

**DeBakey High School For Health Professions
Mathematics Department**

Summer review assignment for students who will be entering Precalculus in the fall

This is an assignment for students who will be entering Precalculus in the fall. These problems cover most of the concepts taught in the Algebra 1, Algebra 2, and Geometry courses which students are expected to know to do well in the Precalculus course. It is very important to master these skills because they will be applied throughout the Precalculus course. Students with a weak foundation in the Algebra 1, Geometry, and Algebra 2 coursework struggle in Precalculus and, subsequently in the AP Calculus course. We highly recommend each student work on these problems throughout the summer and come prepared for the Precalculus class. Since the students have taken Algebra 1, Geometry, and Algebra 2, they are expected to have the necessary background and skills required to solve these problems.

Parents are requested to see that this assignment is completed seriously to ensure success of their child in the Precalculus class.

Solve.

1. $6(2x-1) - 2(5x+2) = 0$	2. $2(3x-5) = 5(17-4x)$
3. $\frac{3x}{8} = \frac{1}{5}(2x-3)$	4. $\frac{1}{5}(3x-5) = -\left(\frac{x}{2}+10\right)$
5. $\frac{-2x}{3} > 8$	6. $5-3x < -7$
7. $2x+2 > -3x-3$	8. $3(x+1) - 4 > 2(2x+1) - 1$

Solve each system.

9. $\begin{cases} 5x+4y=2 \\ 2x-3y=-13 \end{cases}$	10. $\begin{cases} 2x+y=4 \\ x-3y=9 \end{cases}$
11. $\begin{cases} y-x=5 \\ y=-2x \end{cases}$	12. $\begin{cases} 2x+y=1 \\ 4x+2y=6 \end{cases}$

13. $\begin{cases} 2x - y = -1 \\ y + x = 4 \end{cases}$	14. $\begin{cases} 2x + y = 4 \\ x - 3y = 9 \end{cases}$
--	--

Simplify.

15. $\frac{5^2(3^2 - 2^3)}{25}$	16. $6 \div 3(-4)$
17. $3x^3 + 9 + 7x^2 - x^3 - x^2$	18. $2x(3x^2 + 4) - 9(x^2 - 2)$
19. $3x^{-5}(-2x)^5$	20. $(5x^6)^2$
21. $4x(3a^2x)^2$	22. $(64)^{\frac{3}{2}} =$

Multiply.

23. $(3x + 1)(x - 2) =$	24. $(2x + 5)(x - 3)$
25. $(2x - 5)(2x + 5) =$	26. $(3x + 1)(2x - 2) =$
27. $(3x - 5)^2$	28. $(5x - 4y)(5x + 4y)$

29. $(2x - 3)(x^2 - 2x + 3)$	30. $(2x + 3)^2$
------------------------------	------------------

Factor completely.

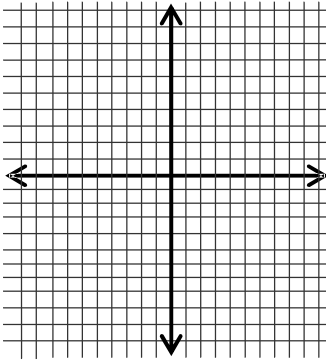
31. $3x^2 - 15x =$	32. $25x^4 - 15x^2$
33. $2x^2 - 5x + 3$	34.. $9x^2 - 25$
35. $x^2 + 5x - 6$	36. $2x^2 - 8x - 24$
37. $3x^2 + 24x + 45$	38. $1 - x^4$
39. $2x^2 - x - 3$	40.. $5 - 5y^2$

LINEAR EQUATIONS

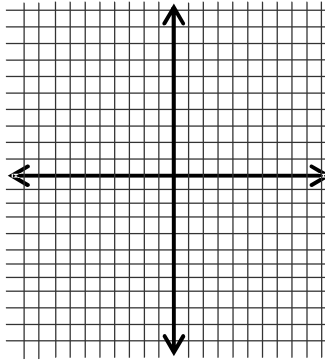
41. Find the x intercept, y intercept, and the slope of the line $y - 3x = 3$	42. Find the x intercept, y intercept, and the slope of the line $2 - x = 2y$
43. Find the slope and y intercept of the line $x - 4 = 0$	44. Find the x intercept, y intercept, and the slope of the line $3y + 4x = 1$
45. Write equation of a line parallel to the line $2y - 3x = 1$, and passing through $(0, -1)$	46. Write equation of a line perpendicular to the line $y + 3x = 1$, and passing through $(0, -1)$

Graph each equation.

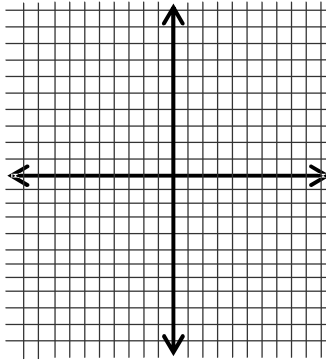
47. $y = 6$



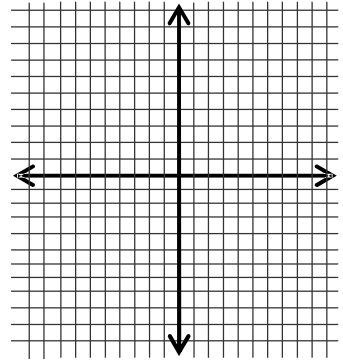
48. $2y = 3x - 4$



49. $6 + 3x = 0$

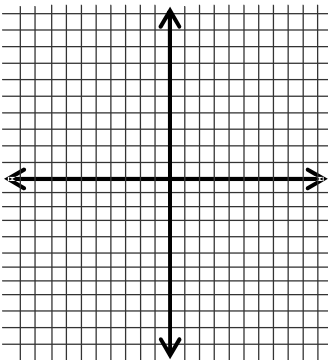


50. $3x + 5y = 15$

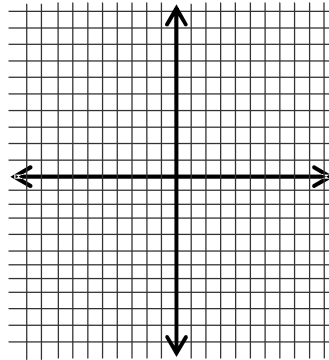


Draw the line passing through the point whose coordinates are given and having the slope that is given.

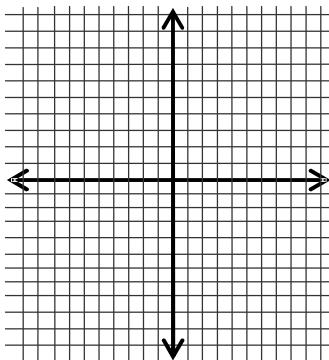
51. $P(2, -1); m = \frac{1}{2}$



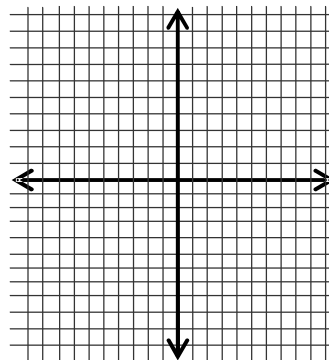
52. $P(-2, 5); m = -1$



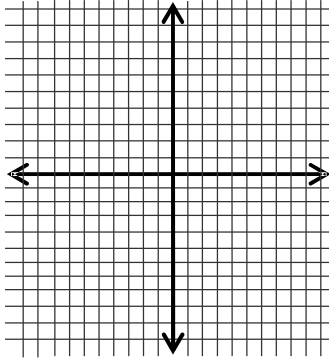
53. Graph the inequality, $y - x > 6$



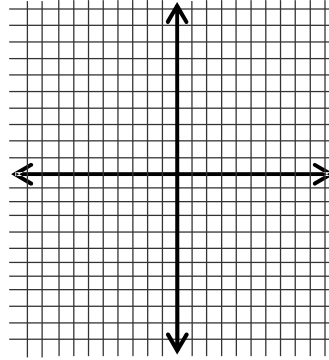
54. Graph the inequality $2x - y \leq 10$



55. Graph the inequalities. $\begin{cases} x^2 - 5x + 6 \leq 0, \\ y < x \end{cases}$

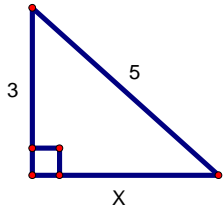
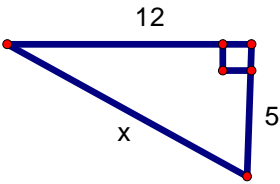
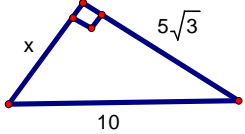
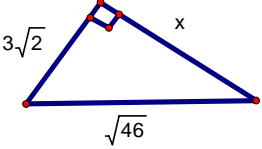
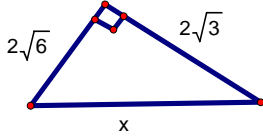
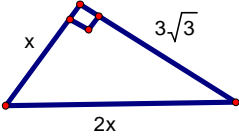


56. Graph the inequalities. $\begin{cases} x^2 - 2x \geq 6, \\ -x^2 + 4x < 0 \end{cases}$



Pythagorean Theorem

Use the Pythagorean Theorem to find x . Express x as a radical in simplest form. Show all steps of your work.

<p>57. </p>	<p>58. </p>
<p>59. </p>	<p>60. </p>
<p>61. </p>	<p>62. </p>

WORD Problems.

<p>63. A book costs \$129.95 with a sales tax rate of 8%. What is the total cost of the book?</p>	<p>64. A car rental agency charges a fee of \$35 per day plus \$.20 for each mile driven. How much will it cost to rent the car for 6 days and drive 800 miles?</p>
---	---

<p>65. Length of a rectangle is 3 cms. longer than the width. Find the dimensions of the rectangle if it's area is 6 cm^2</p>	<p>66 3 shirts and 2 pants cost 50 \$. 2 shirts and 3 pants cost 80 \$. What is the cost of one shirt and one pant?</p>
<p>67 Suppose a video store charges non-member \$3 to rent a video. A membership costs \$21 and then videos cost only \$1,50 to rent. How many videos would you need to rent in order to justify a membership?</p>	<p>68. One number is 25 more than a second number. The sum of those numbers is 106. Find the two numbers.</p>
<p>69. The longest loaf of bread ever baked was 2132 ft 2.5 inches. If this loaf was cut into half inch slices , how many slices of bread would there have been?</p>	<p>70. Liquefied Natural Gas is stored in spherical containers. What will be the diameter of a container if you want to store $\frac{500\pi}{3} \text{ met}^3$ of LNG? Use $V = \frac{4}{3}\pi R^3$. Where R is the radius of the container.</p>
<p>71. A ladder is 25 ft long. The ladder needs to reach to a window that is 24 ft above the ground. How far away from the building should the bottom of the ladder be placed?</p>	<p>72. There is a large building on fire. Fire trucks from two different stations respond to the fire. One station is 1 mi east and 2 mi north of the fire. The other station is 2 mi west and 1 mi south of the fire. How far apart are the two fire stations?</p>

The Laws of Exponents

$$\boxed{a^x a^y = a^{(x+y)}}, \quad \boxed{\frac{a^x}{a^y} = a^x a^{-y} = a^{(x-y)}}, \quad \boxed{(a^x)^y = a^{xy}},$$

$$\boxed{a^{-x} = \frac{1}{a^x}}, \quad \boxed{a^0 = 1}, \quad \boxed{\sqrt{x} = x^{\frac{1}{2}}}, \quad \boxed{\sqrt[3]{x} = x^{\frac{1}{3}}}, \quad \boxed{\sqrt[n]{x} = x^{\frac{1}{n}}}$$

Laws of Exponents

Use the laws of exponents to simplify each of the following expressions.

$$73. \sqrt{x}(x^3) = \quad 74. \frac{x}{\sqrt{x}} = \quad 75. \left(\frac{1}{x^2}\right)^{-1} = \quad 76. (a^3b^2c)^2 = \quad 77. \frac{(a^3b^2c)^2}{a^6b^4} =$$

Rules of Logarithms

If $a^x = y$, then $\log_a y = x$

$$\log_a A + \log_a B = \log_a (AB), \quad \log_a A - \log_a B = \log_a \left(\frac{A}{B}\right),$$

$$\log_a (A)^P = P \log_a (A), \quad \log_a a = 1, \quad a^{\log_a x} = x,$$

$\log_e x = \ln x$, where e is the natural base.

Logarithms:

77. Write as a single logarithm.

$$\log_2 x + \log_2 y^2 - \log_2 z^3 =$$

78. Solve for x :

$$\log_3(x+3) + \log_3(x-2) = \log_3 14$$

79. Solve for x :

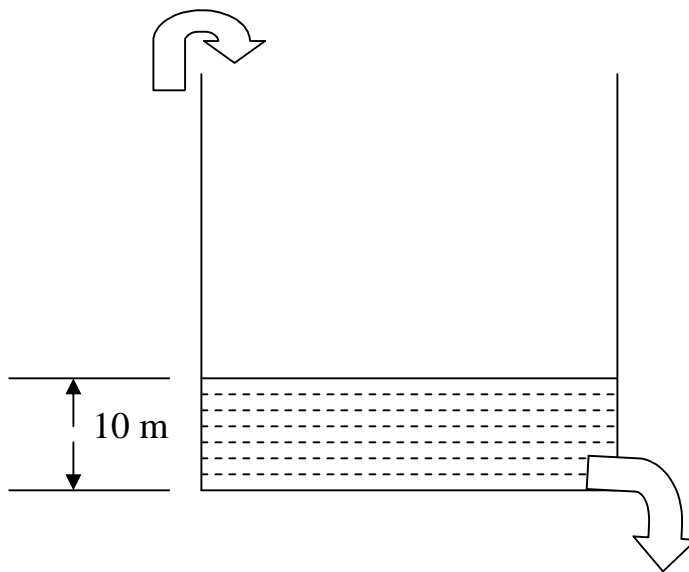
$$2^{(x+2)} = 16$$

80. Solve for x :

$$\log_5 x = \frac{1}{2} \log 25$$

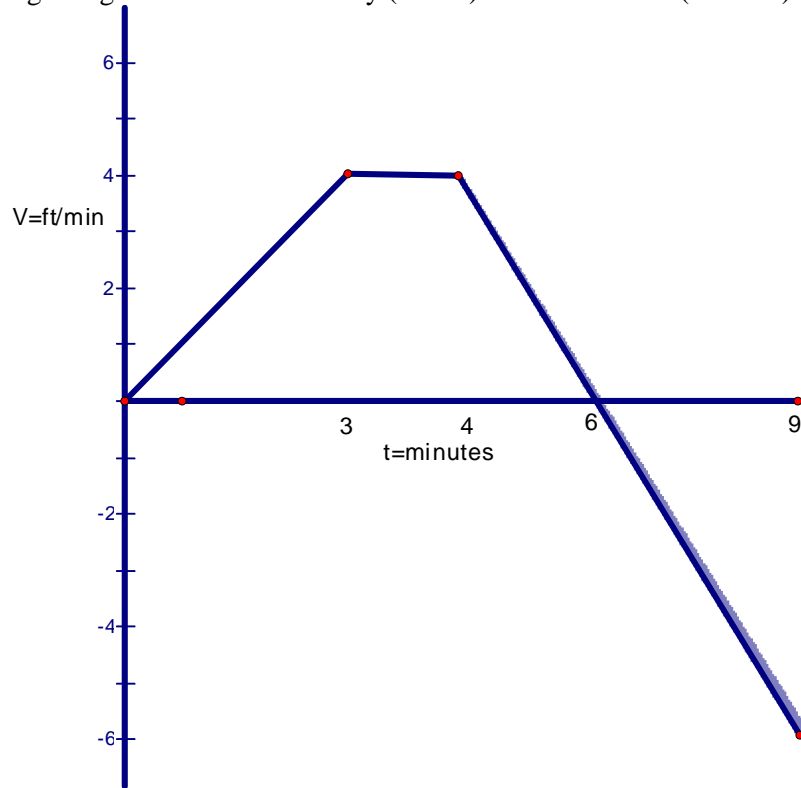
Free response type question #1:

1. A tank is filled with water up to a height of 10 meters. The tap at the top is opened and water is filled in the tank at the rate of 3 meters/min. for $\frac{1}{2}$ hour. Then the tap at the top is closed. After 5 minutes the tap at the bottom of the tank is opened and water is drained out at the rate of 5 meters/min. till the tank is completely empty.
- A) Model the above events in terms of a graph of the level (height) of water in the tank vs. time. Does this graph represent a case of Direct Variation?
- B) What is the slope of the graph when water is being filled in and when it is being drained out of the tank?
- C) What is the significance of positive and negative slope in this situation?
- D) Write equations indicating the relation between level (height) of water in the tank and time when:
- Water is being filled in the tank.
 - The top tap is closed and the bottom tap is opened.
 - Water is being drained out of the tank till it is empty.



Free response type question #3:

A particle is moving along the x axis. Its velocity (ft/min) at various times (minutes) is given by the graph below.



- A) Express velocity as a function of time (Write the equation representing velocity as a function of time) for the following intervals:
1) $0 \leq t \leq 3$ minutes. 2) $3 \leq t \leq 4$ minutes. 3) $4 \leq t \leq 9$ minutes.
- B) Write the time intervals when the velocity is increasing, decreasing, and remaining constant.
- C) Write the slopes of the graph for the time intervals when the velocity is increasing, decreasing, and remaining constant.
- D) What is the significance of the slope values in part C?
- E) At what time does the particle change direction?
- F) At what time is the speed of the particle greatest?
- G) Find the area bounded by the graph above the t axis and below the t axis. What does this area signify?
- H) During the time interval $6 \leq t \leq 9$ minutes, "Velocity is decreasing and the speed of the particle is increasing". Is this statement correct? Explain.