72/72 = 100

Foundations for College Algebra
Spring 2017 - M. Goodroe
Exam #3

Name _Key_ Date _____

Factor out the GCF from the polynomial.

1) $40x + 10$

$$10(4x + 1)$$

2) $40m^9 + 32m^7 - 12m^3$

$$4m^3(10m^6 + 8m^4 - 3)$$

Factor the four-term polynomial by grouping.

3) $5x + 35 + xy + 7y$

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

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

4) $xy + y + 8x + 8$

$$y(x + 1) + 8(x + 1)$$

$$(x + 1)(y + 8)$$

Factor the trinomial completely. If the polynomial cannot be factored, write "prime."

5) $x^2 + x - 42$ $ac = -42, \quad b = 1$ $\dfrac{+}{7} \Big| \dfrac{-}{6}$

$$x^2 + 7x - 6x - 42$$
$$x(x + 7) - 6(x + 7)$$
$$(x + 7)(x - 6)$$

$$(x + 7)(x - 6)$$

6) $x^2 + 3x - 108$ $ac = -108, \quad b = 3$ $\dfrac{+}{12} \Big| \dfrac{-}{9}$

$$(x + 12)(x - 9)$$

7) $x^2 - x - 40$ $ac = -40, \quad b = -1$

$$\text{Relatively Prime}$$

$-$	$+$
-8	5
40	4
20	2

1

Factor completely.

8) $7x^2 - 16x - 15$ $ac = (7)(-15) = -105, \; b = -16$

	+	+	↗
20	4	-80
22	6	-132
121	5	-105

$7x^2 - 21x + 5x - 15$

$7x(x-3) + 5(x-3)$

$\boxed{(x-3)(7x+5)}$

9) $20x^2 + 31x + 12$ $ac = (20)(12) = 240, \; b = 31$

	+	+	
30	1	30
20	11	220
+8	13	234
✓ 16	15	240

$20x^2 + 16x + 15x + 12$

$4x(5x+4) + 3(5x+4)$

$\boxed{(5x+4)(4x+3)}$

Factor the binomial completely.

10) $z^2 - 4$ $a = z, \; b = 2$

$(z+2)(z-2)$

11) $x^2 - \dfrac{1}{9}$ $a = x, \; b = \frac{1}{3}$

$(x + \frac{1}{3})(x - \frac{1}{3})$

Factor the sum or difference of two cubes.

12) $t^3 + 64$ $a = t, \; b = 4$

$\boxed{(t+4)(t^2 - 4t + 16)}$

Solve the equation.

13) $x^2 + 4x - 12 = 0$ $ac = -12, \; b = 4$

+	−
6	2

$(x+6)(x-2) = 0$

① $x + 6 = 0$ ② $x - 2 = 0$

$\boxed{x = -6}$ $\boxed{x = 2}$

14) $4x^2 - 1 = 0$ $a = 2x \; b = 1$

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

① $2x + 1 = 0$ ② $2x - 1 = 0$

$2x = -1$ $2x = 1$

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

Simplify the radical expression. Assume that all variables represent positive real numbers.

15) $\sqrt{75}$

$$\sqrt{25 \cdot 3} = \sqrt{25} \cdot \sqrt{3}$$
$$= \boxed{5\sqrt{3}}$$

16) $\sqrt{y^9}$

$$9/2 = 4 \qquad \sqrt{(y^4)^2 \cdot (y^1)} = \boxed{y^4 \sqrt{y}}$$

Use the square root property to solve the equation.

17) $(x - 7)^2 = 4$

$$\sqrt{(x-7)^2} = \pm\sqrt{4}$$
$$x - 7 = \pm 2$$
$$x = \pm 2 + 7$$

$$\boxed{① \quad x = 2 + 7 = 9 \\ ② \quad x = -2 + 7 = 5}$$

Solve the equation by completing the square.

18) $x^2 + 16x + 53 = 0$

$$x^2 + 16x = -53$$

ⓐ $16 \cdot \tfrac{1}{2} = 8$

ⓑ $8^2 = 64$

$$x^2 + 16x + 64 = -53 + 64$$
$$(x + 8)^2 = 11$$

$$x + 8 = \pm\sqrt{11}$$

$$\boxed{x = -8 \pm \sqrt{11}}$$

1) $10(4x + 1)$
2) $4m^3(10m^6 + 8m^4 - 3)$
3) $(x + 7)(5 + y)$
4) $(x + 1)(y + 8)$
5) $(x - 6)(x + 7)$
6) $(x + 12)(x - 9)$
7) prime
8) $(7x + 5)(x - 3)$
9) $(4x + 3)(5x + 4)$
10) $(z + 2)(z - 2)$
11) $\left(x + \dfrac{1}{3}\right)\left(x - \dfrac{1}{3}\right)$
12) $(t + 4)(t^2 - 4t + 16)$
13) $-6, 2$
14) $\dfrac{1}{2}, -\dfrac{1}{2}$
15) $5\sqrt{3}$
16) $y^4\sqrt{y}$
17) $9, 5$
18) $-8 - \sqrt{11}, -8 + \sqrt{11}$