

Year 9 Term 1 Homework

Student Name: _____	Grade: _____
Date: _____	Score: _____

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3 Year 9 Term 1 Week 3 Homework

3.1 Algebra

3.1.1 The distributive law

Algebraic expressions can be expanded by using the distributive law.

$$a(b + c) = ab + ac \quad \text{and} \quad a(b - c) = ab - ac$$

Exercise 3.1.1 Expand each of these, then collect the like terms.

1. $4(a + 4) + 5(a - 2) =$ _____

2. $5p - 4(p - 3) + 9 =$ _____

3. $9(b + 6) - 7(2 - b) =$ _____

4. $8c(c - 2) - 5c(7 - c) =$ _____

5. $-3(7y + 2) + 5(2y + 3) =$ _____

6. $3a(a + 6) + 2a(a - 4) =$ _____

7. $10b(2c + d) + 5b(3c + 4d) =$ _____

Exercise 3.1.2 Are the following statements true (T) or false(F)?

1. $6(2x + 5) = (2x + 5)6$ _____

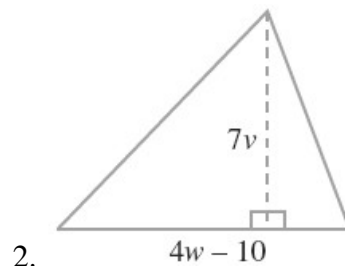
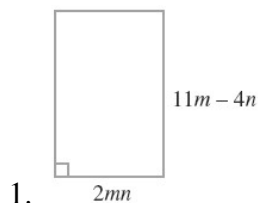
2. $-2(8v - 3) = -16v - 6$ _____

3. $ab(a + b) = a^2b - ab^2$ _____

4. $5 + 4(c - 1) = 9(c - 1)$ _____

5. $-(y - 2) = 2 - y$ _____

Exercise 3.1.3 Find, in simplest form, an expression for the area of each figure.



1. Area = _____

2. Area = _____

3.1.2 The highest common factors

To factorise an expression means to write the expression as the product of its factors.

- write the HCF of the terms outside the grouping symbols
- divide each term in the expression by HCF to find the term inside the grouping symbols.
- $ab + ac = a(b + c)$ and $ab - ac = a(b - c)$

Exercise 3.1.4 Complete each of these factorisations:

1. $5a^2 + 10a = 5a(\text{_____})$
2. $12b^2 - 21b = 3b(\text{_____})$
3. $35cd + 28c^2 = 7c(\text{_____})$
4. $st - t = t(\text{_____})$

Exercise 3.1.5 Factorise each expression completely.

1. $4cb + 28b^2 - 20bd = \text{_____}$
2. $-20a - 28a^2 + 36ab = \text{_____}$
3. $2x^2 + 2xy - 6x = \text{_____}$
4. $8xy - x^2y + xy^2 = \text{_____}$
5. $u^2vw - uv^2w + uvw^2 = \text{_____}$
6. $a^2 + 2ab + b^2 = \text{_____}$

Exercise 3.1.6 Factorise by taking out the binomial common factor.

1. $a(b + c) + 5(c + b) = \text{_____}$
2. $a^2(b - c) - 5(b - c) = \text{_____}$
3. $3(m - 9) - n(m - 9) = \text{_____}$
4. $5b(b + 4) + 2(b + 4) = \text{_____}$
5. $x(4z + 3) - y(4z + 3) = \text{_____}$
6. $2m(x - y) + n(x - y) = \text{_____}$

3.1.3 Adding and subtracting algebraic fractions

To add or subtract algebraic fractions:

- express the fractions with a common denominator
- add or subtract the numerators
- simplify if possible.

Exercise 3.1.7 Simplify:

1. $\frac{11x}{12} + \frac{5x}{12} =$ _____

2. $\frac{19y}{24} - \frac{10y}{24} =$ _____

3. $\frac{10}{3p} + \frac{4}{3p} =$ _____

4. $\frac{12}{7q} - \frac{3}{7q} =$ _____

5. $\frac{r}{4} + \frac{5r}{6} =$ _____

6. $\frac{7s}{6} - \frac{2s}{9} =$ _____

7. $\frac{3}{2x} + \frac{2}{3x} =$ _____

8. $\frac{9a}{10b} - \frac{3a}{4b} =$ _____

Exercise 3.1.8 Simplify each of the following:

1. $\frac{x+1}{6} + \frac{x+2}{2} =$ _____

2. $\frac{2y-5}{12} + \frac{y-1}{4} =$ _____

3. $\frac{3w+10}{5} - \frac{w-3}{4} =$ _____

4. $\frac{x+8}{5} + \frac{x-2}{3} =$ _____

3.1.4 Multiplying and dividing algebraic fractions

To multiply algebraic fractions:

- cancel any common factors between the numerators and the denominators
- multiply the numerators
- multiply the denominators.

To divide algebraic fractions:

- change the division sign to a multiplication sign and take the reciprocal of the second fraction
- multiply the numerators
- multiply the denominators.

Exercise 3.1.9 Simplify each of the following:

1. $\frac{a}{6} \times \frac{3}{ab} =$ _____

2. $\frac{9a}{14c} \times \frac{7c}{18ab} =$ _____

3. $\frac{15x}{27y} \times \frac{18z}{25x} =$ _____

4. $\frac{10p}{3} \div \frac{5q}{12} =$ _____

5. $\frac{12c}{45b} \div \frac{16c}{35a} =$ _____

6. $\frac{42xy}{55x} \div \frac{49yz}{60w} =$ _____

Exercise 3.1.10 Simplify each of the following:

1. $\frac{5a}{4bc} \times \frac{2b}{3a^2} =$ _____

2. $\frac{8x}{21y^2} \div \frac{24x^2}{35y} =$ _____

3. $\frac{15c}{7a} \div \frac{40b}{9a} \times \frac{16ab}{45c} =$ _____

3.1.5 Generalising arithmetic

We use generalised arithmetic to form a general expression to describe any value in a given situation.

Example 3.1.1

1. The sum of x and y . ($x + y$)
2. The difference between a and b . ($a - b$)
3. Three times the cube of x . ($3x^3$)

Exercise 3.1.11 Write an algebraic expression for each of the following:

1. one quarter of cube of y _____
2. two-thirds of x _____
3. five more than the quotient of a and b _____
4. three times the number that is 15 more than p _____
5. twice the square of q _____
6. eight times the number that is 5 less than k _____
7. two-thirds of the sum of b and 8 _____
8. the sum of 6 and the product of p and q _____

Exercise 3.1.12 Write each expression in words.

1. $6x + 8$ _____
2. $\frac{y}{2} + 5$ _____
3. $\frac{m-n}{3}$ _____
4. $2q^2 - 9$ _____
5. $u - \frac{v}{w}$ _____
6. $4(a + 2)$ _____
7. $\frac{2(m-n)}{5}$ _____
8. $\frac{\sqrt{c}}{2}$ _____

3.2 Miscellaneous exercises**Exercise 3.2.1**

1. Simplify each of the following:

(a) $\frac{36ab^2}{3ba} =$ _____

(b) $(-60xy) \div 5x =$ _____

(c) $60p^2 \div 12p \times q =$ _____

2. Use the method of finite differences to find the rule that links x and y .

x	0	1	2	3
y	9	11	13	15

3. Daniel drove 458 km in 5 h 25 min. Find his average speed, correct to 1 decimal place.

4. Factorise each expression completely.

(a) $a^2 - ab - ac =$ _____

(b) $x^2 - 2xy + y^2 =$ _____

(c) $4 + 4q + q^2 =$ _____

5. Write down four consecutive even numbers, if the first of which is $(a - 5)$. Hence, find their sum.

6. *Expand and simplify:*

(a) $(x + 3)(x^2 + 5x + 4) =$ _____

(b) $(3b - 2)(4b^2 - b - 7) =$ _____

(c) $(2c - 1)(c - 4)(5c + 3) =$ _____

7. *Find the value of the expression $\frac{5a+bc+3c}{b+6}$, given that $a = 4$, $b = 7$ and $c = 8$, correct to 1 decimal place.*

8. *A 20-cm length of wire is cut into two pieces, the smallest piece having a length of x cm. The longer piece is bent into the shape of a rectangle with a width of 7 cm. How long is the rectangle?*

9. Simplify:

(a) $\frac{3x}{10} + \frac{5x}{8}$

(b) $\frac{4}{5y} - \frac{3}{4y}$

(c) $\frac{x+2}{3} - \frac{x+3}{4}$

(d) $\frac{5m}{7n} \times \frac{14p}{15m} \times \frac{9n}{16q}$

10. A class contains 14 girls and 16 boys. If 4 more girls join the class, find the fraction of the boys in the class.

11. Find the sum of three consecutive odd numbers such that the middle number is $m+1$.

12. Two of the angles in a triangle are p° and q° . What size is the third angle?

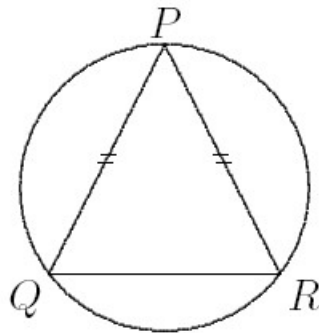
3.3 Maths challenge

Exercise 3.3.1

1. A bag contains 100 marbles and 95% of them are red. Some of the red marbles are removed from the bag and after this 75% of the marble in the bag are red. Find the number of red marbles that have been removed from the bag.

2. Red rose plants are sale for \$5 each and yellow ones for \$8 each. Michelle wants to buy mixture of both types and decides to buy 21 in total, buying 3 more red rose plants than yellow ones. How much does she spend?

3. PQR is an isosceles triangle with a base of 18 cm and sides of 15 cm and is inscribed in the circle shown below. Find the radius of the circle, correct to 2 decimal places.



4. Three people share a sum of money in the ratio of 6 : 4 : 3. The person who receives the least amount get \$270. Find the total amount of money they shared.
