

Key

Review for Math 30-1

**Factor**

1.  $x^2 + 3x + 2$

$(x+2)(x+1)$

3.  $x^2 + x - 6$

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

5.  $a^2 - 2a - 35$

$(a-7)(a+5)$

7.  $b^2 + 7b - 8$

$(b+8)(b-1)$

9.  $x^2 - 4x - 45$

$(x-9)(x+5)$

2.  $x^2 - x - 2$

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

4.  $a^2 + a - 12$

$(a+4)(a-3)$

6.  $b^2 + 8b + 16$

$(b+4)(b+4)$

8.  $y^2 - y - 6$

$(y-3)(y+2)$

10.  $y^2 - 8y + 15$

$(y-3)(y-5)$

**Factor**

1.  $2x^2 + 6x + 4 = 2(x^2 + 3x + 2)$   
 $2(x+2)(x+1)$

2.  $4a^2 - 12a + 8 = 4(a^2 - 3a + 2)$   
 $4(a-2)(a-1)$

3.  $10a^2 + 10a - 20 = 10(a^2 + a - 2)$   
 $10(a-1)(a+2)$

4.  $7a^2 - 14a - 21 = 7(a^2 - 2a - 3)$   
 $7(a-3)(a+1)$

5.  $3y^2 - 15y + 18 = 3(y^2 - 5y + 6)$   
 $3(y-6)(y+1)$

6.  $a^3 - 5a^2 + 4a = a(a^2 - 5a + 4)$   
 $a(a-4)(a-1)$

7.  $x^4 - 15x^3 + 56x^2 = x^2(x^2 - 15x + 56)$   
 $x(x-7)(x-8)$

8.  $b^4 - 3b^3 - 10b^2 = b^2(b^2 - 3b - 10)$   
 $b^2(b-5)(b+2)$

9.  $2a^3 + 8a^2 - 64a = 2a(a^2 + 4a - 32)$   
 $2a(a+8)(a-4)$

10.  $3a^3 - 9a^2 - 54a = 3a(a^2 - 3a - 18)$   
 $3a(a-6)(a+3)$

**Factor**

1.  $2x^2 + 3x + 1$

$(2x + 1)(x + 1)$

2.  $2y^2 + 7y + 3$

$(2y + 1)(y + 3)$

3.  $2b^2 - 11b + 5$

$(2b - 1)(b - 5)$

4.  $3b^2 - 13b + 4$

$(3b - 1)(b - 4)$

5.  $2t^2 - t - 10$

$(2t - 5)(t + 2)$

6.  $3p^2 - 16p + 5$

$(3p - 1)(p - 5)$

7.  $12y^2 - 7y + 1$

$(3y - 1)(4y - 1)$

8.  $2t^2 + 5t - 12$

$(2t - 3)(t + 4)$

9.  $5y^2 - 22y + 8$

$(5y - 2)(y - 4)$

10.  $3p^2 + 22p - 16$

$(3p - 2)(p + 8)$

**Factor**

1.  $x^2 - 25$

$(x + 5)(x - 5)$

2.  $x^2 - 100$

$(x + 10)(x - 10)$

3.  $9x^2 - 1$

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

4.  $64x^2 - 9$

$(8x - 3)(8x + 3)$

5.  $36y^2 + 49$

$(6y + 7)(6y - 7)$

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

$(x + 3)(x + 3) = (x + 3)^2$

7.  $y^2 + 14y + 49$

$(y + 7)^2$

8.  $5a^2 - 20a + 25 = 5(a^2 - 4a + 5)$

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

9.  $2x^2 - 72$

$2(x^2 - 36)$

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

10.  $4x^2 - 16$

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

or

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

Simplify

1.  $\sqrt{125n}$

$$5\sqrt{5n}$$

3.  $\sqrt{216v}$

$$6\sqrt{6v}$$

5.  $\sqrt{216k^4}$

$$6k^2\sqrt{6}$$

7.  $\sqrt{80p^3}$

$$4p\sqrt{5p}$$

9.  $\sqrt{147m^3n^3}$

$$7mn\sqrt{3mn}$$

11.  $\sqrt{16u^4v^3}$

$$4u^2v\sqrt{v}$$

13.  $\sqrt{75x^2y}$

$$5x\sqrt{3y}$$

2.  $\sqrt{512k^2}$

$$16k\sqrt{2}$$

4.  $\sqrt{48k^2}$

$$4k\sqrt{3}$$

6.  $\sqrt{512m^3}$

$$16m\sqrt{2m}$$

8.  $\sqrt{100v^3}$

$$10v\sqrt{v}$$

10.  $\sqrt{45p^2}$

$$3p\sqrt{5}$$

12.  $\sqrt{64m^3n^3}$

$$8mn\sqrt{mn}$$

14.  $\sqrt{28x^3y^3}$

$$2xy\sqrt{7xy}$$

Divide and rationalize the denominator:

$$1. \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$\frac{2\sqrt{3}}{3}$$

$$2. \frac{5}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$$

$$\frac{5\sqrt{10}}{10} = \frac{\sqrt{10}}{2}$$

$$3. \frac{5}{3\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$$

$$\frac{5\sqrt{7}}{21}$$

$$4. -\frac{21}{10\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= -\frac{21\sqrt{3}}{30}$$

$$5. \frac{5}{6+\sqrt{3}} \cdot \frac{6-\sqrt{3}}{6-\sqrt{3}}$$

$$\frac{30-5\sqrt{3}}{33}$$

$$6. \frac{3\sqrt{5}}{9-\sqrt{5}} \cdot \frac{9+\sqrt{5}}{9+\sqrt{5}}$$

$$= \frac{27\sqrt{5}+15}{76}$$

$$7. \frac{3}{3-\sqrt{3}} \cdot \frac{3+\sqrt{3}}{3+\sqrt{3}}$$

$$\frac{9+3\sqrt{3}}{6} = \frac{3+\sqrt{3}}{2}$$

$$8. \frac{12}{4-\sqrt{2}} \cdot \frac{4+\sqrt{2}}{4+\sqrt{2}}$$

$$\frac{48+12\sqrt{2}}{14} = \frac{24+6\sqrt{2}}{7}$$

$$9. \frac{1}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{\sqrt{2}}{6}$$

$$10. \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} \cdot \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}-\sqrt{3}}$$

$$= \frac{5-\sqrt{15}-\sqrt{15}+3}{5-\sqrt{15}+\sqrt{15}-3} = \frac{8-2\sqrt{15}}{2} = 4-\sqrt{15}$$

$$11. \frac{3}{4+\sqrt{5}} \cdot \frac{4-\sqrt{5}}{4-\sqrt{5}}$$

$$\frac{12-3\sqrt{5}}{11}$$

$$12. \frac{5}{\sqrt{7}+4} \cdot \frac{\sqrt{7}-4}{\sqrt{7}-4}$$

$$\frac{5\sqrt{7}-20}{9}$$

$$13. \frac{2\sqrt{7}}{4+\sqrt{5}} \cdot \frac{4-\sqrt{5}}{4-\sqrt{5}}$$

$$\frac{8\sqrt{7}-2\sqrt{35}}{11}$$

$$14. \frac{4\sqrt{5}}{-4+\sqrt{5}} \cdot \frac{-4-\sqrt{5}}{-4-\sqrt{5}}$$

$$\frac{-16\sqrt{5}-4\sqrt{25}}{11} = \frac{-16\sqrt{5}-20}{11}$$

$$15. \frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}-\sqrt{3}} \cdot \frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}+\sqrt{3}}$$

$$\frac{2+\sqrt{6}+\sqrt{6}+3}{-1} = \frac{5+2\sqrt{6}}{-1} = -5-2\sqrt{6}$$

$$16. \frac{\sqrt{15}+\sqrt{6}}{\sqrt{15}-\sqrt{6}} \cdot \frac{\sqrt{15}+\sqrt{6}}{\sqrt{15}+\sqrt{6}}$$

$$= \frac{15+\sqrt{90}+\sqrt{90}+6}{15-6} = \frac{21+2\sqrt{90}}{9} = \frac{21+6\sqrt{10}}{9}$$

$$17. \frac{2}{3-\sqrt{3x^2}} \cdot \frac{3+\sqrt{3x^2}}{3+\sqrt{3x^2}}$$

$$= \frac{7+2\sqrt{10}}{3}$$

$$\frac{6+2\sqrt{3}}{9-3x^2}$$

$$18. \frac{3}{-4k^2-5\sqrt{k^3}} \cdot \frac{-4k^2+5\sqrt{k^3}}{-4k^2+5\sqrt{k^3}}$$

$$\frac{-12k^2+15k\sqrt{k}}{16k^4-25k^3}$$

$$16k^4-25k^3$$

Identify the error in the following questions.

1.  $\frac{\sqrt{4}}{4\sqrt{5}}$

$$\frac{\sqrt{4}}{4\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{20}}{4\sqrt{25}} = \frac{4\sqrt{5}}{20} = \frac{\sqrt{5}}{5}$$

2.  $\frac{\sqrt{5}}{5+\sqrt{2}}$

$$\frac{\sqrt{5}}{5+\sqrt{2}} \cdot \frac{5+\sqrt{2}}{5+\sqrt{2}} = \frac{5\sqrt{5}+\sqrt{10}}{27}$$

↑ should be  $5-\sqrt{2}$  in order to be conjugate

3.  $\frac{2}{3-\sqrt{3x^2}}$

$$\frac{2}{3-\sqrt{3x^2}} \cdot \frac{3+\sqrt{3x^2}}{3+\sqrt{3x^2}} = \frac{6+\sqrt{3x^2}}{9-3x^2} \rightarrow 2\sqrt{3x^2}$$

4.  $\frac{-4+\sqrt{3}}{-1-2\sqrt{5}}$

$$\frac{-4+\sqrt{3}}{-1-2\sqrt{5}} \cdot \frac{-1+2\sqrt{5}}{-1+2\sqrt{5}} = \frac{4+2\sqrt{15}}{-19} = \frac{4-8\sqrt{5}-\sqrt{3}+2\sqrt{15}}{-19}$$

Solve for the variable.

$$1) -20 = -4x - 6x$$

$$-20 = -10x$$

$$x = 2$$

$$2) 6 = 1 - 2n + 5$$

$$0 = -2n$$

$$n = 0$$

$$3) 8x - 2 = -9 + 7x$$

$$x = -7$$

$$4) a + 5 = -5a + 5$$

$$6a = 0$$

$$a = 0$$

$$5) 2(4x - 3) - 8 = 4 + 2x$$

$$8x - 6 - 8 = 4 + 2x$$

$$6x = 18$$

$$x = 3$$

Solve for the variable

$$1) 2n^3 - n^2 - 136n = 0$$

$$n(2n^2 - n - 136)$$

$$n(n+8)(2n-17) = 0$$

$$n = 0, -8, 17/2$$

$$2) 5x^3 + 4x^2 - 57x = 0$$

$$x(5x^2 + 4x - 57) = 0$$

$$x(x-3)(5x+19) = 0$$

$$x = 0, 3, -19/5$$

$$3) 6n^4 + 9n^3 + 3n^2 = 0$$

$$3n^2(2n^2 + 3n + 1) = 0$$

$$3n^2(2n+1)(n+1) = 0$$

$$n = 0, -1/2, -1$$

$$4) 2n^3 + 24n^2 - 56n = 0$$

$$2n(n^2 + 12n - 28) = 0$$

$$2n(n+14)(n-2) = 0$$

$$5) x^3 - x = 0$$

$$x = 0, -1, 1$$

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

$$x = 0, 1$$

$$6) 3n - 5 = -8(6 + 5n)$$

$$3n - 5 = -48 - 40n$$

$$43n = -43$$

$$n = -1$$

$$7) -(1 + 7x) - 6(-7 - x) = 36$$

$$-1 - 7x + 42 + 6x = 36$$

$$-x = -5$$

$$x = 5$$

$$8) -3(4x + 3) + 4(6x + 1) = 43$$

$$-12x - 9 + 24x + 4 = 43$$

$$8x = 48$$

$$x = 6$$

$$9) 27a - 22 = -4(1 - 6a)$$

$$27a - 22 = -4 + 24a$$

$$3a = 18$$

$$a = 6$$

$$10) -5(1 - 5x) + 5(-8x - 2) = -4x - 8x$$

$$-5 + 25x - 40x - 10 = -4x - 8x$$

$$-15 = 3x$$

$$x = -5$$

$$6) 2r^5 - 6r^4 - 56r^3 = 0$$

$$2r^3(r^2 - 3r - 28) = 0$$

$$2r^3(r-7)(r+4) = 0$$

$$r = 0, 7, -4$$

$$7) 12b^3 - 2b^2 - 30b = 0$$

$$2b(6b^2 - b - 15) = 0$$

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

$$b = 0, 5/3, 3/2$$

$$8) 4r^4 - 64r^2 = 0$$

$$4r^2(r^2 - 16)$$

$$4r^2(r-4)(r+4)$$

$$r = 0, -4, 4$$

$$9) 12b^3 + 6b^2 = 18b = 12b^3 + 6b^2 - 18b = 0$$

$$6b(2b^2 + b - 3) = 0$$

$$6b(2b+3)(b-1) = 0$$

$$b = 0, -3/2, 1$$

$$10) 6v^3 - 42v = -4v^2$$

$$6v^3 + 4v^2 - 42v = 0$$

$$2v(3v^2 + 2v - 21) = 0$$

$$2v(3v-7)(v+3) = 0 \quad v = 0, 7/3, -3$$

Identify the error in the following questions.

1.  $x^3 + 5x^2 = 3x + 45$

$6x^2 = 3x + 45$

$6x^2 - 3x - 45 = 0$

$3(2x^2 - x - 15) = 0$

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

$x = 3, -5/2$

can't add together

2.  $6x^3 - 16x = 4x^2$

$6x^3 - 4x^2 - 16x = 0$

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

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

$x = 2, 0, \textcircled{4} - 4/3$

3.  $3x^2(3x + 4) = 12x(x + 3)$

$9x^3 + 12x^2 = 12x^2 + 36x$

$9x^3 - 36x = 0$

$9x(x^2 - 4) = 0$  factors to

$x = 0, \textcircled{4} (x - 2)(x + 2)$

$-2, +2$

