



CREST Mathematics Olympiad (CMO) Worksheet *for* Class 7



Topic

Algebraic Expressions



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Worksheet on Algebraic Expressions

1. What is the area of a square field if the length of each side is $(ax + by - c)$ units?
 - a. $[a^2x^2 + b^2y^2 + 2abxy + 2acx - 2bcy + c^2]$ sq. units
 - b. $[a^2x^2 + b^2y^2 + 2abxy - 2acx - 2bcy + c^2]$ sq. units
 - c. $[a^2x^2 + b^2y^2 + 2abxy - 2acx + 2bcy + c^2]$ sq. units
 - d. $[a^2x^2 + b^2y^2 - 2abxy + 2acx - 2bcy + c^2]$ sq. units
2. If the length of a rectangle is $(4x - 13y)$ units and the perimeter is $(8x + 128y)$ units, what is the breadth of the rectangle?
 - a. $51y$ units
 - b. $(x + 51y)$ units
 - c. $77y$ units
 - d. $(x + 77y)$ units
3. In an auditorium, $(p + t)$ seats are arranged in $(p - t)$ rows. How many seats are there in the auditorium?
 - a. $p^2 - 2pt - t^2$
 - b. $p^2 + 2pt - t^2$
 - c. $p^2 - t^2$
 - d. $t^2 - p^2$
4. What is the cost of $(q - 3)$ cups if the cost of q cups is $\$(11q^3 - 9pq)$?
 - a. $\$(11q^3 + 33q^2 - 9pq + 27p)$
 - b. $\$(11q^3 - 33q^2 + 9pq + 27p)$
 - c. $\$(11q^3 + 33q^2 - 9pq + 27p)$
 - d. $\$(11q^3 - 33q^2 - 9pq + 27p)$
5. What must be added to $3y^3 - 5y^2 + 4y + 7$ to get $7y^3 + 9y - 13$?
 - a. $y(4y^2 - 5y - 5) + 20$
 - b. $y(4y^2 + 5y + 5) - 20$
 - c. $y(4y^2 + 5y - 5) - 20$
 - d. $y(4y^2 + 5y - 5) + 20$

Answer Key

1. b - $[a^2x^2 + b^2y^2 + 2abxy - 2acx - 2bcy + c^2]$ sq. units

Explanation: Length of each side = $(ax + by - c)$ units
Area of a square field = $(\text{Length of each side})^2$
 $= (ax + by - c)^2$
 $= (ax + by - c) \times (ax + by - c)$
 $= ax(ax + by - c) + by(ax + by - c) - c(ax + by - c)$
 $= a^2x^2 + abxy - acx + abxy + b^2y^2 - bcy - acx - bcy + c^2$

$$\begin{aligned}
&= a^2x^2 + b^2y^2 + abxy + abxy - acx - acx - bcy - bcy + c^2 \\
&= a^2x^2 + b^2y^2 + (1 + 1)abxy - (1 + 1)acx - (1 + 1)bcy + c^2 \\
&= [a^2x^2 + b^2y^2 + 2abxy - 2acx - 2bcy + c^2] \text{ sq. units}
\end{aligned}$$

2. $c - 77y$ units

Explanation: Perimeter of the rectangle = $(8x + 128y)$ units

$$\Rightarrow 2(\text{Length} + \text{Breadth}) = 8x + 128y$$

$$\Rightarrow 2(4x - 13y + \text{Breadth}) = 8x + 128y$$

$$\Rightarrow 4x - 13y + \text{Breadth} = \frac{8x + 128y}{2}$$

$$\Rightarrow 4x - 13y + \text{Breadth} = 4x + 64y$$

$$\Rightarrow \text{Breadth} = 4x + 64y - 4x + 13y$$

$$\Rightarrow \text{Breadth} = 77y \text{ units}$$

3. $c - p^2 - t^2$

Explanation: Number of seats = $p + t$

Number of rows = $p - t$

Total number of seats = Number of seats $\times$ Number of rows

$$= (p + t)(p - t)$$

$$= p(p - t) + t(p - t)$$

$$= p^2 - pt + pt - t^2$$

$$= p^2 - t^2$$

4. $d - \$ (11q^3 - 33q^2 - 9pq + 27p)$

Explanation: Cost of q cups = $\$(11q^3 - 9pq)$

Cost of 1 cup = $\$[(11q^3 - 9pq)/q] = \$(11q^2 - 9p)$

Cost of $(q - 3)$ cups = $(q - 3) \times (11q^2 - 9p)$

$$= q \times (11q^2 - 9p) - 3 \times (11q^2 - 9p)$$

$$= 11q^3 - 9pq - 33q^2 + 27p$$

$$= \$(11q^3 - 33q^2 - 9pq + 27p)$$

5. $b - y(4y^2 + 5y + 5) - 20$

Explanation: Required algebraic expressions = $(7y^3 + 9y - 13) - (3y^3 - 5y^2 + 4y + 7)$

$$= 7y^3 + 9y - 13 - 3y^3 + 5y^2 - 4y - 7$$

$$= 7y^3 - 3y^3 + 5y^2 + 9y - 4y - 13 - 7$$

$$= 4y^3 + 5y^2 + 5y - 20$$

$$= y(4y^2 + 5y + 5) - 20$$

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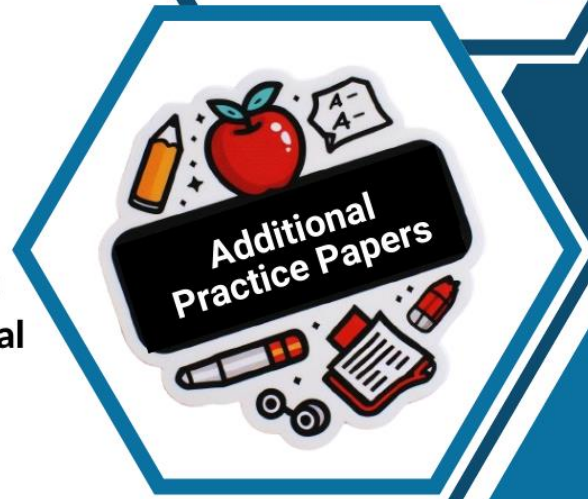
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