37:

Write a formula for the perimeter of the triangle using the variables P (perimeter), a, b, and c (side lengths).

Ex 38:

Write a formula for the area of the square using the variable A (area) and s (side length).

Ex 39:

Write a formula for the area of the rectangle using the variables A (area), l (length), and L (width).

C.3 SIMPLIFYING EXPRESSIONS

Ex 40: Simplify the expression:
$$2x + 4 + x - 2 = \boxed{}$$

Ex 41: Simplify the expression:
$$3x + 5 - x - 3 = \boxed{}$$

Ex 42: Simplify the expression:
$$x + 4x + 3 - 2 = \boxed{}$$

Ex 43: Simplify the expression:
$$3 + 2x - x + 5 = \boxed{}$$

Ex 44: Simplify the expression:
$$x^2 + x + 3x^2 = \boxed{}$$

Ex 45: Simplify the expression:
$$2 + 4x - x^2 - 3x + 3x^2 = \boxed{}$$

Ex 46: Simplify the expression:

$$x^2 + x + 3x^2 - 2x + 6 = \boxed{}$$

Ex 47: Simplify the expression:

$$3x^2 + 2x - 3 - 2x^2 + 3x - 4 = \boxed{}$$

C.4 SIMPLIFYING USING COMMUTATIVITY AND ASSOCIATIVITY

Ex 48: Simplify:

$$2 \times 3x = \boxed{}$$

Ex 49: Simplify:

$$x \times 3x = \boxed{}$$

Ex 50: Simplify:

$$4 \times 2x = \boxed{}$$

Ex 51: Simplify:

$$5x \times 2 = \boxed{}$$

Ex 52: Simplify:

$$2x \times 4x = \boxed{}$$

C.5 SIMPLIFYING USING THE ZERO IDENTITY

Ex 53: Simplify:

$$0(2x - x^2 + 2)^2 \boxed{}$$

Ex 54: Simplify:

$$2x + 0(x^2 - 2) = \boxed{}$$

Ex 55: Simplify:

$$2x + 6x - 8x = \boxed{}$$

Ex 56: Simplify:

$$(2x - 2x)^2 + 3 = \boxed{}$$

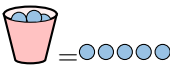# D SUBSTITUTING

D.1 EVALUATING EXPRESSIONS

Ex 57:

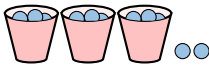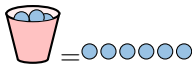Each cup contains x marbles. The expression for the total number of marbles is:

$$2x + 4$$

Evaluate this expression when $x = 5$ (that is, 5 marbles in each cup):

$\boxed{}$ marbles in total.

Ex 58:

Each cup contains x marbles. The expression for the total number of marbles is:

$$3x + 2$$

Evaluate this expression when $x = 6$ (that is, 6 marbles in each cup):
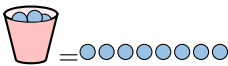

$\boxed{}$ marbles in total.

Ex 59:

Each cup contains x marbles. The expression for the total number of marbles is:

$$4x + 3$$

Evaluate this expression when $x = 8$ (that is, 8 marbles in each cup):
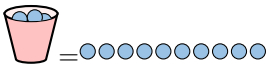

$\boxed{}$ marbles in total.

Ex 60:
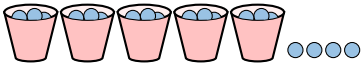
Each cup contains x marbles. The expression for the total number of marbles is:

$$5x + 4$$

Evaluate this expression when $x = 10$ (that is, 10 marbles in each cup):

$\boxed{}$ marbles in total.

D.2 EVALUATING EXPRESSIONS: LEVEL 1

Ex 61: When $x = 2$, evaluate:

$$3x - 4 = \boxed{}$$

Ex 62: When $x = 4$, evaluate:

$$5 - 2x = \boxed{}$$

Ex 63: When $x = 3$, evaluate:

$$x^2 - 2 = \boxed{}$$

D.3 EVALUATING EXPRESSIONS: LEVEL 2

Ex 64: When $x = -2$, evaluate:

$$x^2 + 4 = \boxed{}$$

Ex 65: When $x = 3$, evaluate:

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

Ex 66: When $x = 3$, evaluate:

$$2x^2 - 2x + 1 = \boxed{}$$

Ex 67: When $x = 2$, evaluate:

$$x(5 - x) = \boxed{}$$

D.4 EVALUATING IN EQUATIONS

Ex 68: For the equation $y = 2x - 1$, when $x = 2$, find y.

$$y = \boxed{}$$

Ex 69: For the equation $y = 1 - x$, when $x = 2$, find y.

$$y = \boxed{}$$

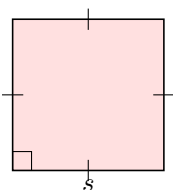**Ex 70:** For the equation $y = x^2 + 1$, when $x = 3$, find y.

$$y = \boxed{}$$

Ex 71: For the equation $y = x^2 + 1$, when $x = -1$, find y.

$$y = \boxed{}$$
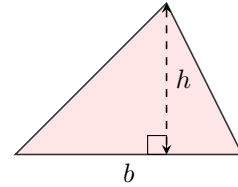
D.5 EVALUATING IN FORMULAE

Ex 72:

The area formula is $A = s^2$. Calculate the area of a square given $s = 2$ cm.

$$A = \boxed{} \text{ cm}^2$$

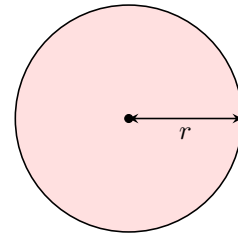**Ex 73:**

The area formula is $A = \frac{b \times h}{2}$. Calculate the area of a triangle given $b = 4$ cm and $h = 3$ cm.

$$A = \boxed{} \text{ cm}^2$$
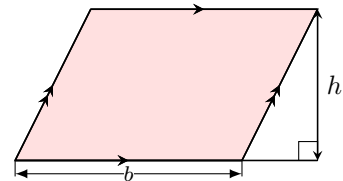
Ex 74:

The area formula is $A = \pi r^2$. Find the area of a circle with $r = 2$ cm (round to 1 decimal place).

$$A = \boxed{} \text{ cm}^2$$

Ex 75:

The area formula is $A = b \times h$. Calculate the area of the parallelogram with $b = 10$ m and $h = 7$ m.

$$A = \boxed{} \text{ m}^2$$