Pre-Calculus 11

KEY 2019

Chapter 3 Review

Name _____

1. Explain the difference between what is being asked in the following questions and complete the questions.

a) Factor

$x^2 + 5x + 6$

$(x+3)(x+2)$

*expression, because by factoring it into its roots.

b) Solve by Factoring

$x^2 + 7x + 6 = 0$

$(x+1)(x+6) = 0$ *equation

$x = -1$

$x = -6$

'solving' or finding the value of your root x.

2. What is an extraneous root? Give an example.

a root to the question but not a solution to the problem.

3. What is the discriminant? What does the discriminant tell you? Give examples.

part of the quadratic formula ($b^2 - 4ac$) under the root which tells us whether there are 0, 1 or 2 solutions.

4. Factor the following polynomials completely.

(a) $9(x-1)^2 - 100y^2$

$a = x-1$

$9a^2 - 100y^2$

$(3a - 10y)(3a + 10y)$

$(3(x-1) - 10y)(3(x-1) + 10y)$

$(3x - 10y - 3)(3x + 10y - 3)$

(b) $\frac{1}{4}x^2 + \frac{1}{2}x - 6$

$\frac{1}{4}(x^2 + 2x - 24)$

$\frac{1}{4}(x+6)(x-4)$

(c) $0.1n^2 - 0.1n - 3$

$0.1(n^2 - n - 30)$

or

$\frac{1}{10}(n^2 - n - 30)$

$0.1(n-6)(n+5)$

(d) $4(x+3)^2 + 8(x+3) - 5$

$a = x+3$

$4a^2 + 8a - 5$

$(2a+5)(2a-1)$

$(2(x+3)+5)(2(x+3)-1)$

$(2x+6+5)(2x+6-1)$

$(2x+11)(2x+5)$

2	5
2	-1

5. Solve each equation by factoring.

(a) $x^2 + 7x + 10 = 0$

$(x+5)(x+2)=0$

$x=-5$

$x=-2$

(b) $x^2 - x = 6$

$x^2-x-6=0$

$(x-3)(x+2)=0$

$x=3$

$x=-2$

(c) $8x^2 = 72x - 144$

$\frac{8x^2}{8} - \frac{72x}{8} + \frac{144}{8} = 0$

$x^2-9x+18=0$

$(x-6)(x-3)=0$

$x=6 \quad x=3$

(d) $5x^2 + 20 = -25x$

$\frac{5x^2}{5} + \frac{25x}{5} + \frac{20}{5} = 0$

$x^2+5x+4=0$

$(x+4)(x+1)=0$

$x=-4$

$x=-1$

2 | 3

2 | 1

(e) $4x^2 + 8x + 3 = 0$

$(2x+3)(2x+1)=0$

$x=-3/2$

$x=-1/2$

(f) $2x^2 - 5x = 0$

$x(2x-5)=0$

$x=0$

$x=5/2$

6. Write a quadratic equation that has the following solutions.

(a) -5, 7

$(x+5)(x-7)=0$

$x^2-7x+5x-35=0$

$x^2-2x-35=0$

(b) $2, \frac{4}{3}$

$(x-2)(3x-4)=0$

$3x^2-4x-6x+8=0$

$3x^2-10x+8=0$

7. Solve each equation.

(a) $8x^2 - 7 = 249$

$8x^2 = 256$

$x^2 = 32$

$x = \pm\sqrt{32} = \pm 4\sqrt{2}$

(b) $(x+5)^2 = 49$

$x + 5 = \pm\sqrt{49}$

$x = 5 + 7 = 2$

$x = -5 - 7 = -12$

(c) $2(x-2)^2 = 18$

$(x-2)^2 = 9$

$x - 2 = \pm\sqrt{9}$

$x = 2 + 3 = 5$

$x = 2 - 3 = -1$

(d) $\left(x - \frac{7}{5}\right)^2 = \frac{36}{25}$

$x - \frac{7}{5} = \pm\sqrt{\frac{36}{25}}$

$x = \frac{7}{5} + \frac{6}{5} = \frac{13}{5}$

$x = \frac{7}{5} - \frac{6}{5} = \frac{1}{5}$

8. Solve each equation by completing the square.

(a) $3x^2 - 12x + 9 = 0$

$3x^2 - 12x = -9$

$x^2 - 4x = -3$

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

$(x-2)^2 = 1$

$x - 2 = \pm 1$

$x = 3, 1$

(b) $x^2 - 12x + 31 = 0$

$x^2 - 12x = -31$

$x^2 - 12x + 36 = -31 + 36$

$(x-6)^2 = 5$

$x - 6 = \pm\sqrt{5}$

$x = 6 \pm \sqrt{5}$

(c) $-4x^2 + 24x - 21 = 0$

$x^2 - 6x = \frac{21}{-4}$

$x^2 - 6x + 9 = \frac{-21}{4} + 9$

$(x-3)^2 = \frac{15}{4}$

$x = 3 \pm \frac{\sqrt{15}}{2} = \frac{6 \pm \sqrt{15}}{2}$

(d) $\frac{1}{4}x^2 + x - \frac{7}{2} = 0$ $\times 4$

$x^2 + 4x - 14 = 0$

$x^2 + 4x = 14$

$x^2 + 4x + 4 = 18$

$(x+2)^2 = 18$

$x + 2 = \pm\sqrt{18}$

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

9. Solve each equation with the quadratic formula.

(a) $4x^2 - 3x - 27 = 0$

$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-27)}}{2(4)}$

$= \frac{3 \pm \sqrt{9 + 432}}{8}$

$= \frac{3 \pm \sqrt{441}}{8} = \frac{3 \pm 21}{8}$

$= \frac{24}{8} = 3$

$= \frac{3 - 21}{8} = \frac{-18}{8} = -\frac{9}{2}$

(b) $x^2 - 10x + 22 = 0$

$x = \frac{10 \pm \sqrt{(-10)^2 - 4(1)(22)}}{2}$

$= \frac{10 \pm \sqrt{12}}{2}$

$= \frac{10 \pm 2\sqrt{3}}{2}$

$= 5 \pm \sqrt{3}$

10. Use the discriminant to determine the number of solutions to each question.

(a) $2x^2 - 9x + 4 = 0$

$b^2-4ac > 0$

$=(-9)^2-4(2)(4)$

$=81-32$

$=49$ ∴ 2 real roots

(b) $-6x^2 + 7x - 5 = 0$

$b^2-4ac < 0$

$=7^2-4(-6)(-5)$

$=49-120$

$=-71$ NO ROOTS

(c) $-6x^2 - 3x + 9 = 0$

$b^2-4ac > 0$

$=(-3)^2-4(-6)(5)$

$=9+216$

$=225$ ∴ 2 real roots

(d) $-x^2 - 6x - 9 = 0$

$b^2-4ac = 0$

$=(-6)^2-4(-1)(-9)$

$=36-36$

$=0$ ∴ ONE Root

11. Solve the following.

(a) $\left(x - 1 = \frac{2}{x}\right)x$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x = 2$

$x = -1$

(b) $x(2x-3) + 4(x+1) = 2(3+2x)$

$2x^2 - 3x + 4x + 4 - 6 - 4x = 0$

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

$(2x+1)(x-2) = 0$

$x = -\frac{1}{2}$

$x = 2$

(c) $-2 - 3(x+1)^2 = -50$

$-3(x+1)^2 = -48$

$(x+1)^2 = \frac{-48}{-3}$

$(x+1)^2 = 16$

$x+1 = \pm\sqrt{16}$

$x = -1+4 = 3$

$x = -1-4 = -5$

(d) $2(x+3)^2 - 11(x+3) + 15 = 0$ let $a = x+3$

$2a^2 - 11a + 15 = 0$

$(a-3)(2a-5) = 0$

sub in $x+3$

$(x+3-3)(2(x+3)-5) = 0$

$x(2x+1) = 0$

$x = 0$

$x = -\frac{1}{2}$

(e) $\left(\frac{1}{4}x^2 + \frac{1}{2}x = 1\right)4$

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

$x^2 + 2x + 1 = 5$

$(x+1)^2 = 5$

$x = -1 \pm \sqrt{5}$

(f) $\sqrt{2x-7} + 5 = x$

$2x - 7 \geq 0$

$x \geq 7/2$

$\left(\sqrt{2x-7}\right)^2 = (x-5)^2$

$2x - 7 = (x-5)^2$

$2x - 7 = x^2 - 10x + 25$

$x^2 - 12x + 32 = 0$

$(x-8)(x-4) = 0$

$x = 8 \quad x = 4$

VERIFY

$\sqrt{2(8)-7} + 5 = 8$

$\sqrt{9} + 5 = 8$

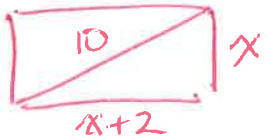
$8 = 8$

$\sqrt{2(4)-7} + 5 = 4$

$1 + 5 = 4$

$6 \neq 4$ extraneous.

11. The diagonal of a rectangle is 10 cm. The length is 2 cm longer than the width. Determine the width.



$a^2 + b^2 = c^2$

$x^2 + (x+2)^2 = 10^2$

$x^2 + x^2 + 4x + 4 = 100$

$\frac{2x^2}{2} + \frac{4x}{2} - \frac{96}{2} = \frac{0}{2}$

$x^2 + 2x - 48 = 0$

$(x+8)(x-6)$

$x = -8$

$x = 6$

11. The height of a golf ball, in yards, is $h(d) = -0.02d^2 + 2d$, where d is the horizontal distance the ball has travelled, in yards, after being struck. Determine how far the ball travels before it first strikes the ground. (Note: Think of what the height is when it touches the ground).

$h = 0$

$0 = \frac{-0.02d^2}{-0.02} + \frac{2d}{-0.02}$

$d^2 - 100d = 0$

$d(d - 100) = 0$

~~$d = 0$~~ (starting point)

$d = 100$

$\therefore$ $d = 100$ yards