

Year 9 Term 1 Homework

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

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9 Year 9 Term 1 Week 9 Homework

9.1 Equations, inequations and formulae

9.1.1 Equations with one fraction

Exercise 9.1.1

1. $3x = \frac{4x-15}{3}$

2. $\frac{1}{4}(3x - 5) = 6$

3. $\frac{2x-3}{5} = 12 - 3x$

4. $3y - 12 = \frac{2}{3}y + 2$

5. $\frac{18-4y}{3} - 11 = -9$

6. $\frac{12}{4y+3} = 3$

9.1.2 Equations with more than one fraction**Exercise 9.1.2 Solve the following equations:**

1. $\frac{6}{a} - \frac{3}{a} = \frac{2}{a+4}$

2. $\frac{b+3}{b+2} = \frac{b}{b-2}$

3. $\frac{c+8}{c-6} = \frac{c+4}{c-2}$

4. $\frac{x+4}{3x} = 7 + \frac{1}{x}$

5. $\frac{2}{y-2} - \frac{3}{y+2} = \frac{7}{y^2-4}$

6. $\frac{1}{2}(z-3) + \frac{3}{5}(z+1) = \frac{2}{3}$

9.1.3 Evaluate the subject of a formula**Exercise 9.1.3 Consolidation**

1. If $S = \frac{v^2 - u^2}{2}$, find S when $v = 12$, $u = 8$.

2. If $h = \frac{dv^2}{gr}$ find h correct to 2 decimal places when $d=4$, $v=2.2$, $g = 1.5$ and $r = 2.4$.

3. If $s = ut + \frac{1}{2}at^2$, find s when $u = 2.5$, $t = 10$ and $a = 6$.

4. If $A = \frac{1}{2}r^2\delta$, find a when $r = 6$, and $\delta = 1.5$.

5. If $S = 2(ab + bc + ca)$, find S when $a = 3$, $b = 5$ and $c = 8$.

6. If $R = \sqrt{a^2 + b^2}$, find R when $a = 2$, $b = \sqrt{5}$.

9.1.4 Changing the subject of a formula

To find the value of one of the pronumeral in a formula, we could either:

1. Substitute the given value into the formula then solve the resulting equation, or
2. Change the subject of the formula to the desired variable then substitute the given values.

To change the subject of a formula:

- Expand any grouping symbols
- Perform inverse operations to both sides until the left-hand side contains only the desired subject.

Example 9.1.1 Make c the subject of the formula $p = \frac{q+\sqrt{c}}{r}$

Solution: $p = \frac{q+\sqrt{c}}{r}$

$$pr = q + \sqrt{c}$$

$$pr - q = \sqrt{c}$$

$$\therefore c = (pr - q)^2$$

Exercise 9.1.4 Make y the subject of each formula:

1. $\frac{x}{3} + \frac{y}{4} = z$

2. $x^2 = y^2 + z^2$

3. $x = 3(y + z)$

4. $x = 5y(2 - z)$

To change the subject of a formula, where the desired subject appears more than once:

- Take all the terms that contain this variable to one side
- Take the remaining terms to the other side
- Factorise the expression that contains the desired subject
- Divide both sides by the expression in the grouping symbols.

Example 9.1.2 Make m the subject of the formula $y = \frac{m}{m-5}$

Solution: $y(m-5) = m$

$$my - 5y = m$$

$$-5y = m - my$$

$$-5y = m(1 - y)$$

$$\frac{-5y}{1-y} = m \quad \therefore m = \frac{-5y}{1-y}$$

Exercise 9.1.5 Make x the subject of each formula:

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

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

3. $b = \frac{a-x}{a+x}$

4. $c = \frac{a-bx}{x-b}$

Exercise 9.1.6 Expand the grouping symbols in each formula, make a the subject.

1. $p = k(2 - a)$

2. $b = m(a - c)$

Exercise 9.1.7 Multiply each term by the LCM, then solve for n.

1. $\frac{n}{2} + \frac{k}{5} = 3$

2. $\frac{n-a}{2} = \frac{b-c}{3}$

Exercise 9.1.8 Transpose each formula so that t is the subject.

1. $k = u - t^2$

2. $\frac{2}{2t} = \frac{8t}{b}$

9.2 Problem solving

1. The area of an equilateral triangle of side x cm is given by the formula $A = \frac{\sqrt{3}}{4}x^2$. Find the side length of an equilateral triangle with area of 30 cm^2 . (correct your answer to 2 decimal places)

2. The distance D km that a person can see to the visible horizon from a height H metres above sea level is given by the formula $D = 5\sqrt{\frac{H}{2}}$. Find the height of a cliff if Linda can see 40 km out to sea from the top of the cliff.

3. Make m_1 the subject of the formula $T = \frac{m_1 - m_2}{1 + m_1 m_2}$.

4. If $m = \frac{y_2 - y_1}{x_2 - x_1}$, find the value of x_1 when $m = 3$, $y_1 = -6$, $y_2 = 9$ and $x_2 = 7$.

9.3 Maths challenge

Exercise 9.3.1

1. A bag contains 240 marbles and 95% of them are red. Some of the red marbles are removed from the bag and after this 75% of the marbles in the bag are red. How many red marbles have been removed?

2. Emma had a sum of money. She spent $\frac{1}{2}$ of it on a present and $\frac{3}{5}$ of the remainder on a book. If she has \$18 left, how much was the original sum of money?

3. I am thinking of a fraction. If it is multiplied by 6 and then $\frac{1}{4}$ is subtracted, the answer is 12. What is the fraction?

4. Andy needs 5 days to mow the lawn at the council park. Mark needs 3 days to do the same job. How long will it take Andy and Mark to do this job if they work together at the given rates? (Assume they all working 8 hours a day).

5. John and Sam had a total of \$480. John gave $\frac{2}{5}$ of his money to Sam. Sam then gave $\frac{1}{3}$ of the total amount of money he had to John. In the end, each of them had the same amount of money. How much money had each man at first?
