9th-grade — ALGEBRA BASICS TEST — Answer Key

1	10
2	-12
3	-5
4	10
5	-5
6	$x = 10$
7	$x = -2$
8	$x = -1$
9	$x = \dfrac{y-5}{2}$ …or… $x = \dfrac{1}{2}y - \dfrac{5}{2}$
10	$x = \dfrac{5y+12}{3}$ …or… $x = \dfrac{5}{3}y + 4$

11	$-20\dfrac{1}{4}$ …or… $-\dfrac{81}{4}$
12	$11\,x^5$
13	$10\,y^3 + 5\,y^2$ …or… cannot be further simplified
14	x^8
15	x^8
16	$x = -\dfrac{1}{3}$
17	$\mathbb{R}$ …or… all real values are solutions
18	$x = \dfrac{27}{2}$ …or… $x = 13\dfrac{1}{2}$
19	$x = \dfrac{20}{21}$

9th-grade — EXPONENTS & POLYNOMIALS TEST — Answer Key

1	x^{10}
2	$2x^5$
3	$12x^2y^3$
4	$35x^6y^2$
5	$5x^2 + 2y^3$ …or… cannot be further simplified
6	$8x^6y^9$
7	$x^2 + 6x - 40$
8	$x^2 + 10x + 25$
9	$21x^5 - 35x^4 + 28x^3$
10	$x^2 - 49$
11	$28x^4 - 21x^3$
12	$15x^5y^7$
13	$7x^3 + 4x^2$
14	$6x^4 - 30x^3 - 36x^2$
15	$3x^3$

16	$13x^4 - 4x^2$ …or… cannot be further simplified
17	$x^2 - 18x + 81$
18	$\dfrac{3}{2}$
19	1
20	$x^6 - 25$
21	$4y^2$
22	$x^3 + 10x^2 + 19x + 6$
23	$75x^7y^5$
24	$12x^{72}$
25	$\dfrac{49x^{14}}{16}$ …or… $\frac{49}{16}x^{14}$
26	$3x^3y^4 + 18x^2y^4 - 81xy^4$
27	7.3×10^{-4}
28	$\dfrac{4}{9x^4y^7z^6}$

9th-grade — FACTORING TEST — Answer Key

1	$x^6 - 9$
2	$x^8 + 10x^4 y + 25 y^2$
3	$(x - 8)(x - 2)$
4	$(x^4 + 5)(x^4 - 5)$
5	$5x^3(x + 2)(x - 2)$
6	$x^2 + 9x - 20$ …or… not factorable
7	$(x + 6)(x - 5)$
8	$2x^2 y^3(3x^5 y^2 - 2)$
9	$(x^2 + 4)(x + 2)(x - 2)$
10	$2x(4y^6 + 7x^4 z^3)$
11	$(x + 28)(x - 3)$
12	$(x - 21)(x - 4)$

13	$10x^3(x + 5)(x - 4)$
14	$(x^2 - 8)(x^2 - 2)$
15	$4(x^2 + 2x + 35)$
16	$(x^3 + 5y^2)(x^3 - 5y^2)$
17	$x = -1 , \ x = 6$
18	$x = -9 , \ x = 2$
19	$x = 1$
20	$x = \frac{29}{3}$ …or… $x = 9\frac{2}{3}$
21	$x = 0 , \ x = -3 , \ x = 8$
22	$x = \pm 10$ …or… $x = -10 , \ x = 10$

9th-grade — WORD PROBLEM TEST — Answer Key

1	$(1,\ 3)$
	…or…
	$(11,\ 13)$
2	$(-6,\ -15)$ and $(5,\ 18)$

3	Kate is 10, and Jeff is 17.
4	24 miles
5	9 quarters, and 23 dimes

Jamie York Math Academy

9th-grade — QUADRATIC FORMULA TEST — Answer Key

1	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2	$ax^2 + bx + c = 0$ $ax^2 + bx = -c$ $x^2 + \dfrac{b}{a}x = -\dfrac{c}{a}$ $x^2 + \dfrac{b}{a}x + \dfrac{b^2}{4a^2} = \dfrac{b^2}{4a^2} - \dfrac{c}{a}$ $\left(x + \dfrac{b}{2a}\right)^2 = \dfrac{b^2}{4a^2} - \dfrac{4ac}{4a^2}$ $\left(x + \dfrac{b}{2a}\right)^2 = \dfrac{b^2 - 4ac}{4a^2}$ $x + \dfrac{b}{2a} = \pm\sqrt{\dfrac{b^2 - 4ac}{4a^2}}$ $x + \dfrac{b}{2a} = \pm\dfrac{\sqrt{b^2 - 4ac}}{2a}$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

3	Rather than a single generic formula encompassing all possibilities, al-Khwarizmi created algorithms for solving specific types of quadratic equations. (The word algorithm is derived from his name.) These were not given as symbolic formulae, but instead as narrative procedures written in words. In keeping with geometric interpretation, these algorithms did not produce negative results.
4	$x \approx 1.447 \;,\;\; x \approx 0.553$
5	$x = -9 \;,\;\; x = -3$

Jamie York Math Academy

9ᵗʰ-grade — ALGEBRA YEAR-END TEST — Answer Key

1	$11\,x^5$
2	$28\,x^{10}$
3	$x^2 + 10\,x + 25$
4	$16\,x^6$
5	$7\,x^4 + 49\,x^3 - 35\,x^2$
6	$4\,x^3 - 7\,x^3\,y^2$
7	$10\,x^2 - 11\,x - 6$
8	$x^3 - 12\,x^2 + 17\,x + 30$
9	$\dfrac{y^5\,z^2}{2\,x^8}$
10	$\dfrac{39}{2}$ …or… $19\frac{1}{2}$
11	$(x + 3)(x + 10)$
12	$(x + 2)(x - 15)$
13	$(x + 15)(x - 2)$
14	$(x - 10)(x - 3)$
15	$(x^2 + 5)(x^2 - 5)$

16	$x^2 + 9$ …or… not factorable
17	$x(x^4 + 2)(x^4 - 2)$
18	$10\,x(x + 4)(x - 1)$
19	$4\,x^2\,y^3(3\,x\,y^2 - 1)$
20	$x = 2 ,\ \ y = -5$ …or… $(2, -5)$
21	$x = -1$
22	$x = 10 ,\ \ x = -2$
23	$x = \frac{41}{4}$ …or… $x = 10\frac{1}{4}$
24	$x = \dfrac{-3 \pm \sqrt{37}}{2}$
25	$x = 3 ,\ \ x = 4$
26	$x = -10 ,\ \ x = 5$