

Answers Key for Algebra Test (Intermediate)

I) Linear equations and inequalities in one variable.

1. $x = 0$

2. let $x =$ smaller integer, $x + 1 =$ next consecutive integer

$$5x + 3(x + 1) = 59$$

$$\Rightarrow 5x + 3x + 3 = 59$$

$$\Rightarrow 8x = 56$$

$$\Rightarrow x = 7$$

\Rightarrow The integers are 7 and 8.

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

$$\Rightarrow -10x - 15 < 2x - 3$$

$$\Rightarrow -12x < 12$$

$$\Rightarrow x > -1$$

4. $-3 < 2x - 5 < 5$

$$\Rightarrow 2 < 2x < 10$$

$$\Rightarrow 1 < x < 5$$

II) Exponents and polynomials.

1) $\frac{a^4 b^6}{36c^{12}}$

2) $(4x^2 y^6 z)^2 (-x^5 y^7 z^8)^6$
 $\Rightarrow (16x^4 y^{12} z^2)(x^{30} y^{42} z^{48})$
 $\Rightarrow 16x^{34} y^{54} z^{50}$

3) $3x^2(x(2x - 5(3x + 2)) - 5)$
 $\Rightarrow 3x^2(x(2x - 15x - 10) - 5)$
 $\Rightarrow 3x^2(x(-13x - 10) - 5)$
 $\Rightarrow 3x^2(-13x^2 - 10x - 5)$
 $\Rightarrow -39x^4 - 30x^3 - 15x^2$

III) Factoring

1) $49x^2 - 25y^2$
 $\Rightarrow (7x + 5y)(7x - 5y)$

$$2) \quad a^2 - ac + ab - bc$$

$$\Rightarrow a(a - c) + b(a - c)$$

$$\Rightarrow (a + b)(a - c)$$

3) prime

IV) Radicals.

$$1) \quad \frac{5\sqrt{3} + 3}{22}$$

$$2) \quad 14xy^3z^2\sqrt{2xy}$$

$$3) \quad \sqrt[4]{32a^5b^4} \Rightarrow 2ab^4\sqrt{2a}$$

$$4) \quad x + 1 = 9 \Rightarrow x = 8$$

V) Complex Numbers.

$$1) \quad i$$

$$2) \quad -2\sqrt{5}i$$

$$3) \quad -5 + 12i$$

$$4) \quad (5i)(9i) = -45$$

VI) Quadratic Equations.

$$1) \quad x = \frac{3 \pm \sqrt{329}}{4}$$

$$2) \quad x = \frac{-2 \pm 4i}{3}$$

VII) Rational Expressions.

$$1) \quad a = -3 \text{ or } a = -2/3$$

$$2) \quad 2y(y + 2)$$

$$3) \quad \frac{-x + 10}{(x + 1)(x - 1)(x + 2)}$$

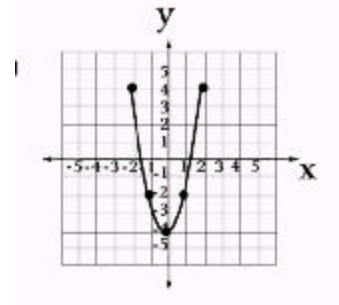
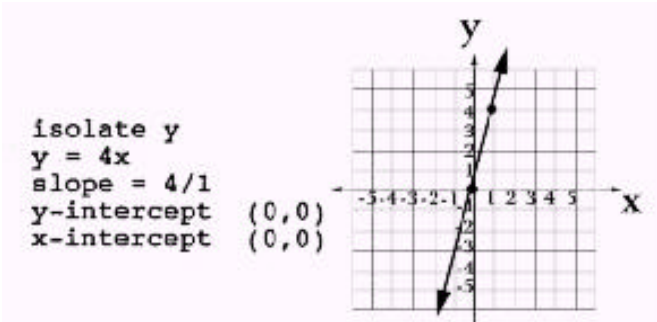
$$4) \quad \frac{6}{a + 2}$$

$$5) \quad p = 1/2 \text{ or } p = -6$$

VIII) Equations and inequalities in two variables.

- 1) graph is a line, with slope 4;
x-intercept and y-intercept at (0,0)

- 2) graph is a parabola, opening up,
vertex is (0,-4), x-intercepts at $\pm\sqrt{2}$



3) distance = $\sqrt{(-3-2)^2 + (7-5)^2} = \sqrt{29}$

$$\text{slope} = \frac{7-5}{-3-2} = \frac{-2}{5}$$

- 4) Since perpendicular lines have slopes which are negative reciprocals, the slope of the desired line is $\frac{1}{2}$; then $y - 1 = (1/2)(x+2)$ or, $y = (1/2)x + 2$

5) (1,1/2)

6) $-5 \leq 4x - 3 \leq 5 \Rightarrow \frac{-1}{2} \leq x \leq 2$

7) $x < -6$ or $x > 3$

- 8) Draw the line given by $2x = 3y + 6$; it is solid and passes through (0,-2) and (3,0). Then shade the region of solution as shown.

