

# Algebra Review

1. Evaluate the expression  $\frac{3a+2b}{2}$  when  $a = -3$  and  $b = -4$ .

A)  $-\frac{1}{2}$

B)  $-\frac{17}{2}$

C)  $\frac{1}{2}$

D)  $\frac{17}{2}$

2. Simplify:  $3+5 \cdot 6-4$

A) 17

B) 29

C) 16

D) 30

3. Simplify:  $6-2 \cdot 2+2^5$

A) 40

B) 18

C) 34

D) 12

4. Evaluate:  $\frac{3x-y}{6z-x}$  if  $x = 2$ ,  $y = 8$ , and  $z = -2$ .

A)  $\frac{1}{7}$

B)  $-\frac{1}{7}$

C)  $\frac{1}{5}$

D)  $-\frac{1}{5}$

5. Simplify:  $\frac{14 - 30}{2(-4)}$

A)  $-2$

B)  $2$

C)  $\frac{11}{2}$

D)  $-\frac{11}{2}$

6. Use the distributive property to simplify.  $-3(x - 10) + x$

A)  $-4x + 30$

B)  $-4x - 30$

C)  $-2x + 30$

D)  $-2x - 30$

7. Simplify:  $8y - 2 - 3(y - 4)$

A)  $11y - 6$

B)  $5y - 6$

C)  $5y - 14$

D)  $5y + 10$

8. Write the fraction in lowest terms:  $\frac{36a^3bc^2}{24ab^4c^2}$

A)  $\frac{3b^2}{2a^3}$

B)  $\frac{2b^3}{3a^2}$

C)  $\frac{3a^2}{2b^3}$

D)  $\frac{2a^2}{3b^3}$

9. Solve for  $x$ :  $3(x + 1) = -6$
- A)  $-2$   
B)  $-3$   
C)  $1$   
D)  $\frac{7}{3}$
10. Add the polynomials:  $2a + 3b + 5a - 7b$
- A)  $7a - 4b$   
B)  $7a + 4b$   
C)  $3ab$   
D)  $7a - 10b$
11. Subtract the polynomials:  $(9x^2 - 4x + 11) - (3x^2 - 2x + 2)$
- A)  $6x^2 - 2x + 9$   
B)  $6x^2 - 2x + 13$   
C)  $6x^2 - 6x + 9$   
D)  $6x^2 - 6x + 13$
12.  $(x + 2)(x^2 - 2x + 4) =$
- A)  $x^3 + 8$   
B)  $x^3 + 4x^2 - 8x + 8$   
C)  $x^3 - 4x^2 + 8x + 8$   
D)  $x^3 + 8x + 8$
13. The difference of twice a number and six is four times the number. Find an equation to solve for the number.
- A)  $2x - 6 = 4$   
B)  $2x - 6 = 4x$   
C)  $2x + 6 = 4x$   
D)  $2x - 6 = x + 4$
14. Expand:  $(2x - 3)^2$
- A)  $4x^2 - 9$   
B)  $4x^2 + 9$   
C)  $2x^2 - 12x + 9$   
D)  $4x^2 - 12x + 9$

15. Which of the following numbers is the smallest?

A)  $-\frac{3}{4}$

B)  $-\frac{3}{2}$

C)  $-1$

D)  $-\frac{2}{3}$

16. Which of the following is the largest?

A)  $|5 - 2|$

B)  $|2 - 5|$

C)  $|-2 - 5|$

D)  $|5 - 2| + |2 - 5|$

17. Solve:  $3(x - 5) \leq x - 8$

A)  $x \leq \frac{7}{2}$

B)  $x \leq \frac{2}{7}$

C)  $x \leq -1$

D)  $x \geq -1$

18. A flower-bed is in the shape of a triangle with one side twice the length of the shortest side and the third side 15 feet longer than the shortest side. If the perimeter is 100 feet and if  $x$  represents the length of the shortest side, find an equation to solve for the lengths of the three sides.

A)  $x + 2x + x + 15 = 100$

B)  $x + 15 = 2x$

C)  $x + 15 + 2x = 100$

D)  $x + 2x = x + 115$

19. If John has \$50 more money than Mary and you choose to represent John's amount of money as  $X$  how should you represent Mary's amount of money in terms of  $X$ ?

A)  $X + \$50$

B)  $X - \$50$

C)  $\$50 - X$

D)  $\$50 \cdot X$

20. Multiply:  $2x(3x^2 - 5x - 3)$
- A)  $6x^3 - 5x^2 - 6x$
  - B)  $6x^3 - 5x - 3$
  - C)  $6x^3 - 10x^2 - 3x$
  - D)  $6x^3 - 10x^2 - 6x$
21. Divide:  $\frac{14m^2 - 28m^8 + 7m}{7m}$
- A)  $2m - 28m^8 + 7m$
  - B)  $2m - 4m^7 + 1$
  - C)  $2m - 4m^7$
  - D)  $2m^2 - 4m^8 + m$
22. Factor completely:  $12x^4 - 20x^3 + 4x^2$   
**One** factor is:
- A)  $4x^4$
  - B)  $3x + 1$
  - C)  $x - 1$
  - D)  $3x^2 - 5x + 1$
23. Factor completely:  $x^2 - 12x + 36$   
**One** factor is:
- A)  $6x$
  - B)  $x - 6$
  - C)  $x - 12$
  - D)  $x + 3$
24. Factor completely:  $7x^2 + 14x - 21$   
**One** factor is:
- A)  $7x$
  - B)  $x + 1$
  - C)  $x - 3$
  - D)  $x + 3$
25. Solve:  $x^2 - 3x - 10 = 0$   
**One** solution is:
- A)  $x = 10$
  - B)  $x = 1$
  - C)  $x = -2$
  - D)  $x = 2$

26. Solve:  $2x^2 - 5x = 0$

The solutions are:

- A)  $x = 0$
- B)  $x = 0, x = 5$
- C)  $x = 0, x = -5$
- D)  $x = 0, x = \frac{5}{2}$

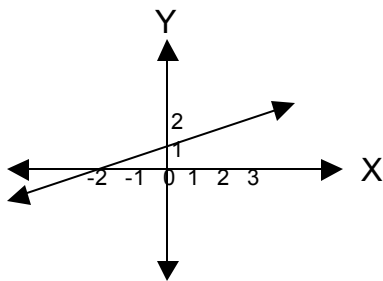
27. Simplify and reduce:  $\frac{3x^2 - 12}{9x + 18}$

- A)  $\frac{x-2}{6}$
- B)  $3x - \frac{2}{3}$
- C)  $\frac{x+2}{3}$
- D)  $\frac{x-2}{3}$

28. Given the equation  $-2x + 3y = 12$ , find the missing value in the ordered pair  $(-3, \underline{\quad})$

- A)  $-6$
- B)  $-2$
- C)  $6$
- D)  $2$

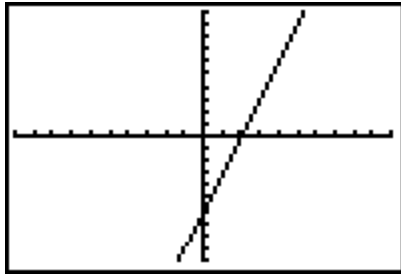
29. What are the coordinates of the x-intercept in the graph below?



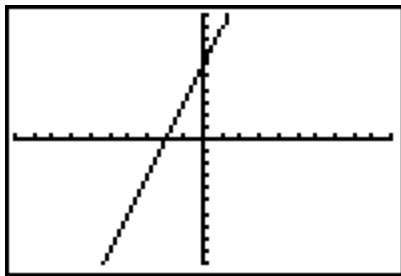
- A)  $(-1, 2)$
- B)  $(0, -2)$
- C)  $(-2, 0)$
- D)  $(0, 1)$

30. Graph the line  $3x + y = 6$ .

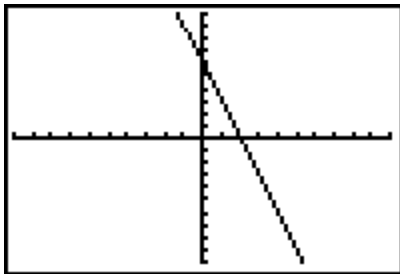
A)



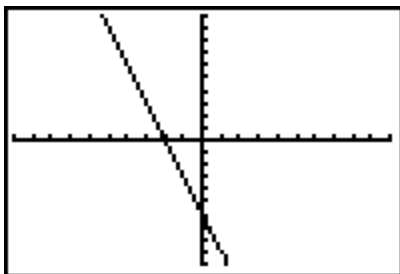
B)



C)



D)



31. Solve and simplify if possible:  $\frac{x^2}{x-3} - \frac{9}{x-3} =$

A)  $\frac{x}{-3} - \frac{3}{x}$

B)  $-1$

C)  $x+3$

D)  $x-3$

32. Solve the following system of equations for the y-value:  $x + 2y = 7$   
 $2x + 2y = 13$

A)  $y = \frac{1}{2}$

B)  $y = 6$

C)  $y = 5$

D)  $y = \frac{13}{4}$

33.  $\frac{5}{6a} - \frac{2}{3a^2} =$

A)  $\frac{3}{6a^2}$

B)  $\frac{3}{3a}$

C)  $\frac{1}{6a^2}$

D)  $\frac{5a-4}{6a^2}$

34.  $\frac{9b^2 - 3b}{3b} =$

A)  $9b^2 - 1$

B)  $3b - 1$

C)  $b - 1$

D)  $9b$

35. The DoBee.Com Corporation has 5 more than three times as many female as male supervisors. If “x” represents the number of male supervisors write an expression that would represent the total number of female supervisors in terms of “x”.

- A)  $x + 5$
- B)  $3x + 5$
- C)  $4x + 5$
- D)  $9x$

36. Which of the following is not an equivalent statement?

- A)  $4 - \frac{b^2}{25} = \left(2 - \frac{b}{5}\right)\left(2 + \frac{b}{5}\right)$
- B)  $x^5 - 3x^2 = x^2(x^3 - 3)$
- C)  $(x^4)^3 = x^7$
- D)  $x^{-4} = \frac{1}{x^4}$

37. Charles needs enough fencing to enclose a rectangular garden with a perimeter of 140 feet. If the width of his garden is to be 30 feet, write the equation that can be used to solve for the length of the garden.

- A)  $x + 30 = 140$
- B)  $2x + 30 = 140$
- C)  $2x + 60 = 140$
- D)  $140 - x = 60$

38. Which one of the following ordered pairs is **NOT** a solution for the equation:  
 $3x + y = 12$ ?

- A)  $\left(\frac{1}{2}, 10\frac{1}{2}\right)$
- B) (6,2)
- C) (12, -24)
- D) (2,6)

39. For what value(s) of x will each expression be undefined?  $\frac{x^2 + 4x + 4}{x^2 + x - 6}$

- A) 6
- B) -2
- C) -2 and 3
- D) 2 and -3

40. Which of the following is a factor of both expressions?  $x^2 + 4x - 5$   
 $2x^2 + 3x - 5$
- A)  $(x + 5)$   
B)  $(x - 5)$   
C)  $(x - 1)$   
D)  $(x - 3)$

## Solutions

### Elementary Algebra Sample Items

1. B Evaluate the expression  $\frac{3a + 2b}{2}$  when  $a = -3$  and  $b = -4$

$$\begin{aligned} & \frac{3(-3) + 2(-4)}{2} \\ & \frac{-9 + -8}{2} \\ & \frac{-17}{2} \end{aligned}$$

2. B Simplify:  $3 + 5 \cdot 6 - 4$

$$\begin{aligned} & 3 + 5 \cdot 6 - 4 \\ & 3 + 30 - 4 \\ & 33 - 4 = 29 \end{aligned}$$

3. C Simplify:  $6 - 2 \cdot 2 + 2^5$

$$\begin{aligned} & 6 - 2 \cdot 2 + 2^5 \\ & 6 - 2 \cdot 2 + 32 \\ & 6 - 4 + 32 \\ & 2 + 32 = 34 \end{aligned}$$

4. A  $\frac{3x - y}{6z - x}$  if  $x = 2$ ,  $y = 8$ , and  $z = -2$ .

$$\frac{3(2) - (8)}{6(-2)}$$

$$\frac{6 - 8}{-12 - 2}$$

$$\frac{-2}{-14} = 1/7$$

5. B Simplify:  $\frac{14 - 30}{2(-4)}$

$$\frac{14 - 30}{2(-4)}$$

$$\frac{-16}{-8} = 2$$

6. C Use the distributive property to simplify.  $-3(x - 10) + x$

$$-3(x - 10) + x$$

$$-3x + 30 + x$$

$$-2x + 30$$

7. D Simplify:  $8y - 2 - 3(y - 4)$

$$8y - 2 - 3(y - 4)$$

$$8y - 2 - 3y + 12$$

$$5y + 10$$

8. C Write the fraction in lowest terms:  $\frac{36a^3bc^2}{24ab^4c^2}$

$$\frac{36a^3bc^2}{24ab^4c^2}$$

$$\frac{3a^{3-1}c^{2-2}}{2b^{4-1}}$$

$$\frac{3a^2c^0}{2b^3}$$

$$\frac{3a^2}{2b^3}$$

9. B Solve for  $x$ :  $3(x+1) = -6$

$$3(x+1) = -6$$

$$3x+3 = -6$$

$$3x+3-(3) = -6-(3)$$

$$3x = -9$$

$$\frac{3x}{3} = \frac{-9}{3}$$

$$x = -3$$

10. A Add the polynomials:  $2a + 3b + 5a - 7b$

$$2a + 3b + 5a - 7b$$

$$(2+5)a + (3-7)b$$

$$7a - 4b$$

11. A Subtract the polynomials:  $(9x^2 - 4x + 11) - (3x^2 - 2x + 2)$

$$(9x^2 - 4x + 11) - (3x^2 - 2x + 2)$$

$$9x^2 - 4x + 11 - 3x^2 + 2x - 2$$

$$6x^2 - 2x + 9$$

12. A  $(x+2)(x^2 - 2x + 4)$

$$(x+2)(x^2 - 2x + 4)$$

$$x^3 - 2x^2 + 4x + 2x^2 - 4x + 8$$

$$x^3 + 0x^2 + 0x + 8$$

$$x^3 + 8$$

13. B The difference of twice a number and six is four times the number.  
Find an equation to solve for the number.

Difference means subtract, is means equal

Therefore  $2x - 6 = 4x$

14. D Expand:  $(2x - 3)^2$

$$\begin{aligned}(2x - 3)^2 \\ (2x - 3)(2x - 3) \\ 4x^2 - 6x - 6x + 9 \\ 4x^2 - 12x + 9\end{aligned}$$

15. B Which of the following numbers is the smallest?  
Make all of the numbers have common denominators and compare.

$$\begin{aligned}-\frac{3}{4} &= -\frac{9}{12} \\ -\frac{3}{2} &= -\frac{18}{12} \rightarrow \text{This is the smallest number since } -18 \text{ is the smallest numerator} \\ -1 &= -\frac{12}{12} \\ -\frac{2}{3} &= -\frac{8}{12}\end{aligned}$$

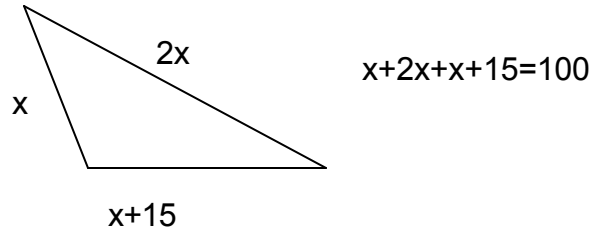
16. C Which of the following is the largest?  
Solve each absolute value and compare results. Remember absolute value is always positive.

$$\begin{aligned}|5 - 2| &= |3| = 3 \\ |2 - 5| &= |-3| = 3 \\ |-2 - 5| &= |-7| = 7 \text{ ? This is the largest} \\ |5 - 2| + |2 - 5| &= |3| + |-3| = 3 + 3 = 6\end{aligned}$$

17. A Solve:  $3(x - 5) \leq x - 8$

$$\begin{aligned}3(x - 5) &\leq x - 8 \\ 3x - 15 &\leq x - 8 \\ 3x - x - 15 &\leq x - x - 8 \\ 2x - 15 &\leq -8 \\ 2x - 15 + 15 &\leq -8 + 15 \\ 2x &\leq 7 \\ \frac{2x}{2} &\leq \frac{7}{2} \\ x &\leq \frac{7}{2}\end{aligned}$$

18. A A flower-bed is in the shape of a triangle with one side twice the length of the shortest side and the third side 15 feet longer than the shortest side. If the perimeter is 100 feet and if  $x$  represents the length of the shortest side, find an equation to solve for the lengths of the three sides.



19. B If John has \$50 more money than Mary and you choose to represent John's amount of money as  $X$  how should you represent Mary's amount of money in terms of  $X$ ?

If John has \$50 more than Mary then Mary must have \$50 less than John. Therefore if John is represented by  $X$ , Mary would be represented by  $X-50$ .

20. D Multiply:  $2x(3x^2 - 5x - 3)$

$$2x(3x^2 - 5x - 3)$$

$$6x^3 - 10x^2 - 6x$$

21. B Divide:  $\frac{14m^2 - 28m^8 + 7m}{7m}$

$$\frac{14m^2 - 28m^8 + 7m}{7m} =$$

$$\frac{14m^2}{7m} - \frac{28m^8}{7m} + \frac{7m}{7m} =$$

$$2m - 4m^7 + 1$$

22. D Factor completely:  $12x^4 - 20x^3 + 4x^2$ . **One** factor is:

$$12x^4 - 20x^3 + 4x^2$$

$$4x^2(3x^2 - 5x + 1)$$

Therefore the correct listed factor is  $3x^2 - 5x + 1$

23. B Factor completely:  $x^2 - 12x + 36$ . **One** factor is:  
 $x^2 - 12x + 36$   
 $(x - 6)(x - 6)$   
 Therefore the correct listed factor is  $x - 6$ .

24. D Factor completely:  $7x^2 + 14x - 21$ . **One** factor is:  
 $7x^2 + 14x - 21$   
 $7(x^2 + 2x - 3)$   
 $7(x + 3)(x - 1)$   
 Therefore the correct listed factor is  $x + 3$ .

25. C Solve:  $x^2 - 3x - 10 = 0$  **One** solution is:  
 $x^2 - 3x - 10 = 0$   
 $(x + 2)(x - 5) = 0$   
 $x + 2 = 0$  or  $x - 5 = 0$   
 $x = -2$  or  $x = 5$   
 Therefore the correct listed solution is  $-2$ .

26. D Solve:  $2x^2 - 5x = 0$ . The solutions are:  
 $2x^2 - 5x = 0$   
 $x(2x - 5) = 0$   
 $x = 0$  or  $2x - 5 = 0$   
 $2x = 5$   
 $x = \frac{5}{2}$   
 Therefore your answers are 0 and  $\frac{5}{2}$ .

27. D Factor and reduce:  $\frac{3x^2 - 12}{9x + 18}$   

$$\frac{3x^2 - 12}{9x + 18} = \frac{3(x^2 - 4)}{9(x + 2)} = \frac{3(x + 2)(x - 2)}{9(x + 2)} = \frac{(x - 2)}{3}$$

28. D Given the equation  $-2x + 3y = 12$ , find the missing value in the ordered pair  $(-3, \underline{\quad})$ .

Substitute the “-3” into the equation for x and solve for y.

$$-2x + 3y = 12$$

$$-2(-3) + 3y = 12$$

$$6 + 3y = 12$$

$$3y = 6$$

$$y = 2$$

29. C The x-axis is the horizontal axis. The line intersects the x-axis at  $(-2, 0)$ .

30. C Using the intercept method to graph a line, substitute “0” in for the x value and solve for y. Then substitute “0” in for the y value and solve for x. Then plot these point and draw the line.

$$3(0) + y = 6 \quad 3x + 0 = 6$$

$$0 + y = 6 \quad 3x = 6$$

$$y = 6 \quad x = 2$$

intercepts are  $(0, 6)$  and  $(2, 0)$

31. C Solve and simplify if possible:  $\frac{x^2}{x-3} - \frac{9}{x-3}$
- $$\frac{x^2}{x-3} - \frac{9}{x-3} = \frac{x^2 - 9}{x-3} = \frac{(x+3)(x-3)}{x-3} = x+3$$

32. A Solve the following system of equations for the y-value:
- $$\begin{array}{r} x + 2y = 7 \\ 2x + 2y = 13 \end{array}$$

$$x + 2y = 7 \text{ multiply by } -2 \quad -2(x + 2y = 7)$$

$$2x + 2y = 13 \quad 2x + 2y = 13$$

Now add the equations vertically

$$-2x - 4y = -14$$

$$\underline{2x + 2y = 13}$$

$$-2y = -1$$

$$\frac{-2y}{-2} = \frac{-1}{-2}$$

$$y = \frac{1}{2}$$

33. D  $\frac{5}{6a} - \frac{2}{3a^2} =$  First find common denominators for your fractions.

$$\frac{5}{6a} \times \frac{a}{a} = \frac{5a}{6a^2} \quad \text{and} \quad \frac{2}{3a^2} \times \frac{2}{2} = \frac{4}{6a^2}$$

Now subtract the numerators

$$\frac{5a - 4}{6a^2}$$

34. B  $\frac{9b^2 - 3b}{3b}$  Factor the numerator  $\frac{3b(3b - 1)}{3b}$ . Now reduce. Answer 3b-1

35. B The DoBee.Com Corporation has 5 more than three times as many female as male supervisors. If “x” represents the number of male supervisors write an expression that would represent the total number of female supervisors in terms of “x”.

The statement “five more than” indicates adding “5” to the product of 3x.

Answer ?  $3x + 5$

36. C Which of the following is not an equivalent statement?

$4 - \frac{b^2}{25} = \left(2 - \frac{b}{5}\right)\left(2 + \frac{b}{5}\right)$  This is the correct factored form of the given.

$x^5 - 3x^2 = x^2(x^3 - 3)$  This is the correct factored form of the given.

$(x^4)^3 = x^7$  This is incorrect.  $(x^4)^3 = x^{12}$

$x^{-4} = \frac{1}{x^4}$  This is correct

37. C Charles needs enough fencing to enclose a rectangular garden with a perimeter of 140 feet. If the width of his garden is to be 30 feet, write the equation that can be used to solve for the length of the garden.

2 lengths + 2 widths = perimeter Let the unknown length be “x”

$$2x + 2(30) = 140$$

$$2x + 60 = 140$$

38. B Which one of the following ordered pairs is **NOT** a solution for the equation:  $3x + y = 12$ ?

The solution is (6,2) because when substituted into the equation your solution is incorrect.  $3(6) + 2 \neq 12$

39. D For what value(s) of  $x$  will each expression be undefined?  $\frac{x^2 + 4x + 4}{x^2 + x - 6}$

An expression is undefined when the denominator equals zero. To solve set the denominator equal to zero and solve for  $x$ .

$$x^2 + x - 6 = 0$$

$$(x + 3)(x - 2) = 0$$

$$x + 3 = 0 \text{ or } x - 2 = 0$$

$$x = -3 \text{ or } x = 2$$

40. C Which of the following is a factor of both equations?  $x^2 + 4x - 5$   
 $2x^2 + 3x - 5$

Factor both equations and compare results

$$\begin{array}{l} x^2 + 4x - 5 \\ (x + 5)(x - 1) \end{array} \quad \begin{array}{l} 2x^2 + 3x - 5 \\ (2x + 5)(x - 1) \end{array} \quad \text{The matching factor is } (x - 1)$$