# Answer Key for Algebra Test

(Elementary)

## I) Linear equations in one variable.

1) $x = 9$

2) $x = -6$

3) $x = -3$

4) $x = 12$

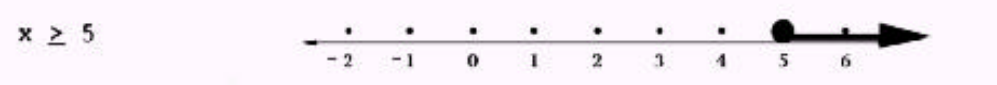
5) $8 - 4(x - 1) = 2 + 3(4 - x)$
$8 - 4x + 4 = 2 + 12 - 3x$
$-4x + 12 = 14 - 3x$
$-x + 12 = 14$
$-x = 2$
$x = -2$

6) one number = $x + 8$
second number = $x$
$3x + 2(x + 8) = 26$
$3x + 2x + 16 = 26$
$5x + 16 = 26$
$5x = 10$
$x = 2$
The numbers are 2 and 10

7) length = $w + 14$
width = $w$
$2w + 2(w + 14) = 264$
$2w + 2w + 28 = 264$
$4w + 28 = 264$
$4w = 236$
$w = 59$
width = 59 m  length = 73 m

## II) Linear inequalities in one variable.

1)



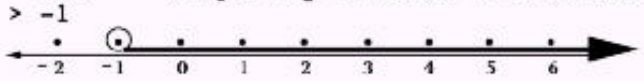
2)

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

$$-10x - 15 < 2x - 3$$
$$-2x \qquad -2x$$
$$-12x - 15 < -3$$
$$+15 \qquad +15$$
$$\frac{-12x}{-12} < \frac{12}{-12}$$

inequality reversed with division by a negative

$$x > -1$$




**III) Exponents and polynomials.**

1) $8x^2 - x - 2$ (combine like terms)

2) $-6xy^8z^{12}$

3)

$$x - 1 \;\overline{)\; 3x^3 + 0x^2 - 7x + 0}$$

$$\frac{4}{x - 1}$$

long divide, use placeholders

$$3x^2 + 3x - 4$$
$$-(3x^3 - 3x^2)$$
$$3x^2 - 7x$$
$$-(3x^2 - 3x)$$
$$-4x + 0$$
$$-(-4x + 4)$$
$$-4$$

4) $3x^2 - \frac{9x}{2} + \frac{3}{2x}$ divide each term of numerator by denominator

5) $6a^2 + a - 40$

6) $9a^2 - 49$

7) $25a^2 + 60a + 36$

8) $12x^2 - 43xy + 35y^2$

**IV) Factoring.**

1) $2x^3y(13xy^6 - 17y^3 + 6x^5)$

2) $4(16x^4 - y^4)$

$= 4(4x^2 + y^2)(4x^2 - y^2)$ (difference of two squares)
$= 4(4x^2 + y^2)(2x - y)(2x + y)$ (difference of two squares again)

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

4) $5a(a - 8)(a + 2)$

5) $a(a - c) + b(a - c) = (a - c)(a + b)$ (grouping)

6) $(a + 8)(a + 4)$

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

**V) Radicals.**

1)

$$\left(30\sqrt{2}\right)\left(16\sqrt{2}\right) = 480\sqrt{4} = 960$$

2)

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

3)

$$2pq^3\sqrt{6p}$$

4)

$$6\sqrt{2} - 20\sqrt{2} + 63\sqrt{2} = 49\sqrt{2}$$

5)

$$9 - \sqrt{64} = 9 - 8 = 1$$

**VI) Quadratic equations.**

1) $(4a + 1)(a + 2) = 0$ (set each factor equal to zero and solve)
$a = -1/4$ or $a = -2$

2) $x = -4$ or $x = 1$

3) $x = 3$ or $x = -3$ (isolate square and take square root of each side since there is no linear term)

4) $3x + 2 = 4$ or $3x + 2 = -4$
$x = 2/3$ or $x = -2$

## VII) Rational expressions.

1)

a) undefined at m = -1

b) undefined at x = 5

2)

a) $24a^3b^2$

b) $(a + 3)(a - 3)^2 (a - 5)$

3)

a)

$$-\frac{1}{a-1}$$

b) $8x^5y^7$ (invert and multiply)

c)

$$\frac{a-3}{2a-3}$$

4)

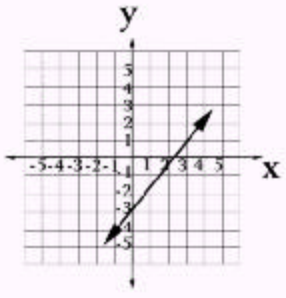
a) a = -8

b) empty set as k = 3 makes the problem undefined

## VIII) Graphing linear equations.

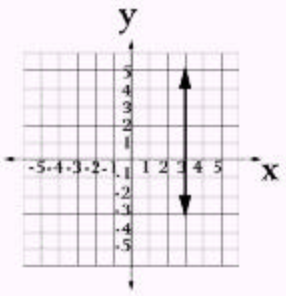
1)

find intercepts
(0,-3) and (2,0)
plot and connect



2)

vertical line at x = 3




3)

horizontal line at y = -2