

CCSS Math Samples — Algebra

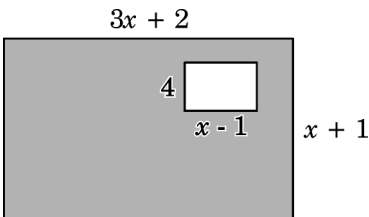
1. Simplify: $(3a^2b - 6ab^2) - (5 + 7ab^2 - 3a^2b)$

- (A) $-13ab^2 - 5$ (B) $3ab^2 - 5$
 (C) $6a^2b - 13ab^2 - 5$ (D) $6a^2b + ab^2 - 5$

2. Simplify:
 $(-4nk + 3k^2) - [(nk - 3k^2) + (k^2 - nk)]$

- (A) $-6nk + 7k^2$ (B) $-4nk + k^2$
 (C) $5k^2 - 4nk$ (D) $4nk - kk^2$

3. Find the area of the shaded region in terms of x .



- (A) $x^2 + x + 2$ (B) $4x^2 - x + 3$
 (C) $3x^2 + x + 6$ (D) $3x^2 + 9x - 2$

4. If $9m^2 - \frac{6}{5}m + C$ is a perfect square, what is C ?

- (A) $\frac{36}{25}$ (B) $\frac{9}{100}$ (C) $\frac{1}{625}$ (D) $\frac{1}{25}$

5. A banquet for a group of network executives is being catered as follows:

For 100 or less attending the cost is a flat \$200 per person. For every person over 100 attending the cost will be reduced by one dollar a person for each person over 100.

- a) What number of executives should attend if the caterer is to maximize the amount of money they make?
 b) What is the maximum amount of money the caterer can make?

6. Consider the following inequality and equation:

$$y < x - 2$$

$$y = -2x + 4$$

- a) Show the solution of the system on a graph
 b) Describe the solution of the system in words

7. You bought your home for \$420,000 and its value increases each year by 8%. Approximately, how many years will it take for the house to be worth \$600,000?

- (A) 4.6 years (B) 4.8 years
 (C) 5.0 years (D) 5.2 years

8. Complete the table.

Polynomial	Factors
$x^2 - 25$	
$x^2 - 25y^2$	
$x^2y^2 - 25$	
$4x^2 - 100$	
$3x^2y^3 - 75y^3$	

9. Use synthetic division to divide $2x^4 - 17x^2 - 5$ by $x - 3$.

(A) $Q(x) = 2x^3 + 6x^2 + x + 3$ R 4

(B) $Q(x) = 2x^3 + 6x^2 + x - 3$ R 4

(C) $Q(x) = 2x^3 + 3x^2 - x + 9$ R 7

(D) $Q(x) = x^3 + 4x^2 - 19$ R 1

10. According to the rational root theorem, a list of all the possible rational roots of the equation $2x^3 - 5x^2 + 3x - 5 = 0$ is:

(A) $\pm 1, \pm 2$

(B) $\pm 1, \pm 5$

(C) $\pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}$

(D) $\pm 1, \pm 2, \pm 5, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{1}{2}, \pm \frac{5}{2}$

11. Using the Binomial Theorem, what is the expansion of $(2x - y)^5$?

(A) $32x^5 - 80x^4y + 80x^3y^2 - 40x^2y^3 + 10xy^4 - y^5$

(B) $x^5 + 5x^4y - 10x^3y^2 + 10x^2y^3 - 5xy^4 + y^5$

(C) $2x^5 - 10x^4y + 20x^3y^2 - 20x^2y^3 + 10xy^4 - 2y^5$

(D) $5x^5 - 10x^4y + 100x^3y^2 - 100x^2y^3 + 10xy^4 - 5y^5$

12. Multiply: $\frac{x^2 - 4x + 4}{x - 6} \times \frac{x^2 - 36}{x^2 - 8x + 12}$

(A) $\frac{(x - 2)(x + 6)}{x - 6}$ (B) $\frac{x + 2}{x - 6}$

(C) $\frac{x - 2}{x + 6}$ (D) $x - 6$

13. Simplify: $5 - \frac{3x + 4y}{x + 3y}$

(A) $\frac{2x + 11y}{x + 3y}$ (B) $\frac{33}{4}$

(C) $\frac{9}{2}$ (D) $7x + 11y$

14. A plane leaves an airport at 1pm traveling at 400 mph. One hour later, another plane leaves on the same course traveling at 440 mph. At what time will they be 50 miles apart?

(A) 9:45 pm (B) 10 pm
(C) 10:45 pm (D) 11 pm

15. Make up a word problem that the following equation could represent:

$$x(7x + 3) = 91$$

16. Solve by completing the square.

- a) $x^2 + x = 6$
b) $4x^2 - 4x = 3$
c) $3x^2 = 7x - 4$

17. A farmer is going to plant a small orchard, and is gathering information about the amount of fruit she can expect to harvest each year once the trees mature. She is advised that, if she plants up to 60 trees of a particular type on her plot of land, the average harvest from each tree will be about 120 kg. For each additional tree planted the expected yield will go down by an average of 2 kg per tree, as a result of overcrowding. Naturally she wants to plan for the maximum yield of fruit. How many trees should she plant?

18. $x + 2y - 2z = -2$
 $x + z = 3$
 $x - 2y - 2z = 2$

What is the augmented matrix for the system of equations?

(A) $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & -2 & -2 \\ 1 & 0 & 1 & 3 \\ 1 & -2 & -2 & 2 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & -2 & -2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

19. Y is equal to the sum of three quantities, one of which is a constant, one of which varies as x , and one of which varies inversely as x . Given Y is 17 when $x = 1$, Y is 14 when $x = 2$, and Y is 13 when $x = 3$. What is the relation between x and Y?

20. Solve the following system of equations for y :

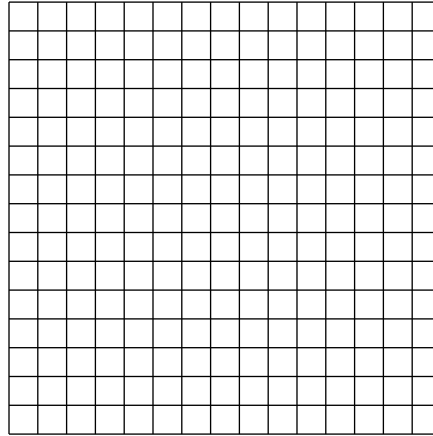
$$\begin{aligned} 3x + 2y - 4z &= 11 \\ 2x - y + 3z &= 0 \\ x + 3y - 5z &= 8 \end{aligned}$$

(A) $-\frac{1}{2}$ (B) $-1\frac{1}{2}$ (C) $1\frac{1}{2}$ (D) $\frac{1}{2}$

21. Addams High School started a recycling program to raise money and reduce waste. During the previous year, students sent 35,000 pounds of trash to the landfill. Officials project that the school will reduce waste by 20% each year.

- a) Complete the table and create a graph that shows the projected waste reduction over the next 5 years. Label and mark your axes.

Year	Waste (lbs)
0	35000
1	
2	
3	
4	
5	



- b) Write an equation that shows waste (W) as a function of time in years (t).
- c) Addams' expects the waste reduction will level off at 7,000 pounds. How many years does Addams High School expect this to take?

22. Rebecca was called to the whiteboard to solve the equation $x = \sqrt{25 - 3x^2}$. Her work is shown below.

- 1) $x = \sqrt{25 - 3x^2}$
- 2) $x^2 = 25 - 3x^2$
- 3) $4x^2 = 25$
- 4) $x^2 = \frac{25}{4}$
- 5) $x = \pm \frac{5}{4}$

Is Rebecca's solution correct? Explain where she made her mistakes, if any, and find the correct solution.

23. Find the sum, accurate to 2 decimal places, of the nine terms of the geometric series having $t_1 = 15$ and $r = 1.2$.

- (A) 247.49 (B) 311.98
 (C) 389.38 (D) 562.58

24. Put the following in the form $a(x - h)^2 + k$.

- a) $y = 2x^2 - 24x + 69$
- b) $y = -x^2 + 6x - 8$
- c) $y = 3x^2 - 3x + \frac{23}{4}$

25. If $(-3, 5)$ is a solution to the system

$$\begin{aligned} px + qy &= -5 \\ px - qy &= -25 \end{aligned}$$

then the values of p and q are:

- (A) 5 and 2 (B) -5 and 2
 (C) -2 and -5 (D) 4 and $-\frac{1}{5}$

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Algebra

Num	Scoring	Standard	Answer
1	C	A.APR.01	$6a^2b - 13ab^2 - 5$
2	C	A.APR.01	$5k^2 - 4nk$
3	C	A.APR.01	$3x^2 + x + 6$
4	D	A.SSE.03B	$\frac{1}{25}$
5		A.CED.02	150; \$22,500
6		A.REI.12	[graph]; [answers vary]
7	A	A.CED.01	4.6 years
8		A.SSE.02	$(x + 5)(x - 5)$; $(x + 5y)(x - 5y)$; $(xy + 5)(xy - 5)$; $4(x + 5)(x - 5)$; $3y^3(x + 5)(x - 5)$
9	A	A.APR.02	$Q(x) = 2x^3 + 6x^2 + x + 3$ R 4
10	C	A.APR.03	$\pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}$
11	A	A.APR.05	$32x^5 - 80x^4y + 80x^3y^2 - 40x^2y^3 + 10xy^4 - y^5$
12	A	A.APR.07	$\frac{(x - 2)(x + 6)}{x - 6}$
13	A	A.APR.07	$\frac{2x + 11y}{x + 3y}$
14	A	A.CED.01	9:45 pm
15		A.CED.01	[answers vary]
16		A.REI.04B	$(-3, 2)$; $(-\frac{1}{2}, \frac{3}{2})$; $(1, \frac{4}{3})$
17		A.CED.03	30
18	C	A.REI.08	$\begin{bmatrix} 1 & 2 & -2 & -2 \\ 1 & 0 & 1 & 3 \\ 1 & -2 & -2 & 2 \end{bmatrix}$
19		A.CED.02	$Y = 11 + \frac{6}{x}$
20	A	A.REI.06	$-\frac{1}{2}$
21		A.CED.02	28000, 22400, 17920, 14336, 11469, [graph]; $W = 35000(0.8)^t$; 8 years
22		A.REI.01	Step 5, $x = \pm \frac{5}{2}$
23	B	A.SSE.04	311.98
24		A.REI.04A	$y = 2(x - 6)^2 - 3$; $y = -(x - 3)^2 + 1$; $y = 3(x - \frac{1}{2})^2 + 5$
25	A	A.REI.06	5 and 2