

**CCGPS PreCalculus
Summer Review Packet**

Instead of being a review of random material that you have previously learned, this assignment provides a very specific review of basic mathematical and algebraic skills that are required for success in CCGPS PreCalculus. You are expected to be completely fluent with these skills so we can apply them in a trigonometric environment. This assignment has been provided for your practice to ensure an easier transition into the study of trigonometry (the major component of a PreCalculus course). Please complete this review, showing all algebraic work where appropriate to give you a better preparation and opportunity for success next year!

Solving Linear Equations

Solve for the given variable.

$$1. \quad 18 + 2n = 4n - 9$$

$$\begin{array}{r} -2n \quad -2n \\ \hline 18 = 2n - 9 \\ +9 \quad \quad +9 \\ \hline 27 = 2n \\ \boxed{\frac{27}{2} = n} \end{array}$$

$$2. \quad \left(\frac{1}{2}y = \frac{1}{3}y + 2\right) \cdot \frac{6}{1}$$

$$\begin{array}{r} \frac{6}{2}y = \frac{6}{3}y + 12 \\ 3y = 2y + 12 \\ -2y \quad -2y \\ \hline \boxed{y = 12} \end{array}$$

$$3. \quad \left(\frac{3}{5}d + 5 = \frac{1}{3}d - 3\right) \cdot \frac{15}{1}$$

$$\begin{array}{r} \frac{45}{5}d + 75 = \frac{15}{3}d - 45 \\ 9d + 75 = 5d - 45 \\ -5d \quad \quad -5d \\ \hline 4d + 75 = -45 \\ -75 \quad -75 \\ \hline 4d = -120 \end{array} \rightarrow \boxed{d = -30}$$

$$4. \quad \left(\frac{2x-4}{-7} = 3x+5\right) \cdot (-7)$$

$$\begin{array}{r} 2x - 4 = -7(3x + 5) \\ 2x - 4 = -21x - 35 \\ +21x \quad +21x \\ \hline 23x - 4 = -35 \\ +4 \quad +4 \\ \hline 23x = -31 \end{array} \rightarrow \boxed{x = \frac{-31}{23}}$$

$$5. \quad 3(2x-1) = 9(x+3) - 2(x-1)$$

$$\begin{array}{r} 6x - 3 = 9x + 27 - 2x + 2 \\ 6x - 3 = 7x + 29 \\ -6x \quad -6x \\ \hline -3 = x + 29 \\ -29 \quad -29 \\ \hline \boxed{-32 = x} \end{array}$$

$$6. \quad -8\left(\frac{1}{4}n - 3\right) = n + 2$$

$$\begin{array}{r} -2n + 24 = n + 2 \\ +2n \quad \quad +2n \\ \hline 24 = 3n + 2 \\ -2 \quad \quad -2 \\ \hline 22 = 3n \\ \boxed{\frac{22}{3} = n} \end{array}$$

Solving Linear Systems of Equations

Solve each system for x and y.

$$\begin{array}{r} 7. \quad 3x - 2y = 4 \\ \quad 2x + 2y = 6 \end{array} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{add}$$

$$5x = 10$$

$$x = 2$$

$$2(2) + 2y = 6$$

$$4 + 2y = 6$$

$$2y = 2$$

$$y = 1$$

$$\boxed{(2, 1)}$$

$$\begin{array}{r} 8. \quad 4x + 3y = -5 \rightarrow 4x + 3y = -5 \\ \quad 2(-2x + 2y = 6) \rightarrow -4x + 4y = 12 \end{array}$$

$$7y = 7$$

$$y = 1$$

$$4x + 3(1) = -5$$

$$4x + 3 = -5$$

$$4x = -8$$

$$x = -2$$

$$\boxed{(-2, 1)}$$

$$\begin{array}{r} 9. \quad 5x + 6y = 3 \rightarrow 5x + 6y = 3 \\ \quad 3(-3x - 2y = -5) \rightarrow -9x - 6y = -15 \end{array}$$

$$-4x = -12$$

$$x = 3$$

$$5(3) + 6y = 3$$

$$15 + 6y = 3$$

$$6y = -12$$

$$y = -2$$

$$\boxed{(3, -2)}$$

$$\begin{array}{r} 10. \quad 2(4x - 3y = 6) \rightarrow 8x - 6y = 12 \\ \quad 3(-3x + 2y = -5) \rightarrow -9x + 6y = -15 \end{array}$$

$$-x = -3$$

$$x = 3$$

$$-3(3) + 2y = -5$$

$$-9 + 2y = -5$$

$$2y = 4$$

$$y = 2$$

$$\boxed{(3, 2)}$$

Simplifying Radicals

Simplify each radical. (No decimal answers!)

$$11. \quad \sqrt{12}$$

$$\sqrt{4 \cdot 3}$$

$$\boxed{2\sqrt{3}}$$

$$12. \quad \sqrt{54}$$

$$\sqrt{9 \cdot 6}$$

$$\boxed{3\sqrt{6}}$$

$$13. \quad -\sqrt{200}$$

$$-\sqrt{100 \cdot 2}$$

$$\boxed{-10\sqrt{2}}$$

Simplify and rationalize each expression. (No radicals in the denominator!)

$$14. \quad \sqrt{\frac{4}{9}} = \frac{\sqrt{4}}{\sqrt{9}} = \boxed{\frac{2}{3}}$$

$$15. \quad \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \boxed{\frac{\sqrt{3}}{2}}$$

$$16. \quad \sqrt{\frac{20}{45}} = \sqrt{\frac{4}{9}} = \boxed{\frac{2}{3}}$$

Order of Operations

Evaluate, without using a calculator. Check your answer using a calculator.

17. $(3 \cdot 5) + 4$

$$15 + 4$$

$$\boxed{19}$$

18. $12 \div 3 + 2 \cdot 8$

$$4 + 16$$

$$\boxed{20}$$

19. $[(9-7)^2 + 5] + 26$

$$[2^2 + 5] + 26$$

$$[4 + 5] + 26$$

$$9 + 26$$

$$\boxed{35}$$

20. $\frac{8 \cdot 2 + 5}{12 + 2^2 - 9}$

$$\frac{16 + 5}{12 + 4 - 9} = \frac{21}{16 - 9} = \frac{21}{7} = \boxed{3}$$

21. $d - e^2$ when $d = 16$ and $e = 3$

$$16 - 3^2$$

$$16 - 9$$

$$\boxed{7}$$

22. $\frac{7}{8}y - \frac{1}{4}$ when $y = \frac{1}{2}$

$$\frac{7}{8}\left(\frac{1}{2}\right) - \frac{1}{4}$$

$$\frac{7}{16} - \frac{4}{16} = \boxed{\frac{3}{16}}$$

Simplifying Fractions

Simplify, without using a calculator. Check your answer using a calculator.

(Believe it or not, we will start the course with a heavy load of fraction operations – it helps to practice now!)

$$23. \frac{2}{5} \cdot \frac{10}{3} = \frac{20}{15}$$
$$= \boxed{\frac{4}{3}}$$

$$24. \frac{4}{5} \div 2 = \frac{4}{5} \div \frac{2}{1}$$
$$= \frac{4}{5} \cdot \frac{1}{2}$$
$$= \frac{4}{10} = \boxed{\frac{2}{5}}$$

$$25. 4 \div \frac{1}{2} = 4 \cdot \frac{2}{1}$$
$$= \boxed{8}$$

$$26. \frac{3}{5} \cdot 15 = \frac{3}{5} \cdot \frac{15}{1}$$
$$= \frac{45}{5} = \boxed{9}$$

need
common
denominator!

$$27. \frac{2}{5} + \frac{3}{4}$$
$$\frac{4}{4} \cdot \frac{2}{5} + \frac{3}{4} \cdot \frac{5}{5}$$
$$= \frac{8+15}{20} = \boxed{\frac{23}{20}}$$

$$28. \frac{3}{8} + \frac{1}{6} \quad \text{LCD} = 24$$
$$\frac{3}{3} \cdot \frac{3}{8} + \frac{1}{6} \cdot \frac{4}{4}$$
$$= \frac{9+4}{24} = \boxed{\frac{13}{24}}$$

$$29. \frac{2}{5} - \frac{3}{4} \quad \text{LCD} = 20$$

$$\frac{4}{4} \cdot \frac{2}{5} - \frac{3}{4} \cdot \frac{5}{5}$$
$$= \frac{8-15}{20} = \boxed{\frac{-7}{20}}$$

$$30. \frac{2}{9} - \frac{1}{3} \quad \text{LCD} = 9$$

$$\frac{2}{9} - \frac{1}{3} \cdot \frac{3}{3}$$
$$= \frac{2-3}{9} = \boxed{\frac{-1}{9}}$$

Using Properties of Exponents

31. $(4x^3y^5)(-2xy^3)$

$$\boxed{-8x^4y^8}$$

32. $(-5x^4)^2$

$$\boxed{25x^8}$$

33. $(3x^4)(4x^5)(-2x^2)$

$$\boxed{-24x^{11}}$$

34. $\left(\frac{1}{3}x^8y^4\right)^3$

$$\boxed{\frac{1}{27}x^{24}y^{12}}$$

35. $-2(-2x)^3(-3)^2$

$$-2(-8x^3)(9)$$

$$\boxed{144x^3}$$

36. $\frac{6p^3}{p^2}$

$$6p^3 \cdot p^{-2}$$

$$\boxed{6p^5}$$

37. $\frac{3x^{12}y^5}{18x^4y^2}$

$$\boxed{\frac{x^8y^3}{6}}$$

38. $(3xy^2)^{-3}$

$$3^{-3}x^{-3}y^{-6}$$

$$\boxed{\frac{y^6}{27x^3}}$$

39. $\left(\frac{1}{4}x^2y^3z^2\right)\left(\frac{2}{3}xy^4z^5\right)$

$$\frac{2}{12}x^3y^7z^7$$

$$\boxed{\frac{x^3y^7z^7}{6}}$$

40. $(-3x^5y^2)(2x^2y^7)$

$$\boxed{-6x^7y^9}$$

41. $(2x^3y^0z^3)^4(xy)^0$

$$2^4x^{12}z^{12}$$

$$\boxed{16x^{12}z^{12}}$$

42. $\frac{-10x^{-2}y^{-8}}{15x^8y^2}$

$$\frac{-2}{3x^{10}y^{10}}$$

$$\boxed{\frac{-2}{3x^{10}y^{10}}}$$

Factoring Polynomials

Factor each polynomial completely.

(you cannot even imagine the expressions we'll be factoring in trig ... practice these "easy" ones now!)

43. $y^2 - 5y$

$$y(y-5)$$

44. $4a^2 + 2a$

$$2a(2a+1)$$

45. $7y^3 + 14y^2$

$$7y^2(y+2)$$

46. $6x^2y^3 + 21xy^2$

$$3xy^2(2xy+7)$$

47. $x^2 - 16$

$$(x+4)(x-4)$$

48. $9x^2 - 25y^2$

$$(3x+5y)(3x-5y)$$

49. $4a^2 - 49$

$$(2a+7)(2a-7)$$

50. $100y^2 - 81$

$$(10y+9)(10y-9)$$

51. $6x^2 - 6y^2$

$$6(x^2 - y^2)$$

$$6(x+y)(x-y)$$

52. $x^2 - 144$

$$(x+12)(x-12)$$

53. $x^3 + 6x^2 + 2x + 12$

$$x^2(x+6) + 2(x+6)$$

$$(x+6)(x^2+2)$$

54. $m^3 - m^2 - 3m + 3$

$$m^2(m-1) - 3(m-1)$$

$$(m-1)(m^2-3)$$

55. $w^2 - 14w + 45$

$$(w-9)(w-5)$$

56. $x^2 + 2x - 24$

$$(x+6)(x-4)$$

57. $r^2 + 12r + 20$

$$(r+10)(r+2)$$

58. $y^2 - 15y + 54$

$$(y-9)(y-6)$$

59. $g^2 - 5g + 6$

$$(g-3)(g-2)$$

60. $k^2 - k - 20$

$$(k-5)(k+4)$$