

Exercise 14.4

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Find and correct the errors in the following mathematical statements.

1. $4(x - 5) = 4x - 5$

Solution:

$$4(x - 5) = 4x - 20 \neq 4x - 5 = \text{RHS}$$

The correct statement is $4(x - 5) = 4x - 20$

2. $x(3x + 2) = 3x^2 + 2$

Solution:

$$\text{LHS} = x(3x + 2) = 3x^2 + 2x \neq 3x^2 + 2 = \text{RHS}$$

The correct solution is $x(3x + 2) = 3x^2 + 2x$

3. $2x + 3y = 5xy$

Solution:

$$\text{LHS} = 2x + 3y \neq \text{R. H. S}$$

The correct statement is $2x + 3y = 2x + 3y$

4. $x + 2x + 3x = 5x$

Solution:

$$\text{LHS} = x + 2x + 3x = 6x \neq \text{RHS}$$

The correct statement is $x + 2x + 3x = 6x$

5. $5y + 2y + y - 7y = 0$

Solution:

$$\text{LHS} = 5y + 2y + y - 7y = y \neq \text{RHS}$$

The correct statement is $5y + 2y + y - 7y = y$

6. $3x + 2x = 5x^2$

Solution:

$$\text{LHS} = 3x + 2x = 5x \neq \text{RHS}$$

The correct statement is $3x + 2x = 5x$

7. $(2x)^2 + 4(2x) + 7 = 2x^2 + 8x + 7$

Solution:

$$\text{LHS} = (2x)^2 + 4(2x) + 7 = 4x^2 + 8x + 7 \neq \text{RHS}$$

The correct statement is $(2x)^2 + 4(2x) + 7 = 4x^2 + 8x + 7$

8. $(2x)^2 + 5x = 4x + 5x = 9x$

Solution:

$$\text{LHS} = (2x)^2 + 5x = 4x^2 + 5x \neq 9x = \text{RHS}$$

The correct statement is $(2x)^2 + 5x = 4x^2 + 5x$

9. $(3x + 2)^2 = 3x^2 + 6x + 4$

Solution:

$$\text{LHS} = (3x + 2)^2 = (3x)^2 + 2^2 + 2 \times 2 \times 3x = 9x^2 + 4 + 12x \neq \text{RHS}$$

The correct statement is $(3x + 2)^2 = 9x^2 + 4 + 12x$

10. Substituting $x = -3$ in

(a) $x^2 + 5x + 4$ gives $(-3)^2 + 5(-3) + 4 = 9 + 2 + 4 = 15$

(b) $x^2 - 5x + 4$ gives $(-3)^2 - 5(-3) + 4 = 9 - 15 + 4 = -2$

(c) $x^2 + 5x$ gives $(-3)^2 + 5(-3) = -9 - 15 = -24$

Solution:

(a) Substituting $x = -3$ in $x^2 + 5x + 4$, we have

$$x^2 + 5x + 4 = (-3)^2 + 5(-3) + 4 = 9 - 15 + 4 = -2. \text{ This is the correct answer.}$$

(b) Substituting $x = -3$ in $x^2 - 5x + 4$

$$x^2 - 5x + 4 = (-3)^2 - 5(-3) + 4 = 9 + 15 + 4 = 28. \text{ This is the correct answer}$$

(c) Substituting $x = -3$ in $x^2 + 5x$

$$x^2 + 5x = (-3)^2 + 5(-3) = 9 - 15 = -6. \text{ This is the correct answer}$$

11. $(y - 3)^2 = y^2 - 9$

Solution:

LHS = $(y - 3)^2$, which is similar to $(a - b)^2$ identity, where $(a - b)^2 = a^2 + b^2 - 2ab$.

$$(y - 3)^2 = y^2 + (3)^2 - 2y \times 3 = y^2 + 9 - 6y \neq y^2 - 9 = \text{RHS}$$

The correct statement is $(y - 3)^2 = y^2 + 9 - 6y$

12. $(z + 5)^2 = z^2 + 25$

Solution:

LHS = $(z + 5)^2$, which is similar to $(a + b)^2$ identity, where $(a + b)^2 = a^2 + b^2 + 2ab$.

$$(z + 5)^2 = z^2 + 5^2 + 2 \times 5 \times z = z^2 + 25 + 10z \neq z^2 + 25 = \text{RHS}$$

The correct statement is $(z + 5)^2 = z^2 + 25 + 10z$

13. $(2a + 3b)(a - b) = 2a^2 - 3b^2$

Solution:

$$\begin{aligned} \text{LHS} &= (2a + 3b)(a - b) = 2a(a - b) + 3b(a - b) \\ &= 2a^2 - 2ab + 3ab - 3b^2 \\ &= 2a^2 + ab - 3b^2 \\ &\neq 2a^2 - 3b^2 = \text{RHS} \end{aligned}$$

The correct statement is $(2a + 3b)(a - b) = 2a^2 + ab - 3b^2$

14. $(a + 4)(a + 2) = a^2 + 8$

Solution:

$$\begin{aligned} \text{LHS} &= (a + 4)(a + 2) = a(a + 2) + 4(a + 2) \\ &= a^2 + 2a + 4a + 8 \\ &= a^2 + 6a + 8 \\ &\neq a^2 + 8 = \text{RHS} \end{aligned}$$

The correct statement is $(a + 4)(a + 2) = a^2 + 6a + 8$

15. $(a - 4)(a - 2) = a^2 - 8$

Solution:

$$\begin{aligned}\text{LHS} &= (a - 4)(a - 2) = a(a - 2) - 4(a - 2) \\ &= a^2 - 2a - 4a + 8 \\ &= a^2 - 6a + 8 \\ &\neq a^2 - 8 = \text{RHS}\end{aligned}$$

The correct statement is $(a - 4)(a - 2) = a^2 - 6a + 8$

16. $\frac{3x^2}{3x^2} = 0$

Solution:

$$\text{LHS} = \frac{3x^2}{3x^2} = 1 \neq 0 = \text{RHS}$$

The correct statement is $\frac{3x^2}{3x^2} = 1$

17. $\frac{3x^2+1}{3x^2} = 1 + 1 = 2$

Solution:

$$\text{LHS} = \frac{3x^2+1}{3x^2} = \frac{3x^2}{3x^2} + \frac{1}{3x^2} = 1 + \frac{1}{3x^2} \neq 2 = \text{RHS}$$

The correct statement is $\frac{3x^2+1}{3x^2} = 1 + \frac{1}{3x^2}$

18. $\frac{3x}{3x+2} = \frac{1}{2}$

Solution:

$$\text{LHS} = \frac{3x}{3x+2} \neq \frac{1}{2} = \text{RHS}$$

The correct statement is $\frac{3x}{3x+2} = \frac{3x}{3x+2}$

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

Solution:

$$\text{LHS} = \frac{3}{4x+3} \neq \frac{1}{4x}$$

The correct statement is $\frac{3}{4x+3} = \frac{3}{4x+3}$

20. $\frac{4x+5}{4x} = 5$

Solution:

$$\text{LHS} = \frac{4x+5}{4x} = 4x/4x + 5/4x = 1 + \frac{5}{4x} \neq 5 = \text{RHS}$$

The correct statement is $\frac{4x+5}{4x} = 1 + \frac{5}{4x}$

21. $\frac{7x+5}{5} = 7x$

Solution:

$$\text{LHS} = \frac{7x+5}{5} = 7x/5 + 5/5 = \frac{7x}{5} + 1 \neq 7x = \text{RHS}$$

The correct statement is $\frac{7x+5}{5} = \frac{7x}{5} + 1$