

**Common Factoring Worksheet**

Answer the following questions on a separate sheet of paper.

1. Factor completely where possible.

- |              |                        |
|--------------|------------------------|
| a) $2x + 6$  | e) $3x + 11$           |
| b) $5y - 10$ | f) $2x^2 - 82$         |
| c) $3x + 6y$ | g) $2tw + 4tx - 6ty$   |
| d) $7w - 7$  | h) $3abx - aby - 2abz$ |

2. Factor completely where possible.

- |                            |  |
|----------------------------|--|
| a) $25x^3 + 10x^2 + 15x$   | h) $22xy - 11y^2 + 33wy$                       |
| b) $y^5 - y^4 + y^3 - y^2$ | i) $36mn^2 - 24m^2n + 28mn$                    |
| c) $36x^5 - 9y^3$          | j) $7rst - 14r^2s^2t$                          |
| d) $12xy + 4wx - 8xz$      | k) $18r^2s^3 - 9rs^2 - 27r^3s^2$               |
| e) $9m^3 - 6m^2t + 3mt^2$  | l) $20m^6n^4 - 30m^5n^5 + 40m^7n^3 - 10m^5n^3$ |
| f) $7xyz - 14xy + 21txy$   | m) $14rst + 17xy - 3w$                         |
| g) $7pqr - 5xy + 8t$       | n) $40x^5y^7 - 32x^7y^6 - 28x^8y^4 - 36x^7y^5$ |

3. Factor.

- |                           |                            |
|---------------------------|----------------------------|
| a) $3m(x + y) + 2(x + y)$ | e) $5w(x - 2) - 3t(x - 2)$ |
| b) $3x(y - 1) + 2(y - 1)$ | f) $2t(x + 5) + (x + 5)$   |
| c) $9x(m + 3) - 2(m + 3)$ | g) $4mn(t - 4) - (t - 4)$  |
| d) $5y(m + n) + t(m + n)$ | h) $a(p - q) - b(p - q)$   |

**SOLUTIONS**

1.a.  $2(x + 3)$  b.  $5(y - 2)$  c.  $3(x + 2y)$  d.  $7(w - 1)$  e. not factorable f.  $2(x^2 - 41)$  g.  $2t(w + 2x - 3y)$  h.  $ab(3x - y - 2z)$

2.a.  $5x(5x^2 + 2x + 3)$  b.  $y^2(y^3 - y^2 - y - 1)$  c.  $9(4x^5 - y^3)$  d.  $4x(3y + w - 2z)$  e.  $3m(3m^2 - 2mt + mt)$   
 f.  $7xy(z - 2 + 3t)$  g. not factorable h.  $y(22x - 11y + 33w)$  i.  $4mn(9n - 6m + 7)$  j.  $7rst(1 - 2rs)$   
 k.  $9rs^2(2rs - 1 - 3r^2)$  l.  $10m^5n^3(2mn - 3mn^2 + 4)$  m. not factorable n.  $4x^5y^4(10y^3 - 8x^2y^2 - 7x^3 - 9x^2y)$

3.a.  $(3m + 2)(x + y)$  b.  $(3x + 2)(y - 1)$  c.  $(9x - 2)(m + 3)$  d.  $(5y + t)(m + n)$  e.  $(5w - 3t)(x - 2)$   
 f.  $(2t + 1)(x + 5)$  g.  $(4mn - 1)(t - 4)$  h.  $(a - b)(p - q)$

Find the GCF for each set of numbers.

$18, 6 = \underline{\hspace{2cm}}$

$20, 32 = \underline{\hspace{2cm}}$

$24, 21 = \underline{\hspace{2cm}}$

$27, 18 = \underline{\hspace{2cm}}$

$30, 9 = \underline{\hspace{2cm}}$

$12, 14 = \underline{\hspace{2cm}}$

$12, 21 = \underline{\hspace{2cm}}$

$36, 12 = \underline{\hspace{2cm}}$

$16, 14 = \underline{\hspace{2cm}}$

$28, 24 = \underline{\hspace{2cm}}$

$4, 12 = \underline{\hspace{2cm}}$

$21, 27 = \underline{\hspace{2cm}}$

$28, 20 = \underline{\hspace{2cm}}$

$24, 27 = \underline{\hspace{2cm}}$

$20, 16 = \underline{\hspace{2cm}}$

$12, 28 = \underline{\hspace{2cm}}$

$9, 21 = \underline{\hspace{2cm}}$

$18, 21 = \underline{\hspace{2cm}}$

$12, 27 = \underline{\hspace{2cm}}$

$20, 8 = \underline{\hspace{2cm}}$

$18, 6 = \underline{\hspace{2cm}}$

$36, 28 = \underline{\hspace{2cm}}$

$9, 18 = \underline{\hspace{2cm}}$

$9, 27 = \underline{\hspace{2cm}}$

### SOLUTIONS

6	4	3
9	3	2
3	6	2
4	4	3
4	3	4
4	3	3
3	4	6
4	9	9

Find the Greatest Common Factor (GCF)

1)  $9c^2, 6c^2$

2)  $20n^3, 16n^3$

3)  $54m^2, 36m^3$

4)  $42n^2, 28n^4$

5)  $3x^2, 6x$

6)  $18a^2, 12a^4$

7)  $36n^3, 24n^4$

8)  $27c, 18c^2$

9)  $36c^3, 18c^3$

10)  $15n^2, 20n^3$

11)  $36m^4, 27m^2$

12)  $42x^3, 28x^3$

13)  $30n^3, 12n^3$

14)  $45c, 27c^2$

15)  $12a^4, 9a^2$

16)  $18c^2, 12c^4$

17)  $36c^4, 27c^3$

18)  $6m^2, 24m^3$

19)  $6b^2, 4b^2$

20)  $10b^2, 15b$

**Solutions**

1.  $3c^2$   
2.  $4n^3$   
3.  $18m^2$   
4.  $14n^2$   
5.  $9-3x$   
6.  ~~$18c^2$~~   
7.  $12n^3$   
8.  $9c$   
9.  $18c^3$   
10.  $5n^2$   
11.  $9m^2$   
12.  $14x^3$   
13.  $6n^3$   
14.  $9c$   
15.  $3a^2$   
16.  $6c^2$   
17.  $9c^3$   
18.  $6m^2$   
19.  $2b^2$   
20.  $5b$

# ***Adding & Subtracting Polynomials***

Answer all of the following questions on a separate sheet of paper.

**Simplify each expression.**

1)  $(5p^2 - 3) + (2p^2 - 3p^3)$

2)  $(a^3 - 2a^2) - (3a^2 - 4a^3)$

3)  $(4 + 2n^3) + (5n^3 + 2)$

4)  $(4n - 3n^3) - (3n^3 + 4n)$

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

6)  $(4r^3 + 3r^4) - (r^4 - 5r^3)$

7)  $(5a + 4) - (5a + 3)$

8)  $(3x^4 - 3x) - (3x - 3x^4)$

9)  $(-4k^4 + 14 + 3k^2) + (-3k^4 - 14k^2 - 8)$

10)  $(3 - 6n^5 - 8n^4) - (-6n^4 - 3n - 8n^5)$

11)  $(12a^5 - 6a - 10a^3) - (10a - 2a^5 - 14a^4)$

12)  $(8n - 3n^4 + 10n^2) - (3n^2 + 11n^4 - 7)$

13)  $(-x^4 + 13x^5 + 6x^3) + (6x^3 + 5x^5 + 7x^4)$

14)  $(9r^3 + 5r^2 + 11r) + (-2r^3 + 9r - 8r^2)$

15)  $(13n^2 + 11n - 2n^4) + (-13n^2 - 3n - 6n^4)$

16)  $(-7x^5 + 14 - 2x) + (10x^4 + 7x + 5x^5)$

17)  $(7 - 13x^3 - 11x) - (2x^3 + 8 - 4x^5)$

18)  $(13a^2 - 6a^5 - 2a) - (-10a^2 - 11a^5 + 9a)$

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19)  $(3v^5 + 8v^3 - 10v^2) - (-12v^5 + 4v^3 + 14v^2)$

20)  $(8b^3 - 6 + 3b^4) - (b^4 - 7b^3 - 3)$

21)  $(k^4 - 3 - 3k^3) + (-5k^4 + 6k^3 - 8k^5)$

22)  $(-10k^2 + 7k + 6k^4) + (-14 - 4k^4 - 14k)$

23)  $(-7n^2 + 8n - 4) - (-11n + 2 - 14n^2)$

24)  $(14p^4 + 11p^2 - 9p^5) - (-14 + 5p^5 - 11p^2)$ 

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25)  $(8k + k^2 - 6) - (-10k + 7 - 2k^2)$

**Solutions**

26)  $(-9v^2 - 8u) + (-2uv - 2u^2 + v^2) + (-v^2 + 4uv)$

27)  $(4x^2 + 7x^3y^2) - (-6x^2 - 7x^3y^2 - 4x) - (10x + 9x^2)$

28)  $(-5u^3v^4 + 9u) + (-5u^3v^4 - 8u + 8u^2v^2) + (-8u^4v^2 + 8u^3v^4)$

29)  $(-9xy^3 - 9x^4y^3) + (3xy^3 + 7y^4 - 8x^4y^4) + (3x^4y^3 + 2xy^3)$

30)  $(y^3 - 7x^4y^4) + (-10x^4y^3 + 6y^3 + 4x^4y^4) - (x^4y^3 + 6x^4y^4)$

1.  $-3p^3 + 7p^2 - 3$

2.  $5a^3 - 5a^2$

3.  $7n^3 + 6$

4.  $-6n^3$

5.  $a^2 - 3$

6.  $2r^4 + 9r^3$

7.  $1$

8.  $6x^4 - 6x$

9.  $-7k^4 - 11k^2 + 6$

10.  $2n^5 - 2n^4 + 3n + 3$

11.  $14a^5 + 14a^4 - 10a^3 - 16a$

12.  $-14n^4 + 7n^2 + 8n + 7$

13.  $18x^5 + 6x^4 + 12x^3$

14.  $7r^3 - 3r^2 + 20r$

15.  $-8n^4 + 8n$

16.  $-2x^5 + 10x^4 + 5x + 14$

17.  $4x^5 - 15x^3 - 11x - 1$

18.  $5a^5 + 23a^2 - 11a$

19.  $15v^5 + 4v^3 - 24v^2$

20.  $2b^4 + 15b^3 - 3$

21.  $-8k^5 - 4k^4 + 3k^3 - 3$

22.  $2k^4 - 10k^2 - 7k - 14$

23.  $7n^2 + 19n - 6$

24.  $-14p^5 + 14p^4 + 22p^2 + 14$

25.  $3k^2 + 18k - 13$

26.  $-9v^2 + 2uv - 2u^2 - 8u$

27.  $14x^3y^2 + x^2 - 6x$

28.  $-2u^3v^4 - 8u^4v^2 + 8u^2v^2 + u$

29.  $-8x^4y^4 - 6x^4y^3 + 7y^4 - 4xy^3$

30.  $-9x^4y^4 - 11x^4y^3 + 7y^3$

## Practice



1. Classify each polynomial by degree and by number of terms.

- a)  $4y + 7$       b)  $2x^2 - 8x$       c)  $3a^3 - 3a - 1$   
 d)  $5w^3 - 3w^2 + w - 6$       e)  $8x$       f)  $78$

2. Evaluate each expression for the given value(s) of the variable(s).

- a)  $x^2 - 7x + 12$  for  $x = 3$       b)  $4a^2 - 5a + 8$  for  $a = 2$   
 c)  $2x^2 - 3xy + 4y^2$  for  $x = 2, y = -1$

3. Write each polynomial in descending order of  $x$ .

- a)  $6x^2 - 5x + 4x^3 - 7$       b)  $1 - 8x^2 - 3x^3$

4. Write each polynomial in ascending order of  $x$ .

- a)  $2x - 5x^3 - 6x^2 + 11$       b)  $-4 + 3x^3 - 2x^2 - 5x^4$

5. Simplify.

- a)  $(3x + 4) + (5x + 2)$       b)  $(7a - 6) + (2a + 9)$       c)  $(2 - 3yz) + (7 + 6yz)$   
 d)  $(m + n) + (5m - 2n)$       e)  $(5x + 7) - (2x + 1)$       f)  $(6a - 2b) - (4a + b)$   
 g)  $(c + d) - (c - d)$       h)  $(2m - n) - (3m + 4n)$

6. Simplify.

- a)  $(3x^2 - 6x + 9) + (4x^2 + 7x + 8)$       b)  $(7x^2 + 3xy - 2y^2) + (8x^2 - xy - y^2)$   
 c)  $(2a^2 - 2a - 7) - (a^2 - 6a - 11)$       d)  $(3t^2 - 12) - (4t^2 + 5t + 7)$   
 e)  $(2x + 4) + (3x - 2) - (5x + 8)$       f)  $(5x^2 - y^2) - (3x^2 + 2y^2) - (x^2 + 3y^2)$

7. Multiply.

- a)  $(4x)(7x^2)$       b)  $(3ab)(-4ab^2)$       c)  $(-6m^2n^3)(-7mn^2)$   
 d)  $(-2xyz^3)(-4x^3y^2)$       e)  $(8r^3s^2t)(4s^3t)$       f)  $(2xy)(-3x^2y^3)(-3x^2)$

8. Simplify. Assume that no denominator equals zero.

- a)  $\frac{2+x^4}{6x}$       b)  $\frac{18a^2b}{9ab}$       c)  $\frac{-36xy^2}{4y^2}$   
 d)  $\frac{-27a^3bc^4}{-3abc^2}$       e)  $\frac{-40x^3y^4z^2}{8x^3y^3}$       f)  $\frac{-75s^2t^5}{-25s^2t^2}$

Section 3.1 pp. 131-133  
 Practice 1. a) degree 1, binomial  
 b) degree 2, binomial c) degree 3, trinomial  
 d) degree 3, polynomial e) degree 1, monomial

- f) degree 0, monomial 2. a) 0 b) 14 c) 18  
 3. a)  $4x^3 + 6x^2 - 5x - 7$  b)  $-3x^3 - 8x^2 + 1$   
 4. a)  $11 + 2x - 6x^2 - 5x^3$  b)  $-4 - 2x^2 + 3x^3 - 5x^4$   
 5. a)  $8x + 6$  b)  $9a + 3$  c)  $9 + 3yz$  d)  $6m - n$  e)  $3x + 6$   
 f)  $2a - 3b$  g)  $2d$  h)  $-m - 5n$  i)  $7x^2 + x + 17$   
 j)  $15x^2 + 2xy - 3y^2$  k)  $a^2 + 4a + 4$  l)  $-t^2 - 5t - 19$  m)  $-6$   
 n)  $x^2 - 6y^2$  o)  $28x^3$  p)  $-12a^2b^3$  q)  $42m^3n^3$  r)  $8x^4y^3z^2$   
 s)  $32x^3y^2z^2$  t)  $18x^5y^4$  u)  $4x^3y^3$  v)  $2a$  w)  $-9x$  x)  $9a^2z^2$   
 y)  $-5yz^2$  z)  $3t^2$  aa)  $6x^2 - 8x$  ab)  $12a^2 - 9ab$   
 ac)  $-20st + 4t^2$  ad)  $-2x^2 + 7x$  ae)  $-3m^2 + 18$  af)  $6x - 2$   
 ag)  $20a^2 + 15a$  ah)  $-3 + 18y$  ai)  $-4x^2 + 12x$  aj)  $7x + 7$   
 ak)  $-3m + 33$  al)  $-12x - 73$  am)  $11t - 36$  an)  $-20x - 9$   
 ao)  $-10x^2 - 15xy + 5y^2$  ap)  $8y^2 + 12y - 4$   
 aq)  $-18x^2 + 36xy + 54x$  ar)  $6a - 8ab + 10a^2$   
 as)  $-3a^2 - 4ab + 2ac$  at)  $-15x$   
 au)  $4m^2 + 16ab - 2b^2 - 6a + 6b$  av)  $-10x^2 - 3x - 23$   
 aw)  $-3y^2 + 9y - 3$  ax)  $6s^2 - st + 5s + 10$

# EXERCISES 1-5

(A)

1. Simplify:

- a)  $\sqrt{20} + \sqrt{5}$  b)  $\sqrt{12} + \sqrt{3}$  c)  $2\sqrt{18} - \sqrt{2}$   
 d)  $3\sqrt{7} + 5\sqrt{28}$  e)  $3\sqrt{40} + 2\sqrt{10}$  f)  $5\sqrt{48} - 11\sqrt{3}$

\* 1-4, 6-8, 10

2. Simplify:

- a)  $\sqrt{50} - \sqrt{18}$  b)  $\sqrt{12} + \sqrt{75}$  c)  $\sqrt{24} + \sqrt{54}$   
 d)  $\sqrt{8} - \sqrt{32}$  e)  $\sqrt{175} + \sqrt{63}$  f)  $\sqrt{80} - \sqrt{45}$

3. Simplify:

- a)  $5\sqrt{12} - 2\sqrt{48}$  b)  $7\sqrt{24} + 3\sqrt{96}$  c)  $8\sqrt{63} - 3\sqrt{175}$   
 d)  $9\sqrt{32} - 12\sqrt{18}$  e)  $11\sqrt{54} + 6\sqrt{150}$  f)  $7\sqrt{20} - 6\sqrt{45}$

4. Simplify:

- a)  $\sqrt{3}(\sqrt{5} + \sqrt{7})$  b)  $4\sqrt{3}(7\sqrt{2} - 3\sqrt{5})$  c)  $5\sqrt{6}(2\sqrt{3} + 4\sqrt{5})$   
 d)  $9\sqrt{5}(2\sqrt{15} - 7\sqrt{3})$  e)  $2\sqrt{6}(4\sqrt{2} - 3\sqrt{6})$  f)  $7\sqrt{2}(3\sqrt{18} + 2\sqrt{2})$

5. Simplify:

- a)  $(\sqrt{3} + \sqrt{5})(2\sqrt{3} - \sqrt{5})$  b)  $(2\sqrt{5} - 3\sqrt{7})(\sqrt{5} + 2\sqrt{7})$   
 c)  $(3\sqrt{2} - 2\sqrt{6})(5\sqrt{2} + 3\sqrt{6})$  d)  $(2\sqrt{3} - 3\sqrt{2})(4\sqrt{3} - \sqrt{2})$   
 e)  $(4\sqrt{6} + 2\sqrt{3})(7\sqrt{6} + 4\sqrt{3})$  f)  $(8\sqrt{5} - 3\sqrt{7})(2\sqrt{5} - 5\sqrt{7})$

6. Simplify:

- a)  $\frac{24\sqrt{14}}{8\sqrt{2}}$  b)  $\frac{-15\sqrt{30}}{45\sqrt{6}}$  c)  $\frac{18\sqrt{39}}{-6\sqrt{3}}$  d)  $\frac{54\sqrt{70}}{9\sqrt{5}}$   
 e)  $\frac{-36\sqrt{22}}{-90\sqrt{2}}$  f)  $\frac{60\sqrt{51}}{-4\sqrt{3}}$  g)  $\frac{32\sqrt{35}}{4\sqrt{7}}$  h)  $\frac{28\sqrt{55}}{42\sqrt{11}}$

(B)

7. Simplify

- a)  $4\sqrt{45} + 3\sqrt{80} - 11\sqrt{20}$  b)  $3\sqrt{50} + 6\sqrt{32} - 4\sqrt{18}$   
 c)  $2\sqrt{150} - 5\sqrt{54} - 3\sqrt{24}$  d)  $5\sqrt{18} + 6\sqrt{8} - 2\sqrt{32}$   
 e)  $3\sqrt{40} - 5\sqrt{90} - 2\sqrt{160}$  f)  $9\sqrt{45} + 5\sqrt{125} - 6\sqrt{245}$

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8. Simplify:

- a)  $3\sqrt{2}(4\sqrt{7} - 5\sqrt{2})$  b)  $6\sqrt{3}(3\sqrt{12} - 2\sqrt{75})$   
 c)  $-5\sqrt{6}(2\sqrt{3} - 3\sqrt{2})$  d)  $4\sqrt{3}(3\sqrt{6} + 2\sqrt{7} - 5\sqrt{3})$   
 e)  $5\sqrt{2}(\sqrt{18} + 7\sqrt{2} - 5\sqrt{8})$  f)  $8\sqrt{6}(4\sqrt{2} - 2\sqrt{3} - 3\sqrt{6})$

9. Simplify:

- a)  $(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})$  b)  $(3\sqrt{5} - 2\sqrt{3})(3\sqrt{5} + 2\sqrt{3})$   
 c)  $(4\sqrt{6} + 8\sqrt{2})(4\sqrt{6} - 8\sqrt{2})$  d)  $(5\sqrt{2} - 3\sqrt{6})^2$   
 e)  $(7\sqrt{3} + 4\sqrt{5})^2$  f)  $2\sqrt{2}(3\sqrt{3} + 5\sqrt{7})^2$

10. Simplify:

- a)  $\frac{12\sqrt{20}}{3\sqrt{5}}$  b)  $\frac{18\sqrt{24}}{-3\sqrt{8}}$  c)  $\frac{-24\sqrt{45}}{72\sqrt{20}}$  d)  $\frac{-30\sqrt{40}}{-5\sqrt{18}}$   
 e)  $\frac{45\sqrt{54}}{18\sqrt{12}}$  f)  $\frac{-60\sqrt{96}}{12\sqrt{27}}$  g)  $\frac{12\sqrt{40}}{8\sqrt{45}}$  h)  $\frac{15\sqrt{84}}{10\sqrt{63}}$

11. From a height of  $h$  m, the distance  $d$  in kilometres to the horizon



2. a) 10 b) 1.6 c) 0.3 d)  $\frac{7}{9}$  e)  $\frac{11}{6}$   
f) 3.9
3. a)  $\sqrt{30}$  b)  $\sqrt{21}$  c)  $56\sqrt{6}$  d)  $15\sqrt{42}$   
e)  $-96\sqrt{77}$  f)  $75\sqrt{70}$
4. a)  $3\sqrt{2}$  b)  $2\sqrt{3}$  c)  $5\sqrt{2}$  d)  $4\sqrt{5}$   
e)  $5\sqrt{3}$  f)  $4\sqrt{3}$  g)  $4\sqrt{7}$  h)  $2\sqrt{33}$
5. a)  $30\sqrt{2}$  b)  $140\sqrt{2}$  c)  $48\sqrt{15}$   
d)  $-108\sqrt{10}$  e)  $-108\sqrt{2}$  f)  $140\sqrt{5}$
6. a) 180 b)  $720\sqrt{3}$  c)  $108\sqrt{5}$   
d)  $-360\sqrt{5}$  e)  $-3780\sqrt{2}$  f)  $-1680\sqrt{6}$
7. a) 5.5 b) 14.1 c) 11.2 d) 0.95  
e) 12.2 f) 1.6
8. a)  $2\sqrt{10}, 4\sqrt{3}, 5\sqrt{2}, 3\sqrt{6}, 2\sqrt{14}$ ,  
b)  $-4\sqrt{6}, -4\sqrt{5}, -5\sqrt{3}, -6\sqrt{2}, -2\sqrt{17}$   
c)  $6\sqrt{3}, 4\sqrt{7}, 5\sqrt{5}, 3\sqrt{14}, 8\sqrt{2}$
10.  $16\text{ cm}^2$
11. a)  $5\sqrt{3}$  b)  $7\sqrt{2}$  c)  $4\sqrt{3}$  d)  $-8\sqrt{3}$   
e)  $2\sqrt[3]{7}$  f)  $\frac{3}{4}\sqrt[3]{12}$

MM

3. Yes.

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1. a)  $3\sqrt{5}$  b)  $3\sqrt{3}$  c)  $5\sqrt{2}$  d)  $13\sqrt{7}$   
e)  $8\sqrt{10}$  f)  $9\sqrt{3}$
2. a)  $2\sqrt{2}$  b)  $7\sqrt{3}$  c)  $5\sqrt{6}$  d)  $-2\sqrt{2}$   
e)  $8\sqrt{7}$  f)  $\sqrt{5}$
3. a)  $2\sqrt{3}$  b)  $26\sqrt{6}$  c)  $9\sqrt{7}$  d) 0  
e)  $63\sqrt{6}$  f)  $-4\sqrt{5}$
4. a)  $\sqrt{15} + \sqrt{21}$  b)  $28\sqrt{6} - 12\sqrt{15}$   
c)  $30\sqrt{2} + 20\sqrt{30}$  d)  $90\sqrt{3} - 63\sqrt{15}$   
e)  $16\sqrt{3} - 36$  f) 154
5. a)  $1 + \sqrt{15}$  b)  $-32 + \sqrt{35}$  c)  $-6 - 2\sqrt{3}$   
d)  $30 - 14\sqrt{6}$  e)  $192 + 90\sqrt{2}$   
f)  $185 - 46\sqrt{35}$
6. a)  $3\sqrt{7}$  b)  $-\frac{1}{3}\sqrt{5}$  c)  $-3\sqrt{13}$  d)  $6\sqrt{14}$   
e)  $\frac{2}{5}\sqrt{11}$  f)  $-15\sqrt{17}$  g)  $8\sqrt{5}$  h)  $\frac{2}{3}\sqrt{5}$
7. a)  $2\sqrt{5}$  b)  $27\sqrt{2}$  c)  $-11\sqrt{6}$  d)  $19\sqrt{2}$   
e)  $-17\sqrt{10}$  f)  $10\sqrt{5}$
8. a)  $12\sqrt{14} - 30$  b)  $-72$  c)  $30(\sqrt{3} - \sqrt{2})$   
d)  $36\sqrt{2} + 8\sqrt{21} - 60$  e) 0  
f)  $64\sqrt{3} - 48\sqrt{2} - 144$
9. a) 3 b) 33 c)  $-32$  d)  $104 - 60\sqrt{3}$   
e)  $227 + 56\sqrt{15}$  f)  $404\sqrt{2} + 60\sqrt{42}$

10. a) 8 b)  $-6\sqrt{3}$  c)  $-\frac{1}{2}$  d)  $4\sqrt{5}$   
e)  $\frac{15}{4}\sqrt{2}$  f)  $-\frac{20}{3}\sqrt{2}$  g)  $\sqrt{2}$  h)  $\sqrt{3}$
11. a) i)  $\sqrt{2}$  ii)  $\sqrt{3}$  b) 4
12. a) i) 2 ii)  $\sqrt{5}$  b) i) 9 ii) 8
13.  $\frac{2\sqrt{3}}{3}$

## Exercises 1-6, page 27

1. a)  $\frac{2\sqrt{5}}{5}$  b)  $\frac{7\sqrt{11}}{11}$  c)  $-\frac{4\sqrt{3}}{3}$  d)  $\frac{5\sqrt{14}}{7}$   
e)  $-2\sqrt{30}$  f)  $\frac{12\sqrt{35}}{35}$  g)  $3\sqrt{10}$  h)  $-\frac{5\sqrt{21}}{3}$
2. a)  $\frac{3\sqrt{30}}{10}$  b)  $\sqrt{10}$  c)  $-3\sqrt{6}$  d)  $\frac{5\sqrt{6}}{4}$   
e)  $\frac{4\sqrt{21}}{3}$  f)  $\frac{\sqrt{21}}{2}$  g)  $\frac{4\sqrt{30}}{3}$  h)  $\frac{27}{4}$
3. a)  $\frac{6+4\sqrt{3}}{3}$  b)  $\frac{35-3\sqrt{7}}{7}$  c)  $\frac{20-2\sqrt{5}}{5}$   
d)  $2\sqrt{6} - 1$  e)  $\frac{8\sqrt{30}+5}{5}$  f)  $3\sqrt{5} - 1$   
g)  $\frac{10\sqrt{3}+3\sqrt{2}}{3}$  h)  $\frac{\sqrt{6}}{2}$
- a, b, c, f 6
- a)  $\frac{\sqrt{15}+\sqrt{6}}{3}$  b)  $\frac{\sqrt{35}-\sqrt{15}}{4}$  c)  $\frac{8\sqrt{11}+\sqrt{55}}{59}$  4  
d)  $\frac{2\sqrt{30}-2\sqrt{15}}{3}$  e)  $\frac{-30\sqrt{2}-25\sqrt{6}}{13}$   
f)  $\frac{4\sqrt{105}+4\sqrt{70}}{5}$  g)  $\frac{30\sqrt{3}-6\sqrt{6}}{23}$  h)  $\frac{3\sqrt{55}+15}{2}$
4. a)  $\frac{\sqrt{6}}{2}$  b)  $\frac{32+7\sqrt{6}}{10}$  c)  $\sqrt{15}$  d)  $\frac{42+}{2}$   
e)  $\frac{27-7\sqrt{21}}{30}$  f)  $\frac{13\sqrt{2}-3\sqrt{7}}{25}$
7. a)  $\frac{\sqrt{2}}{2}$  b)  $\frac{\sqrt{3}}{6}$  c)  $\frac{\sqrt{2}}{10}$  d)  $\sqrt{2} + 1$   
e)  $\sqrt{3} - \sqrt{2}$  f)  $\frac{2\sqrt{5}+3\sqrt{2}}{2}$
8. a) 4 b)  $\frac{2\sqrt{5}+4\sqrt{2}}{3}$  c)  $5\sqrt{2} - 2$   
d)  $\frac{7\sqrt{5}}{5} - 6$  e)  $-2 - \frac{7\sqrt{3}}{3}$  f)  $\sqrt{2} + \frac{\sqrt{3}-3}{2}$

## Exercises 1-7, page 30

1. a, b, d, h 2. a, c, d, g, h
3. b, c—rational; a, d, e, f—irrational
4. a)  $Q', R$  b)  $Q', R$  c)  $N, I, Q, R$   
d)  $Q', R$  e)  $Q, R$  f)  $Q', R$  g)  $Q', R$   
h)  $Q', R$  i)  $I, Q, R$
6. Answers will vary. Examples are:  
a) 2.579 18 and 2.579 181 181 118...  
b)  $-6.327\ 329$  and  $-6.327\ 329\ 010\ 010\ 001...$   
c) 4.190 15 and 4.190 151 151 115...



4. Solve by the addition method.

- |   |  |  |
|---|--|--|
| a. $4a - 3b = 13$<br>$2a + 4b = 12$                   | b. $5x + 2y = 9$<br>$10x - 3y = 4$           | c. $6s + 2t = 16$<br>$3s + 5t = 4$   |
| d. $3x + 6y = -12$<br>$2x - 3y = 34$                  | e. $4c + 5d = 1$<br>$3c - 10d = 97$          | f. $2m - 7n = 22$<br>$6m + 3n = 18$  |
| g. $2s + 5t = 0$<br>$3s - t = 17$                     | h. $3x - 4y = 1$<br>$4x + 2y = 16$           | i. $5x + 6y = 8$<br>$2x - 3y = 14$   |
| j. $6s - 5t = 4$<br>$2s + 4t = -10$                   | k. $3m + 5n = -2$<br>$4m - 2n = 32$          | l. $3x + 8y = -5$<br>$-2x + 4y = -34$  |
| m. $3a + 2b = 4$<br>$\frac{2}{3}a + \frac{1}{3}b = 1$ | n. $x - \frac{2}{3}y = -3$<br>$3x - 3y = -9$ | o. $\frac{3}{8}p + \frac{1}{2}q = -\frac{1}{4}$<br>$\frac{1}{2}p - \frac{3}{4}q = \frac{5}{2}$ |

- The sum of two numbers is 120. Their difference is 14. What are the numbers?
- Two mangoes and 3 kiwi fruit cost \$4.35. Five mangoes and 3 kiwi fruit cost \$7.32. Find the price of each fruit.
- Marie paid for her \$2.50 admission ticket with 13 dimes and quarters. How many of each coin did she use?
- The length of a rectangle is 2 m more than its width. The perimeter is 52 m. Find the dimensions of the rectangle.
- Jeff earned \$74 over twenty hours, working part of the time at \$3/h and part of the time at \$4/h. How many hours did he work at each rate?
- One week, a shop sold 42 boxes of stationery, some at \$5 a box and some at \$7 a box. The total value of the stationery sold was \$246. How many boxes were sold at each price?
- One day, an office mailed out 80 letters, some with 40¢ postage, some with 50¢ postage. The total postage was \$35.20. How many letters were posted at each rate?
- A construction company has 46 trucks, some of them dump trucks and some flatbed trucks. There are 8 more dump trucks than flatbed trucks. How many of each type of truck does the company have?
- Find two numbers with a sum of -6 and a difference of 34.
- On a test, some problems were worth 5 points and the others were worth 4 points. Myra solved 18 problems and got a mark of 83. How many 5-point problems did she solve?
- The average of 2 numbers is 34. The difference of the numbers is 16. What are the numbers?
- Four tapes and 3 records were sold for \$67, and 2 tapes and 5 records were sold for \$65. How much would it cost to buy 3 tapes and 4 records?
- A man is three times as old as his son. In twelve years, he will be twice as old as his son. How old is each?



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Solving Equations Worksheet

► Show all work on a separate sheet of paper.

► Check your work using the answers below.

A. Solve each equation.

1.  $3x + 4 = 25$

2.  $4y - 3 = 21$

3.  $5 - x = 11$

4.  $4t - 6 = -10$

5.  $5r = 9 + 6$

6.  $8m + 2m = 30$

7.  $4w + 3w = -28$

8.  $-3 = -2 - x$

9.  $-5 - y = 6$

10.  $4b - 6b = 12$

11.  $5 + 2n = -15$

12.  $4 + 8 = 3m$

13.  $3p - 7 = 14$

14.  $-14 = 4y + 3y$

15.  $8a - 3a = 15$

B. Solve each equation.

1.  $3x = x + 4$

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

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

4.  $5x = 4x - 4$

5.  $2y = 2 + 4y$

6.  $8r = -4r - 12$

7.  $5m = 10 - 5m$

8.  $3b = 0.64 - 2b$

9.  $4k = 2k + 1.38$

10.  $3x + x = 5x - 6$

11.  $2t - 5t = t + 8$

12.  $3y + 2y = 3y + 6$

13.  $4k - 6k = 6 - k$

14.  $7m + 8m = -10 + 5m$

15.  $12 = 6b + 2b - 4$

C. Solve each of the following.

1.  $3(x + 1) = 24$

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

3.  $-4(y + 3) = -16$

4.  $10 = 5(t + 2)$

5.  $2(z - 3) = -12$

6.  $-15 = 3(k + 3)$

7.  $4(2x - 2) = -16$

8.  $15 = 3(2y - 3)$

9.  $2(2k + 4) = 14$

10.  $-12 = 3(2k + 2)$

11.  $3(x + 2) = -9 - 2x$

12.  $12 + 2(k + 3) = 3k - 6$

13.  $8 - 3y = 2(2y - 3)$

14.  $3(n - 2) - 19 = 5 + 2(n + 5)$

15.  $3(x + 2) = 9 + 2(x + 4)$

### Solutions

#### Part A

1. 7   2. 6   3. -6   4. -1   5. 3   6. 3   7. -4   8. 1   9. -11   10. -6   11. -10   12. 4   13. 7   14. -2   15. 3

#### Part B

1. 2   2. -4   3. 1   4. -4   5. -1   6. -1   7. 1   8. 0.128   9. 0.69   10. 6   11. -2   12. 3   13. -6   14. -1   15. 2

#### Part C

1. 7   2. 6   3. 1   4. 0   5. -3   6. -8   7. -1   8. 4   9. 1.5   10. -3   11. -3   12. 24   13. 2   14. 40   15. 11

Name: \_\_\_\_\_

Date: Sept. 8<sup>th</sup>

## Algebra Review Worksheet

- Show all work on a separate sheet of paper for Parts B and C.  
 ► Ask for assistance if needed.

A. Simplify each of the following.

$$1. 11t - t$$

$$= 10t$$

$$2. -10b^2 + 3b^2$$

$$= -7b^2$$

$$3. -12y - y$$

$$= -13y$$

$$4. 11m^3 + 10m^3$$

$$= 21m^3$$

$$5. 5p + (-2p)$$

$$= 3p$$

$$6. c^2 + c^2$$

$$= 2c^2$$

$$7. 2x + 3x - x$$

$$= 4x$$

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

$$= -12y$$

$$9. 0.4d + 0.5d + 0.1d$$

$$= d$$

$$10. -t^2 - 2t^2 - 3t^2 + t^2 + 6t^2$$

$$= t^2$$

$$11. 8y - 2z + 7y$$

$$= 8y + 7y - 2z$$

$$= 15y - 2z$$

$$12. -2r + 3s - 6r$$

$$= -2r - 6r + 3s$$

$$= -8r + 3s$$

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

$$= -3a^2 + 3a^2 + 2b^2$$

$$= 2b^2$$

$$14. 5e^3 + 2e^3 - e^2$$

$$= 7e^3 - e^2$$

B. Expand.

$$1. 2(x + 3)$$

$$2. 2(x + 2)$$

$$3. 3(x + 3)$$

$$4. 2(2x + 1)$$

$$5. 3(2x + 2)$$

$$6. 4(x + 2)$$

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

$$8. 0.3(x + 5)$$

$$9. 4(2x + 1)$$

$$10. -2(3x - 2)$$

C. Expand and simplify.

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

$$2. 14 - 3(4n - 1 - 3)$$

$$3. 3(2h - 3) + 2(h + 3)$$

$$4. -2(3y - 3) + 3(2y + 2)$$

$$5. -6 + 5(2 - k) - 4k$$

$$6. 4(3u - 1) + 2(3 - 2u)$$

$$7. 2(x^2 + 2x + 1) + 3(x^2 + 3)$$

$$8. 5(y - 2) - 4(2y - 1 - 2)$$

$$9. 3(t^2 - 2t + 1) - 4(t + 2)$$

$$10. 2(e - 4) + 4(3e + 2) - 5(2e - 4)$$

## Solutions

### Part A

$$1. 10t \quad 2. -7b^2 \quad 3. -13y \quad 4. 21m^3 \quad 5. 3p \quad 6. 2c^2 \quad 7. 4x \quad 8. -12y \quad 9. d \quad 10. t^2 \quad 11. 15y - 2z \quad 12. -8r + 3s$$

$$13. 2b^2 \quad 14. 7e^3 - e^2$$

### Part B

$$1. 2x + 6 \quad 2. 2x + 4 \quad 3. 3x + 9 \quad 4. 4x + 2 \quad 5. 6x + 6 \quad 6. 4x + 8 \quad 7. 5x - 15 \quad 8. 0.3x + 1.5 \quad 9. 8x + 4 \quad 10. -6x + 4$$

### Part C

$$1. 13x - 6 \quad 2. 15 - 12n \quad 3. 8h - 3 \quad 4. 12 \quad 5. 4 - 9k \quad 6. 8u + 2 \quad 7. 5x^2 + 4x + 11 \quad 8. -3y + 2 \quad 9. 3t^2 - 10t - 5$$

$$10. 4e + 20$$