Algebra 1
Final Exam Solutions

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MATH

Algebra 1 Final Exam Answer Key

1. (5 pts) A B C D ■

2. (5 pts) A B C ■ E

3. (5 pts) A ■ C D E

4. (5 pts) ■ B C D E

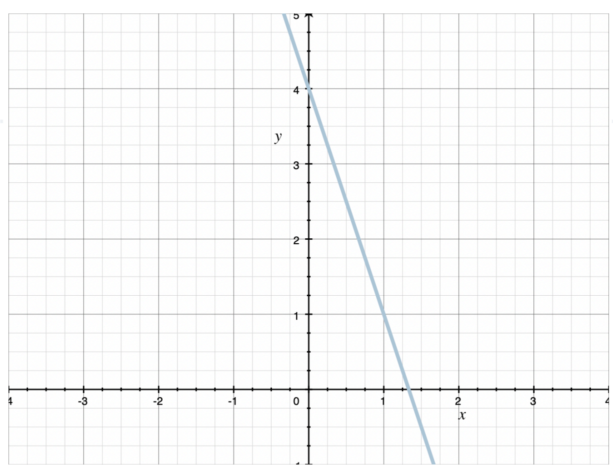
5. (5 pts) A B ■ D E

6. (5 pts) A B C ■ E

7. (5 pts) A B ■ D E

8. (5 pts) ■ B C D E

9. (15 pts)



10. (15 pts) $x = \frac{-5 \pm \sqrt{73}}{4}$

11. (15 pts) Domain: $x \geq 2$, Range: $y \geq 0$

12. (15 pts) Odd

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1. E. The Distributive Property removes the parentheses from the expression. To distribute, multiply the factor outside the parentheses by each term inside the parentheses.

2. D. Plug 2 in for a, 1 in for b, and 4 in for c using parentheses.

$$b^0 + 3(5a - 2b + c^2) - 4a \div 2$$

$$(1)^0 + 3(5(2) - 2(1) + (4)^2) - 4(2) \div 2$$

Simplify using PEMDAS (remember that anything raised to the power of 0 is 1).

$$1 + 3(10 - 2 + 16) - 8 \div 2$$

Simplify the expression inside the parentheses and the division.

$$1 + 3(8 + 16) - 8 \div 2$$

$$1 + 3(24) - 4$$

Simplify the multiplication and then add and subtract from left to right.

$$1 + 72 - 4$$

$$73 - 4$$

69

3. B. Distribute the -1 across the second set of parentheses and remove the first set of parentheses.

$$(8x^2 - 3x) - (6x^2 - 9x + 4)$$

$$8x^2 - 3x - 6x^2 + 9x - 4$$

Combine like terms.

$$2x^2 + 6x - 4$$

4. A. Let n be the first number and $n + 1$ be the second consecutive number. Solve for n.

$$n(n + 1) = 132$$

Distribute.

$$n^2 + n = 132$$

$$n^2 + n - 132 = 0$$

$$(n + 12)(n - 11) = 0$$

$n + 12 = 0$ or $n - 11 = 0$

$n = -12$ or $n = 11$

Since 132 is positive, then the two consecutive numbers must be positive, since the product is positive. Therefore, $n = 11$ and $n + 1 = 12$. The consecutive numbers are 11 and 12.

5. C. Use polynomial long division to simplify.

$$
\begin{array}{r}
x^2 + 4x + 8 + \dfrac{24}{x-2} \\
x-2 \,\big)\overline{\, x^3 + 2x^2 + 0x + 8} \\
-(x^3 - 2x^2) \qquad\qquad \\
\hline
4x^2 + 0x \qquad \\
-(4x^2 - 8x) \qquad \\
\hline
8x + 8 \\
-(8x - 16) \\
\hline
24
\end{array}
$$

6. D. Write out all the factors of each term.

$$3a^5b^3 - 18a^3b^3 - 21a^2b^4$$

$$3 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b - 2 \cdot 3 \cdot 3 \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b$$

$$-21 \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b$$

The only factors that are shared by all three terms are a 3, an $a \cdot a$, and a $b \cdot b \cdot b$, so the greatest common factor is $3a^2b^3$. When we factor out the $3a^2b^3$, we have to divide each term by $2x^2y$.

$$3a^2b^3(a^3 - 6a - 7b)$$

7. C. Subtract 6 from both sides of the inequality.

$$6 - 2x \leq 14$$

$$6 - 6 - 2x \leq 14 - 6$$

$$-2x \leq 8$$

Divide both sides by -2 and, since we're dividing by a negative, remember to switch the direction of the inequality from $\leq$ to $\geq$.

$$\frac{-2x}{-2} \geq \frac{8}{-2}$$

$$x \geq -4$$

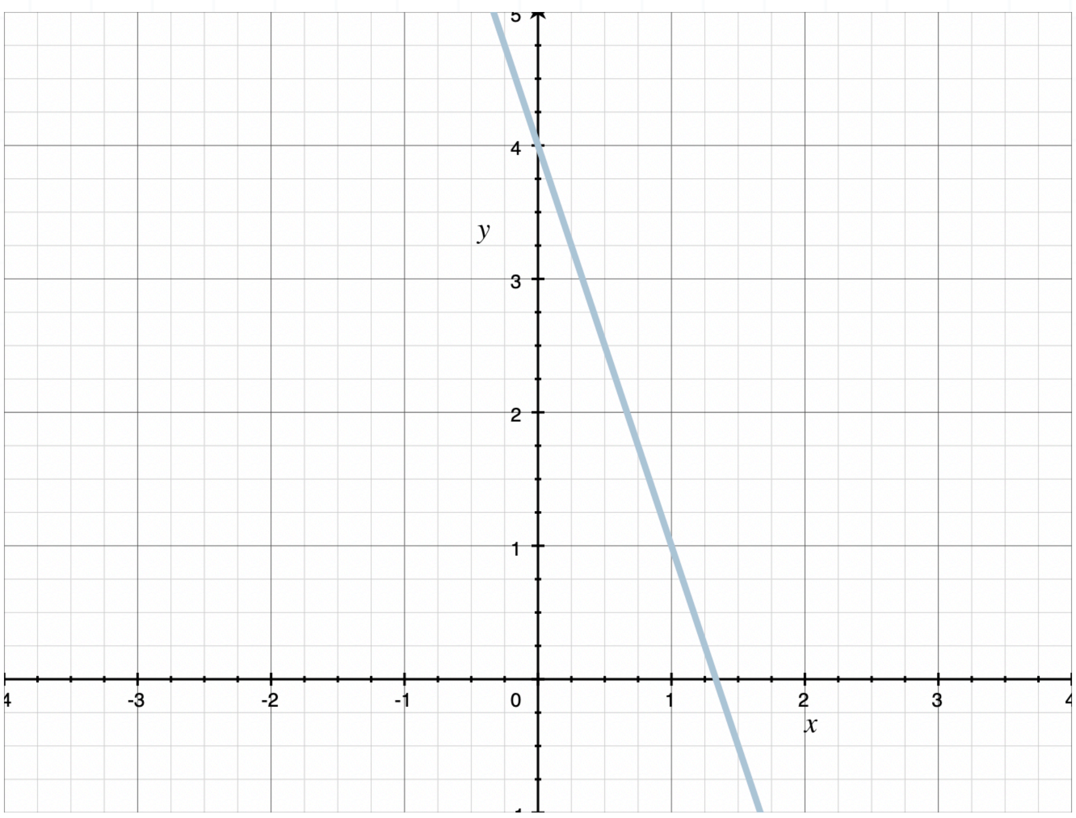
8. A. Interpret each part of the statement starting with "the sum of 5 and a number."

$5 + x$ or $x + 5$

Next, "product" means to multiply.

$$10(x + 5)$$

9. Draw the x- and y-axes and make sure to label tick marks and axes. The y-intercept for $y = -3x + 4$ is 4, so put a point on the y-axis at 4. The slope is $-3/1$, which means from the y-intercept we need to go down 3 units and to the right 1 unit to find the next point on the graph. Find one more point using the slope, then draw a straight line that goes through the points and extends past them in both directions.



10. Use the quadratic formula to find the solutions. In this problem with $2x^2 + 5x - 6 = 0$, we identify $a = 2$, $b = 5$, and $c = -6$.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(2)(-6)}}{2(2)}$$

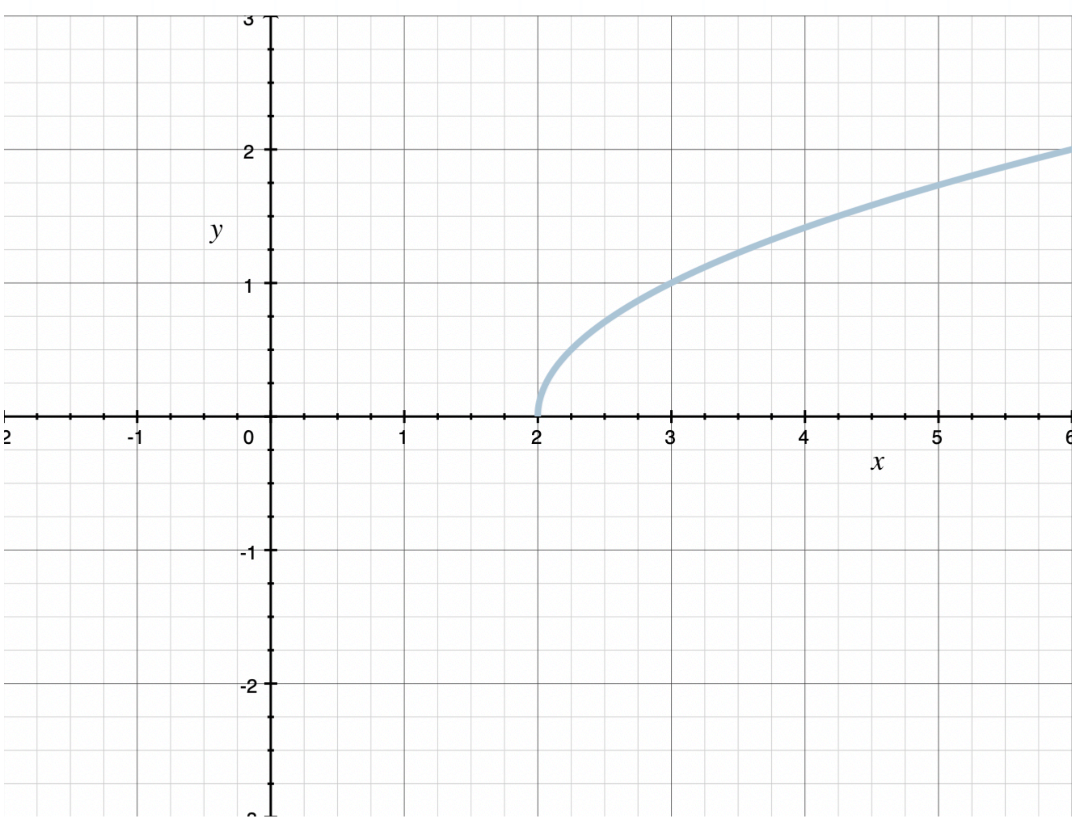
$$x = \frac{-5 \pm \sqrt{25 + 48}}{4}$$

$$x = \frac{-5 \pm \sqrt{73}}{4}$$

Then the solutions are

$$x = \frac{-5 - \sqrt{73}}{4} \text{ and } x = \frac{-5 + \sqrt{73}}{4}$$

11. Graph the function $f(x) = \sqrt{x - 2}$.



The x-coordinate of the leftmost point is 2 and the graph continues infinitely to the right. Therefore, the domain is $x \geq 2$. The y -coordinate of the lowest point is 0 and the graph continues infinitely upward. Therefore, the range is $y \geq 0$.

12. To solve algebraically, we need to find the expression for $f(-x)$, so we'll replace every x (in the expression for $f(x)$) with $-x$.

$$f(-x) = (-x)^3 - 3(-x)$$

Remember that

$$(-x)^3 = (-1x)^3 = (-1)^3x^3$$

and

$$(-x) = (-1)x$$

Raising -1 to an odd power gives -1, so

$$f(-x) = (-1)x^3 - 3(-1)x$$

Factor out a -1, and then simplify.

$$f(-x) = -1(x^3 - 3x)$$

Since $f(-x) = -f(x)$, the function is odd. We can see that the graph is symmetric with respect to the origin.

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