

# Hon Pre-Calc

## Quiz - Algebra Review

Name \_\_\_\_\_

Show All Work!!! No Calculators!!! Circle All Final Answers!!!

### Short Answer

1. Factor completely over the set of integers:

$$4n^2 - 15n - 25$$

2. Factor completely over the set of integers:

$$98p^2 - 200$$

3. Factor completely over the set of integers:

$$200m^4 + 80m^3 + 8m^2$$

4. Factor completely over the set of integers:

$$x^7m + 2x^4m - 15xm$$

5. Factor completely over the set of integers:

$$x^6 + 4x^3 - 60$$

6. Factor completely over the set of integers:

$$105xuv + 60xv - 70xu - 90xv^2$$

7. Factor completely over the set of integers:

$$x^9 - x^6 - x^3 + 1$$

8. Find all real and/or imaginary solutions:

$$7x^2 + 32 = 7 - 40x$$

9. Solve by *completing the square* and find all real and/or imaginary solutions:

$$4x^2 + 31 = -8x$$

10. Solve using the *quadratic formula* and find all real and/or imaginary solutions:

$$4x^2 + 4x - 8 = 1$$

11. Simplify the following completely:

$$\frac{\frac{1}{2} - \frac{x+5}{4}}{\frac{x^2}{2} - \frac{5}{2}}$$

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4,  
12. Find all real solutions:

$$\left(\frac{1}{6}\right)^{3x+2} \cdot 216^{3x} = \frac{1}{216}$$

13. Find all real solutions:

$$\log_9(x+6) - \log_9 x = \log_9 2$$

14. Condense:

$$2(\log 2x - \log y) - (\log 3 + 2 \log 5)$$

15. Find all real solutions:

$$\ln(x+1) - \ln(x-1) = 3$$

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## Quiz - Algebra Review

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### Short Answer

1. Factor completely over the set of integers:

$$4n^2 - 15n - 25$$

$$4n^2 - 20n + 5n - 25$$

$$4n(n-5) + 5(n-5)$$

$$(4n+5)(n-5)$$

2. Factor completely over the set of integers:

$$98p^2 - 200$$

$$2(49p^2 - 100)$$

$$2(7p-10)(7p+10)$$

3. Factor completely over the set of integers:

$$200m^4 + 80m^3 + 8m^2$$

$$8m^2(25m^2 + 10m + 1)$$

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4. Factor completely over the set of integers:

$$x^7m + 2x^4m - 15xm$$

$$xm(x^6 + 2x^3 - 15)$$

$$xm(x^6 + 5x^3 - 3x^3 - 15)$$

$$xm(x^3(x^3+5) - 3(x^3+5))$$

$$xm(x^3-3)(x^3+5)$$

5. Factor completely over the set of integers:

$$x^6 + 4x^3 - 60$$

$$x^6 + 10x^3 - 6x^3 - 60$$

$$x^3(x^3+10) - 6(x^3+10)$$

$$(x^3-6)(x^3+10)$$

6. Factor completely over the set of integers:

$$105xuv + 60xv - 70xu - 90xv^2$$

$$5x(21uv + 12v - 14u - 18v^2)$$

$$5x(21uv - 14u - 18v^2 + 12v)$$

$$5x(7u(3v-2) - 6v(3v-2))$$

$$5x(7u-6v)(3v-2)$$

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$$(x^3-1)$$

7. Factor completely over the set of integers:

$$x^9 - x^6 - x^3 + 1$$

$$x^6(x^3-1) - 1(x^3-1)$$

$$(x^6-1)(x^3-1)$$

$$(x^2-1)(x^4+x^2+1)(x-1)(x^2+x+1)$$

$$(x-1)(x+1)(x^4+x^2+1)(x-1)(x^2+x+1)$$

11

8. Find all real and/or imaginary solutions:

$$7x^2 + 32 = 7 - 40x$$

$$7x^2 + 40x + 25$$

$$7x^2 + 35x + 5x + 25$$

$$7x(x+5) + 5(x+5)$$

$$(7x+5)(x+5)$$

$$7x = -5 \quad x = -5$$

$$x = (-\frac{5}{7})$$

9. Solve by **completing the square** and find all real and/or imaginary solutions:

$$4x^2 + 31 = -8x$$

$$x = \frac{-1 \pm 3i\sqrt{3}}{2}$$

$$x^2 + 2x = (-\frac{31}{4})$$

$$x^2 + 2x + 1 = (-\frac{31}{4}) + \frac{4}{4}$$

$$(x+1)^2 = (-\frac{27}{4})$$

$$x+1 = \pm i\sqrt{\frac{27}{4}}$$

$$x+1 = \pm \frac{i3\sqrt{3}}{2}$$

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

10. Solve using the **quadratic formula** and find all real and/or imaginary solutions:

$$4x^2 + 4x - 8 = 1$$

$$4x^2 + 4x - 9 = 0$$

$$x = \frac{-1 \pm \sqrt{10}}{2}$$

$$x = \frac{(-4) \pm \sqrt{(4)^2 - 4(4)(-9)}}{2(4)}$$

$$x = \frac{(-4) \pm \sqrt{16 + 144}}{8}$$

$$x = \frac{(-4) \pm \sqrt{160}}{8}$$

$$x = \frac{(-4) \pm 4\sqrt{10}}{8} = \frac{-1 \pm \sqrt{10}}{2}$$

11. Simplify the following completely:

$$\frac{\frac{1}{2} - \frac{x+5}{4}}{\frac{x^2}{2} - \frac{5}{2}} = \frac{\frac{2-(x+5)}{4}}{\frac{x^2-5}{2}} = \frac{2-x-5}{\frac{x^2-5}{2}}$$

$$\frac{-x-3}{\frac{x^2-5}{2}} = \frac{-x-3}{\frac{x^2-10}{2}}$$

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

11

12. Find all real solutions:

$$\left(\frac{1}{6}\right)^{3x+2} \cdot 216^{3x} = \frac{1}{216}$$

$$6^{-3x-2} \times 6^{9x} = 6^{-3}$$

$$6^{6x-2} = 6^{-3}$$

$$6x-2 = (-3)$$

$$6x = (-1)$$

$$x = \left(-\frac{1}{6}\right)$$

13. Find all real solutions:

$$\log_9(x+6) - \log_9 x = \log_9 2$$

$$\log_9\left(\frac{x+6}{x}\right) = \log_9 2$$

$$\frac{x+6}{x} = 2$$

$$x+6 = 2x$$

$$6 = x$$

$$\boxed{x=6}$$

14. Condense:

$$2(\log 2x - \log y) - (\log 3 + 2\log 5)$$

$$(\log 4x^2 - \log y^2) - (\log 3 + \log 25)$$

$$\left(\frac{\log 4x^2}{\log y^2}\right) - \log 75$$

$$\frac{\log 4x^2}{\log y^2} = \boxed{\frac{\log 4x^2}{\log 75y^2}}$$

15. Find all real solutions:

$$\ln(x+1) - \ln(x-1) = 3$$

$$\ln\left(\frac{x+1}{x-1}\right) = \ln(e^3)$$

$$\frac{x+1}{x-1} = e^3$$

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

$$x+1 = e^3x - e^3$$

$$x = e^3x - e^3 - 1$$

$$x - e^3x = -e^3 - 1$$

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

$$\boxed{x = \frac{-e^3 - 1}{1 - e^3}}$$

$$\frac{\frac{5}{(x+h)^2} - \frac{5}{x^2}}{h}$$

in which

$$\frac{5x^2 - 5(x+h)^2}{x^2(x+h)^2 h}$$

$$= \frac{5x^2 - 5x^2 - 10xh - 5h^2}{hx^2(x+h)^2} = \frac{-10xh - 5h^2}{x^2(x+h)^2}$$

$$\frac{5}{x^2} = 5x^{-2} \rightarrow f'(x) = -10x^{-3}$$

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