

# Jesuit High School

## Integrated Math 1 Challenge Exam Practice Problems

This is a comprehensive list of Integrated Math 1 practice problems – not all types of problems will be found on the challenge exam. As no calculators are allowed on the exam, it is recommended that you work these problems without a calculator. Answers are posted separately.

### Equations & Inequalities

- 1) Simplify:  $4 + 2(3 - 5)^2 \div 4$
- 2) Simplify:  $24 \div 2(3)$
- 3) Solve:  $2x - (x + 4) = x - 1$
- 4) Solve:  $3x + 7 = 2x + 9x - x + 10$
- 5) Solve:  $5 + (4x + 1) = 3x - (x + 7)$
- 6) Solve:  $\frac{2x - 8}{2} = \frac{3x + 3}{6}$
- 7) Solve:  $|2x - 1| = 7$
- 8) Solve:  $|x + 4| = 3x - 2$
- 9) Solve:  $2 + 6x - 12 < 4 + x - 2x$
- 10) Solve:  $4 - x \geq 20$
- 11) Solve for a:  $2a - 3b = 5a - 2b + c$
- 12) Graph on a number line:  $x > -1$
- 13) Graph on a number line:  $x < 0$  or  $x \geq 3$
- 14) Graph on a number line:  $-2 < x \leq 5$
- 15) Graph on a number line:  $x \neq 2$
- 16) Graph the solution to the inequality:  $2 - 4x > 22$

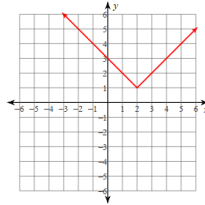
### Linear Functions

- 17) Find the slope of the line that contains (-2,4) and (3,8)
- 18) Find the slope of the line that contains (-2,0) and (-2,4)
- 19) Find the x-intercept and y-intercept for:  $3x - 6y = 12$
- 20) Graph:  $y = \frac{2}{5}x - 1$
- 21) Graph:  $y = -3x + 4$
- 22) Graph:  $4x + 3y = 12$
- 23) Graph:  $y - 2 = -\frac{1}{2}(x - 3)$
- 24) Graph:  $y = -3$
- 25) Graph:  $x = 1$
- 26) Find the slope of the line parallel to  $y = \frac{1}{3}x - 4$
- 27) Find the slope of the line parallel to  $4x - y = 7$
- 28) Find the slope of the line perpendicular to  $y = -5x - 1$
- 29) Write the equation of the line, in slope-intercept form, that has a slope of  $\frac{3}{2}$  and a y-intercept of (0,4)
- 30) Write the equation of the line, in slope-intercept form, that contains (4,5) and (1,-1)
- 31) Write the equation of the line, in point-slope form, that contains (-3,2) and is perpendicular to  $y = 2x + 1$

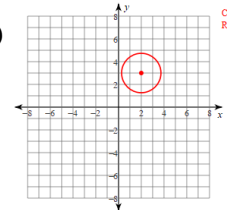
## Functions

32) Determine if the following is a function:

a)



b)



33) Determine if the following is a function:

a)  $\{(3, 2), (4, -1), (3, 1), (8, -2)\}$

b)  $\{(1, 5), (-2, -6), (2, 3), (7, 3)\}$

34) Determine if the following is a function:

a)  $y = -\frac{1}{2}x + 2$

b)  $y = 2x^2 - 3$

35) Determine if the following is a function:

a)

x	y
0	-5
1	6
3	1
-4	5

b)

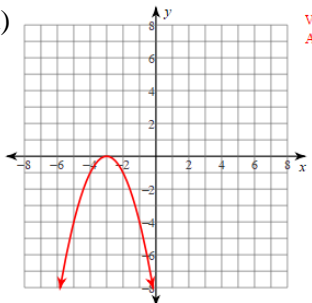
x	y
2	-5
-1	6
3	1
-1	0

36) State the domain and range:

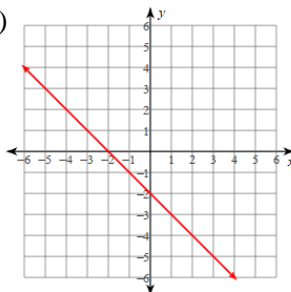
x	y
0	2
5	5
-6	-3
4	1

37) State the domain and range:

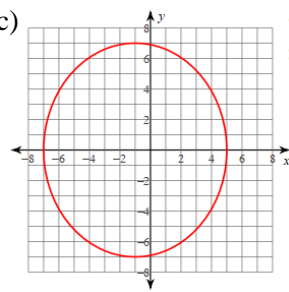
a)



b)



c)



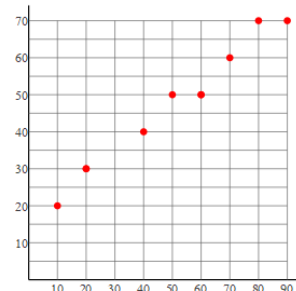
38) If  $f(x) = -2x + 7$ , evaluate  $f(5)$

39) If  $f(x) = 5x^3 + 6x^2 - 1$  and  $g(x) = -3x^2 - 2x$ , evaluate  $(f + g)(-2)$

40) Construct a scatter plot from the given data. Describe the correlation as positive, negative or no correlation. If there is a correlation, identify the relationship as linear, quadratic or exponential.

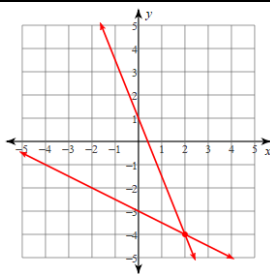
x	40	270	300	370	520	700	840	1000
y	2000	1800	1400	1200	1100	700	300	100

41) Write an equation for a line of best fit for the data plotted at right:

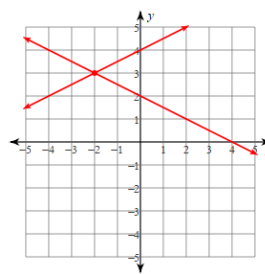


## Systems of Equations and Inequalities

42) Solve:



43) Solve:



44) Solve: 
$$\begin{cases} 3x - 2y = 18 \\ x + 6y = -14 \end{cases}$$

45) Solve: 
$$\begin{cases} x + 8y = 8 \\ -2x - 16y = 5 \end{cases}$$

46) Solve: 
$$\begin{cases} -2x + 3y = 18 \\ 4x - y = 14 \end{cases}$$

47) Solve: 
$$\begin{cases} 2x - 6y = 8 \\ -6x + 9y = 12 \end{cases}$$

48) Solve: 
$$\begin{cases} -9x + 7y = 15 \\ -18x + 14y = 30 \end{cases}$$

49) Graph on a coordinate plane:  $y \geq 2$

50) Graph on a coordinate plane:  $x < -3$

51) Solve: 
$$\begin{cases} y \leq -4x + 1 \\ y > -x - 2 \end{cases}$$

## Exponents

52) Simplify:  $\frac{25x^3y^6}{15x^7y^3}$

53) Simplify:  $3x^2x^5y^{-4}$

54) Simplify:  $3^{-2}$

55) Simplify:  $3x^{-2}$

56) Simplify:  $(3x)^{-2}$

57) Simplify:  $(3xy^2)^3$

58) Simplify:  $\left(\frac{2ab}{3c}\right)^{-2}$

59) Simplify:  $\frac{5^0x^{-3}}{y^{-2}}$

60) Simplify:  $\frac{x^{11}}{x^{-3}}$

61) Simplify:  $25^{\frac{1}{2}}$

62) Simplify:  $8^{\frac{1}{3}}$

63) Simplify:  $27^{\frac{2}{3}}$

64) Write with rational exponents:  $\sqrt{50}$

65) Write with rational exponents:  $\sqrt[3]{5x^2}$

66) Solve:  $5^{-2x-1} = 5^{2x}$

67) Solve:  $8^{2x+5} = 2^{x-1}$

68) Does the data represent a linear, quadratic or exponential function?

<b>x</b>	2	3	4	5	6
<b>y</b>	2	6	18	54	162

69) Does the data represent a linear, quadratic or exponential function?

<b>x</b>	-1	0	1	2	3
<b>y</b>	0.2	1	5	25	125

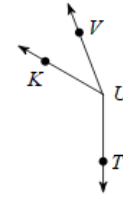
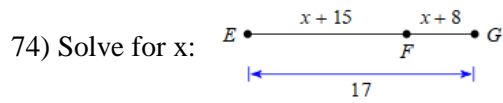
70) Graph:  $y = 2^x$

71) Graph:  $y = \left(\frac{1}{3}\right)^x$

72) Identify the asymptote for  $y = 5^x$

73) Identify the y-intercept for  $y = 2 \cdot 3^x$

## Foundations of Geometry



75) Find x if  $m\angle TUV = 14x + 19$ ,  $m\angle TUK = 12x$  and  $m\angle KUV = 39^\circ$

76) Calculate the midpoint of  $(-2, 7)$  and  $(4, 15)$

77) Calculate the length of the line segment with endpoints at  $(3, -4)$  and  $(-1, 8)$

78) What is the next digit in the sequence: 384, 192, 96, 48, ...

79) Complete the conclusion based on the Law of Contrapositive: If I go to school, then I take math. I don't take math. Therefore \_\_\_\_\_.

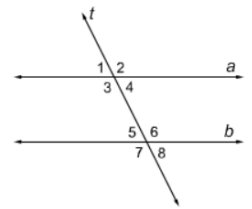
80) Complete the conclusion using the Law of Syllogism: If I go to school, then I take math. If I take math, then I have homework. If I go to school, \_\_\_\_\_.

81) Given the statement: If a triangle has three congruent angles, then the triangle is equilateral, identify the hypothesis and the conclusion.

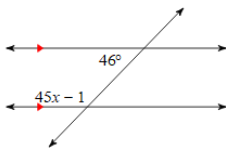
82) Given the statement: If a figure is a square, then it is a quadrilateral, give the converse, the inverse and the contrapositive statements and the truth value of each.

## Parallel and Perpendicular Lines

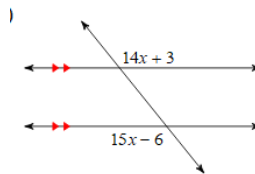
83) Identify the alternate interior, alternate exterior and consecutive interior angle pairs:



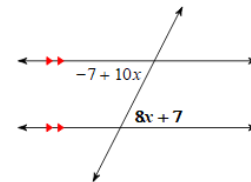
84) Find x:



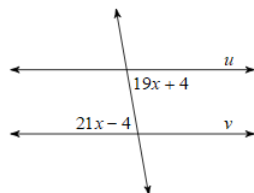
85) Find x:



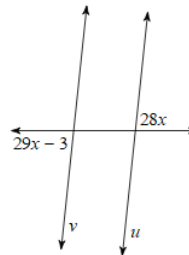
86) Find x:



87) Find x so that line  $u \parallel$  line  $v$

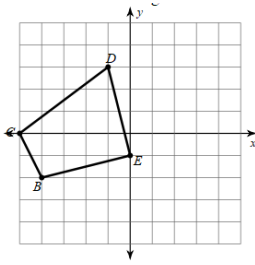


88) Find x so that line  $u \parallel$  line  $v$

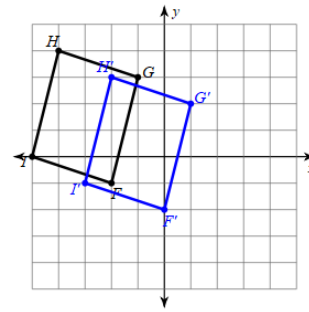


## Transformations

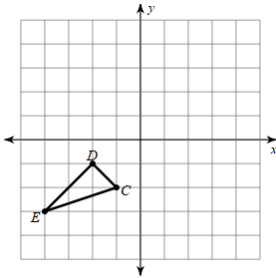
- 89) Graph the image of BCDE that is translated 1 unit right and 2 units up.



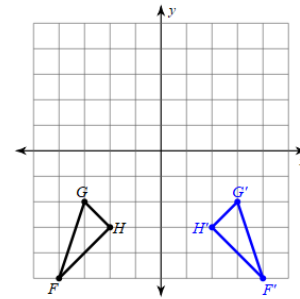
- 90) Write a rule for the translation of FGHI shown:



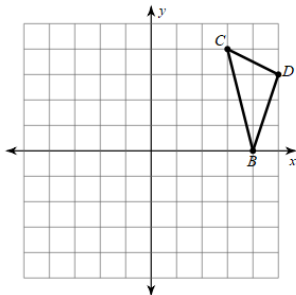
- 91) Graph the image of CDE that is a reflection across the y-axis.



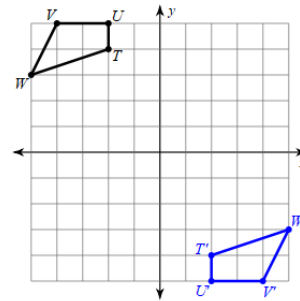
- 92) Write a rule for the reflection of FGH shown:



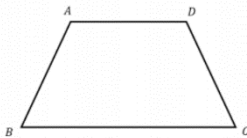
- 93) Graph the image of BCD that is a rotation  $180^\circ$  about the origin.



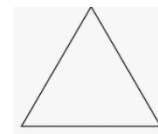
- 94) Write a rule for the rotation of TUVW shown:



- 95) Draw a dashed line to show the line of symmetry in the isosceles trapezoid shown:

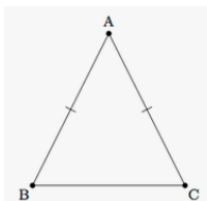


- 96) Draw a dashed line to show the lines of symmetry in the equilateral triangle shown:



## Triangle Congruence

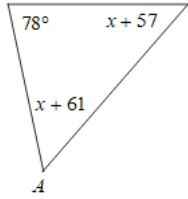
- 97) Name the triangle by side length:



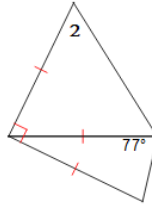
- 98) Name the triangle by angle measure



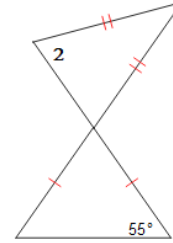
99) Find  $m\angle A$



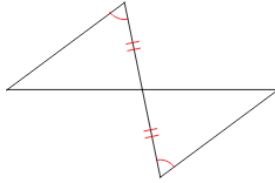
100) Find  $x$  if  $m\angle 2 = 6x + 10$



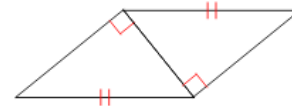
101) Find  $x$  if  $m\angle 2 = 4x + 22$



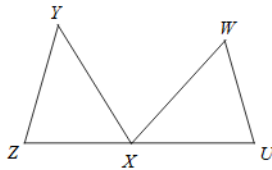
102) Determine if the two triangles are congruent. Justify your answer.



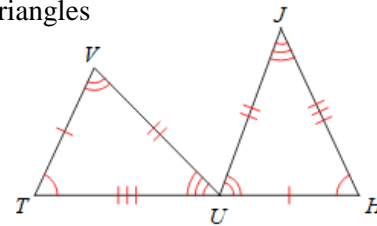
103) Determine if the two triangles are congruent. Justify your answer.



104) Mark the angles and sides to show that  $\triangle ZYX \cong \triangle UXW$

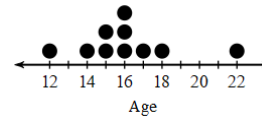


105) Write a congruence statement for the graphed triangles

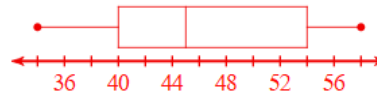


### Data Analysis

106) The dot plot below shows the ages when some people got their first job. Find the mean, median, mode, minimum, maximum and range for this group.



107) The box-and-whisker plot below shows student scores on a 60 point test. Find the median, the interquartile range and the range.



108) Describe the data distributions shown:



109) Give the mean, median and mode for the following data set:  $\{2, 3, 5, 8, 8, 12\}$

110) Give the range for the following data set:  $\{12, 31, 37, 50, 68\}$