ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

CLASS 8

SUBJECT :Algebra & Geometry **Work sheet 24 answer key**

Marks:15 **Revision – Algebraic identities continued** **Date:11.5.2020**

Answer all the following questions(1×15=15)

1. Multiply $6x^3 - y + 3x^2y$ by $x^2 + y^2$.
   (A) $6x^5 - 3x^4y - 6x^3y^2 + 2x^2y^3 - y^4$
   (B) $6x^5 + 3x^4y + 6x^3y^2 - x^2y + 3x^2y^3 - y^3$
   (C) $6x^5 - 3x^4y + 6x^3y^2 + 2x^2y^3 - y^5$
   (D) $6x^5 + 3x^4y - 6x^3y^2 + 2x^2y^3 - y^5$

2. If $3x + 4y = 18$ and $xy = 6$, find the value of $9x^2 + 16y^2$.
   (A) 180 (B) 144
   (C) 324 (D) 170

3. Simplify :
   $$\left[2x^2 - \frac{1}{400}y^2\right]^2 - \left[2x^2 + \frac{1}{400}y^2\right]^2$$
   (A) $-\frac{x^2y^2}{40}$ (B) $-\frac{x^2y^2}{50}$
   (C) $\frac{xy}{50}$ (D) $-\frac{x^2y^2}{5}$

4. Square of $9x - 7xy$ is
   (A) $81x^2 + 49x^2y^2$
   (B) $81x^2 - 49x^2y^2$
   (C) $81x^2 + 49x^2y^2 - 126x^2y$
   (D) $81x^2 + 49x^2y^2 - 63x^2y$

5. If $x^2 + \frac{1}{x^2} = 53$, find the value of $x - \frac{1}{x}$.
   (A) $\sqrt{51}$ (B) $\sqrt{53}$
   (C) $\sqrt{61}$ (D) $\sqrt{63}$

6. If $3x - 7y = 10$ and $xy = -1$, then the value of $9x^2 + 49y^2$ is ____.
   (A) 58 (B) 142
   (C) 104 (D) – 104

7. The product of $(x^2 + 3x + 5)$ and $(x^2 - 1)$ is ____.
   (A) $x^4 + 3x^3 - 4x^2 - 3x - 5$
   (B) $x^4 + 3x^3 + 4x^2 - 3x - 5$
   (C) $x^4 + 3x^3 + 4x^2 + 3x - 5$
   (D) $x^4 + x^3 + x + 5$

8. Find the missing term in the following problem.
   $$\left(\frac{3x}{4} - \frac{4y}{3}\right)^2 = \frac{9x^2}{16} + \frac{16y^2}{9} + \underline{\quad ? \quad}$$
   (A) $2xy$ (B) $-2xy$
   (C) $12xy$ (D) $-12xy$

9. What should be added to $4p^2 + 5p + 7$ to get $7p^2 + 2p + 9$?
   (A) $3p^2 - 3p + 2$ (B) $3p^2 + 3p + 2$
   (C) $-3p^2 + 3p - 2$ (D) $3p^2 - 3p - 2$

10. Simplify :
    $$\frac{3}{2}x^2(x^2-1) + \frac{1}{4}x^2(x^2+x) - \frac{3}{4}x(x^3-1)$$
    (A) $x^4 + \frac{1}{2}x^3 + \frac{1}{4}x^2 + x$
    (B) $2x^4 + \frac{1}{4}x^3 - \frac{3}{4}x^2 + \frac{1}{4}x$
    (C) $x^4 + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$
    (D) $2x^4 + \frac{3}{4}x^3 - \frac{1}{4}x^2 + \frac{3}{4}x$

11. What must be subtracted from $x^4 + 2x^2 - 3x + 7$ to get $x^3 + x^2 + x - 1$?

(A) $x^4 - x^3 + x^2 - 4x + 8$
(B) $x^3 + x^2 - 4x + 8$
(C) $x^4 - x^3 + x^2 + 4x - 8$
(D) $x^4 - x^3 - x^2 + 4x - 8$

12. If $x + \frac{1}{x} = 5$, find the value of $x^4 + \frac{1}{x^4}$.

(A) 144 (B) 400
(C) 236 (D) 527

13. Multiply : $\left(4x + \frac{3y}{5}\right)$ and $\left(3x - \frac{4y}{5}\right)$

(A) $12x^2 + \frac{7xy}{5} - \frac{12y^2}{25}$

(B) $12x^2 + \frac{7xy}{5} + \frac{12y^2}{5}$

(C) $12x^2 - \frac{7xy}{5} - \frac{12y^2}{25}$

(D) None of these

14. Add : $5x^2 - \frac{1}{3}x + \frac{5}{2}, -\frac{1}{2}x^2 + \frac{1}{2}x - \frac{1}{3}$ and $-2x^2 + \frac{1}{5}x - \frac{1}{6}$.

(A) $\frac{5}{2}x^2 + \frac{11}{30}x + 2$

(B) $\frac{3}{2}x^2 + \frac{30}{11}x + 3$

(C) $\frac{5}{2}x^2 + \frac{13}{30}x + 1$

(D) $\frac{3}{4}x^2 + \frac{12}{11}x + 5$

15. Find the value of a if $pqa = (3p + q)^2 - (3p - q)^2$.

(A) 11 (B) 21
(C) 10 (D) 12

1. (B) : $(6x^3 - y + 3x^2y) \times (x^2 + y^2)$
$= x^2(6x^3 + 3x^2y - y) + y^2(6x^3 + 3x^2y - y)$
$= 6x^5 + 3x^4y - x^2y + 6x^3y^2 + 3x^2y^3 - y^3$

2. (A) : We have, $3x + 4y = 18$ ...(i)

$xy = 6$ ...(ii)

Squaring both sides of (i), we get

$(3x)^2 + (4y)^2 + 2 \times 3x \times 4y = (18)^2 = 9x^2 + 16y^2 + 24xy = 324$

$9x^2 + 16y^2 + 24(6) = 324$ (Using (ii))

$9x^2 + 16y^2 + 144 = 324 \Rightarrow 9x^2 + 16y^2 = 180$

3. (B) : $\left[2x^2 - \frac{1}{400}y^2\right]^2 - \left[2x^2 + \frac{1}{400}y^2\right]^2$

$= \left[2x^2 - \frac{1}{400}y^2 + 2x^2 + \frac{1}{400}y^2\right] \times \left[2x^2 - \frac{1}{400}y^2 - 2x^2 - \frac{1}{400}y^2\right]$

$= [4x^2]\left[-\frac{2}{400}y^2\right] = \frac{-8x^2y^2}{400} = -\frac{x^2y^2}{50}$

4. (C) : $(9x - 7xy)^2 = (9x)^2 - 2 \times 9x \times 7xy + (7xy)^2$

$= 81x^2 - 126x^2y + 49x^2y^2$

5. (A) : $\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 = 53 - 2 = 51$

$\Rightarrow \quad x - \frac{1}{x} = \sqrt{51}$.

6. (A) : We have, $3x - 7y = 10$ ...(i)

and $xy = -1$ ...(ii)

Squaring both sides of (i), we get

$(3x)^2 + (7y)^2 - 2 \times 3x \times 7y = 10^2$

or $9x^2 + 49y^2 - 42xy = 100$

or $9x^2 + 49y^2 - 42(-1) = 100$ (Using (ii))

or $9x^2 + 49y^2 + 42 = 100$

$\therefore \quad 9x^2 + 49y^2 = 100 - 42 = 58$

7. (B) : $(x^2 + 3x + 5)(x^2 - 1) = x^4 - x^2 + 3x^3 - 3x + 5x^2 - 5$

Grouping like terms, we get,

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

8. (B) : We have, $\left(\frac{3x}{4} - \frac{4y}{3}\right)^2$

$= \left(\frac{3x}{4}\right)^2 + \left(\frac{4y}{3}\right)^2 - 2 \times \frac{3x}{4} \times \frac{4y}{3} = \frac{9x^2}{16} + \frac{16y^2}{9} + (-2xy)$

9. (A) : Let the expression to be added is x.

$\Rightarrow \quad 4p^2 + 5p + 7 + x = 7p^2 + 2p + 9$

$\Rightarrow \quad x = 7p^2 + 2p + 9 - 4p^2 - 5p - 7$

$\Rightarrow \quad x = 3p^2 - 3p + 2$ is the required expression.

10. (C) : We have, $\frac{3}{2}x^2(x^2 - 1) + \frac{1}{4}x^2(x^2 + x) - \frac{3}{4}x(x^3 - 1)$

$= \frac{3}{2}x^4 - \frac{3}{2}x^2 + \frac{1}{4}x^4 + \frac{1}{4}x^3 - \frac{3}{4}x^4 + \frac{3}{4}x$

$= \frac{3}{2}x^4 + \frac{1}{4}x^4 - \frac{3}{4}x^4 + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$

$= \frac{6x^4 + x^4 - 3x^4}{4} + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$

$= x^4 + \frac{1}{4}x^3 - \frac{3}{2}x^2 + \frac{3}{4}x$

11. (A) : Required expression

$= (x^4 + 2x^2 - 3x + 7) - (x^3 + x^2 + x - 1)$

$= x^4 + 2x^2 - 3x + 7 - x^3 - x^2 - x + 1$

$= x^4 - x^3 + 2x^2 - x^2 - 3x - x + 7 + 1 = x^4 - x^3 + x^2 - 4x + 8$

12. (D) : We have, $x + \frac{1}{x} = 5$

Squaring both sides, we get $\left(x + \frac{1}{x}\right)^2 = 25$

$\Rightarrow \quad x^2 + \frac{1}{x^2} + 2x \times \frac{1}{x} = 25$

$\Rightarrow \quad x^2 + \frac{1}{x^2} + 2 = 25 \Rightarrow x^2 + \frac{1}{x^2} = 23$

Again squaring both sides, we get, $\left(x^2 + \frac{1}{x^2}\right)^2 = (23)^2$

$\Rightarrow \quad x^4 + \frac{1}{x^4} + 2x^2 \times \frac{1}{x^2} = 529$

$\Rightarrow \quad x^4 + \frac{1}{x^4} = 529 - 2 \Rightarrow x^4 + \frac{1}{x^4} = 527.$

13. (C) : $\left(4x + \frac{3y}{5}\right) \times \left(3x - \frac{4y}{5}\right)$

$= 4x\left(3x - \frac{4y}{5}\right) + \frac{3y}{5}\left(3x - \frac{4y}{5}\right)$

$= 12x^2 - \frac{16xy}{5} + \frac{9xy}{5} - \frac{12y^2}{25} = 12x^2 - \frac{7xy}{5} - \frac{12y^2}{25}.$

14. (A) : Required sum

$= \left(5x^2 - \frac{1}{3}x + \frac{5}{2}\right) + \left(-\frac{1}{2}x^2 + \frac{1}{2}x - \frac{1}{3}\right) + \left(-2x^2 + \frac{1}{5}x - \frac{1}{6}\right)$

$= 5x^2 - \frac{1}{2}x^2 - 2x^2 - \frac{1}{3}x + \frac{1}{2}x + \frac{1}{5}x + \frac{5}{2} - \frac{1}{3} - \frac{1}{6}$

[Collecting like terms]

$= \left(5 - \frac{1}{2} - 2\right)x^2 + \left(-\frac{1}{3} + \frac{1}{2} + \frac{1}{5}\right)x + \left(\frac{5}{2} - \frac{1}{3} - \frac{1}{6}\right)$

$= \left(\frac{10 - 1 - 4}{2}\right)x^2 + \left(\frac{-10 + 15 + 6}{30}\right)x + \left(\frac{15 - 2 - 1}{6}\right)$

$= \frac{5}{2}x^2 + \frac{11}{30}x + 2$

15. (D) : We have, $pqa = (3p + q)^2 - (3p - q)^2$

$= (3p + q + 3p - q)(3p + q - 3p + q)$

[Using $x^2 - y^2 = (x + y)(x - y)$]

$= 6p \times 2q \Rightarrow pqa = 12pq$

$\therefore \quad a = \frac{12pq}{pq} = 12.$

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