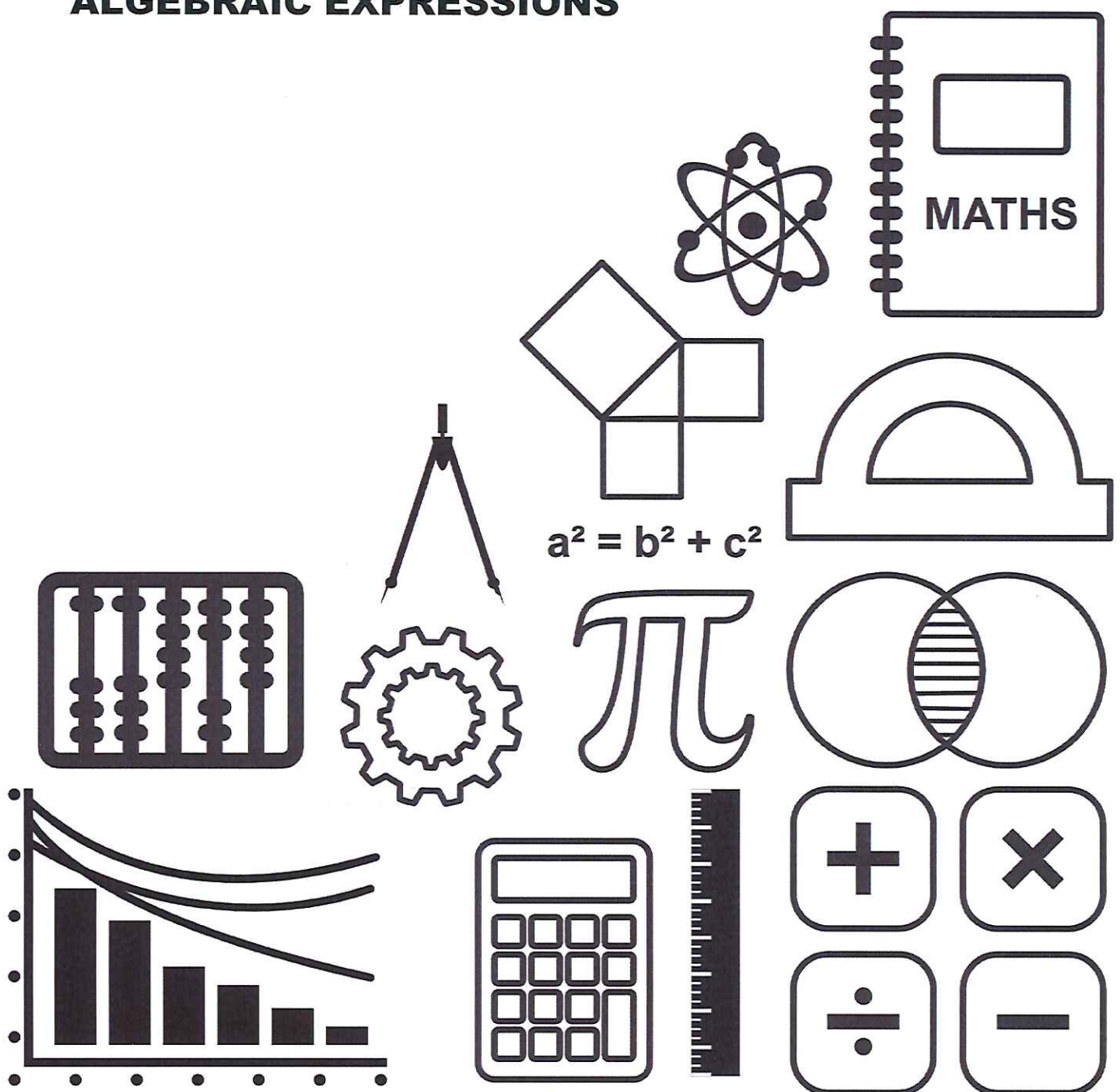
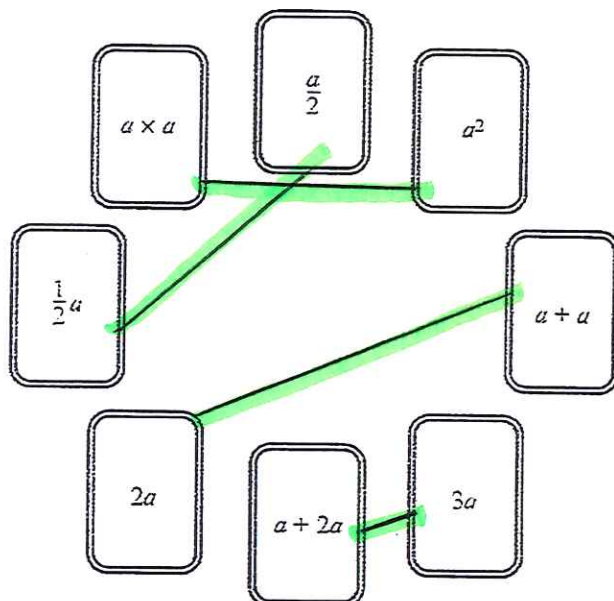


GCSE TOPIC BOOKLET ALGEBRAIC EXPRESSIONS



1. Sammy and Jack play snap with these algebra cards.



- (a) Draw lines to connect the pairs of cards that are equivalent.

[4]

- (b) For each of the following cards, write another equivalent card.

(i)

$$a^3$$

$$a \times a \times a$$

(ii)

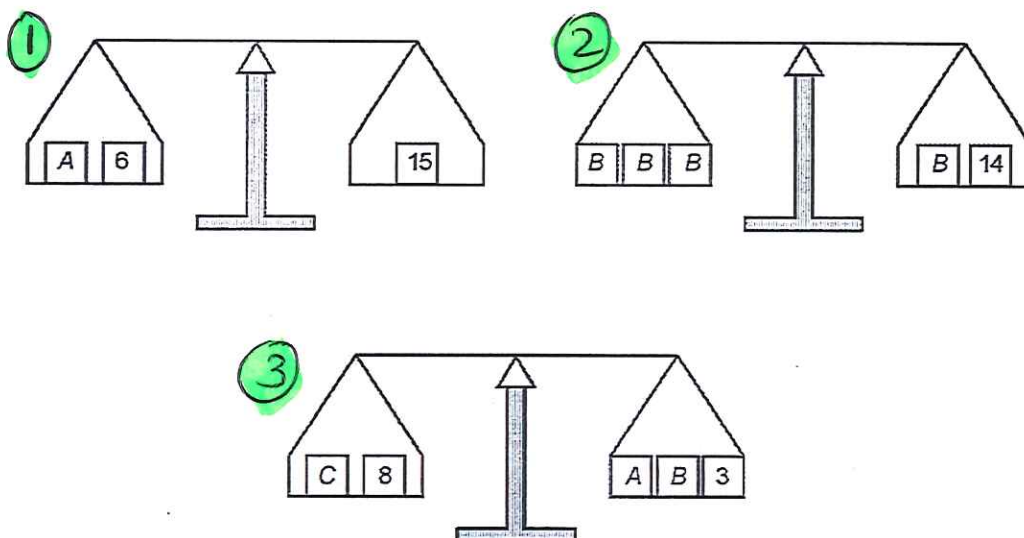
$$2(a + 3)$$

$$2a + 6$$

[2]

2. Each diagram represents a balance with the total weight on each side being equal.
Find the values of A , B and C .

[5]



From ① $A + 6 = 15$, $A = 9$

From ② $3B = B + 14$
 $2B = 14$, $B = 7$

From ③ $C + 8 = A + B + 3$
 $C + 8 = 9 + 7 + 3$
 $C + 8 = 19$, $C = 11$

$A = 9$

$B = 7$

$C = 11$

3. Plates are sold in two different sized boxes, small and large. The small boxes each contain 6 plates and large boxes each contain 9 plates.

Richard has x small boxes each containing 6 plates.

- (a) Write down, in terms of x , the total number of plates there are in these boxes.

$$6x$$

[1]

- (b) Richard has 7 more of the large boxes than he has of the small boxes. Write down, in terms of x , the number of large boxes he has.

$$x + 7$$

[1]

- (c) Write down, in terms of x , the total number of plates in the large boxes.

$$9(x + 7)$$

$$\text{or } 9x + 63$$

[1]

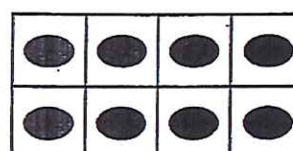
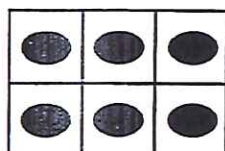
- (d) Write down, in terms of x , the total number of plates altogether. You must simplify your answer as far as possible.

$$9(x + 7) + 6x = 9x + 63 + 6x$$

$$= 15x + 63$$

[3]

4. A shopkeeper sells bars of chocolate in two different sizes. The small bar has 6 pieces of chocolate and the large bar has 8 pieces of chocolate, as illustrated in the following diagrams.



The shopkeeper has x small bars of chocolate.

- (a) Write down, in terms of x , the total number of pieces of chocolate in these x bars.

$$6x$$

[1]

- (b) The number of large bars the shopkeeper has is 11 less than the number of small bars. Write down, in terms of x , the number of large bars he has.

$$x - 11$$

[1]

- (c) Write down, in terms of x , the total number of pieces of chocolate in these large bars.

$$8(x - 11)$$

$$\text{or } 8x - 88$$

[1]

- (d) Write down, in terms of x , the total number of pieces of chocolate in all the bars. You must simplify your answer as far as possible.

$$8(x - 11) + 6x = 8x - 88 + 6x$$

$$= 14x - 88$$

[3]

5. Crayons are sold by a shop in two different sized boxes. Small boxes contain 4 crayons and large boxes contain 12 crayons.

The shopkeeper has x small boxes each containing 4 crayons.

- (a) Write down, in terms of x , the total number of crayons in these boxes.

$$4x$$

[1]

- (b) The shopkeeper has 7 more of the large boxes than he has of the small boxes. Write down in terms of x , the number of large boxes he has.

$$x + 7$$

[1]

- (c) Write down, in terms of x , the total number of crayons in the large boxes.

$$12(x + 7)$$

$$\text{or } 12x + 84$$

[1]

- (d) Write down, in terms of x , the total number of crayons altogether. You must simplify your answer as far as possible.

$$12(x + 7) + 4x$$

$$= 12x + 84 + 4x$$

$$= 16x + 84$$

[3]

6. Alice buys two different magazines called *Goodbye* and *Welcome*. The *Goodbye* magazine costs £3 per copy and *Welcome* costs £4 per copy.

Over the past year Alice bought x copies of *Goodbye*.

- (a) Write down, in terms of x , the total cost (in pounds) of these copies.

$$(\pounds) 3x$$

[1]

- (b) Alice bought 5 more copies of *Welcome* than she bought of *Goodbye*. Write down, in terms of x , how many copies of *Welcome* she bought.

$$x + 5$$

[1]

- (c) Write down, in terms of x , the total cost (in pounds) of these copies of *Welcome* magazine.

$$(\pounds) 4(x + 5)$$

$$\text{or } \pounds 4x + 20$$

[1]

- (d) Write down, in terms of x , the total cost (in pounds) of all the magazines Alice bought. You must simplify your answer as far as possible.

$$3x + 4x + 20$$

$$= (\pounds) 7x + 20$$

[3]

7. Explain, using algebra, why the sum of any 3 consecutive whole numbers is always divisible by 3. [3]

Let the three numbers be

$$x, x+1, x+2$$

$$\begin{aligned} \text{The sum of these numbers} &= x + x+1 + x+2 \\ &= 3x+3 \\ &= 3(x+1) \end{aligned}$$

which is divisible by 3.