

Geometry Summer Math Packet

In preparation for your Geometry class this fall, you will need to complete this packet by the first day of school, August 26, 2008. Your Geometry teacher will be collecting it on the first day of school. If you lose the packet during the summer, you must pick up a new one in the main office. You will be tested on this material by the end of the first week of school. All of the materials in the math packet are math skills that you have learned in your previous math classes.

On a piece of paper, copy the problems and show all the steps when working out the solutions. There are example boxes before each problem set to remind you how to do the problems. You will not be given credit for this packet if no work is shown.

Completed Assignments:

Tuesday, August 26	25 pts.	A
Wednesday, August 27	22 pts.	B
Thursday, August 28	19 pts.	C
Friday, August 29	16 pts.	D
Test Friday, August 29	25 pts.	possible

Have a great summer.

- The Lincoln High School Math Department

*Topic 1**Quadratic Formula*

The solutions of the quadratic equation $ax^2 + bx + c = 0$ are given by the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ when } a \neq 0 \text{ and } b^2 - 4ac > 0$$

Example 1

Solve $x^2 + 3x = 4$

Solution

You must rewrite the equation in standard form $ax^2 + bx + c = 0$ before using the quadratic formula.

$$x^2 + 3x = 4$$

Write original equation

$$x^2 + 3x - 4 = 0$$

Rewrite equation in standard form
(get zero on one side of equal sign)

$$1x^2 + 3x + (-4) = 0$$

Identify $a=1$, $b=3$, $c=-4$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-4)}}{2(1)}$$

Substiute values into the quadratic formula

$$x = \frac{-3 \pm \sqrt{9 + 16}}{2}$$

Simplify

$$x = \frac{-3 \pm \sqrt{25}}{2}$$

Simplify

The equation has two solutions:

$$x = \frac{-3 + 5}{2} = 1 \text{ and } x = \frac{-3 - 5}{2} = -4$$

Solutions

Exercises:

Use the quadratic formula to solve the equation.

1. $x^2 - 4x + 3 = 0$

2. $x^2 + 9x + 20 = 0$

3. $x^2 + x = 6$

4. $4x^2 + 3 = 13x$

5. $x^2 + 5x = 3$

6. $3x^2 - 4x = 2x^2 + 2$

Topic 2

Factoring a quadratic expression

To factor $x^2 + bx + c = 0$, you need to find numbers p and q such that $p + q = b$ and $pq = c$

$$x^2 + bx + c = (x + p)(x + q)$$

To factor $ax^2 + bx + c = 0$, you need to find factors of a (m and n) and factors of c (p and q) such that $(m \times q) + (n \times p) = b$

Example 1

Factor $x^2 + 6x + 8$

Solution:

For this example, $b=6$ and $c=8$. You need to find two numbers whose sum is 6 and whose product is 8.

$$\begin{aligned} x^2 + 6x + 8 &= (x + p)(x + q) \\ &= (x + 4)(x + 2) \end{aligned}$$

$$\begin{aligned} &\text{Find } p \text{ and } q \text{ when } p + q = 6 \text{ and } pq = 8 \\ &p = 4 \text{ and } q = 2 \end{aligned}$$

Example 2

Factor $3x^2 + 7x + 2$

Solution

Test the possible factors of a (1 and 3) and c (1 and 2)

Try $a = 1 \cdot 3$ and $c = 1 \cdot 2$

$$(1x + 1)(3x + 2) = 3x^2 + 5x + 2 \quad \text{Not Correct}$$

Try $a = 1 \cdot 3$ and $c = 2 \cdot 1$

$$(1x + 2)(3x + 1) = 3x^2 + 7x + 2 \quad \text{Correct}$$

The correct factorization of $3x^2 + 7x + 2$ is $(x + 2)(3x + 1)$

Exercise: Factor the trinomial

7. $x^2 + 5x + 6$

8. $x^2 + 8x - 9$

9. $x^2 + 6x + 5$

10. $5x^2 + 11x + 2$

11. $x^2 - 3x + 2$

12. $6x^2 - 23x + 15$

13. $x^2 - 7x + 12$

14. $8x^2 + 2x - 3$

15. $x^2 - x - 2$

16. $x^2 - 4x - 12$

*Topic 3**Adding, Subtracting, multiplying and dividing radicals*

Example 1

Simplify the expression

Solution

$$\begin{aligned}\sqrt{12} + \sqrt{3} &= \sqrt{4 \cdot 3} + \sqrt{3} && \text{Perfect square factor} \\ &= \sqrt{4} \cdot \sqrt{3} + \sqrt{3} && \text{Use product property} \\ &= 2\sqrt{3} + \sqrt{3} && \text{Simplify} \\ &= 3\sqrt{3} && \text{Add like radicals}\end{aligned}$$

Example 2

Simplify the expression

$$\text{a. } \sqrt{3} \cdot \sqrt{12} \quad \text{b. } \sqrt{5}(\sqrt{2} + \sqrt{3})$$

Solution

$$\begin{aligned}\text{a. } \sqrt{3} \cdot \sqrt{12} &= \sqrt{36} = 6 \\ \text{b. } \sqrt{5}(\sqrt{2} + \sqrt{3}) &= \sqrt{5} \cdot \sqrt{2} + \sqrt{5} \cdot \sqrt{3} && \text{Use distributive property} \\ &= \sqrt{10} + \sqrt{15} && \text{Use product property}\end{aligned}$$

Example 3

Simplify $\frac{5}{\sqrt{2}}$

Solution

$$\begin{aligned}\frac{5}{\sqrt{2}} &= \frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} && \text{Multiply top and bottom by } \sqrt{2} \\ &= \frac{5\sqrt{2}}{2} && \text{Simplify}\end{aligned}$$

Exercise:

Simplify

17. $\sqrt{7} + 3\sqrt{7}$

18. $\sqrt{128}$

19. $\sqrt{12} - \sqrt{3}$

20. $\frac{8}{\sqrt{16}}$

21. $\sqrt{98}$

22. $4\sqrt{5} + \sqrt{125} + \sqrt{45}$

23. $\frac{\sqrt{64}}{\sqrt{4}}$

24. $\frac{\sqrt{100}}{\sqrt{20}}$

25. $\sqrt{2}g\sqrt{50}$

26. $\sqrt{20}g\sqrt{30}$

27. $\sqrt{2}(\sqrt{2} + \sqrt{9})$

28. $\sqrt{75}g\sqrt{25}$

*Topic 4**Solving proportions*

A proportion is an equation that states that two ratios are equal.

Cross product property: if $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$.

Example 1

Solve the proportion $\frac{4}{8} = \frac{x-2}{2}$

Solution

$$\frac{4}{8} = \frac{x-2}{2}$$

Write the original proportion

$$8(x-2) = (4)(2)$$

Use cross product property

$$8x - 16 = 8$$

Use distributive property and simplify

$$8x = 24$$

Isolate variable term

$$x = 3$$

Exercise:

Solve the proportion

$$29. \frac{4}{y} = \frac{3}{7}$$

$$30. \frac{4}{x} = \frac{x}{16}$$

$$31. \frac{4}{7} = \frac{2x}{5}$$

$$32. \frac{5}{3c} = \frac{2}{3}$$

$$33. \frac{4}{2x} = \frac{7}{3}$$

$$34. \frac{x+5}{6} = \frac{x-2}{4}$$

$$35. \frac{x-2}{4} = \frac{x+10}{10}$$

$$36. \frac{5}{2y} = \frac{7}{y-3}$$