Year 10 collecting like terms worksheet

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Name: _____ Date: _____

Question 1

Simplify 3x/8 + x/8.

Answer: _____

Question 2

Mia and Theo are painting a fence together. Mia can paint 1/x of the fence per hour and Theo can paint 1/3x of the fence per hour, where x is the number of hours it would take Mia to paint the fence alone. Write a simplified expression for the fraction of the fence they complete together in one hour.

Answer: _____

Question 3

Simplify the following expression. x/4 + 3x/8

Answer: _____

Question 4

Simplify 5/6x - 1/4x.

Answer: _____

Question 5

The formula for the area of a trapezium is A = ½(a + b)h where a and b are the parallel sides and h is the perpendicular height. Find A when a = 5 cm, b = 11 cm and h = 8 cm.

Answer: _____

Question 6

The formula v = √(u² + 2as) relates the final velocity v, initial velocity u, acceleration a and displacement s of an object. Rearrange the formula to make s the subject.

Answer: _____

Question 7

The formula for the period of a pendulum is T = 2π√(L/g) where T is the period in seconds, L is the length of the pendulum in metres and g is the acceleration due to gravity in m/s². Rearrange the formula to make L the subject.

Answer: _____

Question 8

Simplify:

(a) x/5 + 2x/5

(b) 7a/9 - a/9

(c) 3/x + 5/x

Answer: _____

Question 9

Simplify:

(a) x/2 + x/3

(b) 2a/5 - a/4

(c) 3m/4 + m/6 - m/3

Answer: _____

Question 10

Simplify:

(a) (x + 1)/(2) + (x - 3)/(5)

(b) (2y + 3)/(4) - (y - 1)/(3)

(c) (x + 4)/(3) - (x - 2)/(6)

Answer: _____

Year 10 collecting like terms: answers and worked solutions

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Question 1

Key idea: When denominators are the same, add the numerators and keep the denominator.

1. Add the numerators: 3x + x = 4x 2. Write over the common denominator: 4x/8 3. Simplify by dividing numerator and denominator by 4: x/2

Answer: x/2

Question 2

Key idea: Add the two rates. Since the denominators are different, find a common denominator first.

1. Identify the two rates: 1/x and 1/3x 2. The lowest common denominator of x and 3x is 3x. 3. Rewrite the first fraction: 1/x = 3/3x 4. Add the fractions: 3/3x + 1/3x = 4/3x

Answer: 4/3x of the fence per hour

Question 3

Key idea: To add algebraic fractions, rewrite them with a common denominator, then add the numerators.

1. The denominators are 4 and 8. The lowest common denominator (LCD) is **8**. 2. Rewrite the first fraction with denominator 8: x/4 = 2x/8 3. The second fraction already has denominator 8: 3x/8 4. Add the numerators: 2x/8 + 3x/8 = (2x + 3x)/(8) = 5x/8 5. There are no common factors to cancel, so the expression is fully simplified.

Answer: 5x/8

Question 4

Key idea: Find the lowest common denominator of 6x and 4x, rewrite each fraction, then subtract the numerators.

1. The lowest common denominator of 6x and 4x is 12x. 2. Rewrite each fraction: 5/6x = 10/12x, 1/4x = 3/12x 3. Subtract the numerators: 10/12x - 3/12x = 7/12x 4. Check that 7/12x cannot be simplified further (7 is prime and does not divide 12).

Answer: 7/12x

Question 5

Key idea: Replace each variable with its given value, then evaluate using the correct order of operations.

1. Write the formula: $A = \frac{1}{2}(a + b)h$ 2. Substitute the values: $A = \frac{1}{2}(5 + 11) \times 8$ 3. Simplify inside the brackets: $A = \frac{1}{2} \times 16 \times 8$ 4. Evaluate: $A = 64$

Answer: The area of the trapezium is 64 cm^2.

Question 6

Key idea: Use inverse operations in reverse order to isolate the desired variable, undoing the outermost operation first.

1. Square both sides to remove the square root: $v^2 = u^2 + 2as$ 2. Subtract u^2 from both sides: $v^2 - u^2 = 2as$ 3. Divide both sides by 2a: $s = (v^2 - u^2)/(2a)$

Answer: $s = (v^2 - u^2)/(2a)$

Question 7

Key idea: Rearrange using inverse operations, working from the outside in to isolate L.

1. Divide both sides by 2π: $(T)/(2\pi) = \sqrt{(L/g)}$ 2. Square both sides to remove the square root: $(T^2)/(4\pi^2) = L/g$ 3. Multiply both sides by g: $L = (T^2\ g)/(4\pi^2)$

Answer: $L = (T^2\ g)/(4\pi^2)$

Question 8

Answer: (a) $3x/5$ (b) $2a/3$ (c) $8/x$

Question 9

Answer: (a) $5x/6$ (b) $3a/20$ (c) $7m/12$ $((9m + 2m - 4m)/(12))$

Question 10

Answer: (a) $(7x - 1)/(10)$ (b) $(2y + 13)/(12)$ (c) $(x + 10)/(6)$