

Key

Math 4

Name Key

Calculus – Necessary Algebra Skills Review

Examples of critical algebra skills you must have mastered in order to succeed in the Calculus Unit.

Expand the following:

1. $(2x-9)^2$

$$4x^2 - 36x + 81$$

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

$$x^2 + 6xy + 9y^2$$

3. $(-5x^2-6)^2$

$$25x^4 + 60x^2 + 36$$

Simplify the following so that it is written as x^a

4. $(x^2)^3$

$$x^6$$

5. $\frac{1}{x^2}$

$$x^{-2}$$

6. $\sqrt{x}$

$$x^{1/2}$$

7. $\sqrt[4]{x}$

$$x^{1/4}$$

8. $\sqrt[3]{x^2}$

$$x^{2/3}$$

9. $\frac{1}{\sqrt{x^5}}$

$$x^{-5/2}$$

Simplify the following, if possible.

10. $\frac{x+16}{16}$

$$\frac{x+16}{16} = \frac{x}{16} + 1$$

11. $\frac{100 - x^2}{x}$

$$100 - x$$

12. $\frac{5(x+y)^2 + 2(x+y) - (5x^2 + 2x)}{y}$

$$5x^2 + 10xy + 5y^2 + 2x + 2y - 5x^2 - 2x$$

$$y$$

$$10x + 5y + 2$$

Calculate the following:

13. The slope of the line going through the points $(-3, -8)$ and $(10, -4)$.

$$\frac{-4 + 8}{10 + 3} = \frac{4}{13}$$

14. The slope of the line going through the points $(-1, 6)$ and $(12, -7)$.

$$\frac{-7 - 6}{12 + 1} = -1$$

Complete the following:

15. The slope of a horizontal line is 0.

16. The slope of a vertical line is undefined.

Given, $f(x) = 2x^2 - 5x$ evaluate and simplify the following:

$$\begin{aligned} 4. f(4) &= 2(4)^2 - 5(4) \\ &= 32 - 20 \\ &= 12 \end{aligned}$$

$$\begin{aligned} 5. f(-8) &= 2(-8)^2 - 5(-8) \\ &= 128 + 40 \\ &= 168 \end{aligned}$$

$$\begin{aligned} 6. f(x+4) &= 2(x+4)^2 - 5(x+4) \\ &= 2x^2 + 16x + 32 - 5x - 20 \\ &= 2x^2 + 11x + 12 \end{aligned}$$

$$\begin{aligned} 7. f(-4x+9) &= 2(-4x+9)^2 - 5(-4x+9) \\ &= 32x^2 - 144x + 162 + 20x - 45 \\ &= 32x^2 - 124x + 117 \end{aligned}$$

$$f(x) = 2x^2 - 5x$$

8. $f(2x-6) - f(x)$

$$\begin{aligned} &= 2(2x-6)^2 - 5(2x-6) - (2x^2 - 5x) \\ &= 8x^2 - 48x + 72 - 10x + 30 - 2x^2 + 5x \\ &= 6x^2 - 53x + 102 \end{aligned}$$

9. $\frac{f(x-5) - f(x)}{-5}$

$$\frac{2(x-5)^2 - 5(x-5) - (2x^2 - 5x)}{-5}$$

$$\frac{2x^2 - 20x + 50 - 5x + 25 - 2x^2 + 5x}{-5}$$

$$4x - 15$$

Solve the following using Number Line Analysis:

17. $b^3 - 6b^2 + 8b < b^2 - 4b$

$$\begin{aligned} b^3 - 7b^2 + 12b &< 0 \\ b(b-4)(b-3) &< 0 \end{aligned}$$



